

Lawrence Technological University

Assessment Report

2016-2017 Academic Year

University Assessment Committee



Table of Contents

TABLE OF CONTENTS.....	II
EXECUTIVE SUMMARY OF 2016-2017 ASSESSMENT REPORT	IV
ASSESSMENT COMMITTEE MISSION STATEMENT	V
ASSESSMENT COMMITTEE MEMBERSHIP RULES.....	VI
UAC MEMBERSHIP 2016-2017 ACADEMIC YEAR.....	VII
UAC MEMBERSHIP 2016-2017 SERVICE AND ROTATION	VIII
UNIVERSITY EDUCATIONAL GOAL.....	IX
2016-2017 UNDERGRADUATE LEARNING OUTCOMES	X
2016-2017 GRADUATE LEARNING OUTCOMES.....	XI
2016-2017 UNDERGRADUATE ASSESSMENT PLAN	XII
2016-2017 GRADUATE ASSESSMENT PLAN	XIV
NEW UNDERGRADUATE LEARNING OUTCOMES FOR 2017-2018	XV
ASSESSMENT DAY 2016	1
ANNUAL ASSESSMENT REPORTS 2016-2017	8
College of Architecture and Design.....	8
BS in Architectural Studies/Master of Architecture	8
BFA in Game Art	20
BFA in Graphic Design.....	25
BS in Industrial Design	31
BS in Interior Architecture	36
BS in Transportation Design	39
Master of Urban Design	45
College of Arts and Sciences	48
BS in Chemistry	48
BS in Computer Science	56
BA in English and Communication Arts.....	62
BS in Environmental Chemistry	65
BS in Humanities	73
BS in Mathematics	77
BS in Mathematics and Computer Science	83
BS in Media Communication.....	89
BS in Molecular and Cell Biology	93
BS in Physics.....	101
BS in Physics & Computer Science	107
BS in Psychology	113
MS in Computer Science.....	117
MS in Technical and Professional Communication	119
College of Engineering	121
BS/MS in Architectural Engineering	121
BS in Biomedical Engineering.....	154
BS in Civil Engineering	161
BS in Computer Engineering	173
BS in Electrical Engineering	182

BS in Industrial Engineering	190
BS in Mechanical Engineering.....	201
BS in Robotics Engineering	215
MS in Automotive Engineering	220
Master of Civil Engineering/MS in Civil Engineering	224
Master of Construction Engineering Management	232
MS in Electrical and Computer Engineering	236
Master of Engineering Management	238
Master of Engineering in Manufacturing Systems.....	240
MS in Industrial Engineering	242
MS in Mechanical Engineering.....	244
MS in Mechatronic Systems Engineering	246
PhD in Civil Engineering	249
Doctorate in Mechanical Engineering.....	253
Doctorate in Manufacturing Systems	256
College of Management	259
BS in Business Administration	259
BS in Information Technology.....	269
Master of Business Administration	278
Master of Science in Information Technology.....	285

Executive Summary of 2016-2017 Assessment Report

Assessment of student educational outcomes at Lawrence Technological University is the responsibility of the University Assessment Committee (UAC). The function of the UAC is to advise the Director of Assessment, to plan and carry out assessment of student learning in the academic programs of the University, and to disseminate results of assessment activities to the University and the general public. Committee membership typically accounts for the equivalent of three academic hours of service to the University.

The UAC is chaired by the Director of Assessment (who is a faculty member appointed by the Provost), one member from each academic department, and the Provost (*ex officio*), the Associate Provost and the Director of eLearning Services (as non-voting members).

The UAC meets regularly during the academic year (usually 90-minute bi-weekly meetings) to discuss assessment methodology best practices in each program. These meeting help to ensure the vitality of assessment within individual programs. The UAC meets for annual semester planning retreats. The UAC meets with all the University full time faculty, department chairs, program directors and College Deans during the annual University Assessment Day.

All UAC meeting minutes and associated assessment materials are stored on the university learning management system.

The 2016-2017 UAC continued to concentrate on improving the culture of Assessment throughout the university programs. The UAC continued to invest time in the enhancement of alignment between policies and procedures to support the University Educational Learning Outcomes for Undergraduate and Graduate Programs. To this end, a subcommittee was formed to investigate best practices in peer institutions' undergraduate learning outcomes. Results of the subcommittee investigation led to a proposal to change the undergraduate learning outcomes in terms of (1) University Level Learning Outcomes encompassing the Lawrence Tech "Core Curriculum", and (2) Program Level Learning Outcomes encompassing each of the university undergraduate programs. The proposal was adopted by the UAC with plans to implement beginning in the 2017-2018 academic year. Some programs began transitioning to the new undergraduate learning outcomes in Spring 2017.

This report contains the 2016 Assessment Day presentations (which close-the-loop on the previous year assessment activities), and annual reports from programs for the 2016-2017 academic year. Each program report describes assessment and loop closing activities for the academic year, and assessment plans for the next academic year.

Assessment Committee Mission Statement

The University Faculty Handbook describes the role of the University Assessment Committee in section 6.2.8.

6.2.8. *Assessment Committee*

The Assessment Committee coordinates policy and procedures related to both college and University assessment programs. The committee's principal responsibility is to promote improvements in learning through implementation of the University's plan for academic assessment.

The committee is advisory to the Deans' Council, and its members and chairperson are appointed by the Provost.

In order to clarify and to codify this institutional role, the University Assessment Committee adopts the following mission functions:

- i. Advise the Director of Assessment and the Office of the Provost on matters related to the assessment of student learning.
- ii. Design, coordinate and execute the University's assessment plan.
- iii. Supervise and coordinate assessment activities within departments in order to ensure that all academic programs are comparably assessed and continuously improved as a result of assessment.
- iv. Plan and execute University Assessment Day activities.
- v. Revise the University Educational Learning Outcomes periodically.
- vi. Facilitate communication about assessment initiatives and issues among departments, and between departments and the Office of the Provost.
- vii. The University Assessment Committee's mission can be modified by the committee to ensure continuous improvement and ownership of assessment processes by faculty and administrators.

Assessment Committee Membership Rules

Membership Composition

The Assessment Committee is made up of the following individuals:

- The Director of Assessment (Chair, faculty representative)
- One faculty representative from each academic department.
- The Provost, *ex officio* and non-voting
- The Associate Provost, *ex officio* and non-voting
- The Director of eLearning Services, *ex officio* and non-voting
- One representative from any other academic program as the Dean of the appropriate College and/or Provost direct.

Chairperson

The Chairperson of the Assessment Committee is the University's Director of Assessment. He/she is a faculty member appointed by the Provost for a three-year term. The term can be extended if mutually agreed upon by the Chair and the Provost.

Committee Members

- (1) Each department, and each other program designated by the Provost, names its own representative.
- (2) Each department or unit representative serves for a term of three years. In the event of a vacancy during a term, the department or unit will name a representative to serve the unexpired part of the regular term.
- (3) Continuous membership as a department or unit representative is limited to two regular terms plus up to two semesters' service in an unexpired term before the first regular term. A member who becomes ineligible because of this limit remains ineligible for three years unless the Provost decides that the department or unit lacks sufficient faculty for a normal rotation.
- (4) Renewed terms start in August of each year.
- (5) Members will serve 3 years in staggered terms.

The Chairperson will publish a schedule of expirations of terms in force at the time of adoption of these by-laws.

Rules of Order

- (1) A two-thirds majority vote of the voting members of the Assessment Committee is required to change any of the membership rules once this proposal is approved.
- (2) Robert's Rules of Order will be followed in other details that may not have been mentioned in the membership rules.

UAC Membership 2016-2017 Academic Year

Chair and Director of Assessment	Sabah Abro
College of Architecture and Design	
<i>Architecture</i>	Dan Faoro
<i>Art and Design</i>	Andy Hanzel
College of Arts and Sciences	
<i>Humanities, Social Sciences, and Communication</i>	Sarah Lamers
<i>Mathematics and Computer Science</i>	Chris Cartwright
<i>Natural Sciences</i>	Changgong Zhou
College of Engineering	
<i>Biomedical Engineering</i>	Yawen Li
<i>Civil Engineering</i>	John Tocco
<i>Electrical and Computer Engineering</i>	Kun Hua
<i>Engineering Technology</i>	Jerry Cuper
<i>Mechanical Engineering</i>	Andrew Gerhart
College of Management	
<i>BSBA, BSIT, MBA, MSIT</i>	Matthew Cole
Ex-Officio Members	
<i>Associate Provost</i>	James Jolly
<i>eLearning Services</i>	

UAC Membership 2016-2017 Service and Rotation

<u>Member</u>		<u>Years Served</u>	<u>Year Started</u>	<u>Year Ends</u>
Chair and Director of Assessment	Sabah Abro	4	2013-2014	2016-2017
College of Architecture and Design				
<i>Architecture</i>	Dan Faoro	1	2016-2017	2018-2019
<i>Art and Design</i>	Andy Hanzel	4	2013-2014	2016-2017
College of Arts and Sciences				
<i>HSSC</i>	Sarah Lamers	5	2012-2013	2016-2017
<i>Mathematics and Computer Science</i>	Chris Cartwright	7	2010-2011	2016-2017
<i>Natural Sciences</i>	Changgong Zhou	4	2013-2014	2016-2017
College of Engineering				
<i>Biomedical Engineering</i>	Yawen Li	7	2010-2011	2016-2017
<i>Civil Engineering</i>	John Tocco	9	2008-2009	2016-2017
<i>Electrical and Computer Engineering</i>	Kun Hua	5	2012-2013	2016-2017
<i>Engineering Technology</i>	Jerry Cuper	4	2013-2014	2016-2017
<i>Mechanical Engineering</i>	Andrew Gerhart	6	2011-2012	2016-2017
College of Management				
<i>BSBA, BSIT, MBA, MSIT</i>	Matthew Cole	1	2016-2017	2018-2019

University Educational Goal

The University mission is to develop leaders through innovative and agile programs embracing theory and practice.

The University vision is to be a preeminent university producing leaders with an entrepreneurial spirit and global view.

The University provides a student-centered comprehensive educational experience with technologically focused professional programs.

The University's undergraduate and graduate learning outcomes foster students' intellectual development into knowledgeable professionals, critical thinkers, and ethical leaders.

2016-2017 Undergraduate Learning Outcomes

Discipline-Specific Knowledge	Critical Thinking	Leadership & Ethics
<p style="text-align: center;"><u>KNOWLEDGE IN DISCIPLINE</u></p> <p>“LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	<p style="text-align: center;"><u>COMMUNICATION</u></p> <p>“LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	<p style="text-align: center;"><u>LEADERSHIP</u></p> <p>“LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>
<p style="text-align: center;"><u>TECHNOLOGY</u></p> <p>“LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	<p style="text-align: center;"><u>MATHEMATICS</u></p> <p>“LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>	<p style="text-align: center;"><u>TEAMWORK</u></p> <p>“LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>
<p style="text-align: center;"><u>SUSTAINABILITY</u></p> <p>“LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.”</p>	<p style="text-align: center;"><u>READING</u></p> <p>“LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>	<p style="text-align: center;"><u>PROFESSIONAL ETHICS</u></p> <p>“LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>
	<p style="text-align: center;"><u>SCIENTIFIC ANALYSIS</u></p> <p>“LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”</p>	

2016-2017 Graduate Learning Outcomes**Discipline-Specific Knowledge**

“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”

“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies.”

Critical Thinking

“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”

“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”

Leadership & Ethics

“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”

2016-2017 Undergraduate Assessment Plan

Undergraduate Learning Outcomes	Assessment Strategy	Responsible Academic Unit	Class Level of Assessment	Administration Timeline	Loop-Closing Timeline
<p><u>KNOWLEDGE IN DISCIPLINE</u> “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	To be developed and implemented by undergraduate program	Undergraduate program	To be determined by program	Annual	Annual
<p><u>TECHNOLOGY</u> “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	To be developed and implemented by undergraduate program	Undergraduate program	To be determined by program	Annual	Annual
<p><u>SUSTAINABILITY</u> "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."</p>	To be developed and implemented by undergraduate program	Undergraduate program	To be determined by program	Annual	Annual
<p><u>COMMUNICATION</u> “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	1. Written a. HSSC Core Curriculum writing assessment b. WPE Audit 2. Oral a. UAC oral presentation rubric 3. Graphical a. Not yet determined	1. HSSC 2. UAC 3. Not yet determined	1. 1 st and 2 nd year core courses; prereq to SSC/LLT 3000-4000 level courses 2. 4 th year capstone projects 3. Not yet determined	1. Annual 2. Every 3 years 3. Not yet determined	1. Annual 2. Every 3 years 3. Not yet determined
<p><u>MATHEMATICS</u> “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely, and reasoning logically.”</p>	1. Common final exams in Math courses required for the Major: Calc2, Math Analysis 2, Geometry in Art, Technical Calc 2. Calc 2 PBL Assignments (for real-world problems)	1. MCS 2. MCS	1. 1 st and 2 nd year courses 2. 2 nd year courses	1. Semester 2. Semester	1. Every 2 years 2. Every 2 years

<p style="text-align: center;"><u>READING</u></p> <p>“LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>	Core Curriculum Diagnostic Exam	HSSC	1 st & 2 nd year Core courses	Annual /ongoing	Every 3 years (f15)
<p style="text-align: center;"><u>SCIENTIFIC ANALYSIS</u></p> <p>“LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”</p>	Direct assessment of student exams, assignments and/or projects (all physics courses).	NS	All	Semester	Annual
<p style="text-align: center;"><u>LEADERSHIP</u></p> <p>“LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>	<ol style="list-style-type: none"> 1. Leadership survey 2. Portfolio evaluation 3. Impact report 	<ol style="list-style-type: none"> 1. Leadership program office and leadership assessment team 2. Leadership program office and LCIC 3. Leadership program office and LCIC 	<ol style="list-style-type: none"> 1. All 2. 4th year 3. All 	<ol style="list-style-type: none"> 1. Semester 2. Semester 3. Semester 	<ol style="list-style-type: none"> 1. Every odd year 2. Every even year 3. Every odd year
<p style="text-align: center;"><u>TEAMWORK</u></p> <p>“LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	To be developed and implemented by undergraduate program	Undergraduate program	To be determined by program	Annual	Annual
<p style="text-align: center;"><u>PROFESSIONAL ETHICS</u></p> <p>“LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>	To be developed and implemented by undergraduate program	Undergraduate program	To be determined by program	Annual	Annual

2016-2017 Graduate Assessment Plan

Graduate Learning Outcomes	Assessment Strategy	Responsible Academic Unit	Class Level of Assessment	Administration Timeline	Loop-Closing Timeline
<u>KNOWLEDGE IN DISCIPLINE</u> “LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	To be developed and implemented by graduate program	Graduate program	To be determined by program	Annual	Annual
<u>TECHNOLOGY</u> “LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies.”	To be developed and implemented by graduate program	Graduate program	To be determined by program	Annual	Annual
<u>CRITICAL THINKING</u> “LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	To be developed and implemented by graduate program	Graduate program	To be determined by program	Annual	Annual
<u>COMMUNICATION</u> “LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	To be developed and implemented by graduate program	4. Graduate program	To be determined by program	Annual	Annual
<u>LEADERSHIP & ETHICS</u> “LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	To be developed and implemented by graduate program	Graduate program	To be determined by program	Annual	Annual

New Undergraduate Learning Outcomes for 2017-2018

Beginning in the 2017-2018, Lawrence Tech will employ new undergraduate learning outcomes.

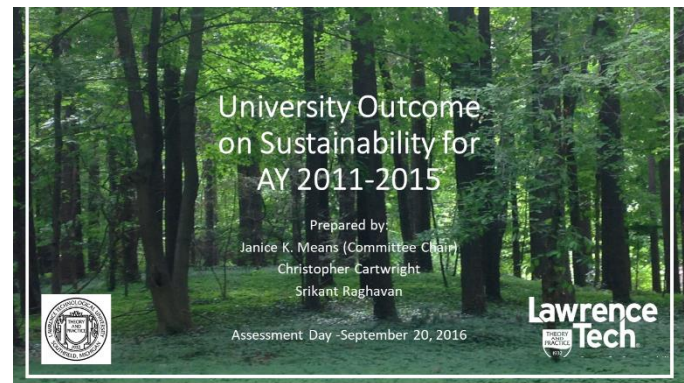
The Lawrence Tech undergraduate learning outcomes are comprised of (1) University Level Learning Outcomes, and (2) Program Level Learning Outcomes. The Undergraduate University Level Learning Outcomes encompass a set of five learning outcomes of LTU's "general education" defined by the university core curriculum. The Undergraduate Program Level Learning Outcomes encompass an overarching set of five learning outcomes defined by each program.

University Level Learning Outcomes	Program Level Learning Outcomes
Written Communication	Technology
Oral Communication	Ethics
Critical Thinking	Leadership
Quantitative Reasoning	Teamwork
Scientific Analysis	Visual Communication

**Assessment Day 2016
September 20, 2016
A200
AGENDA**

- 8:30-9:00** **Continental Breakfast**
- 9:00-9:15** **Welcome**
Dr. Virinder Moudgil, Dr. Maria Vaz, Mr. Jim Jolly, Dr. Sabah Abro
- 9:15-12:30** **Assessment Workshop**
HLC Assessment Representative Dr. Gloria Rogers
- 12:30-13:30** **Lunch – Cafeteria**
- 13:30-14:00** **UAC Subcommittee Reports**
Graphical Communication: Professor Andy Hanzel
Sustainability: Professor Janice Mean
Ethics: Professor John Tocco
- 14:00-16:30** **Program Breakout Sessions**

Welcome to LTU Assessment Day 2016 Afternoon Session



Introduction

Investigative Goals:

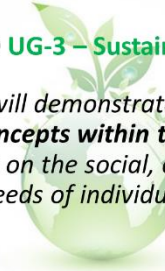
- Determine effectiveness of historical assessments 2011 - 2015
- Identify Best Practices
- Recommend College or University Level Assessment

ULO UG-3 – Sustainability



ULO UG-3 – Sustainability

“LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.”



College of Engineering

For the following programs, assessment for UG-3 **begun in AY 2014-2015**.

Biomed Eng. Robotics Eng. **Electrical Eng. & Computer Eng. Engineering Technology** **Civil Eng.**

- ULO UG-3 mapped onto ABET H by most programs and ABET D, H, J & K for Engineering Technology
- Variety of assessment approaches and rubrics as well as reported results
- **BS Mechanical Eng. and Industrial Eng.**
 - (2011-2014) First results in 2012-2013 with similar results 2013-2014
 - (2014-2015)
 - Students attend 6 seminars, (3 Fall, 3 Spring)
 - Assignments in two EME courses
 - Discuss final reports in 3 courses
 - One paragraph in Senior Project (environmental sustain.)

College of Arts & Sciences (HSSC Department)

- **Psychology**
 - (2012-2013) Planning, development of objective and rubric
 - (2014-2015) PSY 2113 Research Methods – Sustainability Survey given (based on PSY 1003 curriculum) – **First data collection**
 - Goal: Average of 67%; 2014-5 average was 64%
 - Goal: 15% of students score above 90%; 2014-5 0% scored above threshold
- **English, Humanities (2011-2015)**
 - **Planning Stage.**
- **Media Communication**
 - (2011-2014) Proposed change from LDR Portfolio tool to MCO course assessment 2011
 - (2014-2015) Assignments in MCO 2543, 2563, 3633 **to be identified and “Sustainability Rubric” to be developed**

College of Arts & Sciences (Nat. Sci. Department)

- **Chemical Biology, Chemistry, Environmental Chemistry, Mol/Cell Bio, and Physics**
 - **Assessment begun in 2013**
 - (2013-2015)
 - Sr. Project Proposal in PSC3001
 - “Project Rubric”
 - Supporting program needs objectives
 - Assessment in Annual Report is qualitative only?
 - Stated “80% goal” applies to entire Project Proposal, not specifically to sustainability?
 - “Sustainability is NOT applicable to all Sr. Projects”

College of Arts & Sciences (Math/CS Department)

- **Mathematics**
 - (2011-2014) “Professional Development” is mapped to “Sustainability” and Assessment tool = Alumni survey (**no data collected**)
 - (2014-2015) “Professional Development” is mapped to “Sustainability” and **Assessment plan under development**
- **Computer Science**
 - (2014-2015) Curriculum is **under development** and new learning goals based on ABET to be implemented Fall 2016

College of Management

- **BS Information Technology and BS Business Administration**
 - **Assessment plan to be defined.**

College of Architecture & Design

- **M-Arch Degree** – Sustainability permeates this program
 - (2011-2012) Design course students **planned to be assessed** using LEED, Living Building Challenge, Green Globes and the SEED Network, however **assessments not recorded**
 - (2013-2015) Assessment mapped onto NAAB Criteria B.3 for HVAC ability to rate building materials according to their embodied energy, **assessment goals met**
 - (2013-2014) Assessment mapped onto NAAB G.1 and G-5 with rubric based upon rubrics for their designs, however **assessments not recorded**.
- **BFA - Game Art** (2014-2015) Developed **assessment plans for 2015-2016** mapped onto NASAD Outcomes B, C and H with rubrics identified
- **BFA – Graphic Design, BS – Industrial Design and BS – Transportation Design** (2014-2015) Developed **assessment plans for 2015-2016** mapped onto NASAD Outcome H with rubrics identified
- **BFA – Interaction Design** New program, **assessment not identified**
- **BA – Interior Architecture** (2014-2015) Developed **assessment plans for 2015-2016** mapped onto CIDA Standards 3, however **criteria not clearly defined**

Summary (cont.)

- **Teaching of sustainability** permeates some programs apparently not addressed at all in others.
- **Assessment of UG-3 is relatively new in many disciplines and inconsistently applied** within the University programs.
- **Best practices employ program accreditation objectives specific to sustainability.**



Conclusion: Some programs within the University do **not easily relate to the study of any aspect of sustainability** and when it is addressed, it is a challenging subject to assess.



Moving Forward (continued)

Alternative 2 (UNIVERSITY LEVEL):

- The University Assessment Committee will work with departments to **determine which programs within EACH COLLEGE will address sustainability** such that every undergraduate student becomes aware of sustainability concepts.
- In some cases, the responsibility for learning and assessment will need to reside within the **CORE CLASSES taken by all students.**

It is recognized that **students in some disciplines will receive a broader and more in-depth appreciation of sustainability** due to the nature of their discipline.

Investigative Goals:

- Determine effectiveness of historical assessments 2011 - 2015
- Recommend College or University Level Assessment
- Identify Best Practices



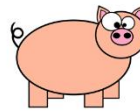
Summary

Sustainability assessment is not addressed for every program.

Sustainability assessment is in its infancy at LTU for many programs.

What is the **Root Cause** for lack of consistent assessment?

Sustainability is not defined through the lens of each program.



Moving Forward

Alternative 1 (PROGRAM LEVEL ASSESSMENT--All programs will address this University Outcome.):

- If not already done, undergraduate programs will:
 - ✓ **DEFINE SUSTAINABILITY,**
 - ✓ **IDENTIFY THE ASPECTS** of sustainability **RELATIVE TO THEIR CURRICULUM**
 - ✓ **DEVELOP** creative ways of incorporating the topic into their curriculum
 - ✓ **CREATE** or **IMPROVE** methods of assessing it.
- Even if a program is not accredited, **ACCREDITATION CRITERIA** may be found through accreditation bodies.

The University Assessment Committee will work with departments to assess the feasibility of these steps in AY 2016-2017 and the institution of new assessment plans for AY 2017-2018.

Graphical Communication

Sub-Committee Report Out

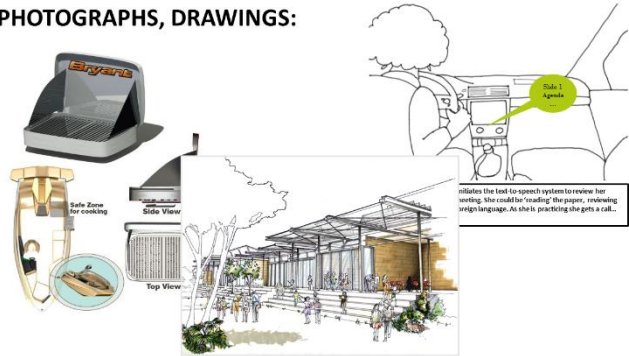
Sub-Committee Members:

- Andrew Hanzel (chair)
- Yawen Li
- Kun Hua
- Changgong Zhou

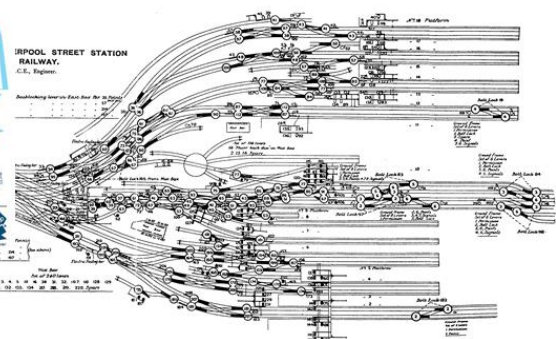
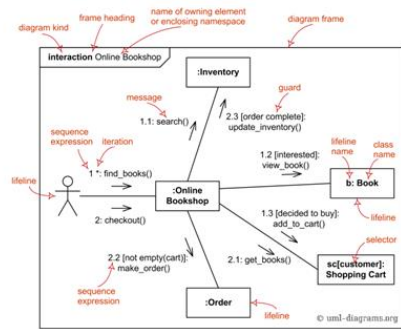
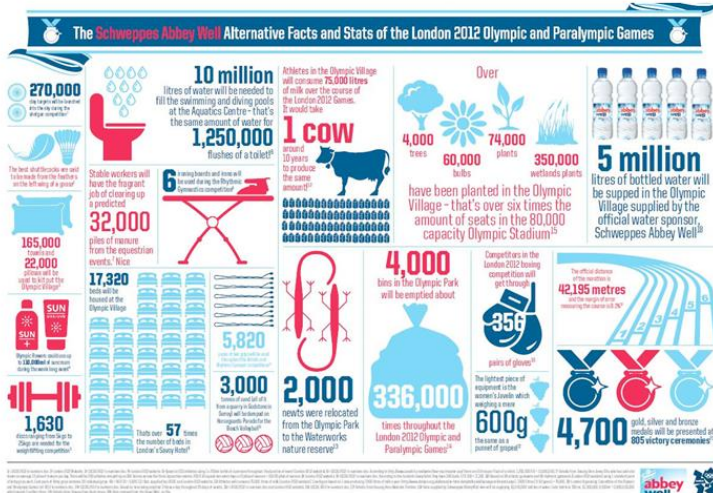
“LTU graduates will demonstrate professional standards in written, oral and **graphical communication** by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”

Graphical Communication is communication through visual aid. It is the conveyance of ideas and information in forms that can be read or looked upon.

PHOTOGRAPHS, DRAWINGS:



GRAPHS, DIAGRAMS, ETC



- College of Architecture & Design**
- BA Architectural Studies:**
- Direct assessment of student assignments,
 - Faculty evaluation of projects.
 - Continue direct assessment of projects
 - Add assessment of general graphic images including Vis Com, CAD, 3D models, etc.

The Assessment of Graphical Communication, therefore, is an assessment of **how well** the information, ideas or emotion have been understood or transferred to the recipient by the various means employed.

College of Architecture & Design

Masters of Urban Design:

- Students will present a comprehensive urban design alternatives scenario in graphic (digital) format, evaluated by consensus rubric.
- **Recommend adopting assessment of all 'graphic' images as means of concept communication.**

BFA Game Art: (2015 New program) :

- 70% of students receiving average of "Above Average" or equivalent cumulative score using Review Form for Presentation.(NASAD outcome B&F)
- **Recommend assessing Image/storyboard skills in addition.**

Interior Architecture (2015 New Program):

- CIDA standards Mean Results for Exams; Internal and External Critique and Evaluation.
- **Recommend adopting general assessment of all 'graphic' images.**

College of Architecture & Design

BFA Interaction Design:

- **70% of students receiving average of "Above Average" or equivalent cumulative score utilizing Review Form for Presentation Evaluation mapped to NASAD outcomes A,B & C**
- **Recommend adding NASAD outcome F**

College of Engineering

Mechanical Engineering:

- **Project Posters:** 80% of students will score 80% or higher.

Bio-med Engineering:

- BME program assesses graphical communication by mapping it to ABET outcome G
- Specific assignments in relevant courses are assessed with a rubric.
- **Recommend adding image assessment (ABET K)**
- **Recommend including assessment of graphic 'images' in overall coursework for other Engineering Departments mapped to ABET outcome G**

College of Arts and Sciences

HSCC:

Psychology, English, Humanities, Media Communications
BS Information Technology

BS Business Administration:

uses a six-point rubric for Communication Technology (Quality of Slides).
Recommendation that Assessment Table should be revised to include the R7 rubric which assesses graphic content.)

Natural Sciences:

Chemical Biology: Laboratory reports will be evaluated using lab report rubric including standard organization, language, and **visual communication (tables/graphs).**

College of Architecture & Design

Graphic Design:

- 70% of students receiving average of "Above Average" or equivalent cumulative score utilizing Review Form for Presentation Evaluation mapped to NASAD outcomes B&F
- **Recommend including assessment of all graphic images as they contribute to communication of concept.(NASAD outcome F)**

Transportation Design/Industrial Design: ID New '12

- ECEO Form, pre-determined performance levels progressively tailored to course level published rubric mapped to NASAD outcomes B&F
- **'16 Adoption of new PEF form for individual graphic element assessment mapped to NASAD outcomes B&F**

College of Engineering

Civil Engineering:

- Non-specific evaluation of student projects.

Engineering Technology:

- Direct and indirect assessment using Course Learning Objectives of TIE4115

Electrical Engineering:

- Assessment night presentation, thesis

College of Arts and Sciences

Computer Science:

Instituted ABET Fall'16

Mathematics: Recommend rubric capturing ABET outcome G

SUMMARY

- **Graphical Communication is not Graphic 'Design'**
- **Graphical Communication includes all visual images such as drawings photos, charts etc and is assessed by how well it communicates its ideas forward using these images.**

SAMPLE RUBRIC

ABET G →

ABET K →



Overall Presentation Skills: Clarity and Quality of Shared Information	The Student exhibited <u>exemplary</u> skills in both oral and graphic communication which was well crafted and easy to understand	The Student exhibited <u>acceptable</u> skills in both oral and graphic communication which was <u>sufficiently</u> crafted and understandable	The Student exhibited <u>insufficient</u> skills in both oral and graphic communication which were not well crafted and were difficult to understand
Graphical/ Descriptive Information: Sections / Views/User Articulation/Visual Support	The Presentation included <u>well-crafted</u> visual descriptive information including sections, views and user interface and action descriptors	The Presentation included <u>adequate</u> visual descriptive information including sections, views and user interface and action descriptors	The Presentation failed to provide <u>adequate</u> descriptive information including sections, views, user interface and action descriptors
Sketching and Rendering Skills	The student exhibits a <u>high level</u> of skill at both sketching and rendering	The student exhibits a <u>Moderate to Excellent level</u> of sketching and rendering capability	The Student exhibits a <u>sub-standard level</u> of sketching and rendering capability requiring remedial training

Assessment Day 2016

Moving Forward

- Graphical Communication assessment should be integrated at all levels and disciplines of the University.
- Rubrics should be implemented using ABET and NASAD outcomes
- Best Practices for utilizing successful Graphical Communication skills across all disciplines can be found here:

http://www.portfoliohandbook.com/PortfolioHandbook_UCID12.pdf

Review Process

- ❖ Subcommittee: Sarah Lamers, Jerry Cuper, John Tocco, Vernon Fernandez (ex officio, emeritus, retired)
- ❖ Review Assessment Reports/Discussions with professors
- ❖ Syllabi review
- ❖ Course Description review

Report on Ethics Undergraduate Learning Outcome

UNIVERSITY ASSESSMENT COMMITTEE
The Vernon Fernandez Unendowed Subcommittee On Ethics



"Assessment is Everything!"



Parsing the Current Ethics Undergraduate Learning Outcome

LTU graduates will understand:

- ❖ ethical issues related to their disciplines
- ❖ ethical codes adopted by relevant professional associations
- ❖ the social consequences of their ethical decisions

Engineering: programs vary on assessment of Ethics Outcome

- ❖ **General Engineering:** ethics/social responsibility module in *Fundamentals of Engineering Design Projects*
- ❖ **Engineering Technology:** ethics discussed in *Engineering Economic Analysis* and in *Senior Project*
- ❖ **Civil & Architectural Engineering:** CE – code of ethics reviewed in *Ethics and Professional Issues*; AE – general ethics question and social consequences addressed in the *capstone studios*

Arts and Sciences: no specific assessment of Ethics Outcome

- ❖ **Math & Computer Science:** no applicable course objectives
- ❖ **Natural Sciences:** ethics case study in *Introduction to Senior Projects in Science*
- ❖ **Humanities, Social Sciences, and Communication:** Psychology administers a multiple choice exam partially addressing ethics

Management: programs vary on assessment of Ethics Outcome

- ❖ **Business Administration:** Example courses include *Project Management*, which addresses social consequences of projects, and *Collaborative Communication for Leaders*, with a course goal of ethical leadership
- ❖ **Information Technology:** ethics indirectly addressed in reflective papers

Engineering, cont.

- ❖ **Mechanical/Robotics Engineering:** ethics addressed in capstone sequence *Project Fundamentals/Capstone Project*
- ❖ **Biomedical Engineering:** ethics objectives in *Biomedical Best Practices*
- ❖ **Electrical & Computer Engineering:** both programs generally address ethics in their two-course *Introduction/Capstone* projects sequence

Architecture and Design: assessment of elements of the Ethics Outcome

- ❖ **Architecture:** *Integrated Design 5* contains elements of ethics, professional judgement, and social consequences
- ❖ **Graphic Design, Industrial Design, Game Art, etc.:** ethics indirectly addressed in reflective papers

Moving Forward: Continuous Improvement Considerations

- ❖ Consider “assessability” of current Outcomes
- ❖ Review/revision cycle for current Outcomes
- ❖ Review proposals for adding/enhancing ethics modules in each program
- ❖ Map revised(?) Outcome to approved(?) modules



“Assessable is Everything!”

Annual Assessment Reports 2016-2017

College of Architecture and Design

BS in Architectural Studies/Master of Architecture

1. Assessment Plan and Summary

The educational outcomes of the BS in Architectural Studies and the Master of Architecture (BS/M.Arch) degree program are listed below (see Tables 1a and 1b). They have been adapted from National Architecture Accrediting Board (NAAB) criteria for U.S. architecture school seeking accreditation. Obtaining M.Arch degree from an accredited school is essential part for architects licensing process in any state.

The BS/MArch program outcomes support the university undergraduate and graduate learning outcomes, respectively. Please refer to column two in both tables to see the inter-relationship between university graduate learning outcomes and the program outcomes as required by NAAB.

Program assessment is conducted using the following:

- A. **Direct assessment of courses:** Direct assessment of student learning is performed in specific selected courses that satisfy NAAB requirements and LTU learning Goals. The M.Arch Program has no concentrations; most courses are offered at least once a year.
- B. **Indirect Assessments:** This year the dept. has adopted procedures to capture indirect assessment work including the following; Documentation of presentation and discussion of the per semester (Fine Grain) reviews of selected courses, documentation of curricula sub-committee meetings meeting two-three times/semester, documentation of student performance with our new co-op Integrated Path to Architecture Licensure (IPAL) program (<https://www.ncarb.org/become-architect/ipal>) from employer surveys. The Indirect Assessment documentation are found in Appendix 5.

The results of the assessment of the program outcomes are presented to the department faculty during the first graduate faculty meeting of the fall semester. Any actions that need to be taken to improve the graduate curriculum are handled by the Graduate Director on an annual basis.

Table 1A. Assessment Plan for the BS in Architectural Studies Program

LTU Learning Outcomes	Supporting Program Learning Objective and NAAB SPC	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop-Closing Timeline
<p>KNOWLEDGE IN DISCIPLINE LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems</p>	<p>NAAB SPC B6 Comprehensive Design - Ability to produce a comprehensive architectural project that demonstrates each student's capacity to make design decisions across scales while integrating the following SPC: A.2, A.4, A.5, A.8, A.9, B.2, B.3, B.4, B.5, B.8, and B.9.</p>	<p>For ARC 4126, Each student is assigned to draw and document structural systems and typical wall constructions for the studio course building project demonstrating the use of sustainable technology. Additionally, criteria must be met for structural stability, safety, appropriate load transfer, optimal member sizing, constructability and thermal comfort. Rain-screen principles must also be applied for exterior wall assemblies.</p>	<p>Using Rubric UG-1, average scores of 70-75% should be achieved on this assignment.</p>	<p>Every semester</p>	<p>Annual</p>
<p>TECHNOLOGY LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problem in their disciplines</p>	<p>NAAB SPC B10 Building Envelope Systems – Understanding of the basic principles involved in the appropriate application of building envelope systems and associated assemblies relative to fundamental performance, aesthetics, moisture transfer, durability, and energy and material resources.</p>	<p>For ARC 4126 Lab, each student is assigned to draw and document structural systems and typical wall constructions for the studio course building project demonstrating the use of sustainable technology. Additionally, criteria must be met for structural stability, safety, appropriate-load transfer, optimal member sizing, constructability and thermal comfort. Rain-screen principles must also be applied for exterior wall assemblies.</p>	<p>Using Rubric UG-2 to assess the development of conventional drawing and documentation standards; common criteria for structural systems- stability, approximate sizing, load transfer, meeting, the building code (IBC) criteria, rain-screen principles, constructability, and thermal properties, average scores of 70-75% should be achieved.</p>	<p>Every semester</p>	<p>Annual</p>
<p>SUSTAINABILITY LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities</p>	<p>NAAB SPC B3 Sustainability - Ability to design projects that optimize, conserve, or reuse natural and built resources, provide healthful environments for occupants/users, and reduce the environmental impacts of building construction and operations on future generations through means such as carbon-neutral design, bioclimatic design, and energy efficiency.</p>	<p>For ARC 3423, using a test question on embodied energy.</p>	<p>75% of students will be able to rank materials based on their embodied energy. There is no rubric for this metric. Students either can or cannot rank materials based on their embodied energy.</p>	<p>Every semester</p>	<p>Annual</p>

<p>COMMUNICATION LTU graduates will demonstrate professional standards in written, oral and graphic communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation</p>	<p>NAAB SPC A3 Visual Communication Skills - Ability to use appropriate representational media, such as traditional graphic and digital technology skills, to convey essential formal elements at each stage of the programming and design process.</p>	<p>For ARC 2813, teams of 2-3, students will select a significant work of public art at Hart Plaza, and investigate and record its constituent data - not only on-site information, but also within a historical and cultural context. Teams will editorialize their investigation with the three landscape realms of Time, Material & Energy. Visual communication strategies will be used to codify this information through and deliver specific information. This will manifest in three information maps - one for each landscape realm. Successful students will interpret "map" broadly, and therefore allow for the potential of 3 dimensional constructs.</p>	<p>Using Rubric UG-4, 60% of students will achieve a "B" or better.</p>	<p>Every semester</p>	<p>Annual</p>
<p>MATHEMATICS LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically</p>	<p>NAAB SPC B9 Structural Systems - Understanding of the basic principles of structural behavior in withstanding gravity and lateral forces and the evolution, range, and appropriate application of contemporary structural systems.</p>	<p>Assess one quantitative problem from each exam for all class sections, for a total of 4 assessments for the Fall semester.</p>	<p>For ARC 4543, student averages for selected test problems using calculations will exceed 75%.</p>	<p>Every semester</p>	<p>Annual</p>
<p>READING LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view</p>	<p>NAAB SPEC A9 Historical Traditions and Global Culture - Understanding of parallel and divergent canons and traditions of architecture, landscape and urban design including examples of indigenous, vernacular, local, regional, national settings from the Eastern, Western, Northern, and Southern hemispheres in terms of their climatic, ecological, technological, socio-economic, public health, and cultural factors.</p>	<p>For ARC 4183, students will write a paper designed to evaluate an assigned reading and relate its content to the topics/issues covered in the course.</p>	<p>100% of students will correctly identify the central thesis of the reading. There is no rubric for this metric. Students can either identify the central thesis or not.</p>	<p>Every semester</p>	<p>Annual</p>

<p>SCIENTIFIC ANALYSIS LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields</p>	<p>NAAB SPC A5 Investigative Skills - Ability to gather, assess, record, apply, and comparatively evaluate relevant information within architectural coursework and design processes.</p>	<p>For ARC 2117, <i>Collect, Conduct, Convey</i>, asks a student to find an existing drainage condition on campus and analyze it for its relevant and measurable characteristics at both local and regional scales. Students then design and cast a concrete form that intervenes in that condition. The intervention must capture, conduct, and eventually release the water, while transforming it along the way.</p>	<p>Using Rubric UG-7, 75% of the students will score at receive a total score of at least 40 total pts (B-).</p>	<p>Every semester</p>	<p>Annual</p>
<p>LEADERSHIP LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.</p>	<p>NAAB SPC C6 Leadership - Understanding of the techniques and skills architects use to work collaboratively in the building design and construction process and on environmental, social, and aesthetic issues in their communities.</p>	<p>For ARC 4116, Each student will: write a personal leadership manifesto outlining their ideals, beliefs and goals by writing statements about who they are as a professional on the deepest level. In the report, student will answer the following questions: “What does ‘design activism’ mean to me?” “What value do I place on ‘design activism? Is it something an architect should consider a mandatory part of their practice?” “Who or what do I feel is most worthy of advocating for?”</p>	<p>Using Rubric UG-8, 75% of students shall meet or exceed requirements, earning a grade of ‘B’ or higher.</p>	<p>Every semester</p>	<p>Annual</p>
<p>TEAMWORK LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions</p>	<p>NAAB SPC C1 Collaboration - Ability to work in collaboration with others and in multidisciplinary teams to successfully complete design projects.</p>	<p>For ARC 2126, students are required to work in groups of two gathering base materials, understanding, and knowledge about the site and client. The information collected, analyzed, and represented will form the primary resource and influence the design in a way that is sensitive to the program, site and client.</p>	<p>Using Rubric UG-9, 70% of students will achieve 15 or more points related to collaboration out of a total possible of 20 points.</p>	<p>Every semester</p>	<p>Annual</p>

<p>PROFESSIONAL ETHICS LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions</p>	<p>NAAB SPC C8 Ethics and Professional Judgment - Understanding of the ethical issues involved in the formation of professional judgment regarding social, political and cultural issues in architectural design and practice.</p>	<p>For 4116, each student will write a personal design manifesto, outlining their personal ideals, beliefs and goals by writing statements about who they are as a designer on the deepest level. They will also identify all social, political and cultural issues of key relevance to them as a designer.</p>	<p>Using Rubric UG-10, 75% of students shall meet or exceed requirements earning a grade of 'B' or higher.</p>	<p>Every semester</p>	<p>Annual</p>
--	---	---	--	-----------------------	---------------

NAAB 2009 Outcomes:

Realm A: Critical Thinking and Representation:

- A.1. Communication Skills: *Ability to* read, write, speak and listen effectively.
- A.2. Design Thinking Skills: *Ability to* raise clear and precise questions, use abstract ideas to interpret information, consider diverse points of view, reach well-reasoned conclusions, and test alternative outcomes against relevant criteria and standards.
- A.3. Visual Communication Skills: *Ability to* use appropriate representational media, such as traditional graphic and digital technology skills, to convey essential formal elements at each stage of the programming and design process.
- A.5. Investigative Skills: *Ability to* gather, assess, record, apply, and comparatively evaluate relevant information within architectural coursework and design processes.
- A.6. Fundamental Design Skills: *Ability to* effectively use basic architectural and environmental principles in design.
- A.11. Applied Research: *Understanding* the role of applied research in determining function, form, and systems and their impact on human conditions and behavior.

Realm B: Integrated Building Practices, Technical Skills and Knowledge:

- B. 3. Sustainability: *Ability to* design projects that optimize, conserve, or reuse natural and built resources, provide healthful environments for occupants/users, and reduce the environmental impacts of building construction and operations on future generations through means such as carbon-neutral design, bioclimatic design, and energy efficiency.

Realm C: Leadership and Practice:

- C. 1. Collaboration: *Ability to* work in collaboration with others and in multidisciplinary teams to successfully complete design projects.
- C. 5. Practice Management: *Understanding* of the basic principles of architectural practice management such as financial management and business planning, time management, risk management, mediation and arbitration, and recognizing trends that affect practice.
- C. 6. Leadership: *Understanding* of the techniques and skills architects use to work collaboratively in the building design and construction process and on environmental, social, and aesthetic issues in their communities.
- C. 7. Legal Responsibilities: *Understanding* of the architect's responsibility to the public and the client as determined by registration law, building codes and regulations, professional service contracts, zoning and subdivision ordinances, environmental regulation, and historic preservation and accessibility laws.
- C. 8. Ethics and Professional Judgment: *Understanding* of the ethical issues involved in the formation of professional judgment regarding social, political and cultural issues in architectural design and practice.

Table 1B. Assessment Plan for MArch Program

University Graduate Learning Outcomes	Supporting NAAB Outcomes*	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop-Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	NAAB SPC A2 Design Thinking Skills - Ability to raise clear and precise questions, use abstract ideas to interpret information, consider diverse points of view, reach well-reasoned conclusions, and test alternative outcomes against relevant criteria and standards.	For ARC 5814 and ARC 5824, each student will complete a task in which he or she is required to prepare a graphic presentation of pre-design, programming, and project intentions.	Using Rubric G-1, 70% of students shall earn at least 12 points out of 16 possible points.	ARC 5814: Fall ARC 5824: Spring	Every 2 yrs
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	NAAB SPC A11 Applied Research - Understanding the role of applied research in determining function, form, and systems and their impact on human conditions and behavior.	For ARC 5013, students will prepare a research poster based on a small research experiment to test the hypothesis and research question developed in the class. Research Method(s) must be selected to answer the question(s) and justification for the choice of the method(s) in this situation is required.	Using Rubric G-2.1 and G-2.2, 75% of students are expected to earn a letter grade of B or better.	Summer	Every year
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	NAAB SPC A5 Investigative Skills - Ability to gather, assess, record, apply, and comparatively evaluate relevant information within architectural coursework and design processes.	For ARC 6514, students will each complete a Forum 2 exercise by: selecting one discrete element from the re-search they have begun to accumulate. It should be self-contained and describe: 1) the element under consideration, 2) the exact means of analysis or interpretation they are employing against that element, 3) the evidence that they gather or adduce from that means, and 4) the claim relevant to architecture that they assert on the basis of that evidence.	Using Rubric G-3, 90% of students will obtain a minimum of 18 points out of a possible 20 on the analysis of their readings and ultimately 80 points out of 100 on their resulting paper.	Every semester	Every 3 yrs
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	NAAB SPC A1 Communication Skills - Ability to read, write, speak and listen effectively.	For ARC 6833, each student prepares a critical essay documenting and evaluating the design objectives of his or her design project prepared in ADS1 or ADS2.	Using Rubric G-4, 70% of students shall earn at least 12 points out of 16 possible points.	Summer	Every 2 yrs

<p>“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”</p>	<p>NAAB SPC C8 Ethics and Professional Judgment - Understanding of the ethical issues involved in the formation of professional judgment regarding social, political and cultural issues in architectural design and practice.</p>	<p>For ARC5643 Students will engage in a written discussion as part of a seminar focused on cultural positions of ethics affecting design.</p>	<p>Using the G-5 rubric, 75% of students shall meet or exceed requirements achieving a high pass.</p>	<p>Every semester</p>	<p>Every 3 yrs</p>
--	--	--	---	-----------------------	--------------------

Plan for 2017-2018 Undergraduate Architecture

Indicators of Learning - Written Communication (WC1, WC2, WC3)

1. Students will communicate ideas via writing as a series of tasks that involves composing, editing, and revising.
2. Students will demonstrate competence in Standard Written English, including grammar, sentence and paragraph structure, coherence, and
3. Students will engage in writing as a process of critiquing, revising, and editing.

Indicators of Learning for Oral Communication (OC1, OC2, OC3)

1. Students will communicate orally in academic, social, and professional endeavors.
2. Students will demonstrate competence in listening.
3. Students will demonstrate competence in using oral communication interpersonally and with others in conversation and group discussion

Indicators of Learning for Critical Thinking in the Humanities (CT1, CT2, CT3)

1. Students will perform close reading of complex texts.
2. Students will demonstrate an understanding of historical and aesthetic periods and their impact on human thought.
3. Students will construct arguments using primary and secondary sources.

Indicators of Learning for Quantitative Reasoning (QR1, QR2, QR3)

1. Students will interpret mathematical models given verbally, or by formulas, graphs, tables, or schematics, and draw inferences from them.
2. Students will represent mathematical concepts verbally, and, where appropriate, symbolically, visually, and numerically.
3. Students will apply arithmetic, algebraic, geometric, technological, or statistical methods to solve problems.

Indicators of Learning for Scientific Analysis (SA1, SA2, SA3)

1. Students will demonstrate comprehension of scientific principles and the ways scientists in a particular discipline conduct research.
2. Students will demonstrate proficiency in their comprehension of principles of science.
3. Students will apply the scientific method by making observations and understanding the fundamental elements of experiment design.
4. Students will analyze natural science problems.

Plan for 2017-2018 Graduate Architecture

Discipline-Specific Knowledge (DS1, DS2)

1. LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.
2. LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies.

Critical Thinking (CR1, CR2)

1. LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.
2. LTU graduates will communicate effectively using written, oral, graphical, and digital formats.

Leadership & Ethics (LE1)

1. LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.

2. Report on 2016-2017 Academic Year and Action Plan (Loop-Closing)

This section has some development this year for three courses as many reporting was undertaken, faculty indicated that there loop-closing was completed. A faculty survey initiated in 11/15/2016 by Prof. Faoro indicated the majority of faculty were not planning any assessment reporting this past year.

We are experiencing the end of the prior assessment plan cycle which was one reason we started new six year Assessment Plan this year for the M.Arch. Degree. The 2014-2015 Architecture Assessment Plan was set up so that **about one third of all assessments are planned to be addressed for loop closing every year.** The programs scheduled for evaluation for loop closing this past year 2016-2017 year were: UG-3, UG-5, G-2 and G-4.

All assessments made during the 2016-2017 academic year, whether a loop closing year or not, are detailed below by applicable University Learning Objective (ULO). Assessment details follow.

UG-1 Knowledge in Discipline and NAAB SPCs C1 – Research, -C2 – (C2)Integrated Evaluations and Decision-Making, Comprehensive Design.

Objective/Outcome: For ARC 4126, each student is assigned to develop a comprehensive project demonstration of design and technical issues in architecture in what is considered a ‘capstone project’. The studio course building project demonstrating the use of sustainable technology–additionally, criteria must be met for structural stability, safety, appropriate-load transfer, optimal member sizing, constructability and thermal comfort. Rain-screen principles must also be applied for exterior wall assemblies. This was a benchmark year for assessment of the new NAAB Criteria. The assessment application of in-class rubrics for SPCs, C1,C2 and C3 completed by the studio faculty member and by two guest outside reviewers, for CI rubrics were used for grading, C2 and C3 were not as more specific rubrics were developed for grading. The report documented approx. 1/3 of course offered in the year due to a change in the course coordinator duties. The report data indicated the results in normal (average grade levels C+ to B/B+) for the Senior Year with strengths and weakness in meeting the NAAB SPC.s . Outcomes demonstrated the use of advanced discipline skills for design and technical documentation, design methods and process, sustainable building systems integration, and research methods utilizing upper division computer simulations and applications. See Appendix 1 for data summaries of Assessment reports.

Assessment: These assessments were to be done for 16 students by Associate Professor Daniel Faoro ARC 4126. Representing 50% of the class size for Spring 2017. Timeframe to loop-closing is three years 2016-2019.

Current/Future Actions: Responsibility now assigned to Daniel Faoro after the retirement of Prof. Tom Nashlen in 2017. It would be beneficial if the Lab instructors would participate in the assessment work. Project duration for the modules and content of the assignments require review and alteration to improve results as well as project type selection regarding complexity and scope/focus. The organization of the lab may require a review and changes for more effectiveness.

Responsibility: Professors Dan Faoro as Course Coordinator and adjuncts Mark Farlow, John Abela).

University/College Support for Objective: The Architecture Chair will assign assessment responsibilities each year based on the professors teaching the part of this course covering this ULO.

UG-1 Knowledge in Discipline and NAAB SPCs (B5) Structural Systems and (C3) Integrative Design in Comprehensive Design.

Objective/Outcome: To assess the following; **a.-NAAB 2014 (SPC) Criteria : B.5**

Structural Systems: *Ability* to demonstrate the basic principles of structural systems and their ability to withstand gravitational, seismic, and lateral forces, as well as the selection and application of the appropriate structural system. *Ability*-Proficiency in using specific information to accomplish a task, correctly selecting the appropriate information, and accurately applying it to the solution of a specific problem, while also distinguishing the effects of its implementation.

This is replacing the prior criteria from NAAB 2009 Criterion: B. 9. Structural Systems. Also we included assessment of **NAAB 2014 (C3) Integrative Design: Ability** to make design decisions in a complex architectural project with broad integration and consideration of the environmental, technical documentation, accessibility, site conditions, life safety, environmental systems, structural systems, and building envelope systems. This revised and new NAAB 2014 SPC was assessed as a secondary level assessment.

Assessments: The data are for Spring 2017. The Dept. Assessment representative, Daniel Faoro has all course data sets. This was the first of three years with the final (loop closing year) of course assessment concluding in Spring 2020. Full time faculty assess all classes and the adjuncts were asked to assess one half of their classes at a min. Data reflects 100% of ARC2513 and ARC3513 classes, and 50% of ARC4543 classes offered in the Fall/Spring terms of the year. The more dedicated and committed adjunct faculty however exceeded this min. 50% reporting requirement. This was undertaken to reflect the following, increase achievement stds, in NAAB 2014 for (B5) SPC, curricular modifications made and inclusion of the new emphasis added for lab work to reinforce construction topics and methods of system assembly. The lab component was added which introduced direct faculty interaction, team work, and case study investigations of notable structures, and more developed structural configuration and planning projects that reinforces lecture content subject areas in the latter part of the term, aids in preparations for the final exam, and reinforces studio based classwork. This expanded content allows for inclusion of the NAAB (C3) to be assessed. Outcomes demonstrated the use of advanced discipline skills for design and technical documentation, structural system planning and configuration studies, building systems integration, and analysis methods utilizing upper division computer simulation applications. Faculty assessed the two lab selected assignments which were based on structural system planning and configuration studies supported by analysis of forces/stresses using a scoring rubric. This was selected as the lab work represented the most significant revision to the classes and has yet to be assessed using direct assessment methods in the dept. Qualitative and Quantitative aspects of the study questions were responsive to NAAB 2014 SPC B5 which had an increase in expected outcomes in addition the new NAAB criteria also places emphasis on integration of structural systems NAAB C3 as well as the criteria. In addition the new NACRB exam ARE 5.0 has placed an increased emphasis on structural systems integration which aligns with the objectives of these lab assignments. In addition all faculty were asked to complete a questionnaire on the lab projects to review the instructional issues with them.

The Faculty Survey Questionnaire results indicated that faculty have the chance to review lab content from all faculty to review for consistency and content. Most agree that time spent on assignments is lacking as evidenced by when lab time is allocated for in-progress review not many students have that much work to show. This may result for course overloads and challenges with balancing work/college but the last minute- before due date approach to working is not helpful to them.

Current/Future Actions: For ARC2513 the lab project requires an earlier start date to be completed due to end of term conflicts, the anticipation was that students who like design would take this on and compensate for weakness in analysis and calculation ability but this does not seem to be the case. For ARC4543 the first project has been modified to allow two different lateral load analysis conditions, address software issues, and increased in scope to tie in content across multiple lectures. The second project is rushed at the end of the term but has been modified to allow for four varying project types. From 15-25% of the class participate in the computer modeling extra credit, software issues require attention regarding loading, units, instability problems, and shape/ configuration. For ARC3513 the scope of the labs was reduced to allow for two structural systems concrete and steel as timber was studied in ARC2513. The lab problems should be expanded in the view of the coordinator (Faoro) by utilizing real buildings as models/templates for the assignment and encompass more issues in structural configuration and planning.

Responsibility: Professors Dan Faoro as Course Coordinator and Ash Rageb and adjuncts Kelchin Shih, Faris Habba, Dr. Wisam Bukita, Dr. Del Makkawey and Dr. Pittabi Sitaram.

University/College Support for Objective: The Architecture Chair will assign assessment responsibilities each year based on the professors teaching the part of this course covering this ULO and NAAB SPC.

**UG LTU Goal Knowledge in Discipline and UG Goal 3 Sustainability , NAAB (2009)
SPC B3 Sustainability This specific NAAB SPC was discontinued in 2014**

Objective and Outcome: Assessment was done through in class direct assessment of course work using scoring and rubrics as needed. Work was conducted in Courses: ARC 3423 - HVAC & Water Systems for 2016 - 2017.

Assessment Outcome: "75% of students will be able to rank materials based on their embodied energy. There is no rubric for this metric. Students either can or cannot rank materials based on their embodied energy." Fall Semester Evaluation Results: FALL 2016 - 21 out of 31 students (67.7%) answered the embodied energy question on the final exam correctly. Therefore, the assessment goal of 75 % answering correctly was not met. Although assessment was not required for the Spring 2017 semester, Professor Filza Walters did provide examples of the homework assignment and test question used for assignment. Statistics on performance was requested, but not supplied. See Appendix 3 for supporting material.

Responsibility: Prof. Janice Means, CoAD and Director of Arch. Eng. Filza Walters.

University/College Support for Objective: The Architecture Chair will assign assessment responsibilities each year based on the professors teaching the part of this course covering this ULO and NAAB SPC.

3. Assessment Plan for 2017-2018 Academic Year

A new Assessment Plan for the undergraduate and graduate architecture degree will be developed this year by D. Faoro based on the new undergraduate learning outcomes that will be implemented in 2017-2018. The assessment plan will include the new NAAB criteria (2014) and new UG LTU learning Goals. In addition our Arch. Program was approved this past year as one of approx. 20 IPAL programs with an abridged path to the NCARB licensing exam. For this reason the BS Arch/M.Arch Assessment Plan outline (Dept. copy only) refers to the ARE 5.0 Exam content as it is an initial attempt to map the ARE exam content relationship to our coursework. It has yet to be adopted and approved by the Chair (J. Stevens) and the faculty informed of this as a possible assessment responsibly.

Peter Osler, in the class ID1 ARC2116 will assess the following: A.4 Architectural Design Skills: A.5 Ordering Systems and A.6 Use of Precedents.

Aaron Jones in the class ID2 ARC2126 will assess the following; B.1 Pre-Design, and B.6 Environmental Systems and the *LTU Undergraduate Goals Indicators of Learning for Scientific Analysis*.

1. Students will demonstrate proficiency in their comprehension of principles of science.
2. Students will apply the scientific method by making observations and understanding the fundamental elements of experiment design.
3. Students will analyze natural sciences problems.

Daniel Faoro- in class ARC4126 Comprehensive design studio will assess the following; NAAB 2014 SPC's C.1 Research, C.2 Integrated Evaluations and Decision-Making Design Process: C.3 Integrative Design, and the LTU graduate Goals Discipline-Specific Knowledge 1. LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.2. LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies.

Prof. Daniel Faoro and adjuncts in these classes ARC2513, ARC3123, ARC4543 will assess NAAB 2014 SPC's B.5 Structural Systems:

Eric Ward- in Classes CS 1 and CS 2 will assess the following NAAB 2014 SPC's B.3. Codes and Regulations: B.4 Technical Documentation, B.7 Building Envelope Systems and Assemblies:.

B.8. Building Materials and Assemblies, B.9 Building Service Systems..

LTU graduate Goals Discipline Specific Knowledge: 1. LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.2 LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies.

Edward Orlowski, in classes ARC4116 ID5, will assess the following NAAB 2014 SPC's; A.2 Design Thinking Skills, A.8 Cultural Diversity and Social Equity and LTU graduate Goals Discipline Specific Knowledge- 1. LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.2 LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies.

BFA in Game Art

1. Assessment Plan and Summary

See Table 1 below. Game Art's assessment criteria is based on the N.A.S.A.D. Essential Competencies, Experiences, and Opportunities (ECEO) for design curriculums:

- a) N.A.S.A.D. Outcome A: The ability to solve communication problems, including the skills of problem identification, research and information gathering, analysis, generation of alternative solutions, prototyping and user testing, and evaluation of outcomes.
- b) N.A.S.A.D. Outcome B: The ability to describe and respond to the audiences and contexts which communication solutions must address, including recognition of the physical, cognitive, cultural, and social human factors that shape design decisions.
- c) N.A.S.A.D. Outcome C: The ability to create and develop visual form in response to communication problems, including an understanding of principles of visual organization/composition, information hierarchy, symbolic representation, typography, aesthetics, and the construction of meaningful images.
- d) N.A.S.A.D. Outcome D: An understanding of tools and technology, including their roles in the creation, reproduction, and distribution of visual messages. Relevant tools and technologies include, but are not limited to, drawing, offset printing, photography, and time-based and interactive media (film, video, computer multimedia).
- e) N.A.S.A.D. Outcome E: An understanding of design history, theory, and criticism from a variety of perspectives, including those of art history, linguistics, communication and information theory, technology, and the social and cultural use of design objects.
- f) N.A.S.A.D. Outcome F: An understanding of basic business practices, including the ability to organize design projects and to work productively as a member of teams.

*Note: Although the nomenclature specifies "Art" in it, N.A.S.A.D. accredits the B.F.A. in Game Art as a design program given that it is focused on applied arts.

Table 1. Assessment Plan for B.F.A. in Game Art

LTU Undergraduate Learning Outcomes	N.A.S.A.D./ Program Outcomes	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing Timeline
<u>KNOWLEDGE IN DISCIPLINE</u> LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.	N.A.S.A.D. Outcome A N.A.S.A.D. Outcome F N.A.S.A.D. Outcome B	Thesis Project in GAM4514, GAM4524 (Senior Project 1 & 2) Post Mortem Form in GAM3313 (Integrated Game Studio 2) Thesis Book produced in ART4622 (Senior Seminar 2)	70% of students receiving average of “Above Average” or equivalent cumulative score using Review Form for Presentation evaluation 70% of students receiving score of 70% or better	Every Semester	Annual
<u>TECHNOLOGY</u> LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.	N.A.S.A.D. Outcome B N.A.S.A.D. Outcome D	Final Research Presentation in ART4612 (Senior Seminar 1) Final Project in ART2813 (Electronic Method Imaging), GAM3143 (3D Animation 2), GAM2123 (2D Animation)	70% of students scoring 70% or better 70% of students receive a score of 70% or higher	Every Semester	Annual
<u>SUSTAINABILITY</u> LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.	N.A.S.A.D. Outcome B N.A.S.A.D. Outcome C N.A.S.A.D. Outcome E	Grade of Midterm Writing Assignment in ART 4612 (Senior Seminar 1) Evaluation of Coursework in GAM3413 (Game Mechanics) Course Projects in GAM2213 (History of Game Design)	70% of students receive a score of 70% or higher	Every Semester	Annual
<u>COMMUNICATION</u> LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.	N.A.S.A.D. Outcome A N.A.S.A.D. Outcome C	Analytical Journals in GAM2213 (History of Game Design) Final Project in ART3323 (Portfolio Design)	70% of students receive a score of 70% or higher 70% of students receiving average of “Above Average” or equivalent cumulative score using Review Form for Presentation evaluation	Every Semester	Annual

<u>MATHEMATICS</u> LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely, and reasoning logically.	N.A.S.A.D. Outcome A N.A.S.A.D. Outcome D N.A.S.A.D. Outcome F	Final grade in MCS 1254 Final course project in ART 2813 Completion of 150-hour internship in ART 4922	70% of students receive a score of 70% or higher 70% of students receive a score of 70% or higher 100% of students receive a score of 60% or higher	Every Semester	Annual
<u>READING</u> LTU graduate will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.	N.A.S.A.D. Outcome A N.A.S.A.D. Outcome E	Grade of Final Research presentation in ART 4514 Grade of final paper in ART 4612 and 4622		Every Semester	Annual
<u>SCIENTIFIC ANALYSIS</u> LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.	N.A.S.A.D. Outcome B N.A.S.A.D. Outcome E	Final Project in ART 3343	70% of students receive a score of 60% or higher	Every Semester	Annual
<u>LEADERSHIP</u> LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.	N.A.S.A.D. Outcome B	Completion of Leadership sequence (LDR 2001, LDR 3000, LDR 4000)	80% of students receive passing grade in sequence	Every Semester	Annual
<u>TEAMWORK</u> LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members' contributions.	N.A.S.A.D. Outcome B N.A.S.A.D. Outcome E	Final course project in GAM 3313 (Integrated Game Studio 2) Successful completion of Thesis Exhibition in GAM 4524 (Senior Project 2)	70% of students receive a score of 70% or higher 70% of students receive a score of 60% or higher	Every Semester	Annual
<u>ETHICS</u> LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.	N.A.S.A.D. Outcome f	Grade Final Reflective Essay in ART4922	70% of students receive a score of 70% or higher	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop-Closing)

A. Outcome A Assessment :

Problem-solving, visual communication and above all prototyping and user testing are at the core of the Game Design discipline. Students are exercising these skills their first year and beyond in project-focused courses like Intro to Games & Animation, Integrated Game Studio and Scripting for Game Design. Students demonstrated effectiveness in this realm from Freshman to Senior year as each year requires a game project to be proposed (a greenlight pitch), prototyped and user tested by public users.

B. Outcome B Assessment:

One key component that is desired among these prototypes is the generation of a defined “user experience”, taking into account the recognition the user has in regards to the game mechanics, that allows users to form and shape decisions during play. Students engage with a variety of user demographics, resulting in a list of ‘needs’ to be met by their player base, shaping their own decisions in a design sense. These outcomes are evaluated throughout project-focused courses like Integrated Game Studio, Senior Project, and lecture/writing-oriented courses like History of Game Design.

C. Outcome C, D Assessment:

Successful game interfaces and other graphical assets represent an accumulated knowledge of visual organization, composition, information hierarchy, symbols/type/icons and aesthetics. Game Art students demonstrate these skills through the creation of art assets implemented into the numerous prototypes created throughout the program, showing (as recognized by N.A.S.A.D.) improvement over the years. Inherently, an understanding of tools and technology and their role in the creation of these art assets is reflected as described in Outcome D.

D. Outcome E, F:

Design choices are fundamentally grounded in an understanding of universal design practices and approaches. Through the study of Game Design History and the research of precedent games and their genres, students have shown a tremendous amount of skill in applying traditional theory and criticism to their assignments. While ‘entertainment’ is one of the biggest goals of any project undergone, special cases involving user accessibility and usability is always considered. Due to the requirement to release games on a public and digital distribution platform, Outcome F is exercised in a real-world way, requiring all students to treat each design choice as a business choice as well, in order to produce an effective product.

3. Assessment Plan for 2017-2018 Academic Year

During the 2017-18 AY the Game Art courses and their relationship with the sister program Game Software Development will be reviewed to ensure individual outcomes and course specific objectives are appropriate for both the N.A.S.A.D. related outcomes and expectations of the current state of the Game-related industry.

Mars Ashton is beginning his tenure-track role, and maintains his role as Director of the program. The Art and Design department as well as the College of Architecture and Design and the University have already provided ample amounts of support in the form of mentorship, direction, grant-funding and travel budget. He has exhibited and/or submitted his work at numerous peer-reviewed venues, including GDEX, Terminus, SXSW, IndieCade and more. He is also co-founder to the International Game Developers Association Ann Arbor branch, aiding in the spike of activity throughout the year in Michigan’s game development community. Mars annually judges the

Independent Games Festival for the Game Developers Conference as well, reviewing and nominating hundreds of independently created games.

The Game Art studio, A221 or “The Forge”, remains the go-to 24/7 spot for Game-related majors. The space is becoming too small to fit our growing programs, however, and discussions have taken place with Administration regarding expanding into the current Freshman studios, eventually creating new walls, expanding the current room and more. The studio will continue to host a number of charitable and development-oriented events such as the Forge Jam, Extra Life, organization events for Art Shop and Anime Club, and a studio space for Infinite Machine. Integration of the IGDA will take form as events highlighting developers in the area.

Further integration, clarity and support for the Game Software Development is underway as a search for a full-time Director role takes place.

BFA in Graphic Design

1. Assessment Plan and Summary

See Table 1 below. Listed here is an interpretation of the second column for Table 1:

N.A.S.A.D. Essential Competencies, Experiences, and Opportunities (ECEO) for design curriculums:

- a) N.A.S.A.D. Outcome A: The ability to conceive and to design visual communications and systems involving various integrations of the elements of professional practice outlined in outcomes B through H

- b) N.A.S.A.D. Outcome B: Understanding and use of basic visual communication principles and processes, including but not limited to:
 - Understanding of how communication theories, principles, and processes have evolved through history and the ability to use this knowledge to address various types of contemporary problems.
 - Understanding of and ability to develop strategies for planning, producing, and disseminating visual communications.
 - Functional knowledge of creative approaches, and the analytical ability to make appropriate, purpose-based choices among them, and to use such approaches to identify communication opportunities and generate alternative solutions.
 - Ability to plan the design process and construct narratives and scenarios for describing user experiences.
 - Fluency in the use of the formal vocabulary and concepts of design—including content, elements, structure, style, and technology—in response to visual communication problems. Studies in critical theory and semiotics are strongly recommended.
 - Ability to develop informed considerations of the spatial, temporal, and kinesthetic relationships among form, meaning, and behavior and apply them to the development of various types of visual communication design projects.
 - Ability to use typography, images, diagrams, motion, sequencing, color, and other such elements effectively in the contexts of specific design projects.

- c) N.A.S.A.D. Outcome C: Ability to incorporate research and findings regarding people and contexts into communication design decision-making, including but not limited to:
 - Ability to frame and conduct investigations in terms of people, activities, and their settings, including, but not limited to using appropriate methods for determining people’s wants, needs, and patterns of behavior, and developing design responses that respect the social and cultural differences among users of design in local and global contexts.
 - Understanding of design at different scales, ranging from components to systems and from artifacts to experiences.
 - Ability to exercise critical judgment about the student’s own design and the design of others with regard to usefulness, usability, desirability, technological feasibility, economic viability, and sustainability in terms of long-term consequences.

- d) N.A.S.A.D. Outcome D: Acquisition of collaborative skills and the ability to work effectively in interdisciplinary or multidisciplinary teams to solve complex problems.

- e) N.A.S.A.D. Outcome E: Understanding of and the ability to use technology, including but not limited to:
- Functional understanding of how to continue learning technology, recognizing that technological change is constant.
 - Ability to conduct critical evaluations of different technologies in specific design problem contexts, including the placement of technical issues in the service of human-centered priorities and matching relationships between technologies and the people expected to use them.
 - Functional capability to shape and create technological tools and systems to address communication problems and further communication goals.
 - Ability to recognize and analyze the social, cultural, and economic implications of technology on message creation and production and on human behavior, and to incorporate results into design decisions.
- f) N.A.S.A.D. Outcome F: Understanding of and ability to use basic research and analysis procedures and skills, including but not limited to:
- Acquisition of research capabilities and skills such as using databases, asking questions, observing users, and developing prototypes.
 - Ability to use analytical tools to construct appropriate visual representations in the execution of research activities.
 - Ability to interpret research findings practically and apply them in design development.
 - Ability to support design decisions with quantitative and qualitative research findings at various stages of project development and presentation.
- g) N.A.S.A.D. Outcome G: Functional knowledge of professional design practices and processes, including but not limited to professional and ethical behaviors and intellectual property issues such as patents, trademarks, and copyrights.
- h) N.A.S.A.D. Outcome H: Experience in applying design knowledge and skills beyond the classroom is essential. Opportunities for field research and experience, internships, collaborative programs with professional and industry groups, and international experiences are strongly recommended. Such opportunities to become oriented to the working profession should be supported through strong advising.

Table 1. Assessment Plan for B.F.A. in Graphic Design

LTU Undergraduate Learning Outcomes	N.A.S.A.D./ Program Outcomes	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing Timeline
<u>KNOWLEDGE IN DISCIPLINE</u> LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.	N.A.S.A.D. Outcome A N.A.S.A.D. Outcome F N.A.S.A.D. Outcome B	Review Form of Thesis Show in ART 4524 Review Form in response to ART 3513 Review Form in ART 3523 Thesis Book produced in ART 4622	70% of students receiving average of “Above Average” or equivalent cumulative score using Review Form for Presentation evaluation 70% of students receiving score of 70% or better	Spring Semester Fall Semester Spring Semester	Every third September starting in AY 2013-14
<u>TECHNOLOGY</u> LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.	N.A.S.A.D. Outcome B N.A.S.A.D. Outcome D	Final Research presentation in ART 4612 Final course project in ART 2813	70% of students scoring 70% or better 70% of students receive a score of 70% or higher	Fall Semester Every Semester	Every third September starting in AY 2014-15
<u>SUSTAINABILITY</u> LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.	N.A.S.A.D. Outcome B	Grade of mid-term writing assignment (Role of Designer in Society) in ART 4612	70% of students receive a score of 70% or higher	Fall Semester	Every third September starting in AY 2015-16
<u>COMMUNICATION</u> LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.	N.A.S.A.D. Outcome A N.A.S.A.D. Outcome C	Thesis Book produced in ART 4622 Review Form of final oral presentation in ART 4624	70% of students receive a score of 70% or higher 70% of students receiving average of “Above Average” or equivalent cumulative score using Review Form for Presentation evaluation	Spring Semester Spring Semester	Every third September starting in AY 2013-14
<u>MATHEMATICS</u> LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely, and reasoning logically.	N.A.S.A.D. Outcome A N.A.S.A.D. Outcome D N.A.S.A.D. Outcome F	Final grade in MCS 1254 Final course project in ART 2813 Completion of 150 hour internship in ART 4922	70% of students receive a score of 70% or higher 70% of students receive a score of 70% or higher 100% of students receive a score of 60% or higher	Fall Semester Fall Semester Fall Semester	Every third September starting in AY 2015-16

<u>READING</u> LTU graduate will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.	N.A.S.A.D. Outcome A N.A.S.A.D. Outcome E	Grade of Final Research presentation in ART 4514 Grade of final paper in ART 4612 and 4622			
<u>SCIENTIFIC ANALYSIS</u> LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.	N.A.S.A.D. Outcome B	Final Project in ART 3343	70% of students receive a score of 60% or higher	Every Semester	Every third September starting in AY 2014-15
<u>LEADERSHIP</u> LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.	N.A.S.A.D. Outcome B	Completion of Leadership sequence (LDR 2001, LDR 3000, LDR 4000)	80% of students receive passing grade in sequence	Every Semester	Every third September starting in AY 2014-15
<u>TEAMWORK</u> LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members' contributions.	N.A.S.A.D. Outcome B N.A.S.A.D. Outcome E	Grade of group-based project assigned in ART 4514 Successful completion of Thesis Exhibition in ART 4524	70% of students receive a score of 70% or higher 70% of students receive a score of 60% or higher	Every Fall Every Semester	Every third September starting in AY 2015-16
<u>ETHICS</u> LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.	N.A.S.A.D. Outcome f	Grade Final Reflective Essay in ART4922	70% of students receive a score of 70% or higher	Every Spring	Every third September starting in AY 2014-15

2. Report on 2016-2017 Academic Year and Action Plan (Loop-Closing)

KNOWLEDGE IN DISCIPLINE

Objective/Outcome: LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.

Assessment: Review Form of Thesis Show in ART 4524; Thesis Book produced in ART 4622

Evaluation: 70% of students receiving average of “Above Average” or equivalent cumulative score using; 70% of students scoring 70% or better

Issue: Based on final grades, students are demonstrating a general understanding of knowledge in discipline.

Current/Future Actions: To develop the understanding and application of these issues, students should be asked to address a practical and theoretical problem in their discipline. As defined by CoAD in spring 2017, undergraduate thesis foregrounds critical analysis of existing knowledge (compared to graduate-level thesis, which expands existing knowledge, and PhD-level thesis, which generates new knowledge). In Graphic Design Senior Thesis (ART 4524) and Senior Seminar (ART 4622), students develop self-directed projects and a written thesis that are informed by theory and research that demonstrates knowledge in discipline. These courses culminate in a public exhibition of their projects. For this final exhibition and project critique, industry professionals as well as members of the program’s advisory board were invited as guest critics, and evaluated projects verbally with students. The written thesis book produced in ART 4622 is also a performance indicator for knowledge in discipline.

Responsibility: Lilian Crum

COMMUNICATION

Objective/Outcome: LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.

Assessment: Thesis Book produced in ART 4622; final oral presentation in ART 4524

Evaluation: 70% of students receive a score of 70% or higher

Issue: Based on final grades, students are demonstrating an ability to communicate effectively.

Current/Future Actions: While students met the grade standard, professional-level written and oral communication tends to be a challenge. For this reason, ongoing efforts should be in place to continue to develop these skills. Beginning in the 2018-2019 academic year, students will undergo a portfolio review at the end of their sophomore year. As part of the review, they will be expected to present their work orally, and include writing as part of their portfolio. During a Graphic Design faculty retreat in summer 2017, faculty identified three categories of writing that should be embedded in studio courses: creative, reflective, and research-based. By embedding these forms of writing in studio courses, students should have more opportunity to develop these skills.

Responsibility: Lilian Crum

READING

Objective/Outcome: LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical abilities from an independent point of view.

Assessment: Grade of Final Research Presentation in ART 4514; Grade in of final paper in ART 4612 and 4622

Evaluation: 70% of students receive a score of 70% or higher; 70% of students receive a score of 70% or higher

Issue: Based on final grades, students are demonstrating an understanding of reading.

Current/Future Actions: To demonstrate proficiency in reading and interpreting text, students are asked to address a practical and theoretical problem in their discipline, and research and write about their findings. As defined by CoAD in spring 2017, undergraduate thesis foregrounds critical analysis of existing knowledge (compared to graduate-level thesis, which expands existing knowledge and PhD-level thesis, which generates new knowledge). In Senior Seminar 1 and 2, ART 4621 and ART 4622, students are required to lead a seminar discussion that is focused on a reading of their choice.

Additionally, they are required to embed external research in each of their written statements that accompany their creative project. By doing so, students will have more opportunity to develop these skills.

Responsibility: Lilian Crum

3. Assessment Plan for 2017-2018 Academic Year

TECHNOLOGY

LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.

The ability to apply advanced technologies to practical and theoretical problems is embedded in all studio courses. With technology rapidly developing, the advisory board for the program will be consulted to ensure that the technology being used is industry-standard and current. The use of technology will be evaluated at the book ends of the program: in Digital Foundations and Senior Thesis 1 and 2 to ensure that technology is introduced and used with increasing sophistication.

LEADERSHIP

LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.

Leadership skills are embedded throughout the curriculum, and will be evaluated by the successful completion of the leadership sequence (LDR 2001, LDR 3000, LDR 4000). Leadership skills will be reinforced throughout the curriculum; Graphic Design 3, in particular, has shifted focus onto human-centered research, civic engagement and activism. This course will be an opportunity for students to apply their leadership skills to design projects.

ETHICS

LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.

Ethical issues are embedded throughout the curriculum, and will be evaluated by the successful completion of an ART 3343 New Media paper, presentation and discussion. With most students taking New Media in their Junior or Senior years, the paper, presentation and discussion is an opportunity for students to respond to contemporary ethical issues in New Media. During the discussion, students are required to question other people's positions, thereby developing a critical point of view for a variety of outlooks and issues. Additionally, Graphic Design 3's shifted focus to human-centered design research, civic engagement and activism, will reinforce ethics during student's junior year.

BS in Industrial Design

1. Assessment Plan and Summary

The primary tool for assessment of the Industrial Design Program is the Project Evaluation Form, a rubric which combines the outcomes identified in NASAD guidelines as essential competencies with both faculty and professional performance assessments. This form replaces the previous ECEO document, has been improved, and is being modified to fit a spreadsheet format which all instructors will be required to use. Its implementation and cadence is outlined in Table 1 below.

Listed here is an interpretation of the second column for Table 1:

N.A.S.A.D. Essential Competencies, Experiences, and Opportunities (ECEO) for design curriculums:

- a) N.A.S.A.D. Outcome A: The ability to solve communication problems, including the skills of problem identification, research and information gathering, analysis, generation of alternative solutions, prototyping and user testing, and evaluation of outcomes.
- b) N.A.S.A.D. Outcome B: The ability to describe and respond to the audiences and contexts which communication solutions must address, including recognition of the physical, cognitive, cultural, and social human factors that shape design decisions.
- c) N.A.S.A.D. Outcome C: The ability to create and develop visual form in response to communication problems, including an understanding of principles of visual organization/composition, information hierarchy, symbolic representation, typography, aesthetics, and the construction of meaningful images.
- d) N.A.S.A.D. Outcome D: An understanding of tools and technology, including their roles in the creation, reproduction, and distribution of visual messages. Relevant tools and technologies include, but are not limited to, drawing, offset printing, photography, and time- based and interactive media (film, video, computer multimedia).
- e) N.A.S.A.D. Outcome E: An understanding of design history, theory, and criticism from a variety of perspectives, including those of art history, linguistics, communication and information theory, technology, and the social and cultural use of design objects.
- f) N.A.S.A.D. Outcome F: An understanding of basic business practices, including the ability to organize design projects and to work productively as a member of teams.
- g) N.A.S.A.D. Outcome G: Functional knowledge of professional design practices and processes, including but not limited to ethical behaviors and intellectual property issues such as patents, trademarks, and copyrights.
- h) N.A.S.A.D. outcome H: Knowledge of basic business practices and their relationship to industrial design as well as the ability to investigate and reconcile the needs related to entrepreneurship, marketing, engineering, manufacturing, servicing, and ecological and social responsibility in the process associated with specific design projects.
- i) N.A.S.A.D. Outcome I: Acquisition of collaborative skills and the ability to work effectively in interdisciplinary or multidisciplinary teams.

2 Table 1: Assessment Plan for BS in Industrial Design

LTU Undergraduate Learning Outcomes	N.A.S.A.D./ Program Outcomes	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing Timeline
<u>KNOWLEDGE IN DISCIPLINE</u> LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.	Outcome A	Thesis design project in IDD4516, IDD4526	70% of students receive a score of 65% or higher 65%	Semester	Annual
	Outcome E	Evaluation of design project in ATD4513, ATD3616, IDD3326	65% average on ECEO form		
	Outcome G	ECEO evaluation form in IDD3316, ATD3616, IDD3326, ATD3626	50% of students receive a score of 70% or higher		
<u>TECHNOLOGY</u> LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.	Outcome B	ECEO evaluation rubric coursework in IDD2215, IDD3316, IDD4516	50% of students receive a score of 70% or higher	Semester	Annual
	Outcome D	Professional critiques and industry assessment of design proposal.	70% of students receive a score of 75% or higher		
<u>SUSTAINABILITY</u> LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.	Outcome H	Evaluation of coursework in ATD3616 or IDD4516 using Sustainability rubric against course content. Content included in ATD 4513 coursework	50% of students receive a score of 65% or higher	Semester	Annual
<u>COMMUNICATION</u> LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.	Outcome B	Evaluation of coursework in each studio: IDD1114, IDD2214, IDD3316, IDD4516	70% of students will score 75% or higher on ECEO Form progressively tailored to course level	Semester	Annual
	Outcome F	Evaluation of coursework in each studio: IDD1124, IDD2224, IDD3326, IDD4526	70% students will score, on ECEO Form, pre-determined performance levels progressively tailored to course level published rubric.		

<p><u>MATHEMATICS</u> LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely, and reasoning logically.</p>	<p>Outcome A Outcome D Outcome E</p>	<p>Coursework in IDD2215 Coursework in IDD2225 Coursework in ATD4513</p>	<p>70% of students receive a score of 55% or higher 70% of students receive a score of 55% or higher 70% of students receive a score of 55% or higher</p>	<p>Semester</p>	<p>Annual</p>
<p><u>READING</u> LTU graduate will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.</p>	<p>Outcome A Outcome E</p>	<p>Coursework in ATD4524 Coursework in IDD372</p>	<p>70% of students receive a score of 65% or higher 70% of students receive a score of 65% or higher</p>	<p>Semester</p>	<p>Annual</p>
<p><u>SCIENTIFIC ANALYSIS</u> LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.</p>	<p>Outcome B Outcome E</p>	<p>Coursework in IDD3316 and IDD3326 Coursework in IDD3723</p>	<p>70% of students receive a score of 60% or higher</p>	<p>Semester</p>	<p>Annual</p>
<p><u>LEADERSHIP</u> LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.</p>	<p>Outcome I Outcome F</p>	<p>Coursework in IDD1113 and IDD1223 Coursework in ATD2832 Student exit interview and Alumni Survey</p>	<p>70% of students receive a score of 60% or higher Job placement and continued relationship with program</p>	<p>Semester</p>	<p>Annual</p>
<p><u>TEAMWORK</u> LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members' contributions.</p>	<p>Outcome B Outcome E</p>	<p>Coursework in IDD1113, and IDD1223 Coursework in ATD3616, and ATD3626</p>	<p>70% of students receive a score of 60% or higher 70% of students receive a score of 60% or higher</p>	<p>Semester</p>	<p>Annual</p>
<p><u>ETHICS</u> LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.</p>	<p>Outcome F</p>	<p>Ethics quiz in ATD4313</p>	<p>70% of students receive a score of 70% or higher</p>	<p>Semester</p>	<p>Annual</p>

IDD2226
SPRING2014

HG				
ND				
FE				
RM				
ZM				
KC				



IDD3316
FALL 2013

ML				
----	--	--	--	--



IDD3326
SPRING 2014

ML				
----	--	--	--	--



3. Assessment Plan for 2017-18 Academic Year

Loop-Closing continues for:

SCIENTIFIC ANALYSIS

Assessment: Coursework in ATD3616 and ATD3626 Coursework in IDD3723

ETHICS

Assessment: Ethics quiz (multiple choice) in ATD4513

TECHNOLOGY

Assessment: Using the PEF rubric evaluation form in ATD3616 and ATD3626

READING

Assessment: ATD4513 Professional Practice scoring of required reading book, individual test and team Presentations on book content.

MATHEMATICS

Assessment: ATD4513 Professional Practice Affinity Diagramming research activity, compilation and data Analysis. Coursework scoring.

BS in Interior Architecture**1. Assessment Plan and Summary**

See Table 1.

Table 1: Assessment Plan for BS in Interior Architecture

LTU Undergraduate Learning Outcomes	N.A.S.A.D./ Program Outcomes	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing Timeline
<u>KNOWLEDGE IN DISCIPLINE</u> LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.	CIDA Standards: ALL ARI 3113_Furniture and Millwork, ARI 3114_Interior Architecture 1, ARI 3123_Inter. Materials, Components, and Textiles, ARI 3124_Interior Architecture 2, ARI 4113_History of Interiors, ARI 4123_Environmental Psychology, ARI 4124_Interior Architecture 3, ARI 4223_Interior Design Practice, ARC 4234_Allied: Interior Design, ARI 4922_Internship	Class Assignments; Examinations; Design Projects; Documentation; Class Participation	Mean Results for Examinations; Internal and External Critique and Evaluation	Semester	Annual
<u>TECHNOLOGY</u> LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.	CIDA Standards: 12, 13	Class Assignments; Examinations; Design Projects; Documentation; Class Participation	Mean Results for Examinations; Internal and External Critique and Evaluation	Semester	Annual
<u>SUSTAINABILITY</u> LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.	CIDA Standards: 3, 12,13	Class Assignments; Design Projects incorporating Research and Documentation; Class Participation	Mean Results for Examinations; Internal and External Critique and Evaluation	Semester	Annual
<u>COMMUNICATION</u> LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.	CIDA Standards: 6, 7	Writing Assignments; Design Projects incorporating a Written and Graphic Analysis with Oral Presentations; Documentation; Class Participation	Mean Results for Exams; Internal and External Critique and Evaluation	Semester	Annual

<p><u>MATHEMATICS</u> LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely, and reasoning logically.</p>	CIDA Standards: 9, 12,	Class Assignments; Design Projects incorporating Mathematics of Proportion as it relates to Space and Form with physical models and Process Documentation; Class Participation 13	Mean Results for Exams; Internal and External Critique and Evaluation	Semester	Annual
<p><u>READING</u> LTU graduate will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.</p>	CIDA Standards: 2	Class Assignments; Examinations; Reading Assignments w/ Follow-up discussion; Documentation; Class Participation	Papers; Peer Evaluation for Group Discussions and Participation	Semester	Annual
<p><u>SCIENTIFIC ANALYSIS</u> LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.</p>	NA			Semester	Annual
<p><u>LEADERSHIP</u> LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.</p>	CIDA Standards: 2, 6, 7	Class Assignments; Design Projects; Documentation; Class Participation	Internal and External Critique and Evaluation; Peer Evaluation for Group Projects	Semester	Annual
<p><u>TEAMWORK</u> LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members' contributions.</p>	CIDA Standards: 5	Class Assignments; Group Design Projects; Documentation; Class Participation; Capstone Projects	Internal and External Critique and Evaluation; Peer Evaluation for Group Projects	Semester	Annual
<p><u>ETHICS</u> LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.</p>	CIDA Standards: 2, 7	Class Assignments; Group Design Projects; Documentation; Class Participation; Capstone Projects	Internal and External Critique and Evaluation; Peer Evaluation for Group Projects	Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop-Closing)

Outcome 1: Discipline Specific Knowledge

Objective: Student ability to understand and execute technical drawings and specifications for furniture and millwork is being addressed more specifically in ARI3124.

Assessment: Internal Critique and Evaluation

Evaluation: Analysis of student work to find evidence of understanding drawing standards and specifications within construction documents.

Evaluation: Student assignments.

Issue: Most students were able to execute specs and technical drawings.

Current/Future Actions: Specific class exercises are implemented to ensure students understand appropriate discipline specific conventions.

Responsibility: Program Director, faculty

University/College Support for Objective: NA

3. Assessment Plan for 2017-2018 Academic Year

1) *Current Loop-closing actions:*

Learning content was incorporated to offer additional opportunities to hone writing skills by the assignment of more specific reading assignments and class discussions targeted toward the development of conceptual ideas. Relevant quizzes including short essay questions were introduced for reading assignments to ensure the reading was completed.

Evidence was collected referencing standard 14. “Entry!level interior designers use laws, codes, standards, and guidelines that impact the design of interior spaces” for the mid-term accreditation report.

2) Actions that are to commence in the current year:

Collect student work and CoAD course documents for the next CIDA accreditation site visit in fall of 2020.

3) New assessment plans for the current year:

Outcome: Discipline-Specific Knowledge as it applies to CIDA 2017 Professional Standards

Actions: Student work collected for accreditation over the next two years evaluated for evidence of all discipline specific standards.

BS in Transportation Design**1. Assessment Plan and Summary**

See Table 1.

- A.** Ability to design products and systems, including but not limited to a foundational understanding of how products and systems are made; what makes them valuable; how they are developed, realized, and distributed; and how they are related to environmental and societal issues and responsible design.
- B.** Ability to use technologies and tools associated with multi-dimensional design representation, development, dissemination, and application.
- C.** Foundational knowledge of the history of industrial design, including but not limited to the influences of works and ideas on the evolution of design study and practice over time and across cultures.
- D.** Fundamental knowledge of user experience, human factors, applied ergonomics, contextual inquiry, user preference studies, and usability assessments.
- E.** Ability to research, define, and communicate about problems, variables, and requirements; conceptualize and evaluate alternatives; and test and refine solutions, including the ability to synthesize user needs in terms of value, aesthetics, and safety.
- F.** Ability to communicate concepts and specifications in verbal, written, and multiple media at levels ranging from abstraction and sketches, to detailed multi-dimensional, functional, and visual representations.
- G.** Functional knowledge of professional design practices and processes, including but not limited to ethical behaviors and intellectual property issues such as patents, trademarks, and copyrights.
- H.** Knowledge of basic business practices and their relationship to industrial design as well as the ability to investigate and reconcile the needs related to entrepreneurship, marketing, engineering, manufacturing, servicing, and ecological and social responsibility in the process associated with specific design projects.
- I.** Acquisition of collaborative skills and the ability to work effectively in interdisciplinary or multidisciplinary teams.
- J.** Opportunities for advanced undergraduate study in areas that intensify skills and concepts, and that deepen and broaden knowledge of the profession of industrial design.
- K.** Experience in applying design knowledge and skills beyond the classroom is essential. Opportunities for field research and experience, internships, collaborative programs with professional and industry groups, and international experiences are strongly recommended. Such opportunities to become oriented to the working profession should be supported through strong advising.

Table 1. Assessment Plan for BS in Transportation Design

LTU Undergraduate Learning Outcomes	N.A.S.A.D./ Program Outcomes	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing Timeline
<u>KNOWLEDGE IN DISCIPLINE</u> LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.	Outcome A	Review of senior design project in ATD 4516	70% of students receive an above average or higher rating	Semester	Annual
	Outcome C Outcome D	Review of portfolio finalized in ATD 4526	70% of students receive an above average or higher rating		
<u>TECHNOLOGY</u> LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.	Outcome B	Coursework evaluation in ATD 3716, ATD 3726, including professional critiques and assessment of design proposal.	70% of students receive a score of 75% or higher	Semester	Annual
<u>SUSTAINABILITY</u> LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.	Outcome H	Final grades in ATD 4513 and ATD 4524	70% of students receive a score of 75% or higher	Semester	Annual
<u>COMMUNICATION</u> LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.	Outcome F	Evaluation of coursework in ATD 4516 and ATD 4526	70% of students will score 75% or higher	Semester	Annual
	Outcome A Outcome C	Evaluation of coursework in ATD 3626 and ATD 4526	70% students will score above average or higher		

<u>MATHEMATICS</u> LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely, and reasoning logically.	Outcome E	Final grade in 8-credit sequence of Math Curriculum	70% of students receive a score of 70% or higher	Semester	Annual
<u>READING</u> LTU graduate will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.	Outcome A	Review of Final Project in ATD 4516	70% of students receive a score of 75% or higher	Semester	Annual
	Outcome F	Review of portfolio finalized in ATD 4526	70% of students receive a score of 65% or higher		
<u>SCIENTIFIC ANALYSIS</u> LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.	Outcome E Outcome I	ATD 4524	70% of students receive a score of 75% or higher	Semester	Annual
<u>LEADERSHIP</u> LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.	Outcome J	Completion of Leadership Sequence (LDR 2001, LDR 3000, LDR 4000)	80% of students receive a passing grade	Semester	Annual
<u>TEAMWORK</u> LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members' contributions.	Outcome E	Coursework and team project in ATD4513	70% of students receive a score of 75% or higher in teamwork	Semester	Annual
	Outcome I	Coursework in ATD 4516, ATD 4526	70% of students receive a score of 75% or higher		
<u>ETHICS</u> LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.	Outcome K Outcome J	Coursework in ATD 2832	70% of students will achieve a score of 70% or higher	Semester	Annual
	Outcome G	Coursework in ATD 4513	70% of students will achieve a score of 70% or higher		

2. Report on 2016-2017 Academic Year and Action Plan (Loop-Closing)

Knowledge in Discipline

Objective/Outcome: LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems..

Assessment: Review of senior design project in ATD 4516. Evaluation of portfolio finalized in ATD 4526.

Evaluation: 70% of students receive a score of 'above average' or higher

Issue: n/a

Current/Future Actions: Industrial Design Senior studios provide the basis for senior students to demonstrate their mastery of the discipline, which has been developed over the course of their studio-based curriculum. The student's portfolio, as finalized in ATD 4526, provides evidence the student has a deep and functional knowledge in all aspects of the discipline. These courses culminate in a public exhibition of their projects, in which industry professionals are invited to review and critique the work.

Responsibility: Keith Nagara

Technology

Objective/Outcome: LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.

Assessment: Coursework evaluation in ATD 3716, ATD 3726, including professional critiques and assessment of design proposal.

Evaluation: 70% of students receive a score of 75% or higher.

Issue: n/a

Current/Future Actions: Students receive extensive instruction within technology applications, and the Industrial Design program will continue to work with industry to insure that the design focus is relevant to the direction of growth.

Responsibility: Keith Nagara

Sustainability

Objective/Outcome: LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.

Assessment: Final grades in ATD 4513 Professional Practice and ATD 4524 Manufacturing Processes

Evaluation: 70% of students receive a score of 75% or higher

Issue: Based on final grades, students are demonstrating a general understanding of issues of sustainability.

Current/Future Actions: To continue to develop an understanding and application of issues, students are asked to address these considerations within the scope of their project. The performance indicator is a graded component of the project.

Responsibility: Keith Nagara

Communication

Objective/Outcome: LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.

Assessment: Evaluation of course work in ATD 3626, ATD 4516 and ATD 4526

Evaluation: 70% of students receive a score of 75% or higher.

Issue: n/a

Current/Future Actions: Student designers are required to develop their communication skills starting with their freshman studio and continuing on through senior year. Effective communication skills are honed individually by each student, in collaboration with the studio peers, instructors, and industry professionals who review the students work. Student work is analyzed in oral, written, and visual reviews, and critiques provide paths to improvement.

Responsibility: Keith Nagara

Mathematics

Objective/Outcome: LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely, and reasoning logically.

Assessment: Final grade in last required math course

Evaluation: 70% of students receive a score of 70% or higher

Issue: n/a

Current/Future Actions: Responsibility:

Keith Nagara

Reading

Objective/Outcome: LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view

Assessment: Review of senior design project in ATD 4516. Evaluation of portfolio finalized in IDD 4526. **Evaluation:** 70% of students receive a score of 75% or higher.

Issue: n/a

Current/Future Actions: Project related readings are individually assessed and analyzed within core studio courses as they relate to each student's particular project. Each student-designers ability to interpret the texts and to inform their research will be evaluated during each students project review.

Responsibility: Keith Nagara

Scientific Analysis

Objective/Outcome: LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.

Assessment: Course work within ATD 4524

Evaluation: 70% of students receive a score of 75% or higher.

Issue: n/a

Current/Future Actions: Student designers are tasked to apply analytical thinking and improve their problem solving skills within the scope of the curriculum.

Responsibility: Keith Nagara

Leadership

Objective/Outcome: LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.

Assessment: Completion of LTU Leadership sequence

Evaluation: 80% of students receive a passing grade.

Issue: n/a

Current/Future Actions: Student designers are encouraged and expected to take a leadership role in

development of their projects in each studio setting.

Responsibility: Keith Nagara

Teamwork

Objective/Outcome: LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members' contributions.

Assessment: Review of group-based project within ATD 4513. Successful project development and completion within ATD 4516, ATD 4526.

Evaluation: 70% of students receive a score of 75% or higher.

Issue: n/a

Current/Future Actions: Student designers are encouraged to collaborate in cross-functional projects, as well as in shared professional and educational experiences.

Responsibility: Keith Nagara

Ethics

Objective/Outcome: LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations and the social consequences of their ethical decisions. .

Assessment: Coursework within ATD 4513, and ATD 2832

Evaluation: 70% of students receive a score of 70% or higher.

Issue: n/a

Current/Future Actions: Students are expected to maintain a level of professionalism as mirrored to them through the actions of their instructors and coursework as presented.

Responsibility: Keith Nagara

3. Assessment Plan for 2017-2018 Academic Year

Continue to follow the assessment plan as outlined in Table 1.

Master of Urban Design

1. Assessment Plan and Summary

See Table 1 for the 2016-2017 Assessment Plan for the Master of Urban Design Program (MUD). This program started with the first cohort of students enrolled in courses in FA10. The MUD is a post baccalaureate Urban Design degree program with no professional accrediting body. Therefore, learning objectives and outcomes are developed and evaluated internally by the MUD Faculty Curriculum Committee, the Chair of Architecture, the Deans, and ultimately, the Office of the Provost. The MUD program is designed to develop advanced knowledge, skills, abilities, and experience in the growing field of healthy and sustainable urbanism.

Graduates with a degree in Urban Design can pursue careers as designers, planners, city managers, and policy makers in the public, private, and non-governmental organization sectors.

Table 1: Assessment Plan for MUD Program

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	Students will demonstrate the formation and application of advanced urban design concepts, principles, and tools through the exploration of the semester long projects in urban and architectural design.	ARC 5714/24 Final studio project Exit Interview	80% of students will participate in design studios and effectively communicate the advanced knowledge they have gained in their final studio project/review, which is evaluated by a consensus rubric	Exit interview conducted with each student who petitions to graduate	Every 3 yrs
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	Students will demonstrate the ability to use the latest technologies to collect, analyze and represent data.	ARC5752 Quantitative Methods in Urban Design -- midterm project	80% of students will successfully demonstrate ability on their midterm projects evaluated by a consensus rubric	Annual	Every 2 years
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	Students will understand diverse and emergent theories on ‘sustainability’ and demonstrate knowledge of how issues of sustainability translate to the scale, scope, complexity and governance models of the city, its urbanized region and associated ecosystem.	ARC5693 Sustainable Urbanism- final paper	80% of students will contribute, in their final paper, their own definition of ‘sustainable urbanism’ to the discipline and literature evaluated by a consensus rubric	Annual	Every 2 years
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	Students will gain specific communication skills to become proficient in the visualization of urban environments.	ARC 5742 Urban Design Methods-final paper	80% of students will present a comprehensive urban design alternatives scenario in graphic (digital) format	Annual	Every 2 years
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	Students will gain exposure to, and knowledge of, principles and practices of urban design in a public sector setting and in the context of the North American regulatory environment.	ARC 5912 Principles and Practices of Urban Design [Practicum] --internship performance Professional Advisory Board meetings	80% of students will receive positive evaluation by outside professionals (acting as internship supervisor)	Annual	Every 2 years

2. Report on 2016-2017 Academic Year and Action Plan (Loop-Closing)

All cohorts, except for two graduate ULOs, are too small to be meaningful due to the infancy of this program. Therefore, only two graduate ULO assessments are addressed below. Note that assessments were made during this academic year and will be combined with future data to provide meaningful loop closing. See appendix 4 for supporting documents.

G-2

- Objective/Outcome: Students will demonstrate ability to use the latest technologies to collect, analyze and represent data
- Assessment: ARC5752 Quantitative Methods in Urban Design – midterm project. 100% (11 of 11 students) successfully demonstrated ability on their midterm projects.
- Current/Future Actions: None indicated.
- Responsibility: Professor Joongsub Kim
- University/College Support for Objective: None indicated.

G-4

- Objective/Outcomes: Students will demonstrate specific communication skills to become proficient in the visualization of urban environments.
- Assessment: ARC5742 Urban Design Methods-final project. 100% (23 of 23 students) presented a comprehensive urban design alternatives scenario in a graphic (digital) format.
- Current/Future Actions: None indicated.
- Responsibility: Professor Joongsub Kim
- University/College Support for Objective: None indicated.

3. Assessment Plan for 2017-2018 Academic Year

The MUD plan used for the 2016-2017 assessment, found in Table 1, will be used for the 2017-2018 academic year.

College of Arts and Sciences***BS in Chemistry*****1. Assessment Plan and Summary**

This is the first year of our revised program assessment plan (see Table 1). The new plan was created based on Dr. Gloria Rogers' recommendation. The new plan has a three-year cycle; the first year is dedicated to data collection; the second year to refining the assessment plan; the third year to implementing changes for loop closing. The past academic year is the first year of the new plan.

Table 1: Assessment Plan for BS in Chemistry

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop-Closing Timeline
<p>KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	<p>Students must integrate the core concepts of physical chemistry: quantum mechanics, statistical thermodynamics, thermodynamics, transport, kinetics, and computational chemistry.</p> <p>Students must demonstrate knowledge of quantitative chemical analysis including wet chemical and instrumental techniques.</p> <p>Students must demonstrate knowledge of the structure and function of the four classes of biomolecules: proteins, nucleic acids, carbohydrates, and lipids.</p> <p>Students must demonstrate their ability to draw and name the major classes of organic molecules, explain how they react, how they are characterized, and demonstrate synthetic skills.</p> <p>Students must analyze and interpret new information on modern topics in inorganic chemistry, such as group theory, ligand field theory, x-ray crystallography, and organometallic chemistry.</p>	<p>ETS National Exam</p> <p>Evaluate exit exam results</p>	<p>60% of graduates score at or above national mean. (4 year running average)</p> <p>Alignment of curriculum with exit exam questions; identification of weak points</p>	<p>Every Semester</p>	<p>Annual</p>
<p>TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	<p>Students must individually and successfully use instrumentation and chemical literature available in the department. Includes analysis of unknown substances, student-synthesized materials, or natural samples.</p>	<p>Direct assessment of coursework w/ lab report rubric in CHM 3392, CHM 4632, CHM 4541, and CHM 3463.</p> <p>Course objectives survey in all CHM 2352, CHM 3463, and CHM 4632.</p>	<p>The designation of qualified/not qualified will be given. 80% will receive a “qualified” designation.</p>	<p>Every Semester</p>	<p>Annual</p>
<p>SUSTAINABILITY “LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and</p>	<p>Students will demonstrate an awareness of sustainability concepts within their chemistry-related senior project proposals.</p>	<p>Evaluation of Senior project proposal with project rubric in PSC 3001. Students will consider sustainability issues. relevant to their project, and document it in</p>	<p>80% “satisfactor” or “superior” performance.</p>	<p>Every Semester</p>	<p>Annual</p>

environmental needs of individuals and communities."		their proposal.			
<u>COMMUNICATION</u> "LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation."	Students will demonstrate professional standards in chemistry through written, oral, and graphical communication.	Direct assessment of student assignments with appropriate rubric CHM 3403. Direct assessment of student assignments with a project/lab report rubrics in CHM 4632. Evaluation of student presentations using oral presentation rubric in CHM 2332, CHM 4912, and 4922.	80% "satisfactory" or "superior" performance based on rubrics	Every Semester	Annual
<u>MATHEMATICS</u> "LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically."		LTU core curriculum.		Every Semester	Annual
<u>READING</u> "LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view."		LTU core curriculum.		Every Semester	Annual
<u>SCIENTIFIC ANALYSIS</u> "LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields."	Students will demonstrate critical thinking and apply analytical and problem-solving skills in chemistry.	Evaluation of student presentation of a paper from the literature to a panel of faculty and students as part of CHM4632, CHM 3463 or PSC 3001 with rubric. Completion of an independent research project or experiment with minimal assistance in CHM 4632, or CHM 3463 and/or CHM4912/4922.	80% "satisfactory" or "superior" performance by the senior year 80% "satisfactory" or "superior" performance by the senior year	Every Semester	Annual

<p><u>LEADERSHIP</u> “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>		<p>LTU Leadership Curriculum</p>		<p>Every Semester</p>	<p>Annual</p>
<p><u>TEAMWORK</u> “LTU graduates will demonstrate team- building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	<p>LTU graduates will demonstrate team- building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions towards solving analytic programs.</p>	<p>Instructor and team-self evaluation in CHM 4632, CHM 4541, CHM 3463. Likert scale of satisfaction will be used.</p>	<p>80% of responses with “always satisfied” or “frequently satisfied” to survey which will include peer evaluation.</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>PROFESSIONAL ETHICS</u> “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>	<p>Students will demonstrate an understanding of the ethical issues related to chemistry.</p>	<p>Ethics case study assignment or quiz in PSC 3001 in which Students will analyze an ethical situation and characterize and reflect the scientific misconduct involved.</p>	<p>80% “satisfactory” or “superior” performance.</p>	<p>Every Semester</p>	<p>Annual</p>

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

The last academic year was the first year for our updated program assessment cycle. In the first year, our efforts concentrated on collecting assessment data.

University Learning Outcomes: “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”

Program Learning Objective: Students must integrate the core concepts of physical chemistry: quantum mechanics, statistical thermodynamics, thermodynamics, transport, kinetics, and computational chemistry.

Students must demonstrate knowledge of quantitative chemical analysis including wet chemical and instrumental techniques.

Students must demonstrate knowledge of the structure and function of the four classes of biomolecules: proteins, nucleic acids, carbohydrates, and lipids.

Students must demonstrate their ability to draw and name the major classes of organic molecules, explain how they react, how they are characterized, and demonstrate synthetic skills.

Students must analyze and interpret new information on modern topics in inorganic chemistry, such as group theory, ligand field theory, x-ray crystallography, and organometallic chemistry.

Assessment Tool 1: ETS National Exam

Metrics: 60% of graduates score at or above national mean. (4 year running average)

Evaluation/Issue 1: The two year rolling average (2015-2017) has 3 out of 8 students, 37.5%, above the national mean.

Actions 1:

Responsibility: Department Chair

Assessment Tool 2: Evaluate exit exam results

Metrics: 60% of graduates score at or above national mean. (4 year running average)

Evaluation/Issue 2:

Action 2:

Responsibility:

University Learning Outcomes: “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”

Program Learning Objective: Students must individually and successfully use instrumentation and chemical literature available in the department. Includes analysis of unknown substances, student-synthesized materials, or natural samples.

Assessment Tool 1: Direct assessment of coursework w/ lab report rubric

Metrics: 80% will receive a “qualified” designation

Evaluation/Issue 1: 2 out of 3 students received qualified designation

Actions 1:

Responsibility: CHM3463

Assessment Tool 2: Course objectives survey

Metrics: 80% “confident” and “very confident” overall of their mastery of the course objectives

Evaluation/Issue 2: In 9 out of 12 survey questions, all students reported either confident or very confident; in each of the 3 remaining questions, only 1 student reported little confident, the others either confident or very confident

Actions 2:

Responsibility: CHM3463

University Learning Outcomes: “LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.”

Program Learning Objective: 80% of responses with “always satisfied” or “frequently satisfied” to survey which will include peer evaluation

Assessment Tool 1: Evaluation of Senior project proposal with project rubric in PSC 3001. Students will consider sustainability issues relevant to their project, and document it in their proposal.

Metrics: 80% “satisfactory” or “superior” performance

Evaluation/Issue 1: Based on the rubric used to evaluate senior project proposals, the one chemical biology major was rated as “superior”.

Actions 1:

Responsibility:

University Learning Outcomes: “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”

Program Learning Objective: Students will demonstrate professional standards in chemistry through written, oral, and graphical communication.

Assessment Tool 1: Direct assessment of student assignments with appropriate rubric (CHM3403)

Metrics: 80% “satisfactory” or “superior” performance based on rubrics

Evaluation/Issue 1: Based on the rubric used to evaluate written reports, 9 students (82%) were rated as “superior”, 0 students were rated as “satisfactory”, and 2 students (18%) were rated as “unsatisfactory”. Based on the rubric used to evaluate oral presentations, 6 students (55%) were rated as “superior” and 5 students (45%) were rated as “satisfactory”.

This semester I had 11 students enrolled in this course. The written reports and oral presentations were based on biochemistry-related news articles and related journal articles found by students based on their interests. A wide variety of topics were discussed and through indirect assessment it was evident that the students found this to be a worthwhile activity.

Actions 1: Next time I will more strongly encourage students who struggle with the English language to visit the AAC for help in editing their written reports prior to submission.

Responsibility: Shannon Timmons

Assessment Tool 2: Evaluation of student presentations using oral presentation rubric (CHM4912/4922), Shannon Timmons

Metrics: 80% “satisfactory” or “superior” performance based on rubrics

Evaluation/Issue 2: Shannon Timmons: Based on the departmental rubric used to evaluate oral presentations, one student was rated as “satisfactory” and two students were rated as “superior”.

Actions 2: Shannon Timmons: Next time I have a student who struggles with written English, I will more strongly recommend that they visit the AAC for writing assistance early and often.

Responsibility: CHM4912/4922 instructor

Assessment Tool 3: Evaluation of student presentations using oral presentation rubric (CHM2332)

Metrics: 80% “satisfactory” or “superior” performance based on rubrics

Evaluation/Issue 3: Based on the rubric used to evaluate oral presentations, 2 student pairs (40%) were rated as “superior” and 3 student pairs (60%) were rated as “satisfactory”.

This semester I initially had 11 students enrolled in this course. One student stopped attending and received a WF grade. The oral presentations assessed in this course were based on the presentation and analysis of results from a brand-new course-based research experience focused on the synthesis of aspirin analogs. Based on indirect assessment data, students greatly enjoyed the research experience and reported that this research project helped them to better understand the research process in organic

chemistry and also when to employ different techniques that they had learned throughout the semester in an authentic research-related setting.

Actions 3: I plan to expand this refine this course-based research experience based on the initial very positive assessment data I have received and hope to eventually publish the results of this research endeavor

Responsibility: CHM2332 instructor

University Learning Outcomes: “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”

Program Learning Objective: Students will demonstrate critical thinking and apply analytical and problem-solving skills in chemistry.

Assessment Tool 1: Completion of an independent research project or experiment with minimal assistance (CHM4912/4922)

Metrics: 80% “satisfactory” or “superior” performance by the senior year

Evaluation/Issue 1: Shannon Timmons: This semester I had three students enrolled in Chemical Sciences Project 2. These three students met all the metrics related to independent research. Two students received “satisfactory” ratings with respect to working independently and efficiently in the laboratory, while one students exceeded my expectations and was rated as “superior”.

Actions 1: I would like to be able to spend even more of my time in the research laboratory with students; however, faculty are stretched thin with heavy teaching loads and many other service-related responsibilities. To improve this situation, the administration should provide lower course loads for faculty with very active research agendas to ensure that students are better served, additional grants are submitted, and more journal articles are published.

Responsibility: CHM4912/4922 Instructor

Assessment Tool 2: Evaluation of student presentation of a paper from the literature to a panel of faculty and students (CHM3463)

Metrics: 80% “satisfactory” or “superior” performance by the senior year

Evaluation/Issue 2: Students presented their work to a panel of students and faculty. Students have rehearsed and presented to instructor prior to formal presentation and the presentation is reported as having been superior.

Actions 2:

Responsibility:

Assessment Tool 3: Completion of an independent research project or experiment with minimal assistance (CHM3463)

Metrics: 80% “satisfactory” or “superior” performance by the senior year

Evaluation/Issue 3: 2 students out of 3 earned a superior rating and the third student was unable to complete the task due to a sport injury.

Actions 3:

Responsibility:

Assessment Tool 4: Students will demonstrate critical thinking and apply analytical and problem-solving skills in chemistry. (PSC3001)

Metrics: 80% “satisfactory” or “superior” performance by the senior year

Evaluation/Issue 4: This class is taken in the junior year and doesn’t involve a presentation of a paper from the literature to a panel of faculty and students. This line needs to be removed entirely or evaluated in a course in the student’s senior year.

Actions 4:

Responsibility: PSC3001 Instructor

University Learning Outcomes: “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”

Program Learning Objective: LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions towards solving analytic programs.

Assessment Tool 1: Instructor and team-self evaluation (CHM3463)

Metrics: 80% of responses with “always satisfied” or “frequently satisfied” to survey which will include peer evaluation

Evaluation/Issue 1: In 7 out of 16 survey questions, students reported good or excellent.

Actions 1:

Responsibility:

University Learning Outcomes: “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”

Program Learning Objective: Students will demonstrate an understanding of the ethical issues related to chemistry.

Assessment Tool 1: Ethics case study assignment or quiz in PSC 3001 in which students will analyze an ethical situation and characterize and reflect the scientific misconduct involved.

Metrics: 80% “satisfactory” or “superior” performance

Evaluation/Issue 1: Based on the ethics case study assignment results, the one chemical biology major was rated as “superior”.

Actions 1: The ethics portion of the class could easily be expanded to include more topics and case studies.

Responsibility: PSC 3001 Instructor

During this period of time, data from pre-selected courses/tests were gathered. Faculty members of the Chemistry program have met to review the data. Several issues have been identified:

- The ETS exams and exit exams don’t generate consistent results because students do not take those exams seriously; which make them unsuitable for the purpose of assessment.
- Some learning outcomes are assessed multiple times. For example, the learning outcome of critical thinking was assessed in four different courses, which the faculty members deem redundant.
- The enrollment numbers of some courses were very small, which was subject to large fluctuation. It is the faculty members’ consensus to use multi year average instead.

3. Assessment Plan for 2017-2018 Academic Year

In the 17-18 academic year, we will

- continue the existing assessment plan for our own degree programs. In the second year, we will focus on reviewing data collected so far, and make necessary modification to the assessment plan.
- devise a separate assessment plan for the new University Undergraduate Education Outcomes. Courses have been selected, and assessment cycle has been planned; however, more details, such as assessment instruments to use, metric to be adopted, have not yet been determined.
- The department chair will call for department working meetings to address those issues; and the assessment representative will facilitate the meetings by providing assessment data, and coordinating communication between the department and the UAC.

BS in Computer Science

1. Assessment Plan and Summary

See Table 1.

The BS in Computer Science program has 10 learning objectives.

1. Apply knowledge of computing and mathematics appropriate to the discipline.
2. Analyze a problem, and identify and define the computing requirements appropriate to its solution.
3. Design, implement, and evaluate a computer-based system, process, component, or program to meet its specified requirements.
4. Function effectively on teams to accomplish a common goal.
5. Plan, create and integrate oral and written communication of [mathematical and algorithmic ideas] effectively to audiences having a range of technical understanding.
6. Analyze the local and global impact of computing on individuals, organizations, and society.
7. Recognize the need for and engage in continuing professional development [and learn new technologies] and adapt to changes in the field.
8. Apply current techniques, skills, and tools necessary for computing practice.
9. Secure employment and/or attend graduate school in their field, drawing on their experiences, both within and outside the major to become responsible citizens and effective professionals
10. Display a complete understanding of a computer language (syntax, semantics and terminology), develop and debug complex code.

Table 1: Assessment Plan for BS in Computer Science

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop Closing Timeline
<p><u>KNOWLEDGE IN DISCIPLINE</u> “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	<p>Apply knowledge of computing and mathematics appropriate to the discipline. (1)</p> <p>Display a complete understanding of a computer language (syntax, semantics and terminology), develop and debug complex code. (10)</p> <p>Apply current techniques, skills, and tools necessary for computing practice. (8)</p>	<p>Direct assessment of standard questions on final exams in MCS1514 and MCS2514 core courses (CS)</p>	<p>Need metrics and indicators</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>TECHNOLOGY</u> “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	<p>Design, implement, and evaluate a computer-based system, process, component, or program to meet its specified requirements. (3)</p>	<p>Direct Assessment of Senior Project oral and written reports</p>	<p>75% of Senior Projects receive Level 3 out of 4 on BOTH oral report rubric and written report rubric</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>SUSTAINABILITY</u> "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."</p>	<p>Recognize the need for and engage in continuing professional development [and learn new technologies] and adapt to changes in the field. (7)</p>	<p>Alumni Survey</p>	<p>75% of students achieve Level 3 (out of 4) on Survey Rubric</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>COMMUNICATION</u> “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	<p><i>Plan, create and integrate</i> oral and written communication of [mathematical and algorithmic ideas] effectively to audiences having a range of technical understanding. (5)</p>	<p>Direct assessment of Senior Project oral and written reports</p> <p>WPE</p>	<p>Level 3 on oral and written rubrics</p> <p>Pass WPE</p>	<p>Every Semester</p>	<p>Annual</p>

<u>MATHEMATICS</u> “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”	Analyze a problem, and identify and define the computing requirements appropriate to its solution. (1)	Direct assessment of standard questions on final exams in three MCS core courses (Math)	75% of students score 70% or higher on final exam questions mapped to Course Learning Objectives (Metric for each of the three courses)	Every Semester	Annual
<u>READING</u> “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”	Plan, create and integrate oral and written communication of [mathematical and algorithmic ideas] effectively to audiences having a range of technical understanding. (5)	Direct assessment in SSC2413, SSC2423, LLT1213, LLT1223 and LLT/SSC Jr/Sr Elective	Use metrics provided by HSSC Department	Every Semester	Annual
<u>SCIENTIFIC ANALYSIS</u> “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”	Analyze a problem, and identify and define the computing requirements appropriate to its solution. (2)	Direct assessment of standard questions on final exams in CHM1213, CHM1223, PHY2413, PHY2423, BIO1213, and BIO1223	75% of students score 70% or higher on final exam questions mapped to Course Learning Objectives (Metric for each of the six courses)	Every Semester	Annual
<u>LEADERSHIP</u> “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”	Analyze the local and global impact of computing on individuals, organizations, and society. (6)	Alumni Survey	75% of students achieve Level 3 (out of 4) on Survey Rubric	Every Semester	Annual
<u>TEAMWORK</u> “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”	Function effectively on teams to accomplish a common goal. (4)	Alumni Survey	75% of students achieve Level 3 (out of 4) on Survey Rubric	Every Semester	Annual
<u>PROFESSIONAL ETHICS</u> “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”	Secure employment and/or attend graduate school in their field, drawing on their experiences, both within and outside the major to become responsible citizens and effective professionals. (9)	Alumni Survey	75% of students achieve Level 3 (out of 4) on Survey Rubric	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

- *Objective/Outcome:* Apply knowledge of computing and mathematics appropriate to the discipline. (1)
- *Assessment:* Direct assessment of final exam questions in MCS1514 (Computer Science 1) and MCS 2514 (Computer Science 2)
- *Evaluation:* For MCS2514, students averaged 70% or above on all 11 course objectives. For MCS1514 students averaged 70% or above on only 6 course objectives in Fall 2016 and on 4 course objectives in Spring 2017 (out of 14 total objectives).
- *Issue:* In both Fall 2016 and Spring 2017 students averaged below 70% on the following course objectives: input/output, user defined data types, arrays and strings, pointers and classes, and recursion. The objective on object-oriented programming was not assessed in either semester in the Final Exam.
- *Current/Future Actions:* The MCS Department Chair emailed CS faculty teaching MCS1514 and MCS2514 the results of the assessment and asked them to “pay attention” to trends of student performance on the final exams.
- *Responsibility:* Prof. Azar, Computer Science 1 and 2 Coordinator
- *University/College Support for Objective:* More full-time CS faculty are needed to be hired so that more sections of MCS1514 may be taught by full-time faculty.

- *Objective/Outcome:* Function effectively on teams. (4)
- *Assessment:* Alumni Survey
- *Evaluation:* Only 2 out of the 8 students surveyed responded that working in groups was highly effective.
- *Issue:* There was not really enough data from the 2017 Survey to draw any significant conclusions.
- *Current/Future Actions:* Survey data from 2019 will be compared to 2017 data to determine if there has been any change in the effectiveness of teamwork.
- *Responsibility:* Prof. Chung, Alumni Survey Coordinator
- *University/College Support for Objective:* Current support is sufficient.

- *Objective/Outcome:* Analyze the local and global impact of computing. (6)
- *Assessment:* Graduating Student Survey
- *Evaluation:* The average score on the “how LTU prepared you for leadership” question was 3.79 (with max of 5.0 for superior).
- *Issue:* This is down from the result from the 2015-6 Survey.
- *Current/Future Actions:* The Leadership Curriculum is currently being modified in the College of Arts and Sciences.
- *Responsibility:* Prof. Cartwright, Math/CS Assessment Coordinator
- *University/College Support for Objective:* College may help provide data from the Pathways courses to each of the Departments.

- *Objective/Outcome:* Engage in continuing professional development. (7)
- *Assessment:* Alumni Survey
- *Evaluation:* No question on the Alumni Survey directly addressed this outcome.
- *Issue:* A different metric needs to be used to assess this outcome.
- *Current/Future Actions:* Identify a different tool to assess this outcome.
- *Responsibility:* CS faculty
- *University/College Support for Objective:* N/A
- *Objective/Outcome:* Apply current techniques for computing practice. (8)

- *Assessment:* Direct assessment of final exam questions in MCS1514 (Computer Science 1) and MCS 2514 (Computer Science 2)
 - *Evaluation:* For MCS2514, students averaged 70% or above on all 11 course objectives. For MCS1514 students averaged 70% or above on only 6 course objectives in Fall 2016 and on 4 course objectives in Spring 2017 (out of 14 total objectives).
 - *Issue:* In both Fall 2016 and Spring 2017 students averaged below 70% on the following course objectives: input/output, user defined data types, arrays and strings, pointers and classes, and recursion. The objective on object-oriented programming was not assessed in either semester in the Final Exam.
 - *Current/Future Actions:* The MCS Department Chair emailed CS faculty teaching MCS1514 and MCS2514 the results of the assessment and asked them to “pay attention” to trends of student performance on the final exams.
 - *Responsibility:* Prof. Azar, Computer Science 1 and 2 Coordinator
 - *University/College Support for Objective:* More full-time CS faculty are needed to be hired so that more sections of MCS1514 may be taught by full-time faculty.
-
- *Objective/Outcome:* Become effective professionals. (9)
 - *Assessment:* Alumni Survey
 - *Evaluation:* 7 out of 10 graduating students had full-time jobs or were continuing their education as a full-time student. The other 3 were underemployed.
 - *Issue:* 70% is lower than the target of 75% for this objective.
 - *Current/Future Actions:* Encourage graduating students to take greater advantage of Career Services through LTU in attempting to secure employment.
 - *Responsibility:* Prof. Nelson, MCS Department Chair
 - *University/College Support for Objective:* Career Services at LTU
-
- *Objective/Outcome:* Develop and debug complex code. (10)
 - *Assessment:* Direct assessment of final exam questions in MCS1514 (Computer Science 1) and MCS 2514 (Computer Science 2)
 - *Evaluation:* For MCS2514, students averaged 70% or above on all 11 course objectives. For MCS1514 students averaged 70% or above on only 6 course objectives in Fall 2016 and on 4 course objectives in Spring 2017 (out of 14 total objectives).
 - *Issue:* In both Fall 2016 and Spring 2017 students averaged below 70% on the following course objectives: input/output, user defined data types, arrays and strings, pointers and classes, and recursion. The objective on object-oriented programming was not assessed in either semester in the Final Exam.
 - *Current/Future Actions:* The MCS Department Chair emailed CS faculty teaching MCS1514 and MCS2514 the results of the assessment and asked them to “pay attention” to trends of student performance on the final exams.
 - *Responsibility:* Prof. Azar, Computer Science 1 and 2 Coordinator
 - *University/College Support for Objective:* More full-time CS faculty are needed to be hired so that more sections of MCS1514 may be taught by full-time faculty.

3. Assessment Plan for 2017-2018 Academic Year

1) Loop-closing actions for 2017-8:

- Identify a different assessment tool to measure the outcome of “continuing professional development.”

- Encourage graduating students to take greater advantage of Career Services through LTU in attempting to secure employment.
- 2) There are 10 program outcomes for the BS in Computer Science. Seven of these outcomes were assessed in 2016-7 (including three outcomes also assessed in 2015-6). The remaining three outcomes will be assessed in 2017-8. All 10 program outcomes will be assessed over a three year cycle.

Assessment will begin in Fall 2017 for MCS1142 Introduction to C and in Spring 2018 for MCS2523 Discrete Math and MCS4623 Software Engineering.

3) New assessment plans for 2017-8:

- *Objective/Outcome:* Analyze a Problem (2)
- *Actions:* Data will be collected from the Natural Sciences Department

- *Objective/Outcome:* Design, implement, and evaluate a computer-based system (3)
- *Actions:* Data will be collected from Senior Project

- *Objective/Outcome:* Plan, create, and integrate oral and written communication (5)
- *Actions:* Data will be collected from the HSSC Department

BA in English and Communication Arts

1. Assessment Plan and Summary

(see Table 1: Assessment Matrix below.)

Table 1: Assessment Plan for B.A. English and Communication Arts

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop-Closing Timeline
<u>KNOWLEDGE IN DISCIPLINE</u> “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”	Students can perform in an exceptional manner in the two internships required in the degree.	Internship reports by on-site supervisors	Satisfactory interviews with supervisors.	Annual	Annual
	Students can identify the distinguishing cultural, historical and social attributes of literary periods and gauge the influence of these attributes on the works at hand.	Papers in Jr.Sr. electives reviewed by industry rep.	Rubric to be developed	Annual	Annual
	Students can write compelling works in more than one of the following genres: poems, short stories, creative non-fiction, novels, screenplays, theatrical drama, television scripts, radio scripts, electronic media, game narrative.	Creative writing portfolio	Rubric scored by outside writer.	Annual	Annual
<u>TECHNOLOGY</u> “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”	Students can write and edit technical documents.	Grade in Tech Editing; Rubric scored by graduate students cross-listed in the course	Grade of B and above.	Annual	Annual
<u>SUSTAINABILITY</u> "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."					
<u>COMMUNICATION</u> “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”	Students can deliver effective oral presentations. Students achieve university-level competency in academic and professional prose styles.	Rubric in Speech class. Papers in Jr.Sr. electives reviewed by industry rep.	Rubric	Annual	Annual

<p><u>MATHEMATICS</u> “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>					
<p><u>READING</u> “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>	<p>Students can identify the distinguishing cultural, historical and social attributes of literary periods and gauge the influence of these attributes on the works at hand.</p>	<p>Papers in Jr.Sr. electives reviewed by industry rep</p>	<p>Rubric</p>	<p>Annual</p>	<p>Annual</p>
<p><u>SCIENTIFIC ANALYSIS</u> “LTU graduates will demonstrate critical thinking and apply analytical and problem- solving skills in scientific fields.”</p>					
<p><u>LEADERSHIP</u> “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>					
<p><u>TEAMWORK</u> “LTU graduates will demonstrate team- building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>					
<p><u>PROFESSIONAL ETHICS</u> “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>					

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

Learning Objective 1: Students can perform in an exceptional manner in the two internships required in the degree.

Assessment: Exit report completed by internship supervisor

Evaluation: Student evaluated as ‘excellent’ in showing initiative, problem-solving skills, verbal communication, written communication, positive attitude, discipline, and commitment to fulfilling responsibilities.

Issue: Only one student completed an internship. A non-numeric rubric was used to evaluate the student’s performance.

Actions: Convert rubric to numeric scoring; next loop closing scheduled for Summer 2020

Responsibility: LLT faculty

University/College Support for Objective: N/A

Learning Objective 3: Students can write compelling works in more than one of the following genres: poems, short stories, creative non-fiction, novels, screenplays, theatrical drama, television scripts, radio scripts, electronic media, game narrative.

Assessment: Average scores as follows:

Fiction: Imagery: 4.25; Characterization: 4; Plot and Conflict: 3.75; Pacing and Structure: 4; Setting: 3; Dialogue: 4; Point of View: 3.75

Poetry: Imagery: 4.75; Line, Rhythm, and Compression: 4.75; Language and Metaphor: 4.5; Structure: 4.25; Clarity: 5

Evaluation: Overall average: Fiction = 3.82; Poetry = 4.65; Threshold met

Issue: Only one BAECA student enrolled in the course, thus data are very limited.

Actions: Program curriculum currently under by HSSC faculty; next loop closing scheduled Summer 2020.

Responsibility: LLT faculty

University/College Support for Objective: N/A

3. Assessment Plan for 2017-2018

- 1) Continue to collect data (formal papers from SSC and LLT courses)
- 2) Loop-closing of Learning Objectives 4 and 6
- 3) Develop rubrics as needed (see Table 1)
- 4) HSSC faculty are currently drafting a proposal for a new degree program (BS in Liberal Arts). Should it be approved, this degree program will replace the BA in English and Communication Arts and the BS in Humanities degrees. To that end, Learning Objectives and an Assessment plan will be devised by HSSC faculty in the LLT and SSC divisions.

BS in Environmental Chemistry

1. Assessment Plan and Summary

This is the first year of our revised program assessment plan (see Table 1). The new plan was created based on Dr. Gloria Rogers' recommendation. The new plan has a three-year cycle; the first year is dedicated to data collection; the second year to refining the assessment plan; the third year to implementing changes for loop closing. The past academic year is the first year of the new plan.

Table 1: Assessment Plan for BS in Environmental Chemistry

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop-Closing Timeline
<p>KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	<p>Students must integrate the core concepts of physical chemistry: quantum mechanics, statistical thermodynamics, thermodynamics, transport, kinetics, and computational chemistry.</p> <p>Students must demonstrate knowledge of quantitative chemical analysis including wet chemical and instrumental techniques.</p> <p>Students must demonstrate knowledge of atmospheric, soil, and water chemistry.</p> <p>Students must demonstrate knowledge of the structure and function of the four classes of biomolecules: proteins, nucleic acids, carbohydrates, and lipids.</p> <p>Students must demonstrate their ability to draw and name the major classes of organic molecules, explain how they react, how they are characterized, and demonstrate synthetic skills.</p> <p>Students must analyze and interpret new information on fundamental topics in inorganic chemistry, such as structures, bonding, and descriptive chemistry of compounds containing main group and transition elements.</p>	<p>ETS National Exam</p> <p>Evaluate exit exam results</p>	<p>60% of graduates score at or above national mean. (4 year running average)</p> <p>Alignment of curriculum with exit exam questions; identification of weak points</p>	<p>Every Semester</p>	<p>Annual</p>
<p>TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	<p>Students must individually and successfully use instrumentation and chemical literature available in the department. Includes analysis of unknown substances, student-synthesized materials, or natural samples.</p>	<p>Direct assessment of coursework w/ lab report rubric in CHM 3392, CHM 4632, CHM 4541, and CHM 3463. Course objectives survey in all CHM 2352, CHM 3463, and CHM 4632.</p>	<p>80% will receive a “qualified” designation 80% “confident” and “very confident” overall of their mastery of the course objectives.</p>	<p>Every Semester</p>	<p>Annual</p>

<p><u>SUSTAINABILITY</u> "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."</p>	<p>Students will demonstrate an awareness of sustainability concepts within their chemistry-related senior project proposals.</p>	<p>Evaluation of Senior project proposal with project rubric in PSC 3001. Students will consider sustainability issues relevant to their project, and document it in their proposal.</p>	<p>80% "satisfactory" or "superior" performance.</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>COMMUNICATION</u> "LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation."</p>	<p>Students will demonstrate professional standards in environmental chemistry through written, oral, and graphical communication.</p>	<p>Direct assessment of student assignments with appropriate rubric CHM 3403. Direct assessment of student assignments with a project/lab report rubrics in CHM 4632. Evaluation of student presentations using oral presentation rubric in CHM 2332, CHM 4912, and 4922.</p>	<p>80% "satisfactory" or "superior" performance based on rubrics</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>MATHEMATICS</u> "LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically."</p>		<p>LTU core curriculum.</p>		<p>Every Semester</p>	<p>Annual</p>
<p><u>READING</u> "LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view."</p>		<p>LTU core curriculum.</p>		<p>Every Semester</p>	<p>Annual</p>
<p><u>SCIENTIFIC ANALYSIS</u> "LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields."</p>	<p>Students will demonstrate critical thinking and apply analytical and problem-solving skills in chemistry.</p>	<p>Evaluation of student presentation of a paper from the literature to a panel of faculty and students as part of CHM4632, CHM 3463 or PSC 3001 with rubric. Completion of an independent research project or experiment with minimal assistance in CHM 4632, or CHM 3463 and/or CHM4912/4922.</p>	<p>80% "satisfactory" or "superior" performance by the senior year 80% "satisfactory" or "superior" performance by the senior year</p>	<p>Every Semester</p>	<p>Annual</p>

<p><u>LEADERSHIP</u> “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>	<p>LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions towards solving analytic programs.</p>	<p>Instructor and team-self evaluation in CHM 4632, CHM 4541, CHM 3463. Likert scale of satisfaction will be used.</p>	<p>80% of responses with “always satisfied” or “frequently satisfied” to survey which will include peer evaluation.</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>TEAMWORK</u> “LTU graduates will demonstrate team- building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	<p>Students will demonstrate an understanding of the ethical issues related to chemistry.</p>	<p>Ethics case study assignment or quiz in PSC 3001 in which Students will analyze an ethical situation and characterize and reflect the scientific misconduct involved.</p>	<p>80% “satisfactory” or “superior” performance.</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>PROFESSIONAL ETHICS</u> “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>		<p>Ethics case study assignment or quiz in PSC 3001</p>	<p>80%“satisfactor” or “superior” performance.</p>	<p>Every Semester</p>	<p>Annual</p>

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

The last academic year was the first year for our updated program assessment cycle. In the first year, our efforts concentrated on collecting assessment data.

University Learning Outcomes: “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”

Program Learning Objective: Students must integrate the core concepts of physical chemistry: quantum mechanics, statistical thermodynamics, thermodynamics, transport, kinetics, and computational chemistry.

Students must demonstrate knowledge of quantitative chemical analysis including wet chemical and instrumental techniques.

Students must demonstrate knowledge of the structure and function of the four classes of biomolecules: proteins, nucleic acids, carbohydrates, and lipids.

Students must demonstrate their ability to draw and name the major classes of organic molecules, explain how they react, how they are characterized, and demonstrate synthetic skills.

Students must analyze and interpret new information on modern topics in inorganic chemistry, such as group theory, ligand field theory, x-ray crystallography, and organometallic chemistry.

Assessment Tool 1: ETS National Exam

Metrics: 60% of graduates score at or above national mean. (4 year running average)

Evaluation/Issue 1: The two year rolling average (2015-2017) has 3 out of 8 students, 37.5%, above the national mean.

Actions 1:

Responsibility: Department Chair

Assessment Tool 2: Evaluate exit exam results

Metrics: 60% of graduates score at or above national mean. (4 year running average)

Evaluation/Issue 2:

Action 2:

Responsibility:

University Learning Outcomes: “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”

Program Learning Objective: Students must individually and successfully use instrumentation and chemical literature available in the department. Includes analysis of unknown substances, student-synthesized materials, or natural samples.

Assessment Tool 1: Direct assessment of coursework w/ lab report rubric

Metrics: 80% will receive a “qualified” designation

Evaluation/Issue 1: 2 out of 3 students received qualified designation

Actions 1:

Responsibility: CHM3463

Assessment Tool 2: Course objectives survey

Metrics: 80% “confident” and “very confident” overall of their mastery of the course objectives

Evaluation/Issue 2: In 9 out of 12 survey questions, all students reported either confident or very confident; in each of the 3 remaining questions, only 1 student reported little confident, the others either confident or very confident

Actions 2:

Responsibility: CHM3463

University Learning Outcomes: “LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.”

Program Learning Objective: 80% of responses with “always satisfied” or “frequently satisfied” to survey which will include peer evaluation

Assessment Tool 1: Evaluation of Senior project proposal with project rubric in PSC 3001. Students will consider sustainability issues relevant to their project, and document it in their proposal.

Metrics: 80% “satisfactory” or “superior” performance

Evaluation/Issue 1: Based on the rubric used to evaluate senior project proposals, the one chemical biology major was rated as “superior”.

Actions 1:

Responsibility:

University Learning Outcomes: “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”

Program Learning Objective: Students will demonstrate professional standards in chemistry through written, oral, and graphical communication.

Assessment Tool 1: Direct assessment of student assignments with appropriate rubric (CHM3403)

Metrics: 80% “satisfactory” or “superior” performance based on rubrics

Evaluation/Issue 1: Based on the rubric used to evaluate written reports, 9 students (82%) were rated as “superior”, 0 students were rated as “satisfactory”, and 2 students (18%) were rated as “unsatisfactory”. Based on the rubric used to evaluate oral presentations, 6 students (55%) were rated as “superior” and 5 students (45%) were rated as “satisfactory”.

This semester I had 11 students enrolled in this course. The written reports and oral presentations were based on biochemistry-related news articles and related journal articles found by students based on their interests. A wide variety of topics were discussed and through indirect assessment it was evident that the students found this to be a worthwhile activity.

Actions 1: Next time I will more strongly encourage students who struggle with the English language to visit the AAC for help in editing their written reports prior to submission.

Responsibility: Shannon Timmons

Assessment Tool 2: Evaluation of student presentations using oral presentation rubric (CHM4912/4922), Shannon Timmons

Metrics: 80% “satisfactory” or “superior” performance based on rubrics

Evaluation/Issue 2: Shannon Timmons: Based on the departmental rubric used to evaluate oral presentations, one student was rated as “satisfactory” and two students were rated as “superior”.

Actions 2: Shannon Timmons: Next time I have a student who struggles with written English, I will more strongly recommend that they visit the AAC for writing assistance early and often.

Responsibility: CHM4912/4922 instructor

Assessment Tool 3: Evaluation of student presentations using oral presentation rubric (CHM2332)

Metrics: 80% “satisfactory” or “superior” performance based on rubrics

Evaluation/Issue 3: Based on the rubric used to evaluate oral presentations, 2 student pairs (40%) were rated as “superior” and 3 student pairs (60%) were rated as “satisfactory”.

This semester I initially had 11 students enrolled in this course. One student stopped attending and received a WF grade. The oral presentations assessed in this course were based on the presentation and analysis of results from a brand-new course-based research experience focused on the synthesis of aspirin analogs. Based on indirect assessment data, students greatly enjoyed the research experience and reported that this research project helped them to better understand the research process in organic

chemistry and also when to employ different techniques that they had learned throughout the semester in an authentic research-related setting.

Actions 3: I plan to expand this refine this course-based research experience based on the initial very positive assessment data I have received and hope to eventually publish the results of this research endeavor

Responsibility: CHM2332 instructor

University Learning Outcomes: “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”

Program Learning Objective: Students will demonstrate critical thinking and apply analytical and problem-solving skills in chemistry.

Assessment Tool 1: Completion of an independent research project or experiment with minimal assistance (CHM4912/4922)

Metrics: 80% “satisfactory” or “superior” performance by the senior year

Evaluation/Issue 1: Shannon Timmons: This semester I had three students enrolled in Chemical Sciences Project 2. These three students met all the metrics related to independent research. Two students received “satisfactory” ratings with respect to working independently and efficiently in the laboratory, while one students exceeded my expectations and was rated as “superior”.

Actions 1: I would like to be able to spend even more of my time in the research laboratory with students; however, faculty are stretched thin with heavy teaching loads and many other service-related responsibilities. To improve this situation, the administration should provide lower course loads for faculty with very active research agendas to ensure that students are better served, additional grants are submitted, and more journal articles are published.

Responsibility: CHM4912/4922 Instructor

Assessment Tool 2: Evaluation of student presentation of a paper from the literature to a panel of faculty and students (CHM3463)

Metrics: 80% “satisfactory” or “superior” performance by the senior year

Evaluation/Issue 2: Students presented their work to a panel of students and faculty. Students have rehearsed and presented to instructor prior to formal presentation and the presentation is reported as having been superior.

Actions 2:

Responsibility:

Assessment Tool 3: Completion of an independent research project or experiment with minimal assistance (CHM3463)

Metrics: 80% “satisfactory” or “superior” performance by the senior year

Evaluation/Issue 3: 2 students out of 3 earned a superior rating and the third student was unable to complete the task due to a sport injury.

Actions 3:

Responsibility:

Assessment Tool 4: Students will demonstrate critical thinking and apply analytical and problem-solving skills in chemistry. (PSC3001)

Metrics: 80% “satisfactory” or “superior” performance by the senior year

Evaluation/Issue 4: This class is taken in the junior year and doesn’t involve a presentation of a paper from the literature to a panel of faculty and students. This line needs to be removed entirely or evaluated in a course in the student’s senior year.

Actions 4:

Responsibility: PSC3001 Instructor

University Learning Outcomes: “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”

Program Learning Objective: LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions towards solving analytic programs.

Assessment Tool 1: Instructor and team-self evaluation (CHM3463)

Metrics: 80% of responses with “always satisfied” or “frequently satisfied” to survey which will include peer evaluation

Evaluation/Issue 1: In 7 out of 16 survey questions, students reported good or excellent.

Actions 1:

Responsibility:

University Learning Outcomes: “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”

Program Learning Objective: Students will demonstrate an understanding of the ethical issues related to chemistry.

Assessment Tool 1: Ethics case study assignment or quiz in PSC 3001 in which students will analyze an ethical situation and characterize and reflect the scientific misconduct involved.

Metrics: 80% “satisfactory” or “superior” performance

Evaluation/Issue 1: Based on the ethics case study assignment results, the one chemical biology major was rated as “superior”.

Actions 1: The ethics portion of the class could easily be expanded to include more topics and case studies.

Responsibility: PSC 3001 Instructor

During this period of time, data from pre-selected courses/tests were gathered. Faculty members of the Chemistry program have met to review the data. Several issues have been identified:

- The ETS exams and exit exams don’t generate consistent results because students do not take those exams seriously; which make them unsuitable for the purpose of assessment.
- Some learning outcomes are assessed multiple times. For example, the learning outcome of critical thinking was assessed in four different courses, which the faculty members deem redundant.
- The enrollment numbers of some courses were very small, which was subject to large fluctuation. It is the faculty members’ consensus to use multi year average instead.

3. Assessment Plan for 2017-2018 Academic Year

In the 17-18 academic year, we will

- continue the existing assessment plan for our own degree programs. In the second year, we will focus on reviewing data collected so far, and make necessary modification to the assessment plan.
- devise a separate assessment plan for the new University Undergraduate Education Outcomes. Courses have been selected, and assessment cycle has been planned; however, more details, such as assessment instruments to use, metric to be adopted, have not yet been determined.
- The department chair will call for department working meetings to address those issues; and the assessment representative will facilitate the meetings by providing assessment data, and coordinating communication between the department and the UAC.

BS in Humanities**1. Assessment Plan and Summary**

(see Table 1: Assessment Matrix below.)

Table 1: Assessment Plan for BS in Humanities

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop-Closing Timeline
<u>KNOWLEDGE IN DISCIPLINE</u> “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”	Students can analyze with ease challenging literary, philosophical, and historical texts.	Papers from Jr. Sr. Electives scored by outside reader	Grade of B or above	Annual	Annual
	Students can evaluate problems from an interdisciplinary perspective.	Senior Thesis scored by outsider	Grade of B or above	Annual	Annual
	Students can demonstrate creativity in at least one literary genre.	Portfolio scored by outsider	Grade of B or above	Annual	Annual
<u>TECHNOLOGY</u> “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”	Students have expertise in using research databases in History, Philosophy, Literature, Social Sciences	Senior Thesis scored by outsider	Grade of B or above	Annual	Annual
<u>SUSTAINABILITY</u> "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."					
<u>COMMUNICATION</u> “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”	Students can conduct original research. Students can effectively incorporate secondary texts into primary analyses. Students can effectively defend their views in writing and orally.	Senior thesis scored by outsider Public presentation/ oral presentation rubric	Grade of B or above	Annual	Annual

		scored by peer reviewer			
<u>MATHEMATICS</u> “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”	Students can analyze with ease challenging literary, philosophical, and historical texts.	Papers from Jr. Sr. Electives scored by outside reader	Grade of B or above		
<u>READING</u> “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”	Students can identify the distinguishing cultural, historical and social attributes of literary periods and gauge the influence of these attributes on the works at hand.	Papers in Jr.Sr. electives reviewed by industry rep	Rubric	Annual	Annual
<u>SCIENTIFIC ANALYSIS</u> “LTU graduates will demonstrate critical thinking and apply analytical and problem- solving skills in scientific fields.”		Assessment by Natural Science department			
<u>LEADERSHIP</u> “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”		Assignments in COM 1001: Pathways to Research Careers			
<u>TEAMWORK</u> “LTU graduates will demonstrate team- building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”		Assignments in COM 1001: Pathways to Research Careers			
<u>PROFESSIONAL ETHICS</u> “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”					

2. Report on 2016-2017 Academic Year and Action Plan (Loop-Closing)

Learning Objective 1: Students can evaluate problems from an interdisciplinary perspective.

Assessment: No assessment performed

Evaluation: n/a

Issue: n/a

Actions: Determine when to assess this goal

Responsibility: HSSC faculty

University/College Support for Objective: n/a

Learning Objective 2: Students can conduct original research. Students can effectively incorporate secondary texts into primary analyses.

Assessment: No assessment performed

Evaluation: n/a

Issue: n/a

Actions: Determine when to assess this goal

Responsibility: HSSC faculty

University/College Support for Objective: n/a

Learning Objective 3: Students have expertise in using research databases in History, Philosophy, Literature, Social Sciences

Assessment: No assessment performed

Evaluation: n/a

Issue: n/a

Actions: Determine when to assess this goal

Responsibility: HSSC faculty

University/College Support for Objective: n/a

Learning Objective 4: Students can evaluate conflicting viewpoints.

Assessment: No assessment performed

Evaluation: n/a

Issue: n/a

Actions: Determine when to assess this goal

Responsibility: HSSC faculty

University/College Support for Objective: n/a

Program Learning Objective 5: Students can analyze with ease challenging literary, philosophical, and historical texts.

Assessment: No assessment performed

Evaluation: n/a

Issue: n/a

Actions: Determine when to assess this goal

Responsibility: HSSC faculty

University/College Support for Objective: n/a

Learning Objective 6: Students can demonstrate creativity in at least one literary genre.

Assessment: No assessment performed

Evaluation: n/a

Issue: n/a

Actions: Determine when to assess this goal

Responsibility: HSSC faculty

University/College Support for Objective: n/a

Learning Objective 7: Students can effectively defend their views in writing and orally.

Assessment: No assessment performed

Evaluation: n/a

Issue: n/a

Actions: Determine when to assess this goal

Responsibility: HSSC faculty

University/College Support for Objective: n/a

3. Assessment Plan for 2017-2018 Academic Year

HSSC faculty are currently drafting a proposal for a new degree program (BS in Liberal Arts). Should it be approved, this degree program will replace the BA in English and Communication Arts and the BS in Humanities degrees. To that end, Learning Objectives and an Assessment plan will be devised by HSSC faculty in the LLT and SSC divisions.

-

BS in Mathematics**1. Assessment Plan and Summary**

See Table 1.

The BS in Mathematics program has 9 learning objectives.

1. Apply knowledge of mathematics appropriate to a problem.
2. Analyze a problem, and identify and define the mathematical techniques appropriate to its solution.
3. Design, implement, and evaluate a mathematical model that satisfies specified requirements.
4. Function effectively on teams to accomplish a common goal, including performing leadership tasks.
5. Communicate mathematical ideas and models effectively to a range of audiences both orally and in written form.
6. Analyze the local and global impact of models on individuals, organizations, and society.
7. Recognize the need for and engage in life-long learning, continuing professional development and adapt to changes in the field.
8. Use current and established techniques, skills, and tools necessary for applying mathematics.
9. Secure employment and/or attend graduate school in mathematics or any field based on mathematics, drawing on their experiences, both within and outside the major to become responsible citizens and effective professionals.

Table 1: Assessment Plan for BS in Mathematics

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop Closing Timeline
<p>KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	<p>a) <i>Apply</i> knowledge of mathematics appropriate to a problem. (1)</p> <p>b) <i>Analyze</i> a problem, and <i>identify</i> and <i>define</i> the mathematical techniques appropriate to its solution. (2)</p> <p>c) <i>Use</i> current and established techniques, skills, and tools necessary for applying mathematics. (8)</p>	Direct assessment of standard questions on final exams in three MCS core courses (Math)	75% of students score 70% or higher on final exam questions mapped to Course Learning Objectives (Metric for each of the three courses)	Every Semester	Annual
<p>TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	Design, implement, and evaluate a mathematical model that satisfies specified requirements (3)	Direct assessment of three MCS core courses (Math)	75% of students score 70% or higher on final exam questions mapped to Course Learning Objectives	Every Semester	Annual
<p>SUSTAINABILITY "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."</p>	Recognize the need for and engage in life-long learning, continuing professional development and adapt to changes in the field. (7)	Alumni Survey	75% of students achieve Level 3 (out of 4) on Survey Rubric	Every Semester	Annual
<p>COMMUNICATION “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	<i>Communicate</i> mathematical ideas and models effectively to a range of audiences both orally and in written form. (5)	<p>a) Direct Assessment of Senior Project oral and written reports</p> <p>b) WPE</p>	<p>a) 75% of Senior Projects receive Level 3 out of 4 on BOTH oral report rubric and written report rubric</p> <p>b) 100% pass WPE (the WPE is a graduation requirement at LTU)</p>	Every Semester	Annual
<p>MATHEMATICS “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>	Analyze a problem, and identify and define the mathematical techniques appropriate to its solution. (2)	Direct assessment of standard questions on final exams in three MCS core courses (Math)	75% of students score 70% or higher on final exam questions mapped to Course Learning Objectives (Metric for each of the three courses)	Every Semester	Annual

<p><u>READING</u> “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>	<p><i>Communicate</i> mathematical ideas and models effectively to a range of audiences both orally and in written form. (5)</p>	<p>Direct assessment in SSC2413, SSC2423, LLT1213, LLT1223 and LLT/SSC Jr/Sr Elective</p>	<p>Use metrics provided by HSSC Department</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>SCIENTIFIC ANALYSIS</u> “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”</p>	<p>Analyze a problem, and identify and define the mathematical techniques appropriate to its solution. (2)</p>	<p>Direct assessment of standard questions on final exams in CHM1213, CHM1223, PHY2413, PHY2423, BIO1213, and BIO1223</p>	<p>75% of students score 70% or higher on final exam questions mapped to Course Learning Objectives (Metric for each of the six courses)</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>LEADERSHIP</u> “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>	<p>Analyze the local and global impact of models on individuals, organizations, and society. (6)</p>	<p>Alumni Survey</p>	<p>75% of students achieve Level 3 (out of 4) on Survey Rubric</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>TEAMWORK</u> “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	<p><i>Function</i> effectively on teams to accomplish a common goal, including performing leadership tasks. (4)</p>	<p>a) Alumni Survey b) MCS1414 and MCS1424 Lab Surveys</p>	<p>a) 75% of students achieve Level 3 (out of 4) on Survey Rubric b) a) 75% of students achieve Level 3 (out of 4) on Survey Rubric</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>PROFESSIONAL ETHICS</u> “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>	<p><i>Secure</i> employment and/or <i>attend</i> graduate school in their field, drawing on their experiences, both within and outside the major to become responsible citizens and effective professionals. (9)</p>	<p>a) Alumni Survey</p>	<p>75% of students achieve Level 3 (out of 4) on Survey Rubric</p>	<p>Every Semester</p>	<p>Annual</p>

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

- *Objective/Outcome:* Apply knowledge of mathematics appropriate to a problem. (1)
 - *Assessment:* Direct assessment of final exam questions in MCS1414 (Calculus 1) and MCS 2414 (Calculus 3)
 - *Evaluation:* For MCS2414, students averaged 70% or above on only two course objectives in Fall 2016 and averaged below 70% on all course objectives for Spring 2017. For MCS1414 students averaged 70% or above on only 4 course objectives in Fall 2016 and on 6 course objectives in Spring 2017 (out of 12 total objectives).
 - *Issue:* In both Fall 2016 and Spring 2017 MCS1414 students averaged below 70% on the following course objectives: related rates and optimization, Fundamental Theorem of Calculus, and areas and volumes.
 - *Current/Future Actions:* The MCS Department Chair emailed faculty teaching MCS1414 and MCS2414 the results of the assessment and asked them to address areas of weak student performance on the final exams.
 - *Responsibility:* Prof. Yu, Calculus Coordinator
 - *University/College Support for Objective:* No additional support needed.
-
- *Objective/Outcome:* Analyze a problem. (2)
 - *Assessment:* Direct assessment of final exam questions in MCS1414 (Calculus 1) and MCS 2414 (Calculus 3)
 - *Evaluation:* For MCS2414, students averaged 70% or above on only two course objectives in Fall 2016 and averaged below 70% on all course objectives for Spring 2017. For MCS1414 students averaged 70% or above on only 4 course objectives in Fall 2016 and on 6 course objectives in Spring 2017 (out of 12 total objectives).
 - *Issue:* In both Fall 2016 and Spring 2017 MCS1414 students averaged below 70% on the following course objectives: related rates and optimization, Fundamental Theorem of Calculus, and areas and volumes.
 - *Current/Future Actions:* The MCS Department Chair emailed faculty teaching MCS1414 and MCS2414 the results of the assessment and asked them to address areas of weak student performance on the final exams.
 - *Responsibility:* Prof. Yu, Calculus Coordinator
 - *University/College Support for Objective:* No additional support needed.
-
- *Objective/Outcome:* Mathematical Modeling (3)
 - *Assessment:* Direct assessment of final exam questions in MCS1414 (Calculus 1) and MCS 2414 (Calculus 3)
 - *Evaluation:* For MCS2414, students averaged 70% or above on only two course objectives in Fall 2016 and averaged below 70% on all course objectives for Spring 2017. For MCS1414 students averaged 70% or above on only 4 course objectives in Fall 2016 and on 6 course objectives in Spring 2017 (out of 12 total objectives).
 - *Issue:* In both Fall 2016 and Spring 2017 MCS1414 students averaged below 70% on the following course objectives: related rates and optimization, Fundamental Theorem of Calculus, and areas and volumes.
 - *Current/Future Actions:* The MCS Department Chair emailed faculty teaching MCS1414 and MCS2414 the results of the assessment and asked them to address areas of weak student performance on the final exams.
 - *Responsibility:* Prof. Yu, Calculus Coordinator
 - *University/College Support for Objective:* Current support is sufficient.

- *Objective/Outcome:* Function effectively on teams. (4)
- *Assessment:* Alumni Survey
- *Evaluation:* The Spring 2017 was only administered to CS students within the department, not mathematics students.
- *Issue:* The Graduating Student Survey (a different survey) can be used to assess this outcome.
- *Current/Future Actions:* Collect data from Graduating Student Survey.
- *Responsibility:* Prof. Cartwright, MCS Assessment Coordinator
- *University/College Support for Objective:* Institutional Research at LTU
-
- *Objective/Outcome:* Analyze the local and global impact of models. (6)
- *Assessment:* Graduating Student Survey
- *Evaluation:* Data was only collected from Computer Science students
- *Issue:* Data needs to be collected from Math students as well as CS students from the Graduating Student Survey.
- *Current/Future Actions:* The Leadership Curriculum is currently being modified in the College of Arts and Sciences.
- *Responsibility:* Prof. Cartwright, MCS Assessment Coordinator
- *University/College Support for Objective:* Institutional Research at LTU
-
- *Objective/Outcome:* Engage in continuing professional development. (7)
- *Assessment:* Alumni Survey
- *Evaluation:* The Spring 2017 was only administered to CS students within the department, not mathematics students.
- *Issue:* A different metric needs to be used to assess this outcome.
- *Current/Future Actions:* Identify a different tool to assess this outcome.
- *Responsibility:* Math faculty
- *University/College Support for Objective:* N/A
-
- *Objective/Outcome:* Use current techniques for applying mathematics. (8)
- *Assessment:* Direct assessment of final exam questions in MCS1414 (Calculus 1) and MCS 2414 (Calculus 3)
- *Evaluation:* For MCS2414, students averaged 70% or above on only two course objectives in Fall 2016 and averaged below 70% on all course objectives for Spring 2017. For MCS1414 students averaged 70% or above on only 4 course objectives in Fall 2016 and on 6 course objectives in Spring 2017 (out of 12 total objectives).
- *Issue:* In both Fall 2016 and Spring 2017 MCS1414 students averaged below 70% on the following course objectives: related rates and optimization, Fundamental Theorem of Calculus, and areas and volumes.
- *Current/Future Actions:* The MCS Department Chair emailed faculty teaching MCS1414 and MCS2414 the results of the assessment and asked them to address areas of weak student performance on the final exams.
- *Responsibility:* Prof. Yu, Calculus Coordinator
- *University/College Support for Objective:* Current support is sufficient.
-
- *Objective/Outcome:* Become effective professionals. (9)
- *Assessment:* Alumni Survey
- *Evaluation:* The Spring 2017 was only administered to CS students within the department, not mathematics students.
- *Issue:* A different metric needs to be used to assess this outcome.

- *Current/Future Actions:* Identify a different tool to assess this outcome.
- *Responsibility:* Math faculty
- *University/College Support for Objective:* N/A

3. Assessment Plan for 2017-2018 Academic Year

1) Loop-closing actions for 2017-8

- Collect data from Math majors from the Graduating Student Survey
- Identify a different assessment tool to measure the outcome of “continuing professional development.”
- Identify a different assessment tool to measure the outcome of “become an effective professional.”

2) There are 9 program outcomes for the BS in Mathematics. Eight of these outcomes were assessed in 2016-7. The remaining outcome will be assessed in 2017-8. All 9 program outcomes will be assessed over a three year cycle.

Begin assessment of MCS2423 Differential Equations, MCS3403 Probability and Statistics, and MCS3863 Linear Algebra in Spring 2018.

3) New assessment plans for 2017-8:

- *Objective/Outcome:* Plan, create, and integrate oral and written communication (5)
- *Actions:* Data will be collected from the HSSC Department

BS in Mathematics and Computer Science**1. Assessment Plan and Summary**

See Table 1.

The BS in Mathematics and Computer Science program has 10 learning objectives.

1. Apply knowledge of computing and mathematics appropriate to a problem.
2. Analyze a problem, and identify and define the computing requirements and mathematical techniques appropriate to its solution.
3. Design, implement, and evaluate a mathematical model, computer-based system, process, component, or program to meet its specified requirements
4. Function effectively on teams to accomplish a common goal, including performing leadership tasks.
5. Plan, create and integrate oral and written communication of [mathematical and algorithmic ideas] effectively to audiences having a range of technical understanding.
6. Analyze the local and global impact of computing and models on individuals, organizations, and society
7. Recognize the need for and engage in life-long learning, continuing professional development [and learn new technologies] and adapt to changes in the field.
8. Apply current and established techniques, skills, and tools necessary for applying mathematics and computing practice.
9. Secure employment and/or attend graduate school in their field, drawing on their experiences, both within and outside the major to become responsible citizens and effective professionals
10. Display a complete understanding of a computer language (syntax, semantics and terminology), and develop and debug complex code.

Table 1: Assessment Plan for BS in Mathematics and Computer Science

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop Closing Timeline
<u>KNOWLEDGE IN DISCIPLINE</u> “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”	<i>Apply</i> knowledge of computing and mathematics appropriate to a problem. (1) <i>Display</i> a complete understanding of a computer language ((syntax, semantics and terminology), <i>develop</i> and <i>debug</i> complex code. (10) <i>Apply</i> current and established techniques, skills, and tools necessary for applying mathematics and computing practice.(8)	Direct assessment of standard questions on final exams in MCS1514 and MCS2514 core courses (CS) and MCS1414 and MCS2414 core courses (Math)	Average score greater than 70% on final exam problems mapped to course objectives	Every Semester	Annual
<u>TECHNOLOGY</u> “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”	Design, implement, and evaluate a mathematical model, computer-based system, process, component, or program to meet its specified requirements (3)	Direct Assessment of Senior Project oral and written reports	75% of Senior Projects receive Level 3 out of 4 on BOTH oral report rubric and written report rubric	Every Semester	Annual
<u>SUSTAINABILITY</u> "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."	<i>Recognize</i> the need for and an ability to engage in continuing professional development [and learn new technologies] and adapt to changes in the field. (7)	Alumni Survey	75% of students achieve Level 3 (out of 4) on Survey Rubric	Every Semester	Annual
<u>COMMUNICATION</u> “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”	<i>Plan, create and integrate</i> oral and written communication of [mathematical and algorithmic ideas] effectively to audiences having a range of technical understanding. (5)	a) Direct Assessment of Senior Project oral and written reports b) WPE	a) 75% of Senior Projects receive Level 3 out of 4 on BOTH oral report rubric and written report rubric b) 100% pass WPE (the WPE is a graduation requirement at LTU)	Every Semester	Annual

<p><u>MATHEMATICS</u> “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>	<p><i>Design, implement, and evaluate</i> a mathematical model, computer-based system, process, component, or program to meet its specified requirements (3)</p>	<p>Direct assessment of standard questions on final exams in three MCS core courses</p>	<p>75% of students score 70% or higher on final exam questions mapped to Course Learning Objectives (Metric for each of the three courses)</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>READING</u> “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>	<p><i>Plan, create and integrate</i> oral and written communication of [mathematical and algorithmic ideas] effectively to audiences having a range of technical understanding. (5)</p>	<p>Direct assessment in SSC2413, SSC2423, LLT1213, LLT1223 and LLT/SSC Jr/Sr Elective</p>	<p>Use metrics provided by HSSC Department</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>SCIENTIFIC ANALYSIS</u> “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”</p>	<p><i>Analyze</i> a problem, and <i>identify</i> and <i>define</i> the computing requirements and mathematical techniques appropriate to its solution. (2)</p>	<p>Direct assessment of standard questions on final exams in CHM1213, CHM1223, PHY2413, PHY2423, BIO1213, and BIO1223</p>	<p>75% of students score 70% or higher on final exam questions mapped to Course Learning Objectives (Metric for each of the six courses)</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>LEADERSHIP</u> “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>	<p><i>Analyze</i> the local and global impact of computing and models on individuals, organizations, and society. (6)</p>	<p>Alumni Survey</p>	<p>75% of students achieve Level 3 (out of 4) on Survey Rubric</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>TEAMWORK</u> “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	<p>Function effectively on teams to accomplish a common goal, including performing leadership tasks (4)</p>	<p>a) Alumni Survey b) MCS1414 and MCS1424 Lab Surveys</p>	<p>a) 75% of students achieve Level 3 (out of 4) on Survey Rubric b) a) 75% of students achieve Level 3 (out of 4) on Survey Rubric</p>	<p>Every Semester</p>	<p>Annual</p>
<p><u>PROFESSIONAL ETHICS</u> “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>	<p><i>Secure</i> employment and/or <i>attend</i> graduate school in their field, drawing on their experiences, both within and outside the major to become responsible citizens and effective professionals. (9)</p>	<p>a) Alumni Survey</p>	<p>75% of students achieve Level 3 (out of 4) on Survey Rubric</p>	<p>Every Semester</p>	<p>Annual</p>

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

- *Objective/Outcome:* Apply knowledge of computing and mathematics appropriate to a problem. (1)
 - *Assessment:* Direct assessment of final exam questions in MCS1514 (Computer Science 1), MCS 2514 (Computer Science 2), MCS1414 (Calculus 1) and MCS2414 (Calculus 3)
 - *Evaluation:* For MCS2514, students averaged 70% or above on all 11 course objectives. For MCS1514 students averaged 70% or above on only 6 course objectives in Fall 2016 and on 4 course objectives in Spring 2017 (out of 14 total objectives). For MCS2414, students averaged 70% or above on only two course objectives in Fall 2016 and averaged below 70% on all course objectives for Spring 2017. For MCS1414 students averaged 70% or above on only 4 course objectives in Fall 2016 and on 6 course objectives in Spring 2017 (out of 12 total objectives)
 - *Issue:* In both Fall 2016 and Spring 2017 MCS1514 students averaged below 70% on the following course objectives: input/output, user defined data types, arrays and strings, pointers and classes, and recursion. The objective on object-oriented programming was not assessed in either semester in the Final Exam. In both Fall 2016 and Spring 2017 MCS1414 students averaged below 70% on the following course objectives: related rates and optimization, Fundamental Theorem of Calculus, and areas and volumes.
 - *Current/Future Actions:* The MCS Department Chair emailed CS faculty teaching MCS1514 and MCS2514 and Math faculty teaching MCS1414 and MCS2414 the results of the assessment and asked them to “pay attention” to trends of student performance on the final exams.
 - *Responsibility:* Prof. Azar, Computer Science 1 and 2 Coordinator; Prof. Yu, Calculus Coordinator
 - *University/College Support for Objective:* More full-time CS faculty are needed to be hired so that more sections of MCS1514 may be taught by full-time faculty.
-
- *Objective/Outcome:* Analyze a problem. (2)
 - *Assessment:* Direct assessment of final exam questions in MCS1414 (Calculus 1) and MCS 2414 (Calculus 3)
 - *Evaluation:* For MCS2414, students averaged 70% or above on only two course objectives in Fall 2016 and averaged below 70% on all course objectives for Spring 2017. For MCS1414 students averaged 70% or above on only 4 course objectives in Fall 2016 and on 6 course objectives in Spring 2017 (out of 12 total objectives).
 - *Issue:* In both Fall 2016 and Spring 2017 MCS1414 students averaged below 70% on the following course objectives: related rates and optimization, Fundamental Theorem of Calculus, and areas and volumes.
 - *Current/Future Actions:* The MCS Department Chair emailed faculty teaching MCS1414 and MCS2414 the results of the assessment and asked them to address areas of weak student performance on the final exams.
 - *Responsibility:* Prof. Yu, Calculus Coordinator
 - *University/College Support for Objective:* No additional support needed.
-
- *Objective/Outcome:* Function effectively on teams. (4)
 - *Assessment:* Alumni Survey
 - *Evaluation:* The Spring 2017 was only administered to CS students within the department, not mathematics students.
 - *Issue:* The Graduating Student Survey (a different survey) can be used to assess this outcome.
 - *Current/Future Actions:* Collect data from Graduating Student Survey.
 - *Responsibility:* Prof. Cartwright, MCS Assessment Coordinator
 - *University/College Support for Objective:* Institutional Research at LTU
 - *Objective/Outcome:* Analyze the local and global impact of computing and models (6)

- *Assessment:* Graduating Student Survey
 - *Evaluation:* Data was only collected from Computer Science students
 - *Issue:* Data needs to be collected from Math students as well as CS students from the Graduating Student Survey.
 - *Current/Future Actions:* The Leadership Curriculum is currently being modified in the College of Arts and Sciences.
 - *Responsibility:* Prof. Cartwright, MCS Assessment Coordinator
 - *University/College Support for Objective:* Institutional Research at LTU
-
- *Objective/Outcome:* Engage in continuing professional development. (7)
 - *Assessment:* Alumni Survey
 - *Evaluation:* The Spring 2017 was only administered to CS students within the department, not mathematics students.
 - *Issue:* A different metric needs to be used to assess this outcome.
 - *Current/Future Actions:* Identify a different tool to assess this outcome.
 - *Responsibility:* Math faculty
 - *University/College Support for Objective:* N/A
-
- *Objective/Outcome:* Apply current techniques for mathematics and computing practice. (8)
 - *Assessment:* Direct assessment of final exam questions in MCS1514 (Computer Science 1), MCS 2514 (Computer Science 2), MCS1414 (Calculus 1) and MCS2414 (Calculus 3)
 - *Evaluation:* For MCS2514, students averaged 70% or above on all 11 course objectives. For MCS1514 students averaged 70% or above on only 6 course objectives in Fall 2016 and on 4 course objectives in Spring 2017 (out of 14 total objectives). For MCS2414, students averaged 70% or above on only two course objectives in Fall 2016 and averaged below 70% on all course objectives for Spring 2017. For MCS1414 students averaged 70% or above on only 4 course objectives in Fall 2016 and on 6 course objectives in Spring 2017 (out of 12 total objectives)
 - *Issue:* In both Fall 2016 and Spring 2017 MCS1514 students averaged below 70% on the following course objectives: input/output, user defined data types, arrays and strings, pointers and classes, and recursion. The objective on object-oriented programming was not assessed in either semester in the Final Exam. In both Fall 2016 and Spring 2017 MCS1414 students averaged below 70% on the following course objectives: related rates and optimization, Fundamental Theorem of Calculus, and areas and volumes.
 - *Current/Future Actions:* The MCS Department Chair emailed CS faculty teaching MCS1514 and MCS2514 and Math faculty teaching MCS1414 and MCS2414 the results of the assessment and asked them to “pay attention” to trends of student performance on the final exams.
 - *Responsibility:* Prof. Azar, Computer Science 1 and 2 Coordinator; Prof. Yu, Calculus Coordinator
 - *University/College Support for Objective:* More full-time CS faculty are needed to be hired so that more sections of MCS1514 may be taught by full-time faculty.
-
- *Objective/Outcome:* Become effective professionals. (9)
 - *Assessment:* Alumni Survey
 - *Evaluation:* The Spring 2017 was only administered to CS students within the department, not mathematics students.
 - *Issue:* A different metric needs to be used to assess this outcome.
 - *Current/Future Actions:* Identify a different tool to assess this outcome.
 - *Responsibility:* Math faculty
 - *University/College Support for Objective:* N/A
 - *Objective/Outcome:* Develop and debug complex code. (10)

- *Assessment:* Direct assessment of final exam questions in MCS1514 (Computer Science 1) and MCS 2514 (Computer Science 2)
- *Evaluation:* For MCS2514, students averaged 70% or above on all 11 course objectives. For MCS1514 students averaged 70% or above on only 6 course objectives in Fall 2016 and on 4 course objectives in Spring 2017 (out of 14 total objectives).
- *Issue:* In both Fall 2016 and Spring 2017 students averaged below 70% on the following course objectives: input/output, user defined data types, arrays and strings, pointers and classes, and recursion. The objective on object-oriented programming was not assessed in either semester in the Final Exam.
- *Current/Future Actions:* The MCS Department Chair emailed CS faculty teaching MCS1514 and MCS2514 the results of the assessment and asked them to “pay attention” to trends of student performance on the final exams.
- *Responsibility:* Prof. Azar, Computer Science 1 and 2 Coordinator
- *University/College Support for Objective:* More full-time CS faculty are needed to be hired so that more sections of MCS1514 may be taught by full-time faculty.

3. Assessment Plan for 2017-2018 Academic Year

1) Loop-closing actions for 2017-8:

- Collect data from MathCS majors from the Graduating Student Survey
- Identify a different assessment tool to measure the outcome of “continuing professional development.”
- Identify a different assessment tool to measure the outcome of “become an effective professional.”

2) There are 10 program outcomes for the BS in Computer Science. Eight of these outcomes were assessed in 2016-7. The remaining two outcomes will be assessed in 2017-8. All 10 program outcomes will be assessed over a three year cycle.

Assessment will begin in Fall 2017 for MCS1142 Introduction to C and in Spring 2018 for MCS2523 Discrete Math, MCS4623 Software Engineering, MCS2423 Differential Equations, MCS3403 Probability and Statistics, and MCS3863 Linear Algebra

3) New assessment plans for 2017-8:

- *Objective/Outcome:* Design, implement, and evaluate a mathematical model or computer-based system (3)
- *Actions:* Data will be collected from Senior Project
- *Objective/Outcome:* Plan, create, and integrate oral and written communication (5)
- *Actions:* Data will be collected from the HSSC Department

BS in Media Communication

1. Assessment Plan and Summary

See Table 1 below.

Table 1: Assessment Plan for BS in Media Communication

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
<p><u>KNOWLEDGE IN DISCIPLINE</u> “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	<p>Graduates will have an in-depth understanding of the scope and purpose of the media industry.</p> <p>Graduates will understand the standards of professional practices within the media industry.</p>	<p>Direct assessment of student assignments in MCO 3633: Social Media- Client Strategy Assignment; MCO 1003: Media, Communication and Society- Critical Approach Exam for 1a and Global Marketplace Exam for 1b, MCO 2563: Intro to Broadcast- Director/Tech Director Final, MCO 2543: Writing for Electronic & Print Web News Assignment</p>	<p>70% score 4 or higher on 5 Point Professional Practices rubric</p>	<p>Semester</p>	<p>Annual</p>
<p><u>TECHNOLOGY</u> “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	<p>Graduates will have an industry-standard skill set in production, post-production and new media.</p>	<p>Student work from: MCO 2003: Intro to Video Production; MCO 3303: Video Editing; MCO 3203: Camera for Broadcast; MCO 4073: Special Topics: Adobe for Media</p>	<p>70% score 4 or higher on 5 point course specific Technology rubric</p>	<p>Semester</p>	<p>Annual</p>
<p><u>SUSTAINABILITY</u> "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."</p>	<p>Graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.</p>	<p>MCO 2543: Writing for Electronic & Print Media, MCO 2563: Intro to Broadcast Studio, MCO 3633: Social Media - for Sustainability content</p>	<p>70 % Score 4 or higher on 5 point on Sustainability rubric</p>	<p>Semester</p>	<p>Annual</p>
<p><u>COMMUNICATION</u> “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	<p>Graduates will possess industry-standard professional skills in writing, presentations, and interpersonal communication.</p>	<p>Direct assessment of student assignments in MCO2543: Writing for Electronic and Print Media, MCO3713: Advanced Writing for Media, and COM2113: Speech HSSC writing assessment, WPE UAC oral presentation assessment</p>	<p>70% Score 4 or higher on 5 point Writing and Presentation rubrics</p>	<p>Semester</p>	<p>Annual</p>

<u>MATHEMATICS</u> “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”		Assessment to be completed by Mathematics department		Semester	Annual
<u>READING</u> “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”		Assessment using the Core Curriculum Diagnostic Reading Exam		Semester	Annual
<u>SCIENTIFIC ANALYSIS</u> “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”		Assessment by Natural Science department		Semester	Annual
<u>LEADERSHIP</u> “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”		Assignments in COM 1001: Pathways to Research Careers		Semester	Annual
<u>TEAMWORK</u> “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”		Assignments in COM 1001: Pathways to Research Careers		Semester	Annual
<u>PROFESSIONAL ETHICS</u> “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”	Graduates will understand the impact of their professional decisions on the public and broader global societies.	MCO 1003: Media, Communication & Society: Assignment TBD	70% Score 4 or higher on 5 point rubric	Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop-Closing)

Learning Objective 1a: Graduates will have an in-depth understanding of the scope and purpose of the media industry.

Assessment: Student work in the following courses:

MCO 3633: Social Media – Developing a Social Media Strategy for an Outside Client Final Assignment for Detroit Institute for Social Innovation

MCO 1003: Media, Communication and Society – Mass Communication: A Critical Approach Exam

MCO 2563: Intro to Broadcast – Director/Technical Director Practical Exam

MCO 2543: Writing for Electronic & Print Media – News Package/Script Eval

Evaluation: Course specific rubrics were developed for assignments in the above courses. Scores are as follows:

MCO 3633: Social Media - 87% scored 80% or higher as an equivalent to a 4 or higher on a 5 point rubric.

MCO 4073: Special Topics: Emerging Web Techniques - 87% scored 3 or higher as applied to a 4 point rubric. Discussing the implementation of a 5 point rubric for 2017/2018.

MCO 1003: Media, Communication and Society - 90% scored 80% or higher as an equivalent to a 4 or higher on a 5 point rubric.

MCO 2563: Intro to Broadcast - 85% scored 80% or higher as an equivalent to a 4 or higher on a 5 point rubric.

MCO 2543: Writing for Electronic & Print Media - 84% scored 4 or higher as applied to a 5 point rubric. Goal met.

Issues: A new instructor taught Social Media Fall 16. The prior 5 point rubric used Fall 15 was not implemented in the new instructor's class. This is why a new 5 point rubric was created for Fall 17.

Current/Future Actions: Determine ways to tailor rubrics for specific courses. Collect data from the Web News Assignment in MCO 2543 Writing for Electronic & Print Media moving forward for Learning Objective 1a. This is a better match for assessing in-depth understanding of the scope and purpose of the media industry. Next loop closing Summer 2020.

Responsibility: Jody Gaber, program director

University/College Support for Objective: N/A

Learning Objective 1b: Graduates will understand the standards of professional practices within the media industry.

Assessment: Student work in the following courses:

MCO 3633: Social Media – Developing a Social Media Strategy for an Outside Client Final Assignment for Detroit Institute for Social Innovation

MCO 1003: Media, Communication and Society – Media Economics and the Global Marketplace Exam

MCO 2563: Intro to Broadcast – Director/Technical Director Practical Exam

MCO 2543: Writing for Electronic & Print Media – Dramatic Script/Video Script/Radio Package

Evaluation: Course specific rubrics were developed for the following classes from Fall 2106 to Summer 2017. Scores are as follows:

MCO 3633: Social Media - 87% scored 80% or higher as an equivalent to a 4 or higher on a 5 point rubric.

MCO 4073: Special Topics: Emerging Web Techniques - 87% scored 3 or higher as applied to a 4 point rubric. Discussing the implementation of a 5 point rubric for 2017/2018

MCO 1003: Media, Communication and Society - 100% scored 80% or higher as an equivalent to a 4 or higher on a 5 point rubric. A 5 point rubric is not applicable to this assignment.

MCO 2563: Intro to Broadcast - 85% scored 80% or higher as an equivalent to a 4 or higher on a 5 point rubric. Will create and implement a 5 point rubric for 2017/2018.

MCO 2543: Writing for Electronic & Print Media - 76% scored 4 or higher as applied to a 5 point rubric. Goal met.

Issues: A new instructor taught Social Media Fall 16. The prior 5 point rubric used Fall 15 was not implemented in the new instructor's class. This is why a new 5 point rubric was created for Fall 17.

Current/Future Actions: Determine ways to tailor rubrics for specific courses. Collect data from the Documentary Script Assignment in MCO 3713 Advanced Writing for Television moving forward for Learning Objective 1b. This is a better match for assessing in-depth understanding of the scope of professional practices within the media industry. Next loop closing Summer 2020

Responsibility: Jody Gaber, program director

University/College Support for Objective: NA

3. Assessment Plan for 2017-2018 Academic Year

- Examine and revise rubrics as needed (see above).
- Continue to refine plan for archiving assignments for review.
- Continue efforts to create a portfolio review panel utilizing industry advisors and adjuncts to provide students with valuable industry standard feedback.
- Develop system for capturing data from external sources for assessing students' progress related to the various learning objectives.
- Continue to collect and assess data on Learning Objectives #4 and #5 for loop closing Summer 18.
- Continue to collect and assess data on Learning Objectives #2, and possibly #3 (if Sustainability is determined as an assessment to be provided) for loop closing Summer 19.
- Adjust Assessment matrix as needed

BS in Molecular and Cell Biology

1. Assessment Plan and Summary

This is the first year of our revised program assessment plan (see Table 1). The new plan was created based on Dr. Gloria Rogers' recommendation. The new plan has a three-year cycle; the first year is dedicated to data collection; the second year to refining the assessment plan; the third year to implementing changes for loop closing. The past academic year is the first year of the new plan.

Table 1: Assessment Plan for BS in Molecular and Cell Biology

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop-Closing Timeline
<p>KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	<p>LTU MCB graduates will</p> <p>Defend the modern synthesis of evolution and genetics and apply this foundational biological paradigm to biological phenomena</p> <p>Explain the intrinsic relationship between the structure and function in biological systems and be able to predict structure given functional data or vice versa.</p> <p>Defend biological central dogma and summarize the process of the control of gene expression.</p> <p>Compare and contrast the various ways that biological organisms harvest energy and convert it to matter.</p> <p>Explain how living systems are interconnected and apply this knowledge to predict perturbations to these systems.</p>	<p>ETS National Exam (Analytical Skills, Ecology, Population Genetics and Evolution, Molecular Biology and Molecular Genetics, Cellular Structure, Organization, Function and Biochemistry and Cell Energetics)</p> <p>Exit exam results</p>	<p>60% of graduates score at or above national mean. (4 year running average)</p> <p>Alignment of curriculum with exit exam questions; identification of weak points</p>	Every Semester	Annual
<p>TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	<p>LTU MCB graduates will</p> <p>Apply advanced technologies such as software or instrumentation to practical and/or theoretical problems in molecular cell biology.</p> <p>Have the ability to use modeling and simulation with complex biological systems</p>	<p>Direct assessment of coursework with rubric in BIO 3301 (F), BIO 4103 (S), and BIO 4812 (S) F=formative S=summative Indirect assessment: Course Objectives for upper level courses.</p>	<p>The designation of qualified/not qualified will be given. 80% will receive a “qualified” designation. 80% “confident” and “very confident” overall of their mastery of the objectives.</p>	Every Semester	Annual
<p>SUSTAINABILITY “LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals</p>	<p>LTU MCB graduates will</p> <p>Evaluate the impact of scientific practices and findings on society.</p>	<p>Evaluation of Senior project proposal with project rubric in PSC 3001. Students will consider sustainability issues relevant to their project, and document it in their proposal. Indirect assessment of course</p>	<p>80% “satisfactory” or “superior” performance.</p>	Every Semester	Annual

and communities."		objectives			
<p>COMMUNICATION “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	<p>LTU MCB graduates will Have the ability to communicate and collaborate with other disciplines</p>	<p>Evaluation of written work including papers and laboratory reports with rubric. Proposals (PSC 3001) and Laboratory reports/Posters (Bio 3201, Bio 2321 and Bio 4812) will be evaluated using rubric, including standards for organization, language, and visual communication (tables/graphs). Evaluation of student presentations using oral rubric (Bio 491X & 492X).</p>	80% “satisfactory” or “superior” performance based on rubrics	Every Semester	Annual
<p>MATHEMATICS “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>		LTU core curriculum.		Every Semester	Annual
<p>READING “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>		LTU core curriculum.		Every Semester	Annual
<p>SCIENTIFIC ANALYSIS “LTU graduates will demonstrate critical thinking and apply analytical and problem- solving skills in scientific fields.”</p>	<p>LTU MCB graduates will have the ability to apply the process of science.</p>	<p>Evaluation of student presentation of a paper from the literature to a panel of faculty and students as part of BIO 4813 with rubric Completion of an independent research project or experiment with minimal assistance in BIO 4812 and/or BIO 4912/4922.</p>	80% “satisfactory” or “superior” performance by the senior year 80% “satisfactory” or “superior” performance by the senior year	Every Semester	Annual

<p>LEADERSHIP “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>		<p>LTU Leadership Curriculum</p>		<p>Every Semester</p>	<p>Annual</p>
<p>TEAMWORK “LTU graduates will demonstrate team- building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	<p>LTU MCB graduates will have the ability to communicate and collaborate with other disciplines</p>	<p>Instructor and team-self evaluation in BIO 3201. Likert scale of satisfaction will be used.</p>	<p>80% of responses with “always satisfied” or “frequently satisfied” to survey which will include peer evaluation.</p>	<p>Every Semester</p>	<p>Annual</p>
<p>PROFESSIONAL ETHICS “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>	<p>LTU MCB graduates will be able to Evaluate the impact of scientific practices and findings on society.</p>	<p>Ethics case study assignment or quiz in PSC 3001 in which Students will analyze an ethical situation and characterize and reflect the scientific misconduct involved.</p>	<p>80% “satisfactory” or “superior” performance.</p>	<p>Every Semester</p>	<p>Annual</p>

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

The last academic year was the first year for our updated program assessment cycle. In the first year, our efforts concentrated on collecting assessment data.

University Learning Outcomes: “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”

Program Learning Objective: LTU MCB graduates will

Defend the modern synthesis of evolution and genetics and apply this foundational biological paradigm to biological phenomena

Explain the intrinsic relationship between the structure and function in biological systems and be able to predict structure given functional data or vice versa.

Defend biological central dogma and summarize the process of the control of gene expression.

Compare and contrast the various ways that biological organisms harvest energy and convert it to matter.

Explain how living systems are interconnected and apply this knowledge to predict perturbations to these systems.

Assessment Tool 1: ETS National Exam

(Analytical Skills, Ecology, Population Genetics and Evolution, Molecular Biology and Molecular Genetics, Cellular Structure, Organization, Function and Biochemistry and Cell Energetics)

Metrics: 60% of graduates score at or above national mean. (4 year running average)

Evaluation/Issue 1: The two-year average (2015-2017) has 6 out of 14, 42.9%, students above the national mean.

Actions 1:

Responsibility: Department Chair

Assessment Tool 2: Exit exam results

Metrics: 60% of graduates score at or above national mean. (4 year running average)

Evaluation/Issue 2:

Action 2:

Responsibility:

University Learning Outcomes: “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”

Program Learning Objective: LTU MCB graduates will

Apply advanced technologies such as software or instrumentation to practical and/or theoretical problems in molecular cell biology.

Have the ability to use modeling and simulation with complex biological systems

Assessment Tool 1: Direct summative assessment of coursework with rubric

Metrics: The designation of qualified/not qualified will be given. 80% will receive a “qualified” designation

Evaluation/Issue 1:

Actions 1:

Responsibility:

University Learning Outcomes: “LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.”

Program Learning Objective: LTU MCB graduates will evaluate the impact of scientific practices and findings on society.

Assessment Tool 1: Evaluation of Senior project proposal with project rubric in PSC 3001. Students will consider sustainability issues relevant to their project, and document it in their proposal.

Metrics: 80% “satisfactory” or “superior” performance

Evaluation/Issue 1: Based on the rubric used to evaluate senior project proposals, one MCB major was rated “satisfactory” and four MCB majors were rated as “superior”.

Actions 1:

Responsibility:

University Learning Outcomes: “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”

Program Learning Objective: Have the ability to communicate and collaborate with other disciplines

Assessment Tool 1: Research poster and oral presentations will be evaluated using rubrics, including standards for organization, language, and visual (BIO3201)

Metrics: 80% “satisfactory” or “superior” performance based on rubrics

Evaluation/Issue 1: All students (5) rated as satisfactory on poster presentations.

Four students rated as superior, and one student satisfactory on oral research presentations.

Student feedback

Indirect assessment indicates that students enjoyed these experimental design activities and they felt that the activities helped in their understanding of the scientific process and their ability to disseminate results.

Instructor reflection

This semester I only had five students in the course. But, all were able to satisfactorily design their own experiments and present their research finding.

Actions 1: Continue to give ample opportunities during labs for students to design their OWN experiments and interpret data.

Responsibility: BIO3201 Instructor

Assessment Tool 2: Evaluation of student’s final oral presentations. (BIO4922)

Metrics: 80% “satisfactory” or “superior” performance based on rubrics

Evaluation/Issue 2: All students rated as superior performance

All of the final oral presentations were performed satisfactorily. Students complained that there were too many research presentations.

Actions 2: Students complained that there were too many research presentations (Research Day, MASAL, Science and Industry Showcase, Advisory Board) I propose keeping the oral presentation as a requirement for all students, but to limit the number of poster presentations they must do to one or two.

Responsibility: BIO4922

Assessment Tool 3: PSC3001 Proposals will be evaluated using rubric, including standards for organization, language, and visual.

Metrics: 80% “satisfactory” or “superior” performance based on rubrics

Evaluation/Issue 3: Based on the rubric used to evaluate senior project proposals, all five MCB majors were rated as “superior”.

Actions 3:

Responsibility: PSC3001 Instructor

University Learning Outcomes: “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”

Program Learning Objective: LTU MCB graduates will have the ability to apply the process of science.

Assessment Tool 1: Completion of an independent research project or experiment with minimal assistance. (BIO4922)

Metrics: 80% “satisfactory” or “superior” performance based on rubrics

Evaluation/Issue 1: Four students rated at superior performance, and four students rated at satisfactory performance.

All eight senior Molecular and Cell Biology senior project students were able to satisfactorily design and conduct their own experiments and present their research finding effectively.

Actions 1:

Responsibility: BIO4922

University Learning Outcomes: “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”

Program Learning Objective: LTU MCB graduates will have the ability to communicate and collaborate with other disciplines

Assessment Tool 1: Instructor and team-self evaluation in BIO 3201. Likert scale of satisfaction will be used.

Metrics: 80% of responses with “always satisfied” or “frequently satisfied” to survey which will include peer evaluation.

Evaluation/Issue 1:

Actions 1:

Responsibility:

University Learning Outcomes: “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”

Program Learning Objective: LTU MCB graduates will be able to evaluate the impact of scientific practices and findings on society.

Assessment Tool 1: Ethics case study assignment or quiz in PSC 3001 in which Students will analyze an ethical situation and characterize and reflect the scientific misconduct involved.

Metrics: 80% “satisfactory” or “superior” performance

Evaluation/Issue 1: Based on the ethics case study assignment results, one MCB major was rated “satisfactory” and four MCB majors were rated as “superior”.

Actions 1:

Responsibility:

During this period of time, data from pre-selected courses/tests were gathered. Faculty members of the MCB program have met to review the data. Several issues have been identified:

- The ETS exams and exit exams don’t generate consistent results because students do not take those exams seriously; which make them unsuitable for the purpose of assessment.
- Some learning outcomes are assessed multiple times. For example, the learning outcome of communication was assessed in three different courses, which the faculty members deem redundant.
- The enrollment numbers of some courses were very small, which was subject to large fluctuation. It is the faculty members’ consensus to use multiyear average instead.

3. Assessment Plan for 2017-2018 Academic Year

In the 17-18 academic year, we will

- continue the existing assessment plan for our own degree programs. In the second year, we will focus on reviewing data collected so far, and make necessary modification to the assessment plan.
- devise a separate assessment plan for the new University Undergraduate Education Outcomes. Courses have been selected, and assessment cycle has been planned; however, more details, such as assessment instruments to use, metric to be adopted, have not yet been determined.
- The department chair will call for department working meetings to address those issues; and the assessment representative will facilitate the meetings by providing assessment data, and coordinating communication between the department and the UAC.

*BS in Physics***1. Assessment Plan and Summary**

This is the first year of our revised program assessment plan (see Table 1). The new plan was created based on Dr. Gloria Rogers' recommendation. The new plan has a three-year cycle; the first year is dedicated to data collection; the second year to refining the assessment plan; the third year to implementing changes for loop closing. The past academic year is the first year of the new plan.

Table 1: Assessment Plan for BS in Physics

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
<p>KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	<p>Mastery of the topic areas of Classical Mechanics, Relativity, EM, Optics/Waves, Thermal Physics, Quantum Mechanics, Atomic</p>	<p>Course learning objective survey (formative assessment) ETS National Exam Exit exam</p>	<p>At least 4 out of 5 Likert scale for learning objectives 60% of graduates score at or above national mean. (4 year running average) 60% of graduates score at or above national mean. (4 year running average)</p>	<p>Every Semester</p>	<p>Annual</p>
<p>TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	<p>Students must individually and successfully use appropriate instrumentation available in the department, such as AFM, SEM to characterize specimen.</p>	<p>Direct assessment of coursework with the rubric in PHY 3661 and PHY 4781. The designation of qualified/not qualified will be given.</p>	<p>At least 80% will receive a “qualified” designation.</p>	<p>Every Semester</p>	<p>Annual</p>
<p>SUSTAINABILITY "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."</p>	<p>Students will consider their research equipment and resources cost, and the cost to replenish those.</p>	<p>Evaluation of Senior project proposal with project rubric in PSC3001, in which students will consider sustainability issue relevant to their project.</p>	<p>All students receive “satisfactory”</p>	<p>Every Semester</p>	<p>Annual</p>
<p>COMMUNICATION “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	<p>Students are aware of the publication standards from common scientific publications and the rubric for their senior projects, and apply them in their technical reports.</p>	<p>Direct assessment of student assignment with appropriate rubric in courses PHY3661, PHY4781, PHY4912/22. Designation of “unsatisfactory”, “satisfactory” and “superior” will be given. Evaluation of student presentations using oral advance physics course rubric in PHY4843. Designation of “unsatisfactory”, “satisfactory” and “superior” will be given.</p>	<p>At least 80% of students receiving “satisfactory” or “superior” performance based on rubrics. At least 80% “satisfactory” or “superior” performance based on rubrics.</p>	<p>Every Semester</p>	<p>Annual</p>

MATHEMATICS “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”		LTU core curriculum.		Every Semester	Annual
READING “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”		LTU core curriculum.		Every Semester	Annual
SCIENTIFIC ANALYSIS “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”	Students will demonstrate critical thinking in overcoming obstacle in theoretical calculation and lab experimentation.	Students’ research plan for PHY4912/22 (proposed in PSC3001) will be graded with a rubric. Designation of “reasonable” or “unreasonable” will be given. Completion of an independent experiment with minimal assistance in PHY 3661 and PHY 4781.	All students will receive “reasonable”. Graded by level of assistance provided. (assistance rubric will be created)	Every Semester	Annual
LEADERSHIP “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”		LTU Leadership Curriculum		Every Semester	Annual
TEAMWORK “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”	LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members contributions towards solving analytic programs	Instructor and team-self-evaluation in PHY 2413/2423. Team process check survey will be used. Likert scale of satisfaction will be used.	80% of responses with “always satisfied” or “frequently satisfied” to survey which will include peer evaluation.	Every Semester	Annual
PROFESSIONAL ETHICS “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”	Students will understand ethical responsibilities in physics.	Ethics case study assignment in PSC 3001, in which students will analyze an ethical situation and characterize and reflect the scientific misconduct involved.	Students receive at least “satisfactory” (need to formalize the rubric)	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

The last academic year was the first year for our updated program assessment cycle. In the first year, our efforts concentrated on collecting assessment data.

University Learning Outcomes: “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”

Program Learning Objective: Mastery of the topic areas of Classical Mechanics, Relativity, EM, Optics/Waves, Thermal Physics, Quantum Mechanics, Atomic

Assessment Tool 1: Course learning objective survey administered by Changgong Zhou

Metrics: At least 4 out of 5 Likert scale for learning objectives

Evaluation/Issue 1: Only 1 student took the survey for Optics/Waves, and 2 students took the survey for Quantum Mechanics; For the Optics/Waves survey, the metrics is not met for 4 out of 14 questions; for the Quantum Mechanics survey, the metrics is not met for 4 responses out of 16 questions.

Actions 1:

Responsibility: Changgong Zhou

Assessment Tool 2: ETS National Exam by department chair

Metrics: 60% of graduates score at or above national mean. (4 year running average)

Evaluation/Issue 2: The two-year average (2015-2017) has zero out of 4, 0%, students above the national mean.

Action 2:

Responsibility: Department chair

Assessment Tool 3: Exit exam

Metrics: 60% of graduates score at or above national mean. (4 year running average)

Evaluation/Issue 3:

Action 3:

Responsibility: Department chair

University Learning Outcomes: “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”

Program Learning Objective: Students must individually and successfully use appropriate instrumentation available in the department, such as AFM, SEM to characterize specimen.

Assessment Tool 1: Direct assessment of coursework with the rubric in PHY 3661 and PHY 4781. administered by Changgong Zhou

Metrics: At least 80% will receive a “qualified” designation.

Evaluation/Issue 1: All students successfully followed operation procedures and used SEM to scan specimen of micron-sized features

Actions 1:

Responsibility: Changgong Zhou

University Learning Outcomes: “LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.”

Program Learning Objective: Students will consider their research equipment and resources cost, and the cost to replenish those.

Assessment Tool 1: Evaluation of Senior project proposal with project rubric in PSC3001, in which students will consider sustainability issue relevant to their project. administered by Shannon Timmons

Metrics: All students receive “satisfactory”

Evaluation/Issue 1: Based on the rubric used to evaluate senior project proposals, all three physics majors was rated “satisfactory”.

Actions 1:

Responsibility: PSC3001 Instructor

University Learning Outcomes: “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”

Program Learning Objective: Students are aware of the publication standards from common scientific publications and the rubric for their senior projects, and apply them in their technical reports.

Assessment Tool 1: Direct assessment of student assignment with appropriate rubric in courses PHY3661, PHY4781, PHY4912/22. PHY3661 & 4781 by Changgong Zhou; PHY4912/22 by all physics faculty

Metrics: At least 80% of students receiving “satisfactory” or “superior” performance based on rubrics.

Evaluation/Issue 1: The rubrics were points-based; which do not have a clear definition of the criteria for “satisfactory” or “superior”.

Actions 1: Define satisfactory or superior criteria

Responsibility: Changgong Zhou for PHY3661 & 4781; all physics faculty for PHY4912/22

Assessment Tool 2: Evaluation of student presentations using oral advance physics course rubric in PHY4843, Valentina Tobos

Metrics: At least 80% “satisfactory” or “superior” performance based on rubrics.

Evaluation/Issue 2: All students received 90%+

Actions 2:

Responsibility:

University Learning Outcomes: “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”

Program Learning Objective: Students will demonstrate critical thinking in overcoming obstacle in theoretical calculation and lab experimentation.

Assessment Tool 1: Students’ research plan for PHY4912/22 (proposed in PSC3001) will be graded with a rubric. Designation of “reasonable” or “unreasonable” will be given.

Metrics: All students will receive “reasonable”.

Evaluation/Issue 1: Two students worked on their senior projects and received “reasonable”.

Actions 1:

Responsibility: Senior Project Advisors

Assessment Tool 2: Completion of an independent experiment with minimal assistance (Graded by level of assistance provided.)

Metrics:

Evaluation/Issue 2: An experiment (Frank Hertz Experiment) was selected for this purpose. Students’ behavior and discussion was observed. Students were engaged in active discussion, and the experiment was completed on time. The complexity of the experiment made it a challenge for students

Actions 2: Assistance rubric will be created. A different experiment will be selected.

Responsibility: PHY3661 Changgong Zhou

University Learning Outcomes: “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”

Program Learning Objective: LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members contributions towards solving analytic programs

Assessment Tool 1: Instructor and team-self-evaluation in PHY 2413/2423. Team process check survey will be used. Likert scale of satisfaction will be used

Metrics: 80% of responses with “always satisfied” or “frequently satisfied” to survey which will include peer evaluation.

Evaluation/Issue 1:

Actions 1:

Responsibility: All full time physics faculty

University Learning Outcomes: “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”

Program Learning Objective: Students will understand ethical responsibilities in physics.

Assessment Tool 1: Ethics case study assignment in PSC 3001, in which students will analyze an ethical situation and characterize and reflect the scientific misconduct involved.

Metrics: Students receive at least “satisfactory” (need to formalize the rubric)

Evaluation/Issue 1: Based on the rubric used to evaluate the ethics case study assignment results, all three physics majors were rated as “superior”.

Actions 1:

Responsibility: PSC3001 Instructor

During this period of time, data from pre-selected courses/tests were gathered. Faculty members of the physics program have met to review the data. Several issues have been identified:

- The ETS exams and exit exams don’t generate consistent results because students do not take those exams seriously; which make them unsuitable for the purpose of assessment.
- The enrollment numbers of some courses were very small, which was subject to large fluctuation. It is the faculty members’ consensus to use multi year average instead.

3. Assessment Plan for 2017-2018 Academic Year

In the 17-18 academic year, we will

- continue the existing assessment plan for our own degree programs. In the second year, we will focus on reviewing data collected so far, and make necessary modification to the assessment plan.
- devise a separate assessment plan for the new University Undergraduate Education Outcomes. Courses have been selected, and assessment cycle has been planned; however, more details, such as assessment instruments to use, metric to be adopted, have not yet been determined.
- The department chair will call for department working meetings to address those issues; and the assessment representative will facilitate the meetings by providing assessment data, and coordinating communication between the department and the UAC.

*BS in Physics & Computer Science***1. Assessment Plan and Summary**

This is the first year of our revised program assessment plan (see Table 1). The new plan was created based on Dr. Gloria Rogers' recommendation. The new plan has a three-year cycle; the first year is dedicated to data collection; the second year to refining the assessment plan; the third year to implementing changes for loop closing. The past academic year is the first year of the new plan.

Table 1: Assessment Plan for BS in Physics & Computer Science

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
<p>KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	Mastery of the topic areas of Classical Mechanics, Relativity, EM, Optics/Waves, Thermal Physics, Quantum Mechanics, Atomic	Course learning objective survey (formative assessment) ETS National Exam Exit exam	At least 4 out of 5 Likert scale for learning objectives 60% of graduates score at or above national mean. (4 year running average) 60% of graduates score at or above national mean. (4 year running average)	Every Semester	Annual
<p>TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	Students must individually and successfully use appropriate instrumentation available in the department, such as AFM, SEM to characterize specimen.	Direct assessment of coursework with the rubric in PHY 3661 and PHY 4781. The designation of qualified/not qualified will be given.	At least 80% will receive a “qualified” designation.	Every Semester	Annual
<p>SUSTAINABILITY “LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.”</p>	Students will consider their research equipment and resources cost, and the cost to replenish those.	Evaluation of Senior project proposal with project rubric in PSC3001, in which students will consider sustainability issue relevant to their project.	All students receive “satisfactory”	Every Semester	Annual
<p>COMMUNICATION “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	Students are aware of the publication standards from common scientific publications and the rubric for their senior projects, and apply them in their technical reports.	Direct assessment of student assignment with appropriate rubric in courses PHY3661, PHY4781, PHY4912/22. Designation of “unsatisfactory”, “satisfactory” and “superior” will be given. Evaluation of student presentations using oral advance physics course rubric in PHY4843. Designation of “unsatisfactory”, “satisfactory” and “superior” will be given.	At least 80% of students receiving “satisfactory” or “superior” performance based on rubrics. At least 80% “satisfactory” or “superior” performance based on rubrics.	Every Semester	Annual

MATHEMATICS “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”		LTU core curriculum.		Every Semester	Annual
READING “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”		LTU core curriculum.		Every Semester	Annual
SCIENTIFIC ANALYSIS “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”	Students will demonstrate critical thinking in overcoming obstacle in theoretical calculation and lab experimentation.	Students’ research plan for PHY4912/22 (proposed in PSC3001) will be graded with a rubric. Designation of “reasonable” or “unreasonable” will be given. Completion of an independent experiment with minimal assistance in PHY 3661 and PHY 4781.	All students will receive “reasonable”. Graded by level of assistance provided. (assistance rubric will be created)	Every Semester	Annual
LEADERSHIP “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”		LTU Leadership Curriculum		Every Semester	Annual
TEAMWORK “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”	LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members contributions towards solving analytic programs	Instructor and team-self-evaluation in PHY 2413/2423. Team process check survey will be used. Likert scale of satisfaction will be used.	80% of responses with “always satisfied” or “frequently satisfied” to survey which will include peer evaluation.	Every Semester	Annual
PROFESSIONAL ETHICS “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”	Students will understand ethical responsibilities in physics.	Ethics case study assignment in PSC 3001, in which students will analyze an ethical situation and characterize and reflect the scientific misconduct involved.	Students receive at least “satisfactory” (need to formalize the rubric)	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

The last academic year was the first year for our updated program assessment cycle. In the first year, our efforts concentrated on collecting assessment data.

University Learning Outcomes: “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”

Program Learning Objective: Mastery of the topic areas of Classical Mechanics, Relativity, EM, Optics/Waves, Thermal Physics, Quantum Mechanics, Atomic

Assessment Tool 1: Course learning objective survey administered by Changgong Zhou

Metrics: At least 4 out of 5 Likert scale for learning objectives

Evaluation/Issue 1: Only 1 student took the survey for Optics/Waves, and 2 students took the survey for Quantum Mechanics; For the Optics/Waves survey, the metrics is not met for 4 out of 14 questions; for the Quantum Mechanics survey, the metrics is not met for 4 responses out of 16 questions.

Actions 1:

Responsibility: Changgong Zhou

Assessment Tool 2: ETS National Exam by department chair

Metrics: 60% of graduates score at or above national mean. (4 year running average)

Evaluation/Issue 2: The two-year average (2015-2017) has zero out of 4, 0%, students above the national mean.

Action 2:

Responsibility: Department chair

Assessment Tool 3: Exit exam

Metrics: 60% of graduates score at or above national mean. (4 year running average)

Evaluation/Issue 3:

Action 3:

Responsibility: Department chair

University Learning Outcomes: “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”

Program Learning Objective: Students must individually and successfully use appropriate instrumentation available in the department, such as AFM, SEM to characterize specimen.

Assessment Tool 1: Direct assessment of coursework with the rubric in PHY 3661 and PHY 4781. administered by Changgong Zhou

Metrics: At least 80% will receive a “qualified” designation.

Evaluation/Issue 1: All students successfully followed operation procedures and used SEM to scan specimen of micron-sized features

Actions 1:

Responsibility: Changgong Zhou

University Learning Outcomes: “LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.”

Program Learning Objective: Students will consider their research equipment and resources cost, and the cost to replenish those.

Assessment Tool 1: Evaluation of Senior project proposal with project rubric in PSC3001, in which students will consider sustainability issue relevant to their project. administered by Shannon Timmons

Metrics: All students receive “satisfactory”

Evaluation/Issue 1: Based on the rubric used to evaluate senior project proposals, all three physics majors was rated “satisfactory”.

Actions 1:

Responsibility: PSC3001 Instructor

University Learning Outcomes: “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”

Program Learning Objective: Students are aware of the publication standards from common scientific publications and the rubric for their senior projects, and apply them in their technical reports.

Assessment Tool 1: Direct assessment of student assignment with appropriate rubric in courses PHY3661, PHY4781, PHY4912/22. PHY3661 &4781 by Changgong Zhou; PHY4912/22 by all physics faculty

Metrics: At least 80% of students receiving “satisfactory” or “superior” performance based on rubrics.

Evaluation/Issue 1: The rubrics were points-based; which do not have a clear definition of the criterions for “satisfactory” or “superior”.

Actions 1: Define satisfactory or superior criterions

Responsibility: Changgong Zhou for PHY3661 &4781; all physics faculty for PHY4912/22

Assessment Tool 2: Evaluation of student presentations using oral advance physics course rubric in PHY4843, Valentina Tobos

Metrics: At least 80% “satisfactory” or “superior” performance based on rubrics.

Evaluation/Issue 2: All students received 90%+

Actions 2:

Responsibility:

University Learning Outcomes: “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”

Program Learning Objective: Students will demonstrate critical thinking in overcoming obstacle in theoretical calculation and lab experimentation.

Assessment Tool 1: Students’ research plan for PHY4912/22 (proposed in PSC3001) will be graded with a rubric. Designation of “reasonable” or “unreasonable” will be given.

Metrics: All students will receive “reasonable”.

Evaluation/Issue 1: Two students worked on their senior projects and received “reasonable”.

Actions 1:

Responsibility: Senior Project Advisors

Assessment Tool 2: Completion of an independent experiment with minimal assistance (Graded by level of assistance provided.)

Metrics:

Evaluation/Issue 2: An experiment (Frank Hertz Experiment) was selected for this purpose. Students’ behavior and discussion was observed. Students were engaged in active discussion, and the experiment was completed on time. The complexity of the experiment made it a challenge for students

Actions 2: Assistance rubric will be created. A different experiment will be selected.

Responsibility: PHY3661 Changgong Zhou

University Learning Outcomes: “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”

Program Learning Objective: LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members contributions towards solving analytic programs

Assessment Tool 1: Instructor and team-self-evaluation in PHY 2413/2423. Team process check survey will be used. Likert scale of satisfaction will be used

Metrics: 80% of responses with “always satisfied” or “frequently satisfied” to survey which will include peer evaluation.

Evaluation/Issue 1:

Actions 1:

Responsibility: All full time physics faculty

University Learning Outcomes: “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”

Program Learning Objective: Students will understand ethical responsibilities in physics.

Assessment Tool 1: Ethics case study assignment in PSC 3001, in which students will analyze an ethical situation and characterize and reflect the scientific misconduct involved.

Metrics: Students receive at least “satisfactory” (need to formalize the rubric)

Evaluation/Issue 1: Based on the rubric used to evaluate the ethics case study assignment results, all three physics majors were rated as “superior”.

Actions 1:

Responsibility: PSC3001 Instructor

During this period of time, data from pre-selected courses/tests were gathered. Faculty members of the physics program have met to review the data. Several issues have been identified:

- The ETS exams and exit exams don’t generate consistent results because students do not take those exams seriously; which make them unsuitable for the purpose of assessment.
- The enrollment numbers of some courses were very small, which was subject to large fluctuation. It is the faculty members’ consensus to use multi year average instead.

3. Assessment Plan for 2017-2018 Academic Year

In the 17-18 academic year, we will

- continue the existing assessment plan for our own degree programs. In the second year, we will focus on reviewing data collected so far, and make necessary modification to the assessment plan.
- devise a separate assessment plan for the new University Undergraduate Education Outcomes. Courses have been selected, and assessment cycle has been planned; however, more details, such as assessment instruments to use, metric to be adopted, have not yet been determined.
- The department chair will call for department working meetings to address those issues; and the assessment representative will facilitate the meetings by providing assessment data, and coordinating communication between the department and the UAC.

BS in Psychology**1. Assessment Plan and Summary**

See Table 1.

Table 1: Assessment Plan for BS in Psychology

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
<u>KNOWLEDGE IN DISCIPLINE</u> "LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems."	Objective #1: Students will demonstrate knowledge and expertise in 4 content macro-areas: clinical psychology, neuroscience and cognition, experimental methods and techniques and social psychology.	Scores obtained from tests and assignments in the four macro areas of interest. Target courses for each macro area are: 1) PSY 1213, PSY 3633, and PSY 4633 2) PSY 1213, PSY 3213, and PSY 4213 3) PSY 1213, PSY 2113, and PSY 3223 4) PSY 1213 and PSY 3623	Average scores from 100 point scale should be higher than 67%.	Each Semester	Annual
<u>TECHNOLOGY</u> "LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines."	Objective #2: Students will demonstrate competence and ability to use appropriate software to produce understandable reports and posters in APA style, including use of statistical analysis software, office dissemination software, and library and internet research databases.	Scores obtained from the administration of technology rubric. Target courses are PSY 2113 Research Methods and PSY 3223 -Experimental Psychology Lab;	Average score should be higher than 67%.	Each Semester	Annual
<u>SUSTAINABILITY</u> "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."	Objective 3: LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.	Scores obtained from the administration of sustainability rubric. Target courses are PSY 2113 Research Methods and PSY 1003 World of the Mind	Two criteria to meet: Average higher than 67%; at least 15% of the students score above 90%	Each Semester	Annual

<p><u>COMMUNICATION</u> “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	<p>Objective 4: LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.</p>	<p>Assessed by UAC</p>		<p>Each Semester</p>	<p>Annual</p>
<p><u>MATHEMATICS</u> “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>	<p>Objective 5: LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.</p>	<p>Assessed by UAC</p>		<p>Each Semester</p>	<p>Annual</p>
<p><u>READING</u> “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>	<p>Objective 6: LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.</p>	<p>Assessed by UAC</p>		<p>Each Semester</p>	<p>Annual</p>
<p><u>SCIENTIFIC ANALYSIS</u> “LTU graduates will demonstrate critical thinking and apply analytical and problem- solving skills in scientific fields.”</p>	<p>Objective 7: Students will demonstrate critical thinking in the field of psychology and the ability of solving theoretical and applied problems in psychological research.</p>	<p>Score is based on Critical Thinking rubric Target courses: PSY 4922: Senior Research Project 2; PSY 3223: Experimental Psychology Laboratory</p>	<p>Two criteria to meet: Average higher than 67%; at least 15% of the students score above 90%</p>	<p>Each Semester</p>	<p>Annual</p>
<p><u>LEADERSHIP</u> “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>	<p>Objective 8: LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.</p>	<p>Being assessed by the leadership program Specifically the courses: LDR2000, LDR3000 LDR4000</p>		<p>Each Semester</p>	<p>Annual</p>

<p><u>TEAMWORK</u> “LTU graduates will demonstrate team- building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	<p>Objective 9: LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.</p>			Each Semester	Annual
<p><u>PROFESSIONAL ETHICS</u> “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>	<p>Objective 10: Students will demonstrate knowledge of the APA ethics code in the treatment of patients, and human and non-human subjects in experimental research. Also, students will demonstrate knowledge of the norms related to the respect of the truth in scientific research.</p>	<p>Score is based on the ethics topic of PSY 2113- Research Method course. See appendix 4. Target course is PSY 2113- Research Methods</p>	<p>Two criteria to meet: 1. Average higher than 67% At least 15% of the students score above 90%</p>	Each Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

Program Learning Objective #3: Sustainability: LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.

Assessment: Use of a sustainability survey (Adapted from Sustainability Education at UBC: A Student Perspective, Marcus et al., 2009) administered every year in PSY 2113: Research Methods.

Evaluation: In the questionnaire there are a total of 26 questions which measure the interest of students in several topics related to sustainability (e.g. environmental policies, food security, sustainable cities, etc.). The average interest in the topic was 3.7 on a 5 point scale. This corresponds to a score of 74% and none of the students exceeded a score of 90%. As the two criteria to are: 1.) Average higher than 67% and 2.) At least 15% of the students scoring above 90%, our students did not meet the requested criteria.

Issue: We expected a greater interest in sustainability than what the data indicates. We offered a greater focus on psychological aspects of sustainability in PSY 1003: World of the Mind. However, few Psychology students were enrolled in PSY 1003 in Spring 2017.

Action: Reevaluate the threshold and the language of the learning objective (“demonstrate an awareness” differs from demonstrating an interest).

Responsibility: Psychology faculty for the scoring and administration. Program directors for data analysis and loop closing.

University/College Support for Objective: N/A

Program Learning Objective #7: Scientific Analysis. Students will demonstrate critical thinking in the field of Psychology and the ability of solving theoretical and applied problems in psychological research.

Assessment: Critical thinking rubric (see appendix 3) administered every year, loop closed every 2 years. Target courses: PSY 4922: Senior Research Project 2; PSY 3713: Topics in Psychology – Psychology of Art; PSY 3223: Experimental Psychology Laboratory

Evaluation: The rubric includes four fields (see appendix 3) which measure various aspects of critical thinking. The average score was 91.20%. More than 15% of students scored above 90%. Criteria were met.

Issues: None

Action: None

Responsibility: Psychology faculty for the scoring and administration. Program directors for data analysis and loop closing.

University/College Support for Objective: N/A

3. Assessment Plan for 2017-2018 Academic Year

- 1) Learning objectives 1, 2 will be assessed in the Fall 2018 semester.
- 2) Learning objectives 3, 7,10 will be assessed in the Fall 2019 semester.

*MS in Computer Science***1. Assessment Plan and Summary**

See Table 1.

Table 1: Assessment Plan for MS in Computer Science

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	<i>Display</i> a thorough understanding of the theoretical concepts and practical uses of computer science in two concentrations. <i>Demonstrate</i> a sufficient depth of knowledge in a substantive area of computer science to pursue advanced practical work in industry	Direct assessment of student assignments Alumni survey	Level 3 on graduate assignment rubric Level 3 on survey rubric	Every Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	<i>Formulate</i> and <i>analyze</i> technical requirements for new or existing projects	Direct assessment of student collaborative research projects	Level 3 on project rubric	Every Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	Be lifelong learners who are able to <i>master</i> new topics required to <i>understand</i> and <i>synthesize</i> solutions to novel problems, based on their technical knowledge of computer science and their ability to <i>think critically</i>	Alumni Survey	Level 3 on rubric	Every Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	5. <i>Plan, create and integrate</i> oral and written communication of [mathematical and algorithmic ideas] effectively to audiences having a range of technical understanding.	Direct assessment of student collaborative research projects	Level 3 on project rubric	Every Semester	Annual
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	4. Be lifelong learners who are able to <i>master</i> new topics required to <i>understand</i> and <i>synthesize</i> solutions to novel problems, based on their technical knowledge of computer science and their ability to <i>think critically</i>	Evaluation of work in ARI5622 ID	70% of students obtain a grade of B or above	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

For 2016-7, the Math/CS department decided to focus efforts in assessment in Computer Science on the undergraduate program and postpone assessment of the graduate program until 2017-8.

3. Assessment Plan for 2017-2018 Academic Year

1) There are no loop-closing actions from 2016-7.

2) Assessment of the graduate program will begin in 2017-8.

3) New assessment plans for 2017-8 academic year:

- *Objective/Outcome:* Two outcomes will be assessed in 2017-8. CS faculty will meet in Fall 2017 to determine which two outcomes will be assessed in 2017-8. All five program outcomes will be assessed over a three year cycle.
- *Actions:* CS faculty will meet in Fall 2017 to determine which courses are to be assessed in the MS of CS curriculum for 2017-8. Assessment of MS in CS curriculum will begin in Spring 2018.

*MS in Technical and Professional Communication***1. Assessment Plan and Summary**

See Table 1.

Table 1: Assessment Plan for MS in Technical and Professional Communication

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	1) Design, produce, and evaluate the various types of technical and professional communication required by diverse audiences.	Graduate Exit Survey	4 or better average on the Graduate Exit Survey	Every Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	2) Gain insight into the current research methodologies applicable to the fields of technical and professional communication	Research Rubric applied to Semester Project in COM6453	2 or better average on the Research Rubric	Every Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	3) Apply major rhetorical theories of technical and professional discourse to a variety of communication environments	Final Project in COM6443, Rhetoric of Technical Communication	B or better on Final Project	Every Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	4) Use verbal, visual, analytical, and digital skills to create and enhance communication in professional environments. 5) Master presentation techniques that are adaptable to multiple audiences	Written Communication Rubric applied to COM7203 Practicum Project Oral Communication Rubric applied to COM6553 Semester project	2 or better average on the Written Rubric 2 or better average on the Oral Communication Rubric	Every Semester	Annual
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	6) Apply emerging electronic technologies and other media to the creation of various publications and presentations	Exit Survey	4 or better average on the Exit Survey	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop-Closing)

Learning Objective 4: Use verbal, visual, analytical, and digital skills to create and enhance communication in professional environments

Assessment: Written Communication Rubric applied to COM7203 Practicum Project **Evaluation:**

- In the area of Conventional Form—error free mechanics, effective formatting, and reliable and accurate sources with correct style—the student evaluated had a score of 3 on a scale of 3.
- In the area of Clarity and Coherence—fluent and concise writing, logical organization and audience adaptation—the student evaluated had a score of 3 on a scale of 3.
- In the area of Content—excellent style, organization, content, and publishable quality—the student evaluated had a score of 3 on a scale of 3.

Issues: On a 3.0 scale, the student's overall average was 3, which exceeds the threshold of 2. Although this represents only one student, it might be an indicator of a new direction.

Actions: Next loop closing will be summer 2018.

Responsibility: Corinne Stavish, program director

Learning Objective 5: Master presentation techniques that are adaptable to multiple audiences

Assessment: Oral Communication Rubric applied to COM6553 Semester project

Evaluation:

- In the area of Content the four students had an average of 2.5 on a scale of 3.
- In the area of Organization the four students had an average of 2.6 on a scale of 3.
- In the area of Delivery, the four students had an average of 2.75 on a scale of 3.

Issues: No issues identified. The students' performances more than met the goal 2.

Actions: Next loop closing will be Summer 2019

Responsibility: Corinne Stavish, program director

3. Assessment Plan for 2017-2018 Academic Year

- Continue to work on writing skills: We are making progress in this area with individual students. There are a few students in the Program who have writing skills that need further attention. We continue to work on those and are using the tutors in the AAC more than might be expected in a graduate program. The instructors are aware of the students' needs and continue to work on written skills.
- Discuss what types of writing courses might be introduced in the program: We discussed and are considering introducing a course in writing documentation, usability and instructions manuals. So far, we do not have the student demand. However, we have more students interested in taking Proposal Writing and Technical Editing, so we are offering those courses more frequently.
- Continue to have all instructors in the program aware of the need to work on the students' writing skills.
- Administer Exit Survey
- Administer Written Communication Rubric
- Administer Research Rubric
- Administer Rhetoric Rubric
- Administer Oral Communication Rubric
- Close loop on learning goals 2, 3, 4, 6

College of Engineering

BS/MS in Architectural Engineering

1. Assessment Plan and Summary

This section describes the assessment plan for the MSArE program for 2016-2017. Tables 1.1 and 1.2 summarize the plan for the undergraduate and graduate courses, respectively. The first column includes the University Learning Outcomes and explains the expectation of each. The second column maps the University learning Outcomes to those of the ABET Student Outcomes (SO a-k) and one specific MSArE Program Outcome (SO 1). Listed below is an interpretation of the ABET SOs from Criterion 3. Upon successful completion of the MSArE degree program, the graduate will have:

- a) an ability to apply knowledge of mathematics, science, and engineering;
- b) an ability to design and conduct experiments, as well as to analyze and interpret data;
- c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- d) an ability to function on multidisciplinary teams;
- e) an ability to identify, formulate, and solve engineering problems;
- f) an understanding of professional and ethical responsibility;
- g) an ability to communicate effectively;
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- i) a recognition of the need for, and an ability to engage in life-long learning
- j) a knowledge of contemporary issues;
- k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- l) an ability to integrate building engineering and architectural systems through collaboration and tools to create high-performing solutions

The third column describes the assessment tools used for each outcome. The fourth column details the metrics required for each assessment tool. The fifth column lists when each assessment tool will be collected and assessed. The sixth column includes the Close-the-Loop timeline.

Table 1.1. 2016-2017 Assessment Plan for Architectural Engineering Undergraduate Courses

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing
Discipline-Specific Knowledge					
<p><i>(Undergraduate)</i> <u>KNOWLEDGE IN DISCIPLINE</u> LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.</p>	<p>Outcome a <i>an ability to apply knowledge of mathematics, science, and engineering</i></p>	<p>EAE 3113: ElecSys1 Final Design Project using assignment rubric</p> <p>EAE3613: MechSys1 Exam 3 questions on Psychometrics); Homework 7 assignment on thermodynamics, and refrigeration cycle</p> <p>EAE 3014: AEIDS 1 Rubric, graphic research narrative and calculations for structural wood roof trusses and micro-hydro electrical system</p> <p>EAE 4113: ElecSys2 Homework 2 assignment and Midterm Exam questions</p> <p>EAE 4014: AEIDS 2 Rubric, graphic research narrative and calculations for a photo-voltaic system</p> <p>ECE 4753: Steel Design Exam 1 questions (Problems 3 and 4) on mathematics and interpolations of the formulas</p> <p>EAE 4623: Acoustics Final Project Report</p> <p>EAE 4024: AEIDS 3 Graphic and computational solutions to architectural engineering problems</p>	<p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p>	<p>Fall Semester</p> <p>Spring Semester</p> <p>Spring Semester</p> <p>Fall Semester</p> <p>Fall Semester</p> <p>Once Per Year</p> <p>Spring Semester</p> <p>Spring Semester</p>	<p>Annual</p>
	<p>Outcome c <i>an ability to design a system, component, or process to</i></p>	<p>EAE 3113: ElecSys1 Final Design Project using assignment rubric</p>	<p>80% of students receive a score of 80% or higher</p>	<p>Fall Semester</p>	<p>Annual</p>

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing
	<i>meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability</i>	<p>EAE3613: MechSys1 Group Design Project using assignment rubric</p> <p>EAE 3014: AEIDS 1 Rubric and design drawings, including plans and sections, illustrating compliance with the criteria.</p> <p>ECE 4743: Concrete Design Exam 2 had four problems which dealt with calculations of different design systems</p> <p>EAE 4113: ElecSys2 Project 1 using assignment rubric</p> <p>EAE 4014: AEIDS 2 Rubric and design documents/drawings completed in BIM (Revit) software</p> <p>ECE 4753: Steel Design Final Exam problems to design a beam, brace, column, and two connection designs</p> <p>EAE 4613: MechSys2 Questions from Test 1, Test 2, Final Exam and extra credit assignment</p> <p>EAE 4623: Acoustics Final Project Report</p> <p>EAE 4024: AEIDS 3 Drawings and descriptions and studies of thermal performance completed in Modules 3/4</p>	<p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p>	<p>Spring Semester</p> <p>Spring Semester</p> <p>Once Per Year</p> <p>Fall Semester</p> <p>Fall Semester</p> <p>Once Per Year</p> <p>Spring Semester</p> <p>Spring Semester</p> <p>Spring Semester</p>	
	Outcome e <i>an ability to identify, formulate, and solve engineering problems</i>	<p>EAE 3113: ElecSys1 Final Design Project using assignment rubric</p> <p>EAE3613: MechSys1</p>	<p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a</p>	<p>Fall Semester</p> <p>Spring Semester</p>	Annual

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing
		<p>Homework #6 and Exam 3 questions</p> <p>EAE 3014: AEIDS 1 Rubric, design drawings and structural calculations for retaining walls and a dam</p> <p>ECE 4743: Concrete Design First Exam on analyzing a floor system for moment and shear</p> <p>EAE 4113: ElecSys2 Problems from Homework #3</p> <p>ECE 4243: Construction ProjMgmt Problem #4 of Final Exam</p> <p>EAE 4014: AEIDS 2 Rubric and design documents/drawings that illustrate compliance with the criteria</p> <p>ECE 4753: Steel Design Problem 1 of Exam 1</p> <p>EAE 4613: MechSys2 Questions from Test 1, Test 2, Final Exam and extra credit assignment</p> <p>EAE 4623: Acoustics Final Project Report using assignment rubric</p> <p>EAE 4024: AEIDS 3 Rubric, design drawings, technical documentation and calculations of thermal losses and capacity of mechanical systems</p>	<p>score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p>	<p>Spring Semester</p> <p>Once Per Year</p> <p>Fall Semester</p> <p>Once Per Year</p> <p>Fall Semester</p> <p>Once Per Year</p> <p>Spring Semester</p> <p>Spring Semester</p> <p>Spring Semester</p>	
	<p>Outcome k <i>an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;</i></p>	<p>EAE 3113: ElecSys1 Final Design Project using assignment rubric</p> <p>EAE 3014: AEIDS 1 Rubric and design</p>	<p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p>	<p>Fall Semester</p> <p>Spring Semester</p>	<p>Annual</p>

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing
		documents/drawings completed in BIM (Revit) software ECE 4743: Concrete Design Problem 4 of Exam 2	80% of students receive a score of 80% or higher	Once Per Year	
		EAE 4113: ElecSys2 Problems in Homework #10 and Final Exam	80% of students receive a score of 80% or higher	Fall Semester	
		EAE 4014: AEIDS 2 Rubric and design documents/drawings completed in BIM (Revit) software	80% of students receive a score of 80% or higher	Fall Semester	
		EAE 4613: MechSys2 Questions from Test 1, Test 2, Final Exam and extra credit assignment	80% of students receive a score of 80% or higher	Spring Semester	
		EAE 4623: Acoustics Final Project Report using assignment rubric	80% of students receive a score of 80% or higher	Spring Semester	
		EAE 4024: AEIDS 3 Rubric and Final Project documentation using software and digital tools	80% of students receive a score of 80% or higher	Spring Semester	
<p><i>(Undergraduate)</i> <u>INTEGRATED BUILDINGS</u></p> <p>Program graduate will demonstrate the ability to integrate building engineering and architectural systems through collaboration and tools to create high-performing solutions.</p>	<p>Outcome 1 <i>an ability to integrate building engineering and architectural systems through collaboration and tools to create high-performing solutions</i></p>	<p>EAE 1081: Intro to AE Homework #3 – AE Systems Homework #5 – 5-year Study Plan Homework #6 – BIM, IDE, IDP Group Project 1,2 & 3 Group Presentation</p> <p>EAE3613: MechSys1 Group Design Project using assignment rubric</p>	<p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p>	<p>Fall Semester</p> <p>Spring Semester</p>	Annual
	<p>Outcome 1 <i>(continued)</i></p>	<p>EAE 3014: AEIDS 1 Rubric, teams design documents by and individual reports to show integration of design criteria</p>	<p>80% of students receive a score of 80% or higher</p>	<p>Spring Semester</p>	

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing
		EAE 4014: AEIDS 2 Rubric, teams design documents by and individual reports to show integration of design criteria	80% of students receive a score of 80% or higher	Fall Semester	
		EAE 4613: MechSys2 Questions from Test 1, Test 2, Final Exam and extra credit assignment	80% of students receive a score of 80% or higher	Spring Semester	
		EAE 4024: AEIDS 3 Final project report of the systems used and calculations	80% of students receive a score of 80% or higher	Spring Semester	
<p><i>(Undergraduate)</i> <u>TECHNOLOGY</u></p> <p>LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.</p>	<p>Outcome k <i>an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;</i></p>	EAE 3113: ElecSys1 Final Design Project	80% of students receive a score of 80% or higher	Fall Semester	Annual
		EAE 3014: AEIDS 1 Rubric and drawings completed in BIM (Revit) software	80% of students receive a score of 80% or higher	Spring Semester	
		ECE 4743: Concrete Design Four problems on Exam2	80% of students receive a score of 80% or higher	Once Per Year	
		EAE 4113: ElecSys2 Problems from Homework #10 and Final Exam	80% of students receive a score of 80% or higher	Fall Semester	
		EAE 4014: AEIDS 2 Rubric and design documents/drawings completed in BIM (Revit) software	80% of students receive a score of 80% or higher	Fall Semester	
		EAE 4613: MechSys2 Questions from Test 1, Test 2, Final Exam and extra credit assignment	80% of students receive a score of 80% or higher	Spring Semester	
		EAE 4623: Acoustics Final Project Report	80% of students receive a score of 80% or higher	Spring Semester	
		EAE 4024: AEIDS 3 Final project report displays use of software and digital tools	80% of students receive a score of 80% or higher	Spring Semester	
	<p>Outcome b <i>an ability to design &</i></p>	EAE3613: MechSys1 Group Design Project using	80% of students receive a score of 80% or higher	Spring Semester	

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing
	<i>conduct experiments, as well as to analyze & interpret data</i>	assignment rubric EAE 4623: Acoustics Three Experimental Reports EAE 4024: AEIDS 3 Final project reports of building performance study	80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher	Spring Semester Spring Semester	
<p><i>(Undergraduate)</i> SUSTAINABILITY</p> <p>LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.</p>	<p>Outcome h <i>the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context</i></p>	<p>EAE 1081: Intro to AE Homework #7 – Ghafari Essay Group Project 1,2 & 3 Group Presentation</p>	80% of students receive a score of 80% or higher	Fall Semester	Annual
		<p>EAE 1093: AE History Final Exam Essay Questions and City Planning Paper</p> <p>EAE 3113: ElecSys1 Final Design Project using assignment rubric</p> <p>EAE 3014: AEIDS 1 Rubric and design drawings demonstrating awareness of water and ash wood and its ecologically appropriate use.</p> <p>ECE 4743: Concrete Design First Exam on analyzing a floor system for moment and shear</p> <p>EAE 4113: ElecSys2 Problems from Final Exam</p> <p>EAE 4014: AEIDS 2 Rubric and design drawings demonstrating awareness of economic sufficiency and social context for an urban assembly building.</p>	<p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p>	<p>Once Per Year</p> <p>Fall Semester</p> <p>Spring Semester</p> <p>Once Per Year</p> <p>Fall Semester</p> <p>Fall Semester</p>	

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing
<p><i>(Undergraduate)</i> COMMUNICATION</p> <p>LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.</p>	<p>Outcome g <i>an ability to communicate effectively</i></p>	<p>EAE 1081: Intro to AE Homework # 1 –Personal Paragraph Homework #4 – ArE Logo Design Homework #7 – Ghafari Essay Group Project 1,2 & 3 Group Presentation</p> <p>EAE 1093: AE History Final Exam Essay Questions and City Planning Paper</p>	<p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p>	<p>Fall Semester</p> <p>Once Per Year</p>	<p>Annual</p>
		<p>EAE 3014: AEIDS 1 Rubric and a set of design drawings illustrating compliance with the criteria</p>	<p>80% of students receive a score of 80% or higher</p>	<p>Spring Semester</p>	
		<p>EAE 4014: AEIDS 2 Rubric and a set of design drawings illustrating compliance with the criteria</p>	<p>80% of students receive a score of 80% or higher</p>	<p>Fall Semester</p>	
		<p>EAE 4613: MechSys2 Questions from Test 1, Test 2, Final Exam and extra credit assignment</p>	<p>80% of students receive a score of 80% or higher</p>	<p>Spring Semester</p>	
		<p>EAE 4024: AEIDS 3 Peer evaluation form and final report shows the collective work of the teams</p>	<p>80% of students receive a score of 80% or higher</p>	<p>Spring Semester</p>	
<p><i>(Undergraduate)</i> MATHEMATICS</p> <p>LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely, and reasoning logically.</p>	<p>Outcome a <i>an ability to apply knowledge of mathematics, science, and engineering</i></p>	<p>EAE 3113: ElecSys1 Final Design Project using assignment rubric</p> <p>EAE3613: MechSys1 Exam 3; Homework 7</p> <p>EAE 3014: AEIDS 1 Rubric, graphic research narrative and calculations for structural wood roof trusses and micro-hydro electrical system</p>	<p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p> <p>80% of students receive a score of 80% or higher</p>	<p>Fall Semester</p> <p>Spring Semester</p> <p>Spring Semester</p>	<p>Annual</p>
		<p>Outcome a</p>	<p>EAE 4113: ElecSys2</p>	<p>80% of students receive a</p>	

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing
	<i>(continued)</i>	Homework 2 assignment and Midterm Exam questions EAE 4014: AEIDS 2 Rubric, graphic research narrative and calculations for a PV system ECE 4753: Steel Design Exam 1 questions (Problems 3 and 4) on mathematics and interpolations of the formulas EAE 4623: Acoustics Final Project Report EAE 4024: AEIDS 3 Graphic and computational solutions to engineering problems	score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher	Fall Semester Once Per Year Spring Semester Spring Semester	
<i>(Undergraduate)</i> <u>READING</u> LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.	<i>Not accessed within program</i>				
<i>(Undergraduate)</i> <u>SCIENTIFIC ANALYSIS</u> LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.	Outcome a <i>an ability to apply knowledge of mathematics, science, and engineering</i>	EAE 3113: ElecSys1 Final Design Project using assignment rubric EAE3613: MechSys1 Exam 3 questions on Psychometrics); Homework 7 assignment on thermodynamics, and refrigeration cycle	80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher	Fall Semester Spring Semester	Annual
	Outcome a	EAE 3014: AEIDS 1	80% of students receive a	Spring Semester	

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing
	<i>(continued)</i>	Rubric, graphic research narrative and calculations for structural wood roof trusses and micro-hydro electrical system EAE 4113: ElecSys2 Homework 2 assignment and Midterm Exam questions EAE 4014: AEIDS 2 Rubric, graphic research narrative and calculations for a PV system ECE 4753: Steel Design Exam 1 questions (Problems 3 and 4) on mathematics and interpolations of the formulas EAE 4623: Acoustics Final Project Report EAE 4024: AEIDS 3 Graphic and computational solutions to architectural engineering problems	score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher	Fall Semester Fall Semester Once Per Year Spring Semester Spring Semester	
<i>(Undergraduate)</i> LEADERSHIP LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.	Outcome h <i>the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context</i>	EAE 1081: Intro to AE Homework #7 – Ghafari Essay Group Project 1,2 & 3, Presentation EAE 1093: AE History Final Exam Essay Questions and City Planning Paper EAE 3113: ElecSys1 Final Design Project EAE 3014: AEIDS 1 Rubric and design drawings demonstrating awareness of water and of ash wood and its ecologically appropriate use.	80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher	Fall Semester Once Per Year Fall Semester Spring Semester	Annual
	Outcome h <i>(continued)</i>	ECE 4743: Concrete Design First Exam on analyzing a floor system for moment and shear	80% of students receive a score of 80% or higher	Once Per Year	

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing
		EAE 4113: ElecSys2 Problems from Final Exam EAE 4014: AEIDS 2 Rubric and design drawings demonstrating awareness of economic sufficiency and social context for an urban assembly building.	80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher	Fall Semester Fall Semester	
<i>(Undergraduate)</i> <u>LIFELONG LEARNING</u> Program graduates will have a recognition of the need for, and an ability to engage in, lifelong learning	Outcome i <i>a recognition of the need for, and an ability to engage in, lifelong learning</i>	EAE 1081: Intro to AE Homework #2 –S.O.A.R. Homework #7 – Ghafari Essay Homework #6 – BIM, IDE, IDP Group Project 1,2 & 3, Presentation EAE 4613: MechSys2 Questions from Test 1, Test 2, Final Exam and extra credit assignment	80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher	Fall Semester Spring Semester	Annual
<i>(Undergraduate)</i> <u>CONTEMPORARY ISSUES</u> Program graduates will have a knowledge of contemporary issues related to engineering and to their discipline.	Outcome j <i>a knowledge of contemporary issues</i>	EAE 3014: AEIDS 1 Rubric, design drawings and sizing calculations for an applied Living Machine system ECE 4243: Construction ProjMgmt Problems from Final Exam EAE 4014: AEIDS 2 Rubric, graphic narrative and design drawings for daylighting systems. EAE 4613: MechSys2 Questions from Test 1, Test 2, Final Exam and extra credit assignment EAE 4024: AEIDS 3 Final project documents show use of energy simulation programs which were reviewed by engineering professionals	80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher	Spring Semester Once Per Year Fall Semester Spring Semester Spring Semester	Annual
<i>(Undergraduate)</i> <u>TEAMWORK</u>	Outcome d <i>an ability to function on multidisciplinary teams</i>	EAE 1081: Intro to AE Homework #7 – Ghafari Essay Homework #6 – BIM, IPD, IDE	80% of students receive a score of 80% or higher	Fall Semester	Annual

LTU Undergraduate Learning Outcomes	Supporting Program Learning Objective	Assessment Tools	Metric/Indicators	Administration Timeline	Loop-Closing
<p>LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members' contributions.</p>		<p>Group Project 3 EAE 4113: ElecSys2 Project 2 Report EAE 4014: AEIDS 2 Rubric and design documents to show application of morphological, optics and electrology content. EAE 4623: Acoustics Final Project Report EAE 4024: AEIDS 3 Peer evaluation form and final report shows the collective work of the teams</p>	<p>80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher</p>	<p>Fall Semester Fall Semester Spring Semester Spring Semester</p>	
<p><i>(Undergraduate)</i> <u>ETHICS</u> LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.</p>	<p>Outcome f <i>an understanding of professional and ethical responsibility</i></p>	<p>EAE 1081: Intro to AE Homework #2 - S.O.A.R. Group Project 1 and 2 EAE3613: MechSys1 Exam 1 Essay Question EAE 3014: AEIDS 1 Rubric and design drawings that demonstrate supportive human and environmental relationships EAE 4014: AEIDS 2 Rubric and design drawings that illustrate compliance with criteria EAE 4024: AEIDS 3 Final project demonstrates explanations of engineering based building performance goals</p>	<p>80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher 80% of students receive a score of 80% or higher</p>	<p>Fall Semester Spring Semester Spring Semester Fall Semester Spring Semester</p>	<p>Annual</p>

Table 1.2. 2016-2017 Assessment Plan for Architectural Engineering Graduate Courses

University Graduate Learning Outcomes	Supporting Student Outcomes*	Assessment Tools	Metrics/	Administration Timeline	Loop-Closing
discipline-Specific Knowledge <i>(Graduate)</i> LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.	Outcome a <i>an ability to apply knowledge of mathematics, science, and engineering</i>	EME 5373: Alt. Energy Eng. Homework #1 (Problem #3), Homework #2, Homework #4, Homework #5 (Problems #4 & #5)	80% of students receive a score of 90% or higher	Fall Semester	Annual
		EME 5983: Geothermal Homework #1, #2, #3 PBL Exercises #1, #2, #3	80% of students receive a score of 90% or higher	Fall Semester	
		EAE 5113: Adv. Lighting Final Design Project & Daylighting Experiment	80% of students receive a score of 90% or higher	Fall Semester	
		EAE 5014: AEIDS 4 Professional Presentations with rubric completed by IAB	80% of students receive a score of 90% or higher	Fall Semester	
		ECE 5703: Timber Structures Design Project & Final Exam	80% of students receive a score of 90% or higher	Spring Semester	
		EAE 5623: Building Controls Final Design Project	80% of students receive a score of 90% or higher	Spring Semester	
		EAE 5123: AdvElecSys Homework #4	80% of students receive a score of 90% or higher	Spring Semester	
		EAE 5024: AEIDS 5 Final Report with Supporting Documentation & Calculations	80% of students receive a score of 90% or higher	Spring Semester	
		ECE 5283: Conceptual Estimating Final Estimation Project	80% of students receive a score of 90% or higher	Once Per Year	
		Outcome j <i>a knowledge of contemporary issues</i>	EME 5373: Alt. Energy Eng. Homework #1 (Problems #5 & #6), Homework #5 (Problem #1), Special Topics Papers #2	80% of students receive a score of 90% or higher	
EME 5983: Geothermal Homework #3, PBL Exercises #2 & #3	80% of students receive a score of 90% or higher		Fall Semester		
EAE 5014: AEIDS 4 Professional Presentations with rubric completed by IAB	80% of students receive a score of 90% or higher		Fall Semester		

University Graduate Learning Outcomes	Supporting Student Outcomes*	Assessment Tools	Metrics/	Administration Timeline	Loop-Closing
<p>(Graduate)</p> <p>LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies</p>	<p>Outcome j <i>(continued)</i></p>	<p>ECE 5703: Timber Structures Final Design Project</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Spring Semester</p>	<p>Annual</p>
	<p>EAE 5623: Building Controls Final Design Project</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Spring Semester</p>		
	<p>EAE 5123: AdvElecSys Homework #7</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Spring Semester</p>		
	<p>EAE 5024: AEIDS 5 Final Report with Supporting Documentation & Calculations</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Spring Semester</p>		
	<p>Outcome l <i>an ability to integrate building engineering and architectural systems through collaboration and tools to create high-performing solutions</i></p>	<p>EAE 5113: Adv. Lighting Final Design Project</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Fall Semester</p>	
	<p>EAE 5014: AEIDS 4 Professional Presentations with rubric completed by IAB</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Fall Semester</p>		
	<p>EAE 5123: AdvElecSys Projects #1, #2, & #3</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Spring Semester</p>		
	<p>EAE 5024: AEIDS 5 Final Report with Supporting Documentation & Calculations</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Spring Semester</p>		
	<p>Outcome b <i>an ability to design and conduct experiments, as well as to analyze & interpret data</i></p>	<p>EAE 5113: Adv. Lighting Daylighting Experiment</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Fall Semester</p>	
	<p>EAE 5123: AdvElecSys Homework #9, Project #3</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Spring Semester</p>		
	<p>Outcome c <i>an ability to design a system, component, or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability</i></p>	<p>ECE 5283: Conceptual Estimating Final Estimation Project</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Once Per Year</p>	
	<p>EME 5983: Geothermal Homework #1, #2, #3 PBL Exercises #2, #3</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Fall Semester</p>		
	<p>EAE 5113: Adv. Lighting Final Design Project</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Fall Semester</p>		
<p>EAE 5014: AEIDS 4 Professional Presentations with rubric completed by IAB</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Fall Semester</p>			
<p>ECE 5703: Timber Structures Final Design Project</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Spring Semester</p>			

University Graduate Learning Outcomes	Supporting Student Outcomes*	Assessment Tools	Metrics/	Administration Timeline	Loop-Closing
	Outcome c <i>(continued)</i>	EAE 5623: Building Controls Final Design Project EAE 5123: AdvElecSys Final Exam Problems EAE 5024: AEIDS 5 Final Report with Supporting Documentation & Calculations	80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher	Spring Semester Spring Semester Spring Semester	
	Outcome e <i>an ability to identify, formulate, and solve engineering problems</i>	ECE 5283: Conceptual Estimating Final Estimation Project EME 5373: Alt. Energy Eng. Homework #2, Homework #4, Homework #5 (Problems #2-6), Homework #7, Homework #8 (Problems #2-4), EME 5983: Geothermal Homework #3 PBL Exercises #2, #3 EAE 5014: AEIDS 4 Professional Presentations with rubric completed by IAB ECE 5703: Timber Structures Final Design Project & Final Exam EAE 5623: Building Controls Final Design Project EAE 5123: AdvElecSys Midterm & Final Exam Problems EAE 5024: AEIDS 5 Final Report with Supporting Documentation & Calculations	80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher	Once Per Year Fall Semester Fall Semester Fall Semester Spring Semester Spring Semester Spring Semester	Annual
	Outcome k <i>an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;</i>	ECE 5283: Conceptual Estimating Final Estimation Project EME 5983: Geothermal Homework #3, PBL Exercises #2, Special Topics Paper EAE 5113: Adv. Lighting Final Design Project	80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher	Once Per Year Fall Semester Fall Semester	Annual

University Graduate Learning Outcomes	Supporting Student Outcomes*	Assessment Tools	Metrics/	Administration Timeline	Loop-Closing
	Outcome k <i>(continued)</i>	EAE 5014: AEIDS 4 Professional Presentations with rubric completed by IAB ECE 5703: Timber Structures Final Design Project EAE 5623: Building Controls Final Design Project EAE 5123: AdvElecSys Projects #1, #2, & #3 EAE 5024: AEIDS 5 Final Report with Supporting Documentation & Calculations	80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher	Fall Semester Spring Semester Spring Semester Spring Semester Spring Semester	
Critical Thinking <i>(Graduate)</i>					
LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature. <i>(Graduate)</i>	<i>Not accessed within program</i>				
LTU graduates will communicate effectively using written, oral, graphical, and digital formats.	Outcome g <i>an ability to communicate effectively</i>	ECE 5283: Conceptual Estimating Final Estimation Project EME 5983: Geothermal Homework #1, #2, #3 PBL Exercises #1, #2, #3 Special Topics Paper EAE 5014: AEIDS 4 Professional Presentations with rubric completed by IAB ECE 5703: Timber Structures Final Design Project EAE 5623: Building Controls Final Design Project EAE 5123: AdvElecSys Projects #1, #2 & #3 EAE 5024: AEIDS 5 Final Report with Supporting Documentation & Calculations	80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher 80% of students receive a score of 90% or higher	Once Per Year Fall Semester Fall Semester Once Per Year Spring Semester Spring Semester Spring Semester	Annual
Leadership & Ethics					

University Graduate Learning Outcomes	Supporting Student Outcomes*	Assessment Tools	Metrics/	Administration Timeline	Loop-Closing	
<p><i>(Graduate)</i></p> <p>LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics</p>	<p>Outcome d <i>an ability to function on multidisciplinary teams</i></p>	<p>EME 5983: Geothermal PBL Exercises #1, #2, #3</p> <p>EAE 5014: AEIDS 4 Professional Presentations with rubric completed by IAB</p> <p>ECE 5703: Timber Structures Final Design Project</p> <p>EAE 5024: AEIDS 5 Final Report with Supporting Documentation & Calculations</p>	<p>80% of students receive a score of 90% or higher</p> <p>80% of students receive a score of 90% or higher</p> <p>80% of students receive a score of 90% or higher</p> <p>80% of students receive a score of 90% or higher</p>	<p>Fall Semester</p> <p>Fall Semester</p> <p>Once Per Year</p> <p>Spring Semester</p>	Annual	
	<p>Outcome f <i>an understanding of professional and ethical responsibility</i></p>	<p>ECE 5283: Conceptual Estimating Final Estimation Project</p> <p>EAE 5014: AEIDS 4 Professional Presentations with rubric completed by IAB</p> <p>ECE 5703: Timber Structures Final Design Project</p> <p>EAE 5123: AdvElecSys Projects #1, #2 & #3</p> <p>EAE 5024: AEIDS 5 Final Report with Supporting Documentation & Calculations, Professional Ethics Essay</p> <p>Graduate Exit Interview</p>	<p>80% of students receive a score of 90% or higher</p> <p>80% of students receive a score of 90% or higher</p> <p>80% of students receive a score of 90% or higher</p> <p>80% of students receive a score of 90% or higher</p> <p>80% of students receive a score of 90% or higher</p> <p>50% of students have taken or are signed up to take the FE within 1 year of graduate</p>	<p>Once Per Year</p> <p>Fall Semester</p> <p>Once Per Year</p> <p>Spring Semester</p> <p>Spring Semester</p> <p>Spring Semester</p>		Annual
	<p>Outcome h <i>the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context</i></p>	<p>ECE 5283: Conceptual Estimating Final Estimation Project</p> <p>EME 5373: Alt. Energy Eng. Homework #1 (Problems #4 & 5), Homework #5 (Problems #1), Special Topic Papers #1 & #2</p> <p>EME 5983: Geothermal Homework #2, PBL Exercises #1, #2, #3, and Special Topic Paper</p>	<p>80% of students receive a score of 90% or higher</p> <p>80% of students receive a score of 90% or higher</p> <p>80% of students receive a score of 90% or higher</p>	<p>Once Per Year</p> <p>Fall Semester</p> <p>Fall Semester</p>		
	<p>Outcome h <i>(continued)</i></p>	<p>EAE 5014: AEIDS 4 Professional Presentations with rubric completed by IAB</p>	<p>80% of students receive a score of 90% or higher</p>	<p>Fall Semester</p>		

University Graduate Learning Outcomes	Supporting Student Outcomes*	Assessment Tools	Metrics/	Administration Timeline	Loop-Closing
		ECE 5703: Timber Structures Final Design Project	80% of students receive a score of 90% or higher	Once Per Year	
		EAE 5123: AdvElecSys Projects #1, #2 & #3	80% of students receive a score of 90% or higher	Spring Semester	
		EAE 5024: AEIDS 5 Final Report with Supporting Documentation & Calculations	80% of students receive a score of 90% or higher	Spring Semester	
		Graduate Exit Interview	80% of student met 80% of the Living Building Challenge standards in their Capstone project	Spring Semester	
	Outcome i <i>a recognition of the need for, and an ability to engage in, lifelong learning</i>	EAE 5024: AEIDS 5 Life Long Learning Essay	80% of students receive a score of 90% or higher	Spring Semester	Annual
		Graduate Exit Interview	50% will have membership in at least one prof. society and 50% will state two professional goals to achieve in 2-5 years	Spring Semester	

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

All of the University Outcomes have been mapped to the twelve ABET Student Outcomes (SO a-l) that are used for assessing the Architectural Engineering program. Each course's objectives are also mapped to the SOs and listed as the Highest Level of Attainment Level. The Levels correspond with the six Bloom's Taxonomy, which are:

- Level 1 (L1) – Knowledge
- Level 2 (L2) – Comprehension
- Level 3 (L3) – Application
- Level 4 (L4) – Analysis
- Level 5 (L5) – Synthesis
- Level 6 (L6) – Evaluation

The performance measure (proficiency) used for each tool to assess the level attained is based on a 5-point scale or Rank. *Rank* refers to the Instructor's determination as to how well the students met the required level of achievement as evidenced by assigned and collected work. The goal is to reach a minimum rank of 4; i.e., 80% mastery of the outcome. When the rank falls below 4 for an outcome, the Instructor must consider what corrective actions are necessary, such as additional coverage of the outcome in homework, a different pedagogical approach, etc. The specific point value and associated level are defined for each rank point and associated percentage, as explained below:

Rank 1 (1.0) Outcome was not addressed during the semester

Rank 2 (2.0) > 20% of the students met the target 'level attained' for the SO. Therefore, at least 20% of the students comprehended the outcome sufficiently to reach the required level of achievement and the Instructor has serious concerns about student performance.

Rank 3 (3.0) > 50% of the students met the target 'level attained' for the SO. Thus, at least 50% of the students comprehended the outcome sufficiently to reach the required level of achievement, but the Instructor still has concerns about overall student performance.

Rank 4 (4.0) > 80% of the students met the target 'level attained' for the SO. Where at least 80% of students demonstrated mastery of the outcome and reached the required level of achievement and the Instructor is satisfied with student performance.

Rank 5 (5.0) all students met the target 'level attained' for the SO. Therefore, all the students demonstrated mastery of the outcome and exceeded the required level of achievement.

The faculty arrive at an overall average rank of the students' level attained for the individual SO based on the results from all assessment tools. The program will take the following actions based on the assigned 'Rank':

$X > 4.0$ *No action required*

$3.0 < X < 4.0$ *Discussion and potential action*

$1.0 < X < 3.0$: *Discussion and action which will include the Program Director and Department Chair*

Table 2.1 and Table 2.2 shows the Ranking (R) per Student Outcome (SO) for each undergraduate and graduate course. The ranking is also mapped to the Bloom's Taxonomy Cognitive Levels (L) for that specific SO. The highest level is bolded. Any ranking that is R3 or below is bolded and highlighted.

Table 2.1. Assessment Data for Fall 2016 Undergraduate and Graduate Courses

FALL 2016 ASSESSMENT DATA		COGNITIVE LEVEL (L) MAPPED TO STUDENT OUTCOMES	STUDENT OUTCOMES (SO)											
			<i>Mathematics, Science, Engineering</i> (a)	<i>Experiments, Analyze, Interpret Data</i> (b)	<i>System, Component, Process Constrains</i> (c)	<i>Multi-Disciplinary Teams</i> (d)	<i>Identify, Formulate, Solve Engineering Problems</i> (e)	<i>Professional & Ethical Responsibility</i> (f)	<i>Communicate Effectively</i> (g)	<i>Broad Education, Impact in Global, Economic, Envir., Social Context</i> (h)	<i>Life Long Learning</i> (i)	<i>Contemporary Issues</i> (j)	<i>Modern Engineering Tools for Engineering Practice</i> (k)	<i>Integrated Building</i> (l)
LTU CRN	COURSE	HIGHEST (L)	SOs ACHIEVED RANKING (R) FROM SUMMARY ASSESSMENT FORMS											
2004	EAE 1081: Intro. to AE	L1				R4		R4	R4	R4	R4			
		L2												R4
		L3												
		L4												
		L5												
		L6												
1878	EAE 3113: Elec. Sys. 1	L1												
		L2	R5											
		L3			R4					R4			R4	
		L4					R4							
		L5												
		L6												
1050	ECE 4743: Concrete	L1												
		L2												
		L3					R4						R4	
		L4								R4				
		L5			R4									
		L6												
2008	EAE 4113: Elec. Sys. 2	L1												
		L2												
		L3				R4				R4				
		L4	R5		R4		R4						R5	
		L5												
		L6												

FALL 2016 ASSESSMENT DATA		COGNITIVE LEVEL (L) MAPPED TO STUDENT OUTCOMES	STUDENT OUTCOMES (SO)											
			<i>Mathematics, Science, Engineering</i> (a)	<i>Experiments, Analyze, Interpret Data</i> (b)	<i>System, Component, Process Constrains</i> (c)	<i>Multi-Disciplinary Teams</i> (d)	<i>Identify, Formulate, Solve Engineering Problems</i> (e)	<i>Professional & Ethical Responsibility</i> (f)	<i>Communicate Effectively</i> (g)	<i>Broad Education, Impact in Global, Economic, Envir., Social Context</i> (h)	<i>Life Long Learning</i> (i)	<i>Contemporary Issues</i> (j)	<i>Modern Engineering Tools for Engineering Practice</i> (k)	<i>Integrated Building</i> (l)
LTU CRN	COURSE	HIGHEST (L)	SOs ACHIEVED RANKING (R) FROM SUMMARY ASSESSMENT FORMS											
2007	EAE 4014: AEIDS 2	L1												
		L2						R4						
		L3	R5		R4	R4	R5			R5		R4	R5	
		L4							R5					R5
		L5												
		L6												
2218	ECE 4753: Steel Design	L1												
		L2												
		L3	R4											
		L4			R4		R4							
		L5												
		L6												
3072	ECE 4243: Const. Proj. Mgmt.	L1												
		L2												
		L3									R4			
		L4					R4					R4		
		L5												
		L6												
4703	ECE 5283: Conceptual Est.	L1												
		L2												
		L3						R4						
		L4			R4		R4		R4	R4		R4	R4	
		L5												
		L6												

FALL 2016 ASSESSMENT DATA		COGNITIVE LEVEL (L) MAPPED TO STUDENT OUTCOMES	STUDENT OUTCOMES (SO)											
			<i>Mathematics, Science, Engineering</i> (a)	<i>Experiments, Analyze, Interpret Data</i> (b)	<i>System, Component, Process Constrains</i> (c)	<i>Multi-Disciplinary Teams</i> (d)	<i>Identify, Formulate, Solve Engineering Problems</i> (e)	<i>Professional & Ethical Responsibility</i> (f)	<i>Communicate Effectively</i> (g)	<i>Broad Education, Impact in Global, Economic, Envir., Social Context</i> (h)	<i>Life Long Learning</i> (i)	<i>Contemporary Issues</i> (j)	<i>Modern Engineering Tools for Engineering Practice</i> (k)	<i>Integrated Building</i> (l)
LTU CRN	COURSE	HIGHEST (L)	SOs ACHIEVED RANKING (R) FROM SUMMARY ASSESSMENT FORMS											
4581	ECE 5703: Timber Structures	L1												
		L2												
		L3				R5		R5		R5				
		L4							R5			R4		
		L5	R5		R4		R4						R4	
		L6												
2038	EAE 5113: Advanced Lighting	L1												
		L2												
		L3												
		L4												
		L5	R4										R4	
		L6		R3	R5								R5	
1916	EME 5373: Alternative Energy	L1												
		L2												
		L3	R5				R4							
		L4								R5		R5		
		L5												
		L6												
4194	EME 5983: Geothermal Energy	L1												
		L2												
		L3												
		L4												
		L5	R4		R5				R5			R5		
		L6				R5	R4			R5			R5	

FALL 2016 ASSESSMENT DATA		COGNITIVE LEVEL (L) MAPPED TO STUDENT OUTCOMES	STUDENT OUTCOMES (SO)											
			<i>Mathematics, Science, Engineering</i> (a)	<i>Experiments, Analyze, Interpret Data</i> (b)	<i>System, Component, Process Constraints</i> (c)	<i>Multi-Disciplinary Teams</i> (d)	<i>Identify, Formulate, Solve Engineering Problems</i> (e)	<i>Professional & Ethical Responsibility</i> (f)	<i>Communicate Effectively</i> (g)	<i>Broad Education, Impact in Global, Economic, Envir., Social Context</i> (h)	<i>Life Long Learning</i> (i)	<i>Contemporary Issues</i> (j)	<i>Modern Engineering Tools for Engineering Practice</i> (k)	<i>Integrated Building</i> (l)
LTU CRN	COURSE	HIGHEST (L)	SOs ACHIEVED RANKING (R) FROM SUMMARY ASSESSMENT FORMS											
3516	EAE 5014: AEIDS 4	L1												
		L2												
		L3						R5				R5	R5	
		L4	R5		R5	R4	R5			R5				
		L5							R5					R5
		L6												

Table 2.2. Assessment Data for Spring 2017 Undergraduate and Graduate Courses

SPRING 2017 ASSESSMENT DATA		COGNITIVE LEVEL (L) MAPPED TO STUDENT OUTCOMES	STUDENT OUTCOMES (SO)											
			Mathematics, Science, Engineering (a)	Experiments, Analyze, Interpret Data (b)	System, Component, Process Constrains (c)	Multi-Disciplinary Teams (d)	Identify, Formulate, Solve Engineering Problems (e)	Professional & Ethical Responsibility (f)	Communicate Effectively (g)	Broad Education, Impact in Global, Economic, Envir., Social Context (h)	Life Long Learning (i)	Contemporary Issues (j)	Modern Engineering Tools for Engineering Practice (k)	Integrated Building (l)
LTU CRN	COURSE	HIGHEST (L)	SOs ACHIEVED RANKING (R) FROM SUMMARY FORMS											
3509	EAE 1093: AE History	L1							R4	R4				
		L2												
		L3												
		L4												
		L5												
		L6												
3511	EAE 3613: Mech. Sys. 1	L1						R3						
		L2		R3	R3		R4						R4	
		L3	R4											
		L4												
		L5												
		L6												
3512	EAE 3016: AEIDS 1	L1												
		L2	R5		R5		R4	R4		R4		R4	R5	R5
		L3							R4					
		L4												
		L5												
		L6												
3072	ECE 5213: Const. Proj. Mgmt.	L1												
		L2												
		L3										R3		
		L4						R3					R3	
		L5												
		L6												

SPRING 2017 ASSESSMENT DATA		COGNITIVE LEVEL (L) MAPPED TO STUDENT OUTCOMES	STUDENT OUTCOMES (SO)											
			<i>Mathematics, Science, Engineering</i> (a)	<i>Experiments, Analyze, Interpret Data</i> (b)	<i>System, Component, Process Constraints</i> (c)	<i>Multi-Disciplinary Teams</i> (d)	<i>Identify, Formulate, Solve Engineering Problems</i> (e)	<i>Professional & Ethical Responsibility</i> (f)	<i>Communicate Effectively</i> (g)	<i>Broad Education, Impact in Global, Economic, Envir., Social Context</i> (h)	<i>Life Long Learning</i> (i)	<i>Contemporary Issues</i> (j)	<i>Modern Engineering Tools for Engineering Practice</i> (k)	<i>Integrated Building</i> (l)
LTU CRN	COURSE	HIGHEST (L)	SOs ACHIEVED RANKING (R) FROM SUMMARY FORMS											
1050	ECE 4743: Concrete	L1												
		L2												
		L3					R4						R4	
		L4								R4				
		L5			R4									
		L6												
2218	ECE 4753: Steel Design	L1												
		L2												
		L3	R3											
		L4			R4		R3							
		L5												
		L6												
3513	EAE 4623: Mech. Sys. 2	L1												
		L2			R4		R4		R4		R4	R4		R4
		L3											R4	
		L4												
		L5												
		L6												
3514	EAE 4026: Acoustics	L1												
		L2			R4	R4								
		L3	R4				R4						R4	
		L4		R4										
		L5												
		L6												

SPRING 2017 ASSESSMENT DATA		COGNITIVE LEVEL (L) MAPPED TO STUDENT OUTCOMES	STUDENT OUTCOMES (SO)											
			<i>Mathematics, Science, Engineering</i> (a)	<i>Experiments, Analyze, Interpret Data</i> (b)	<i>System, Component, Process Constraints</i> (c)	<i>Multi-Disciplinary Teams</i> (d)	<i>Identify, Formulate, Solve Engineering Problems</i> (e)	<i>Professional & Ethical Responsibility</i> (f)	<i>Communicate Effectively</i> (g)	<i>Broad Education, Impact in Global, Economic, Envir., Social Context</i> (h)	<i>Life Long Learning</i> (i)	<i>Contemporary Issues</i> (j)	<i>Modern Engineering Tools for Engineering Practice</i> (k)	<i>Integrated Building</i> (l)
LTU CRN	COURSE	HIGHEST (L)	SOs ACHIEVED RANKING (R) FROM SUMMARY FORMS											
3515	EAE 4026: AEIDS 3	L1												
		L2												
		L3						R3				R3		
		L4	R4	R3	R4	R4	R4		R4	R4			R4	R4
		L5												
		L6												
4703	ECE 5283: Conceptual Estimating	L1												
		L2												
		L3						R4						
		L4			R4		R4		R4	R4		R4	R4	
		L5												
		L6												
4581	ECE 5703: Timber Structures	L1												
		L2												
		L3				R4		R4		R4				
		L4							R5			R4		
		L5	R5		R5		R5						R5	
		L6												
4542	EAE 5623: Building Controls	L1												
		L2												
		L3	R3									R4		
		L4					R3		R4					
		L5			R3								R4	
		L6												

SPRING 2017 ASSESSMENT DATA		COGNITIVE LEVEL (L) MAPPED TO STUDENT OUTCOMES	STUDENT OUTCOMES (SO)											
			<i>Mathematics, Science, Engineering</i> (a)	<i>Experiments, Analyze, Interpret Data</i> (b)	<i>System, Component, Process Constraints</i> (c)	<i>Multi-Disciplinary Teams</i> (d)	<i>Identify, Formulate, Solve Engineering Problems</i> (e)	<i>Professional & Ethical Responsibility</i> (f)	<i>Communicate Effectively</i> (g)	<i>Broad Education, Impact in Global, Economic, Envir., Social Context</i> (h)	<i>Life Long Learning</i> (i)	<i>Contemporary Issues</i> (j)	<i>Modern Engineering Tools for Engineering Practice</i> (k)	<i>Integrated Building</i> (l)
LTU CRN	COURSE	HIGHEST (L)	SOs ACHIEVED RANKING (R) FROM SUMMARY FORMS											
4543	EAE 5123: Adv. Elec. Sys.	L1												
		L2												
		L3									R4			
		L4			R5		R5		R4	R3		R4		
		L5	R5	R4				R5					R5	R4
		L6												
4406	EAE 5024: AEIDS 5	L1												
		L2												
		L3										R5	R5	
		L4	R5				R5	R5						
		L5			R5	R4				R5				
		L6							R4					R5

Objective/Outcome: Knowledge in Discipline

LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.

- *Assessment:* All of those indicated in Table 1
- *SO Mapping:* ABET Student Outcomes a, c, e, k, l
- *Evaluation:* The Ranking for each course per SO can be found in Table 2.1 for Fall 2016 courses and Table 2.2 for Spring 2017. The average Ranking for all courses for the academic year was 4.3
- *Issue:* Steel Design (ECE 4753) and Building Controls (EAE 5623) both have Ranking of R3 for Outcome a. Mechanical Systems 1 (EAE 3613) and Building Controls (EAE 5623) both have Ranking of R3 for Outcome c. Construction Project Management (ECE 5213), Steel Design (ECE 4753), and Building Controls (EAE 5623) all have Ranking of R3 for Outcome e. Construction Project Management (ECE 5213) has a Ranking of R3 for Outcome k.
- *Current/Future Actions:*
 - Steel Design (ECE 4753)
 - Based on what was assessed, the results are insufficient. However, the instructor was requested by students to add videos of different types of failures, particularly for connection design.
 - Mechanical Systems 1 (EAE 3613)
 - The biggest issue is that there is too much information to cover it is difficult to spend a great deal of time on any one topic, and feel confident that it is fully understood. Additional examples should allow be added to show how the classwork applies in “real-world” situations, and continuing to provide more explanation to the science behind the equations used.
 - Construction Project Management (ECE 5213)
 - Due to the limited number of students in the course, the sample size is too small to provide a deep analysis. However, the students appear to lack interest in the course.
 - Building Controls (EAE 5623)
 - A final group project was the tool used to assess the student’s abilities. It was very difficult to distinguish the understanding from each individual student. Also, the students postponed completely the assignment until the last moment and did not include any recommendations made by the professor. Smaller, individual assignments need to be utilized for the assessment tool(s). Also, “real-world” examples should be added to connect the individual controls components to the entire system.
- *Responsibility:* All issues and future action plans are collectively discussed at the Close-the-Loop meeting and with the Civil Engineering faculty. Then the course instructors implement the plan, and Dr. Annis-Alajaj tracks the results.
- *University/College Support for Objective:* No support required.

Objective/Outcome: Technology

LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.

- *Assessment:* All of those indicated in Table 1
- *SO Mapping:* ABET Student Outcomes b, k
- *Evaluation:* The Ranking for each course per SO can be found in Table 2.1 for Fall 2016 courses and Table 2.2 for Spring 2017. The average Ranking for all courses for the academic year was
- *Issue:* Mechanical Systems 1 (EAE 3613), AEIDS 3 (EAE 4026), Advanced Lighting/Daylighting (EAE 5113) all have Ranking of R3 for Outcome b.
- *Current/Future Actions:*
 - Mechanical Systems 1 (EAE 3613)

- Additional examples should allow be added to show how the classwork applies in “real-world” situations, and continuing to provide more explanation to the science behind the equations used.
- AEIDS 3 (EAE 4026)
- One issue identified was the lack of proper modeling techniques in REVIT. The instructor will identify common modeling errors to remedy the problem in the future.
- Advanced Lighting/Daylighting (EAE 5113)
- Most of the students did a minimal work for the experiment, and lacked the ability to draw their own conclusions. The details of the experiment needs to be reevaluated and clarified.
 - *Responsibility:* All issues and future action plans are collectively discussed at the Close-the-Loop meeting. Then the course instructors implement the plan, and Dr. Annis-Alajaj tracks the results.
 - *University/College Support for Objective:*
 - *University/College Support for Objective:* No support required.

Objective/Outcome: Sustainability

LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities.

- *Assessment:* All of those indicated in Table 1
- *SO Mapping:* ABET Student Outcome h
- *Evaluation:* The Ranking for each course per SO can be found in Table 2.1 for Fall 2016 courses and Table 2.2 for Spring 2017. The average Ranking for all courses for the academic year was
- *Issue:* Advanced Electrical Systems (EAE 5123) has a Ranking of R3 for Outcome h.
- *Current/Future Actions:* The instructions for the three projects will be clarified so that the students are able to demonstrate the importance of properly selecting electrical equipment and overcurrent protective to reduce the electrical hazards.
- *Responsibility:* All issues and future action plans are collectively discussed at the Close-the-Loop meeting. Then the course instructors implement the plan, and Dr. Annis-Alajaj tracks the results.
- *University/College Support for Objective:* No support required.

Objective/Outcome: Communication

LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.

- *Assessment:* All of those indicated in Table 1
- *SO Mapping:* ABET Student Outcome g
- *Evaluation:* The Ranking for each course per SO can be found in Table 2.1 for Fall 2016 courses and Table 2.2 for Spring 2017. The average Ranking for all courses for the academic year was
- *Issue:* There were no Ranking below an R4 in any of the assessed courses.
- *Current/Future Actions:* No action is needed at this time.
- *Responsibility:* All issues and future action plans are collectively discussed at the Close-the-Loop meeting. Then the course instructors implement the plan, and Dr. Annis-Alajaj tracks the results.
- *University/College Support for Objective:* No support required.

Objective/Outcome: Mathematics

LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.

- *Assessment:* All of those indicated in Table 1

- *SO Mapping:* ABET Student Outcome a
- *Evaluation:* The Ranking for each course per SO can be found in Table 2.1 for Fall 2016 courses and Table 2.2 for Spring 2017. The average Ranking for all courses for the academic year was
- *Issue:* Steel Design (ECE 4753) and Building Controls (EAE 5623) both have Ranking of R3 for Outcome a.
- *Current/Future Actions:* The major area of concern in both ECE 4753 and EAE 5623 was the students' ability to demonstrate their understanding of the engineering problems, and not specifically with the mathematics within the problems. No action is needed at this time.
- *Responsibility:* All issues and future action plans are collectively discussed at the Close-the-Loop meeting. Then the course instructors implement the plan, and Dr. Annis-Alajaj tracks the results.
- *University/College Support for Objective:* No support required.

Objective/Outcome: Scientific Analysis

LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.

- *Assessment:* All of those indicated in Table 1
- *SO Mapping:* ABET Student Outcome a
- *Evaluation:* The Ranking for each course per SO can be found in Table 2.1 for Fall 2016 courses and Table 2.2 for Spring 2017. The average Ranking for all courses for the academic year was
- *Issue:* Steel Design (ECE 4753) and Building Controls (EAE 5623) both have Ranking of R3 for Outcome a.
- *Current/Future Actions:*
 - Steel Design (ECE 4753)
 - Based on what was assessed, the results are insufficient. However, the instructor was requested by students to add videos of different types of failures, particularly for connection design.
 - Building Controls (EAE 5623)
 - A final group project was the tool used to assess the student's abilities. It was very difficult to distinguish the understanding from each individual student. Also, the students postponed completely the assignment until the last moment and did not include any recommendations made by the professor. Smaller, individual assignments need to be utilized for the assessment tool(s).
- *Responsibility:* All issues and future action plans are collectively discussed at the Close-the-Loop meeting. Then the course instructors implement the plan, and Dr. Annis-Alajaj tracks the results.
- *University/College Support for Objective:* No support required.

Objective/Outcome: Leadership

LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.

- *Assessment:* All of those indicated in Table 1
- *SO Mapping:* ABET Student Outcome d
- *Evaluation:* The Ranking for each course per SO can be found in Table 2.1 for Fall 2016 courses and Table 2.2 for Spring 2017. The average Ranking for all courses for the academic year was
- *Issue:* Although there were no Ranking below an R4 in any of the assessed courses, the Program's ability and opportunities to demonstrate the student's leadership abilities are limited at the present time.
- *Current/Future Actions:* Once the Leadership and Professional Development for Engineers (EGE 3022) course is added to the student's curriculum, the Program will be able to better assess the

Leadership Outcome. Until that time, there will be no major change to the current assessment process.

- *Responsibility:* All issues and future action plans are collectively discussed at the Close-the-Loop meeting. Then the course instructors implement the plan, and Dr. Annis-Alajaj tracks the results.
- *University/College Support for Objective:* As the College of Engineering starts to transition towards the EGE 3022 Leadership and Professional Development for Engineers, the AE Program will mostly relay on the assessment completed in this course for the “leadership” outcome assessment.

Objective/Outcome: Lifelong Learning

AE program graduates will have a recognition of the need for, and an ability to engage in, lifelong learning. This outcome has been added to the University Learning Outcomes for the AE Program assessment.

- *Assessment:* All of those indicated in Table 1
- *SO Mapping:* ABET Student Outcome i
- *Evaluation:* The Ranking for each course per SO can be found in Table 2.1 for Fall 2016 courses and Table 2.2 for Spring 2017. The average Ranking for all courses for the academic year was
- *Issue:* There were no Ranking below an R4 in any of the assessed courses.
- *Current/Future Actions:* No action is required at this time.
- *Responsibility:* All issues and future action plans are collectively discussed at the Close-the-Loop meeting. Then the course instructors implement the plan, and Dr. Annis-Alajaj tracks the results.
- *University/College Support for Objective:* No support required.

Objective/Outcome: Contemporary Issues

LTU graduates will have a knowledge of contemporary issues related to engineering and to their discipline.

- *Assessment:* All of those indicated in Table 1
- *SO Mapping:* ABET Student Outcome j
- *Evaluation:* The Ranking for each course per SO can be found in Table 2.1 for Fall 2016 courses and Table 2.2 for Spring 2017. The average Ranking for all courses for the academic year was
- *Issue:* AEIDS 3 (EAE 4026) and Construction Project Management (ECE 5213) both have Ranking of R3 for Outcome j.
- *Current/Future Actions:*
 - AEIDS 3 (EAE 4026)
 - Overall building code issues remain a problem as projects become larger and more complex. It would be useful to add an exercise as part of an existing module to address preliminary code compliance check for basic issues, occupancy, construction type, fire ratings, egress and ADA compliance.
 - Construction Project Management (ECE 5213)
 - Due to the limited number of students in the course, the sample size is too small to provide a deep analysis. However, the students appear to lack interest in the course.
- *Responsibility:* All issues and future action plans are collectively discussed at the Close-the-Loop meeting. Then the course instructors implement the plan, and Dr. Annis-Alajaj tracks the results.
- *University/College Support for Objective:* No support required.

Objective/Outcome: Teamwork

LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.

- *Assessment:* All of those indicated in Table 1

- *SO Mapping:* ABET Student Outcome d
- *Evaluation:* The Ranking for each course per SO can be found in Table 2.1 for Fall 2016 courses and Table 2.2 for Spring 2017. The average Ranking for all courses for the academic year was
- *Issue:* There were no Ranking below an R4 in any of the assessed courses.
- *Current/Future Actions:* No action is required at this time.
- *Responsibility:* All issues and future action plans are collectively discussed at the Close-the-Loop meeting. Then the course instructors implement the plan, and Dr. Annis-Alajaj tracks the results.
- *University/College Support for Objective:* No support required.

Objective/Outcome: Ethics

LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.

- *Assessment:* All of those indicated in Table 1
- *SO Mapping:* ABET Student Outcome f
- *Evaluation:* The Ranking for each course per SO can be found in Table 2.1 for Fall 2016 courses and Table 2.2 for Spring 2017. The average Ranking for all courses for the academic year was
- *Issue:* Mechanical Systems 1 (EAE 3613) and AEIDS 3 (EAE 4026) both have Ranking of R3 for Outcome f.
- *Current/Future Actions:*
 - Mechanical Systems 1 (EAE 3613)
 - Additional examples should allow be added to show how the classwork applies in “real-world” situations, and continuing to provide more explanation to the science behind the equations used and the ethical decisions that must be made.
 - AEIDS 3 (EAE 4026)
 - Overall the students demonstrated a broader inclusion of bioclimatic design, energy conservation, computer simulations and alternative energy based systems and LCA analysis. Some fundamental knowledge should be added to the Mechanical Systems 1 and 2 courses to better prepare the students.
- *Responsibility:* All issues and future action plans are collectively discussed at the Close-the-Loop meeting. Then the course instructors implement the plan, and Dr. Annis-Alajaj tracks the results.
- *University/College Support for Objective:* No support required.

3. Assessment Plan for 2017-2018 Academic Year

The main focus of the AE Program’s assessment process and continuous improvement plans for the 2017-2018 academic year is based on recommendations made as part of the ABET final report. This specifically identifies the masters-level courses in both content and tools used to assess the courses. An external Task Force group is currently reviewing the content and making suggestions on the five AE mechanical and electrical courses (EAE 5613 - Renewable Energy Systems, EAE 5633 – Adv. Mechanical Systems, EAE 5113 – Adv. Lighting/Daylighting, EAE 5623 – Building Controls, and EAE 5123 – Adv. Electrical Systems) and two AE Capstone courses (EAE 5016 – Capstone 1 and EAE 5026 – Capstone 2).

We are also going to simplify the assess tools used for each of the outcomes. Since the courses are only offered once a year and there are major changes occurring to the courses, all courses will be assessed for

at least the next two consecutive years. At the moment, there is no reliable data that demonstrates a need to adjust the performance indicators.

The secondary focus of the AE Program's assessment process and continuous improvement plans for the 2017-2018 academic year is reevaluate the mapping of course objectives to the Student Outcomes and the level of attainment of each SO for the undergraduate courses. The main focus for the 2018-2019 academic year will be to complete an in-depth analysis of the content and tools used to assess the undergraduate courses.

BS in Biomedical Engineering**1. Assessment Plan and Summary**

See Table 1.

Table 1: Assessment Plan for Biomedical Engineering Program

LTU Undergraduate Learning Outcomes	BME ABET Outcomes*	Assessment Tools	Metrics/ Indicators**	Administration Timeline	Loop-Closing Timeline
KNOWLEDGE IN DISCIPLINE "LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems."	a. Apply math. Sci. eng. (L3) b. Design and conduct experiments(L5) c. Design system (L5) e. Solve eng. Problems (L3) l. Apply principles of eng., sci., and math (L3) m. Solve eng. problems at interface of eng. and biology (L3) n. Analyze biomedical systems (L3) o. Making measurement and interpret data from living system (L3)	Direct assessment of student assignments from BME 3103, 4103, 2203, 4203, 4013, 4201, 2101, 3101, 4801, 4013, 4113, 4022, 3703, 4313, 2201. Faculty evaluation of senior design Course objective survey Alumni survey	Green or white flag	Every Semester	Annual
TECHNOLOGY "LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines."	k. Use techniques and modern eng. Tools (L3) l. Apply principles of eng., sci., and math (L3) m. Solve eng. problems at interface of eng. and biology (L3) n. Analyze biomedical systems (L3) o. Making measurement and interpret data from living system (L3)	Direct assessment of student assignments from BME 3301, 3703, 4113, 4313, 4103, 4801, 2201. Faculty evaluation of senior design Course objective survey Alumni survey	Green or white flag	Every Semester	Annual
SUSTAINABILITY "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."	h. Understand global, economic, environmental and social impact (L3)	Exit Interview Direct assessment of student assignments. Course Objectives	Green or white flag	Every Semester	Annual

<p>COMMUNICATION</p> <p>“LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	<p><i>g. Communication</i></p>	<p>Faculty evaluation of senior project presentations.</p> <p>Direct assessment of student assignments.</p> <p>Course Objectives</p> <p>WPE</p>	<p>Green or white flag</p> <p>Pass the WPE</p>	<p>Every Semester</p>	<p>Annual</p>
<p>MATHEMATICS</p> <p>“LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>	<p>a. Apply math, science, and eng. (L3)</p> <p>e. Solve eng. Problems (L3)</p> <p>l. Apply principles of eng., sci., and math (L3)</p> <p>m. Solve eng. problems at interface of eng. and biology (L3)</p> <p>n. Analyze biomedical systems (L3)</p> <p>o. Making measurement and interpret data from living system (L3)</p>	<p>Direct assessment of student assignments from BME 3103, 4103, 2203, 2103, 4203, 4013, 4201, 2101, 3101, 4801, 4113, 4313, 4801, 2201.</p> <p>Faculty evaluation of senior design</p> <p>Course objective survey</p> <p>Alumni survey</p>	<p>Green or white flag</p>	<p>Every Semester</p>	<p>Annual</p>
<p>READING</p> <p>“LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>		<p>LTU core curriculum</p>			<p>Continuously by the University</p>

<p>SCIENTIFIC ANALYSIS “LTU graduates will demonstrate critical thinking and apply analytical and problem- solving skills in scientific fields.”</p>	<p>e. Solve eng. Problems (L3) l. Apply principles of eng., sci., and math (L3) m. Solve eng. problems at interface of eng. and biology (L3) n. Analyze biomedical systems (L3) o. Making measurement and interpret data from living system (L3)</p>	<p>Direct assessment of student assignments from BME 4113, 4203, 3703, 4313, 4103, 4801, 2201 Faculty evaluation of senior design Course objective survey Alumni survey</p>	<p>Green or white flag</p>	<p>Every Semester</p>	<p>Annual</p>
<p>LEADERSHIP “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>		<p>LTU Leadership core curriculum</p>			<p>Continuously by University</p>
<p>TEAMWORK “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	<p><i>d. Teams</i></p>	<p>Faculty evaluation of senior design Course objective survey Direct assessment of student assignments from BME 1002, 4022 Alumni survey</p>	<p>Green or white flag</p>	<p>Every Semester</p>	<p>Annual</p>
<p>PROFESSIONAL ETHICS “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>	<p><i>f. Professional and ethics</i></p>	<p>Direct assessment of student assignments from BME 3002 Exit interviews Course objective survey Alumni survey</p>	<p>4.0 on Level 3</p>	<p>Every Semester</p>	<p>Annual</p>

¹: The LTU undergraduate learning outcomes are mapped to the BME ABET Outcomes:

- a) an ability to apply knowledge of mathematics, science, and engineering
- b) an ability to design and conduct experiments, as well as to analyze and interpret data

- c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d) an ability to function on multidisciplinary teams
- e) an ability to identify, formulate, and solve engineering problems
- f) an understanding of professional and ethical responsibility
- g) an ability to communicate effectively
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i) a recognition of the need for, and an ability to engage in life-long learning
- j) a knowledge of contemporary issues
- k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- l) applying principles of engineering, biology, human physiology, chemistry, calculus-based physics, mathematics (through differential equations), and statistics;
- m) solving bio/biomedical engineering problems, including those associated with the interaction between living and non-living systems.
- n) analyzing, modeling, designing and realizing bio/biomedical engineering devices, systems, components, or processes
- o) making measurements on and interpreting data from living systems

²: The target level of attainment is quantified using Bloom's taxonomy:

- Level 1 (L1) – Knowledge
- Level 2 (L2) – Comprehension
- Level 3 (L3) – Application
- Level 4 (L4) – Analysis
- Level 5 (L5) – Synthesis
- Level 6 (L6) - Evaluation

³: Each ABET outcome is assessed using a combination of several assessment tools. Each assessment tool may involve evaluation/analysis of multiple courses or other components. Details of this approach can be found in the *BME program annual assessment report 2014-2015*.

⁴: Each key performance indicator is assessed using an “excellent, Adequate, Minimal, Unsatisfactory” (EAMU) vector. The description and nominal measurement ranges for each level are set as appropriate to the task associated with the key performance indicator. The performance vectors are classified into four categories: “Red flag”, “Yellow flag”, “White flag” and “Green flag” as described below:

- Red flag: Below 2.0 average performance vector and more than 10% of the class demonstrating unsatisfactory performance
- Yellow flag: Below 2.0 average performance vector and less than 10% of the class demonstrating unsatisfactory performance; or above 2.0 average performance vector and more than 10% of the class demonstrating unsatisfactory performance
- White flag: Not under Red, Yellow or Green flag classifications

- Green flag: Above 2.75 average performance vector and no indication of any unsatisfactory performance
Details of the KPI assessment method can be found in the *BME program annual assessment report 2014-2015*.

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

Outcome a: *an ability to apply knowledge of mathematics, science, and engineering*

- *Assessment:* Course objective survey and direct assessment of student work on learning objectives that map key performance indicators in support of Outcome (a).
- *Evaluation:* Direct assessment results raised Yellow flag on key performance indicator (KPI) a-2 evaluation in BME 4803 Tissue Engineering. The four courses that were assessed for other two KPIs related to Outcome (a) had no significant concerns.
- *Issue:* It has been difficult to find a good textbook. Some students didn't feel well prepared because exam questions were much more extensive than quiz questions.
- *Current/Future Actions:* The instructor will assess different textbooks and implement it during the next offering. The instructor will add exercises and problems that require the students' integrating concepts and principles they learn in classroom to the analysis of clinical problems.
- *Responsibility:* Yawen Li
- *University/College Support for Objective:* NA

Outcome b: *an ability to design and conduct experiments, as well as to analyze and interpret data*

- *Assessment:* Course objective survey and direct assessment of student work on learning objectives that map key performance indicators in support of Outcome (b).
- *Evaluation:* Direct assessment results did not raise significant concerns in the five courses that were assessed for the three KPIs related to Outcome (b). Common student feedback is that they spend too much time on the one-credit hour labs.
- *Issue:* Lab courses require significant time of both the instructors and students.
- *Current/Future Actions:* Hiring student assistants to help setup and run lab courses and the addition of a BME Senior Lecturer should reduce the time burden on instructors to set up laboratory resources and manage students.
- *Responsibility:* BME Department and Instructors
- *University/College Support for Objective:* NA

Outcome c: *an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability*

- *Assessment:* Course objective survey and direct assessment of student work on learning objectives as well as Senior Projects assessment map to key performance indicators in support of Outcome (c).
- *Evaluation:* Direct assessment results did not raise significant concerns in the three courses that were assessed for the three KPIs related to Outcome (c). Students did great projects in the Junior level design course. They will be encouraged to continue with these projects as their senior capstone design. Senior projects went well, with better performance than previous years.
- *Issue:* The additional requirement that all engineering students take a Sophomore design studio (EGE 2123) will allow revising of some of the BME course requirements.
- *Current/Future Actions:* A second design course option during the Junior year will be offered during the Fall semester. Wearable Technology Studio will be more open-ended, while focusing on fabrication and hands-on skills. Medical Device Design will continue to focus on background theory, technology and regulatory aspects for a few examples.
- *Responsibility:* Eric Meyer, Mansoor Nasir and BME Department
- *University/College Support for Objective:* NA

3. Assessment Plan for 2017-2018 Academic Year

The BME faculty agreed on the following assessment plan for the 2016-2017 academic year:

a. *Direct assessment*

ABET Student Outcome	KPI	Courses	Instructor
(a) an ability to apply knowledge of mathematics, science, and engineering	a-1 (L3): Implement mathematical algebra, geometry, calculus, probability techniques, differential equations and/or statistics	BME 4801	Li
(d) an ability to function on multidisciplinary teams	d-1 (L3): Demonstrate personal responsibilities in a team.	BME 1002 Intro to BME	Meyer
	d-2 (L3): Share responsibilities and collaborate in a cross-functional team.	BME 4022 Projects 2	Nasir
(e) an ability to identify, formulate, and solve engineering problems	e-1 (L3): Write a problem statement for a biomedical engineering problem.	BME 4803 Tissue Eng	Li
	e-2 (L3): Produce a solution to a biomedical engineering problem.	BME 4203 Intro to MEMS	Li
(f) an understanding of professional and ethical responsibility	f-1 (L2): Demonstrate knowledge of the professional code of ethics and government regulations.	BME 3002 Biomed Best Prac	Lancina
	f-2 (L2): Explain the ethical dimensions of a biomedical engineering problem.	BME 3002 Biomed Best Prac	Lancina
(g) an ability to communicate effectively	g-1 (L3): Construct and deliver a logical and articulate communication based on independent work.	BME 3213 Biomater	Li
	g-2 (L4): Create a plan, and document methods, observations, and results of an experiment or a project.	BME 4022 Projects 2	Nasir
	g-3 (L3): Organize and represent data collected in a clear and concise format that enhances the ability to interpret it.	BME 3101 Bioinstr Lab	Nasir

b. *Course learning objective survey*

Indirect assessment using course learning objective survey will be conducted for all required BME courses.

c. *Senior design*

The senior design will be evaluated by both faculty and IAB members.

d. *Exit interview*

Exit interview will be conducted in spring 2018.

BS in Civil Engineering

1. Assessment Plan and Summary

The Lawrence Tech Civil Engineering student outcomes (SOs) are based on the *Civil Engineering Body of Knowledge for the 21st Century, Second Edition (BOK2)* disseminated by the American Society of Civil Engineers (ASCE). The program has adopted the 24 SOs as listed below and mapped to the University Student Outcomes in Table 1, *Assessment Plan for Civil Engineering*.

Civil Engineering Student Outcomes:

1. Mathematics: Solve problems in mathematics through differential equations and apply knowledge to the solution of engineering problems.
2. Natural Sciences: Solve problems in calculus-based physics, chemistry and geology, and apply this knowledge to the solution of engineering problems.
3. Humanities: Demonstrate the importance of the humanities in the professional practice of engineering.
4. Social Sciences: Demonstrate the incorporation of social sciences knowledge into the professional practice of engineering.
5. Materials Science: Use knowledge of materials science to solve problems appropriate to civil engineering.
6. Mechanics: Analyze and solve problems in solid and fluid mechanics.
7. Specify and design an experiment to meet a specified need; conduct the experiment and analyze, interpret and explain the resulting data.
8. Problem Recognition and Solving: Develop problem statements and solve both well-defined and open-ended civil engineering problems by selecting and applying appropriate techniques and tools.
9. Design: Design a system or process to meet desired needs within such realistic constraints as economic, environmental, social, political, ethical, health and safety, constructability and sustainability.
10. Sustainability: Apply the principles of sustainability to the design of traditional and emergent engineering systems and explain how civil engineers should strive to comply with the principles of sustainable development in the performance of their professional duties.
11. Contemporary Issues and Historical Perspectives: Explain the impact of historical and contemporary issues on the identification and formulation of solutions to engineering problems and explain the impact of engineering solutions on the economy, environment, political landscape and society.
12. Risk and Uncertainty: Apply the principles of probability and statistics and solve problems containing uncertainty.
13. Project Management: Analyze a proposed project and formulate documents for incorporation into the project management plan.
14. Breadth in Civil Engineering Areas: Analyze and solve well-defined engineering problems in at least four technical areas appropriate to civil engineering.
15. Technical Specialization: Apply specialized tools or technologies to solve problems in traditional or emerging specialized technical areas of civil engineering.
16. Communication: Plan, compose and integrate the verbal, written, virtual and graphical communication of a project to technical and non-technical audiences.

17. Public Policy: Discuss and explain key concepts and processes involved in public policy.
18. Business and Public Administration: Explain key concepts and processes used in business and public administration.
19. Globalization: Explain global issues related to professional practice, infrastructure, environment and service populations as such issues arise across cultures and countries.
20. Leadership: Explain leadership principles and attitudes and apply those principles and attitudes when making decisions and directing the efforts of a small group.
21. Teamwork: Function effectively as a member of an intra-disciplinary team and evaluate the performance of the team and individual team members.
22. Attitudes: Explain attitudes supportive of the professional practice of civil engineering.
23. Lifelong Learning: Demonstrate the ability for self-directed learning and identify additional knowledge, skills and attitudes appropriate for continued professional practice.
24. Professional and Ethical Responsibility: Explain the many aspects of professionalism and what it means to be a member of the civil engineering profession; analyze a situation involving multiple conflicting professional and ethical interests to determine an appropriate course of action.

Table 1. Assessment Plan for the Department of Civil Engineering

LTU Undergraduate Learning Outcomes	Student Outcomes*	Assessment Tools	Metrics/ Indicators**	Administration Timeline	Loop- Closing Timeline
KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”	Outcome #8 Problem Solving Outcome #9 Design Outcome #13 Project Management Outcome #14 Breadth in CE Areas Outcome #15 Technical Specialization	Direct assessment of student assignments	Rank 4 on direct assessment rubric; Achievement Level 5 for top tier courses Rank 4 on direct assessment rubric;	Every semester.	Annual
TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”	Outcome #15 Technical Specialization	Direct assessment of student assignments.	Rank 4 on direct assessment rubric; Achievement Level 3 for top tier courses Meets Expectations on technical presentation rubrics	Every semester	Annual
SUSTAINABILITY "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."	Outcome #10 Sustainability	Direct assessment of student assignments	Rank 4 on direct assessment rubric; Achievement Level 3 for top tier courses	Every semester	Annual
COMMUNICATION “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”	Outcome #16 Communication	Advisory Board and faculty evaluation of capstone poster and project presentations Direct assessment of student assignments	<i>Meets Expectations</i> on technical presentation rubrics <i>Rank 4</i> on direct assessment rubric; Achievement <i>Level 5</i> for top tier courses WPE	Every semester	Annual
MATHEMATICS “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”	Outcome #1 Mathematics	Direct assessment of student assignments	<i>Rank 4</i> on direct assessment rubric; Achievement <i>Level 3</i> for top tier courses	Every semester	Annual

<p>READING</p> <p>“LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>		LTU core curriculum			Continuously by the University
<p>SCIENTIFIC ANALYSIS</p> <p>“LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”</p>	Outcome #8 Problem Recognition and Solving	Direct assessment of student assignments	Rank 4 on direct assessment rubric; Achievement Level 4 for top tier courses	Every semester.	Annual
<p>LEADERSHIP</p> <p>“LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>	Outcome #20 Leadership Outcome #24 Professional and Ethical Responsibility	Direct assessment of student assignments Fundamentals of Engineering Exam	University Leadership Program Rank 4 on direct assessment rubric; Achievement Level 3 for top tier courses Above national average for Carnegie peer institutions	Every semester.	Annual
<p>TEAMWORK</p> <p>“LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	Outcome #21 Teamwork	Direct assessment of student assignments Peer evaluations	Rank 4 on direct assessment rubric; Achievement Level 3 for top tier courses Rank 3 on Teamwork Evaluation rubric	Every Semester	Annual
<p>PROFESSIONAL ETHICS</p> <p>“LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>	Outcome #24 Professional and ethical responsibility	Direct assessment of student assignments Fundamentals of Engineering Exam	Rank 4 on direct assessment rubric; Achievement Level 4 for top tier courses Above national average for Carnegie peer institutions	Every semester	Annual

Table 1 (continued). Assessment Plan for the Department of Civil Engineering

LTU Undergraduate Learning Outcomes	Student Outcomes*	Assessment Tools	Metrics/ Indicators**	Administration Timeline	Loop- Closing Timeline
No correlative Lawrence Tech outcome	Outcome #3 Humanities	Direct assessment of appropriate student work; assignments, tests, projects, etc.	EAMU Vector weighted average of 2.0 or above; Achievement Level 3 for subsdiscipline terminal courses	Every semester.	Annual
No correlative Lawrence Tech outcome	Outcome #4 Social Sciences	Direct assessment of appropriate student work; assignments, tests, projects, etc.	EAMU Vector weighted average of 2.0 or above; Achievement Level 3 for subsdiscipline terminal courses	Every semester	Annual
No correlative Lawrence Tech outcome	Outcome #5 Material Sciences	Direct assessment of appropriate student work; assignments, tests, projects, etc.	EAMU Vector weighted average of 2.0 or above; Achievement Level 3 for subsdiscipline terminal courses	Every semester	Annual
No correlative Lawrence Tech outcome	Outcome #6 Mechanics	Direct assessment of appropriate student work; assignments, tests, projects, etc.	EAMU Vector weighted average of 2.0 or above; Achievement Level 4 for subsdiscipline terminal courses	Every semester	Annual
No correlative Lawrence Tech outcome	Outcome #11 Contemporary Issues & Historical Perspectives	Direct assessment of appropriate student work; assignments, tests, projects, etc.	EAMU Vector weighted average of 2.0 or above; Achievement Level 3 for subsdiscipline terminal courses	Every semester	Annual

No correlative Lawrence Tech outcome	Outcome #12 Risk & Uncertainty	Direct assessment of appropriate student work; assignments, tests, projects, etc.	EAMU Vector weighted average of 2.0 or above; Achievement Level 3 for subdiscipline terminal courses	Every semester.	Annual
No correlative Lawrence Tech outcome	Outcome #17 Public Policy	Direct assessment of appropriate student work; assignments, tests, projects, etc.	EAMU Vector weighted average of 2.0 or above; Achievement Level 2 for subdiscipline terminal courses	Every semester	Annual
No correlative Lawrence Tech outcome	Outcome #18 Business & Public Administration	Direct assessment of appropriate student work; assignments, tests, projects, etc.	EAMU Vector weighted average of 2.0 or above; Achievement Level 2 for subdiscipline terminal courses	Every semester	Annual
No correlative Lawrence Tech outcome	Outcome #19 Globalization	Direct assessment of appropriate student work; assignments, tests, projects, etc.	EAMU Vector weighted average of 2.0 or above; Achievement Level 2 for subdiscipline terminal courses	Every semester	Annual
No correlative Lawrence Tech outcome	Outcome #22 Attitudes	Direct assessment of appropriate student work; assignments, tests, projects, etc.	EAMU Vector weighted average of 2.0 or above; Achievement Level 2 for subdiscipline terminal courses	Every semester	Annual
No correlative Lawrence Tech outcome	Outcome #23 Lifelong Learning	Direct assessment of appropriate student work; assignments, tests, projects, etc.	EAMU Vector weighted average of 2.0 or above; Achievement Level 4 for subdiscipline terminal courses	Every semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

Close-the-Loop report on outcomes that required action from 2015-2016 academic year

#13 – Project Management

Prior Evaluation: Assessment results from the 2015-2016 academic year for ECE4243 indicated a Vector Designation of U, and poor student deliverables in the Capstone courses, requiring action by faculty.

Prior Issue: For the second straight year students failed to grasp several foundational project management concepts in ECE4243; additionally, the construction engineering (project management) deliverables in the Capstone courses remained exceedingly poor; part of the problem appears to be student attitudes and the refusal to put forth the work necessary for a senior level course.

Results of Remedial Actions: The actions taken to remedy this issue (outlined in 2015-2016 Annual Assessment Report) appear to have improved the attainment of this outcome. However, there is still room for improvement as the target vector designation has still not been reached. See the 2017-2018 plan for continuing remedial actions.

#14 – Breadth in Civil Engineering

Prior Evaluation: Assessment results from the 2015-2016 academic year for ECE4243 indicated a Vector Designation of U, and poor student deliverables in the Capstone courses, requiring action by faculty.

Prior Issue: For the second straight year students failed to grasp several foundational project management concepts in ECE4243; additionally, the construction engineering (project management) deliverables in the Capstone courses remained exceedingly poor.

Results of Remedial Actions: The actions taken to remedy this issue (outlined in 2015-2016 Annual Assessment Report) have been unsuccessful. 2016-2017 assessment of Outcome #14 still indicates that the outcome is not being met, although the underlying issue appears to have changed. See the 2017-2018 plan for actions addressing this concern.

#16 – Communication

Prior Evaluation: Assessment results from the 2015-2016 academic year indicated that students were underperforming on Capstone writing and oral deliverables.

Prior Issue: Based on assessment by faculty and the Civil Engineering Advisory Board, communication in the Capstone, both the oral presentations and the written technical reports, were of concern. Student work product seemed to be at the level of a standard engineering course—i.e., the level of achievement did not meet the expectations for a capstone project (culminating design/project management experience).

Results: Efforts to raise the level of student achievement for this outcome were successful. In the 2016-2017 academic year, Outcome #16 received a satisfactory vector weighted average of 2.0. No changes will be made in the coming year.

Close-the-Loop report on outcomes requiring action from 2016-2017 academic year

2016-2017 Assessment Summary Table

Below is the assessment summary for 2016-2017. The descriptions of the EAMU vector designations and weighted averages follow the summary.

#2 Natural Sciences EAMU Vector Weighted Avg: 2.11	#3 Humanities EAMU Vector Weighted Avg: 2.15	
#4 Social Science EAMU Vector Weighted Avg: 2.00	#5 Materials Science EAMU Vector Weighted Avg: 1.10	#6 Mechanics EAMU Vector Weighted Avg: 1.82
#7 Experiments EAMU Vector Weighted Avg: 2.34	#8 Problem Solving EAMU Vector Weighted Avg: 2.02	#9 Design EAMU Vector Weighted Avg: 1.97
#10 Sustainability EAMU Vector Weighted Avg: 1.80	#11 Contemporary Issues EAMU Vector Weighted Avg: 2.08	#12 Risk and Uncertainty EAMU Vector Weighted Avg: 2.43
#13 Project Management EAMU Vector Weighted Avg: 1.91	#14 Breadth in Civil Eng. EAMU Vector Weighted Avg: 0.98	#15 Technical Specialization EAMU Vector Weighted Avg: 1.81
#16 Communication EAMU Vector Weighted Avg: 2.00	#17 Public Policy EAMU Vector Weighted Avg: 2.20	#18 Business Administration EAMU Vector Weighted Avg: 1.52
#19 Globalization EAMU Vector Weighted Avg: 2.53	#21 Teamwork EAMU Vector Weighted Avg: 2.20	#22 Attitudes EAMU Vector Weighted Avg: 2.33
#23 Lifelong Learning EAMU Vector Weighted Avg: 2.33	#24 Ethical Responsibilities EAMU Vector Weighted Avg: 2.32	

Vector Descriptions

For each EAMU vector, a weighted average is calculated, using the following formula:

$$\text{Weighted Average} = \frac{3N_E + 2N_A + N_M + 0N_U}{N_E + N_A + N_M + N_U}$$

In which N is the number of respective designations within the composite vector. Using the weighted average, the vector is then flagged according to the following scales. Red flags indicate a definite problem area which must be addressed; Yellow flags indicate potential problems areas which may need to be addressed; No flag indicates satisfactory results; Green flags indicate either high level of achievement OR an assessment process that lacks rigor and required adjustment.

Weighted Average Rubric	
Green	≥ 2.75
White	No Flag
Yellow	< 2.0 OR Unsatisfactory $> 20\%$
Red	< 2.0 & Unsatisfactory $> 20\%$

VECTOR DESIGNATION	MEASUREMENT	DESCRIPTION
E	$\geq 90\%$	Excellent: student applied knowledge with little or no conceptual or procedural errors
A	75% to 89%	Acceptable: student applied knowledge with no significant conceptual and only minor procedural errors
M	60% to 74%	Minimal: student applied knowledge with occasional conceptual errors and minor procedural errors
U	$\leq 59\%$	Unsatisfactory: student applied knowledge and made significant conceptual and/or procedural errors
NA		Not Applicable: Outcome was not addressed during the semester

Student Outcomes Requiring Action

The following outcomes were flagged as Red through the 2016-2017 assessment process, as described above.

#5 – Material Science

Assessment: Direct assessment of ECE 3424 – Soil Mechanics.

Evaluation: Assessment results of ECE 3424 indicated a weighted vector average of 1.10 with more than 20% percent of students performing at the *Unsatisfactory* level.

Issue: Upon review of the ASCE BOK2 outcome description by the course instructor (A. Lobbestael) and the Civil Engineering program faculty, it was determined that Soil Mechanics is not a suitable course for assessment of the Material Science outcome. It was determined that the material being used

as assessment evidence was not directly applicable to the outcome and therefore not a good indicator of student achievement.

Actions: The faculty collectively agreed to adjust the assessment plan to assess Outcome #5 in ECE1413 – CE Materials. Although this is a freshmen-level course, the material is directly applicable to the outcome.

Responsibility: A. Lobbestael and N. Bandara

#14 – Breadth in Civil Engineering

Assessment: Direct assessment of the following courses: ECE 4243 – Construction Project Management, ECE 4544 – Hydraulic Engineering ECE 4743 – Concrete Engineering, ECE 4843 – Highway Engineering

Evaluation: 5 of the 6 courses that were assessed for breadth were designated with a Red flag and the sixth class was designated with a Yellow flag. Collectively, the weighted average for the vector was 0.98 with more than 20% of students performing at the *Unsatisfactory* level.

Issue: Given the low vector weighted average for this critical outcome, the faculty reviewed the outcome description provided in the ASCE BOK2. The faculty feel strongly that we are indeed covering Breadth very well in our program. This indicates an issue with the assessment procedure. Furthermore, the current assessment procedure looks at each course individually, instead of collectively and therefore does not have the ability to assess whether this breadth is actually being achieved.

Actions: For the 2017-2018 academic year, no changes will be made to the assessment procedure for Outcome 14 and no specific action will be taken to remedy the vector weighted average. The assessment procedure will however be reviewed over the course of the year and necessary changes will be implemented for the 2018-2019 academic year (as discussed at the end of Section 3).

#18 – Business Administration

Assessment: Direct assessment of ECE 4243 – Construction Project Management and ECE 4022 – CE Design Project 1

Evaluation: Collectively, assessment results indicated a weighted vector average of 1.52 for this outcome. The assessment results from the Capstone project (ECE 4022) however were satisfactory with a weighted vector average of 2.30. Assessment results from ECE 4243 indicated a significantly lower weighted vector average of 1.19, with more than 20% of students performing at the *Unsatisfactory* level.

Issue: Failure to attain the *Business Administration* outcome can be attributed to student performance in ECE 4243. The instructor (J. Tocco) has indicated that students seem to fail to grasp the importance of various project delivery methods and contractual structures.

Actions: Attempts to remedy this outcome will be isolated to ECE 4243. The instructor plans to incorporate additional practicums into the course to more fully discuss how project delivery methods are utilized and what responsibilities they require of each of the primary stakeholders.

Responsibility: J. Tocco

The following outcomes were flagged as Yellow through the 2016-2017 assessment process, as described under “Vector Descriptions.”

#6 – Mechanics

Assessment: Direct assessment of ECE 3723 – Theory of Structures

Evaluation: Assessment results indicated a weighted vector average of 1.82 for this outcome, with less than 20% of students performing at the *Unsatisfactory* level.

#9 – Design

Assessment: Direct assessment of ECE 4743 – Concrete Engineering, ECE 4843 – Highway Engineering, and ECE 4032 – CE Design Project 2

Evaluation: Assessment results indicated a weighted vector average of 1.97 for this outcome, with less than 20% of students performing at the *Unsatisfactory* level.

#10 – Sustainability

Assessment: Direct assessment of ECE 4022 – CE Design Project 1

Evaluation: Assessment results indicated a weighted vector average of 1.80 for this outcome, with less than 20% of students performing at the *Unsatisfactory* level.

#13 – Project Management

Assessment: Direct Assessment of ECE 4243 – Project Management

Evaluation: Assessment results indicated a weighted vector average of 1.91 for this outcome, with less than 20% of students performing at the *Unsatisfactory* level.

Issue and Actions (Collectively for Outcomes 6, 9, 10, 13): Yellow flags indicate outcomes that may require remedial action, but are not necessarily definite problem areas. The weighted vector averages for all of the above 4 outcomes were very close (within 0.20) to the target weighted average of 2.00. This was the first year that the EAMU vector weighted average was used as in the Civil Engineering assessment process. As this new assessment procedure is being rolled out, it is still unclear how sensitive the weighted averages are to small changes in student achievement/performance and a period of calibration or norming may be necessary. Furthermore, a new assessment coordinator has taken over for the program as of the end of the last academic year. For these reasons no actions will be taken at this point to address these outcomes. They will however be reviewed at the end of the next assessment cycle and will be addressed at that time, if necessary.

#15 – Technical Specialization

Assessment: Direct Assessment of the following courses: ECE 4243 – Construction Project Management, ECE 4544 – Hydraulic Engineering, ECE 4743 – Concrete Engineering, ECE 4843 – Highway Engineering

Evaluation: Assessment results indicated a weighted vector average of 1.81 for this outcome, with less than 20% of students performing at the *Unsatisfactory* level.

Issue: Upon review of the ASCE BOK2 outcome description by the Civil Engineering program faculty, it was collectively agreed that the Technical Specialization outcome should not have a required cognitive achievement level of 3 (as was the case for the 2016-2017 academic year. It was agreed that a cognitive achievement level of 2 aligns better with our program goals.

Action: Revise the student outcome summary matrix to reflect a required cognitive achievement level of 2 for this outcome.

Responsibility: A. Lobbestael

3. Assessment Plan for 2017-2018 Academic Year

Action Items for the 2017-2018 Academic Year:

Outcome: #5 – Material Science

Actions: The faculty collectively agreed to adjust the assessment plan to collect data for and assess Outcome #5 in ECE1413 – CE Materials (instead of in ECE3424 – Soil Mechanics).

Outcome: #14 – Breadth in Civil Engineering

Actions: For the 2017-2018 academic year, no changes will be made to the assessment procedure for Outcome 14 and no specific action will be taken to remedy the vector weighted average. The assessment procedure will however be reviewed over the course of the year and necessary changes will be implemented for the 2018-2019 academic year (as discussed at the end of Section 3).

Outcome: #15 – Technical Specialization

Actions: Revise the student outcome summary matrix to reflect a required cognitive achievement level of 2 for this outcome.

Outcome: #18 – Business Administration

Actions: Attempts to remedy this outcome will be isolated to ECE 4243. The instructor plans to incorporate additional practicums into the course to more fully discuss how project delivery methods are utilized and what responsibilities they require of each of the primary stakeholders.

Changes to the Assessment Procedure for the 2017-2018 Academic Year:

The Program utilized the Vector Designations for the first time in 2015-2016, and continued to utilize and refine the technique over the course of the 2016-2017 academic year, with the introduction of the EAMU vector weighted average. Assessment was managed electronically for the first time this year through Google Docs.

For the 2017-2018 academic year, there is a new assessment coordinator for the Civil Engineering Program. During this transition period, no significant changes will be made to the assessment plan. However, following discussions among the faculty at the 2017 Close the Loop meeting and the coordinator's attendance at the ABET Fundamentals of Program Assessment workshop, the assessment plan will be reviewed over the course of the year and changes will be proposed for the 2018-2019 academic year. The review will focus on 1) the possibility of implementing a rolling assessment plan to alleviate faculty workload associated with assessment, 2) the possibility of transitioning to an assessment cycle with a duration greater than 1 year, and 3) incorporation of outcome-specific performance indicators.

Minor changes will be made for the 2017-2018 academic year in order to accommodate attrition of faculty within the program and to reflect faculty decisions made during the 2017 Close the Loop meeting. These changes include updates and revisions to course coordinator assignments and minor revisions to the student outcome assessment matrix, as outlined above.

BS in Computer Engineering

1. Assessment Plan and Summary

Under the department's working assessment plan, the eleven student outcomes are divided into two groups and assessed in alternating fashion. Outcomes (a), (b), (c), (d), (e), and (k) are assessed during odd-numbered academic years (e.g., 2017-2018) while outcomes (f), (g), (h), (i) and (j) are assessed during even-numbered academic years (e.g., 2016-2017). This implies that all required corrective actions should be completed for the first group of outcomes during even-numbered years and for the second group during odd-numbered years.

The following student outcomes (SO) have been assessed during the 2016-17 academic year

-SO (f), (g), (h), (i), and (j):

- f) An understanding of professional and ethical responsibility;
- g) An ability to communicate effectively;
- h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- i) A recognition of the need for, and ability to engage in, lifelong learning;
- j) A knowledge of contemporary issues;

All student outcomes are evaluated in accordance with the ECE program assessment plan shown in Table 1. This plan has been modified so that the program learning outcomes are mapped to the LTU undergraduate learning outcomes.

Table 1. Assessment Plan for the BS in Computer Engineering

LTU Undergraduate Learning Outcomes	Student Outcomes*	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”	[a] An ability to apply knowledge of mathematics, science, and engineering to computer engineering situations. [b] an ability to design and conduct experiments, as well as to analyze and interpret data. [c] An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political ethical, health and safety, manufacturability, and sustainability.	Direct assessment of student assignments in EEE3125, 3221, 3231, 3233, 4273, 4514 and 4842.	3 out of 5	Every semester.	Annual
TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”	[k] An ability to use the techniques, skills and modern computer engineering tools necessary for engineering practice	Direct assessment of student assignments in EEE3231, 3233, 4842.	3 out of 5	Every semester	Annual
SUSTAINABILITY "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."	[c] An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political ethical, health and safety, manufacturability, and sustainability. [h] The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context. [j] A knowledge of contemporary issues	Direct assessment of student assignments in EEE2214, 3124, 3233, 4273, and 4514. IAB evaluation of EEE4842 Senior Project.	3 out of 5	Every semester	Annual

<p>COMMUNICATION “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	<p>[g] An ability to communicate effectively</p>	<p>Direct assessment of student assignments in EEE1001, 3231, 4514, and 4842.</p> <p>LTU Core Curriculum</p>	<p>3 out of 5 WPE</p>	<p>Every semester</p>	<p>Annual</p>
<p>MATHEMATICS “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>	<p>[a] An ability to apply knowledge of mathematics, science, and engineering to computer engineering situations.</p>	<p>Direct assessment of student assignments in EEE3231, 4273, 4514, and 4842.</p>	<p>3 out of 5</p>	<p>Every semester</p>	<p>Annual</p>
<p>READING “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>	<p>[g] An ability to communicate effectively [i] a recognition of the need for, and an ability to engage in life-long learning</p>	<p>Direct assessment of student assignments in EEE1001, 2214, 3124, 3231, 4514, and 4842.</p> <p>LTU Core Curriculum</p>			<p>Continuously by the University</p>
<p>SCIENTIFIC ANALYSIS “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”</p>	<p>[e] An ability to identify, formulate, and solve computer engineering problems</p>	<p>Direct assessment of student assignments in EEE3233, 4514, and 4842.</p>	<p>3 out of 5</p>	<p>Every semester.</p>	<p>Annual</p>
<p>LEADERSHIP “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>	<p>[h] The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.</p>	<p>IAB evaluation of Senior Projects.</p> <p>LTU Leadership curriculum</p>	<p>3 out of 5</p>	<p>Every semester.</p>	<p>Annual</p>

<p>TEAMWORK “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	<p>[d] An ability to function on multidisciplinary teams</p>	<p>Direct assessment of student assignments in EGE1001 and EEE4842.</p>	<p>3 out of 5</p>	<p>Every Semester</p>	<p>Annual</p>
<p>PROFESSIONAL ETHICS “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>	<p>[f] An understanding of professional and ethical responsibility</p>	<p>Direct assessment of student assignments in EEE1001 and 4842.</p>	<p>3 out of 5</p>	<p>Every semester</p>	<p>Annual</p>

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

In the 2016-2017 academic year, the following highlighted ECE department supporting program learning objectives f, g, h, i, j have been assessed in ECE department, which are chosen from ABET a-k outcomes. We set Metrics and Indicators as 3.0/5.0. Rubrics have been discussed and updated by all ECE faculty.

- a) An ability to apply knowledge of mathematics, science, and engineering to electrical engineering situations;
- b) An ability to design and conduct experiments, as well as to analyze and interpret data;
- c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- d) An ability to function on multidisciplinary teams;
- e) An ability to identify, formulate, and solve engineering problems;
- f) An understanding of professional and ethical responsibility;
- g) An ability to communicate effectively;
- h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context;
- i) A recognition of the need for, and an ability to engage in life-long learning;
- j) A knowledge of contemporary issues ;
- k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice;

Several ECE faculty members are involved in evaluating the following outcomes:

Outcome f): An understanding of professional and ethical responsibility;

- Assessment: Outcome (f) was assessed in EEE1001 Introduction to ECE in Spring 2017. All students in this class were required to write a paper on engineering ethics. Several ECE faculty members applied a new departmental rubric to evaluate the samples of student work.
- Evaluation: Outcome (f) is satisfied at the level of this course.
- Issues: The ECE faculty-at-large did suggest that the new ethics rubric should be given to the EEE1001 course instructor for distribution to the next group of students during Fall 2017.
- Actions: Since Outcome (f) appears to be attained by students in the Computer Engineering Program, no corrective action will be taken next year.
- Responsibility: Michael Cloud

Outcome g): An ability to communicate effectively;

- Assessment: During the 2016-2017 academic year, Outcome (g) was assessed via three independent mechanisms: a). Capstone project presentations were evaluated by six faculty members looking at both written and oral aspects of professional communication skills; b). Capstone project reports were

evaluated by the senior project instructor and coordinator (Dr. Jaber), using a rubric he had developed for the purpose. The four rubric dimensions were (I) punctuation, mechanics, and grammar, (II) writing style, (III) report content, and (IV) format and source acknowledgment. C). To add some longitudinal aspect to the assessment of Outcome (g), a new departmental rubric was designed specifically to score a writing assignment given in EEE1001 Intro to ECE. This year's assignment was a paper on engineering ethics.

- Evaluation: In all three mechanisms, computer engineering student demonstrated the effective communication abilities, and exceed the performance threshold.
- Issues: The program also monitored student success on LTU's mandatory Writing Proficiency Exam (WPE) as a measure of written communication ability derived from the general education courses in the curriculum. Dr. Jensen reported that for the May 2017 EE graduates, the time to graduation was impacted in 1 of 14 cases because of the WPE (the student could have graduated one semester earlier if not required to take the Writing Seminar (1 cr), as he/she had failed the WPE twice). On this basis it was concluded that the general education portion of the curriculum provides students with an adequate written communication ability and does so in a timely manner. No corrective action is required. However, the program is considering removal of the WPE as a program assessment tool for Outcome (g), as direct student evidence is now being collected, analyzed, and acted on in program specific courses.
- Actions: Since Outcome (g) appears to be attained by students in the computer engineering program, no corrective action will be taken next year.
- Responsibility: Michael Cloud, Nabih Jaber

Outcome h): The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context;

- Assessment: Assessment of Outcome (h) has been based on the Industrial Advisory Board (IAB) members' evaluations of the senior project poster presentation. This presentation occurs one week prior to semester end. The evaluation data are collected using a rubric, first deployed in Fall 2015. Outcome (h) was assessed in Fall 2015, Spring 2016, Fall 2016 and, most recently, in Spring 2017. The assessment of Outcome (h) was presented during the ABET visit with data from Fall 2015 and Spring 2016. During the current academic year the IAB assessed five projects in the fall and six projects in the spring. During this academic year, data was not collected from EEE4423 Communication Systems.
- Evaluation: Analysis showed that the program met the target threshold by having 100% of the students achieve 60% or higher in at least one of the dimensions listed above (see Outcome (h)).
- Issues: No issues.
- Actions: Since Outcome (h) appears to be attained by students in the computer engineering program, no corrective action will be taken next year.
- Responsibility: Michael Cloud, Elin Jensen

Outcome i): A recognition of the need for, and an ability to engage in life-long learning;

- Assessment: Recognition of the need for, and an ability to engage in, lifelong learning was assessed via two distinct mechanisms this year.

First mechanism, in EEE3233 Microprocessors, the instructor and course coordinator (Chase) instituted a take-home quiz with the following items:

1. A technical question pertaining to material that was not presented in class.
2. A thought question on why the student's ability to answer question #1 might be attractive to an employer.

The student responses were marked using a simply binary scheme: the technical question was marked "s" for satisfactory if the student was able to learn a new piece of information; the thought question was marked "s" if the student mentioned an ability to learn new information.

Second mechanism, in EEE2214 Digital Electronics and Lab, EEE3124 Signals & Systems, and EEE3414 Electromagnetic Fields and Waves, an instructor and coordinator of the latter two courses (Cloud) instituted a new assignment as follows:

Primary Literature Report

"Primary literature" is defined as a document written by the person or persons who actually did the work described in the document. Obvious examples would be engineering journal papers and industry technical reports. The assignment is to choose, read, and summarize (in your own words of course) one such item of primary literature. Your report should include full citation information for your chosen item, your reason for choosing this particular item, an executive summary of the information it contains, and your assessment of potential application areas for the information. An LTU Reference Librarian would be an excellent resource person to help you locate potential items in the open literature.

One relation between lifelong learning and this task is the direct assessment of reading comprehension that the latter provides. The ECE faculty judge reading comprehension to be an essential indicator of an ability to learn throughout the professional lifespan. Moreover, the assignment requires comprehension of the sorts of non-textbook literature sources that practicing engineers must often read.

Another relation between lifelong learning and this task is the way in which the latter can serve as a gauge of student curiosity. One can see whether students reach for topics of strong individual interest, or simply choose to expand on topics already covered in the course.

For these reasons the primary literature report assignment was selected as a second mechanism for the assessment of Outcome (i).

A selection of student papers was scored by multiple faculty using a rubric composed for the purpose . The results strongly demonstrate satisfaction of Outcome (i).

- Evaluation: First mechanism, results from Fall 2016 and Spring 2017 show that at least 70% of students in the sample group do understand the need for, and are able to engage in, lifelong learning.
- Issues:No issues

- **Actions:** Considering data from the two assessment mechanisms presented above, the ECE faculty judged that no further action was required to address Outcome (i) during the present assessment cycle.
- **Responsibility:** Michael Cloud, Richard Chase

Outcome j): A knowledge of contemporary issues;

- **Assessment:** The primary literature assignment described under Outcome (i) was also used as a vehicle for assessing a knowledge of contemporary issues. Although the term “contemporary issues” did not appear in the statement of the assignment, students showed a marked tendency to choose recently published literature items and this increased the probability that Outcome (j) would be addressed. As a group 13 of 14 papers (93%) were recent and published after January 2009. One paper was published in 2002, see Figure 1.

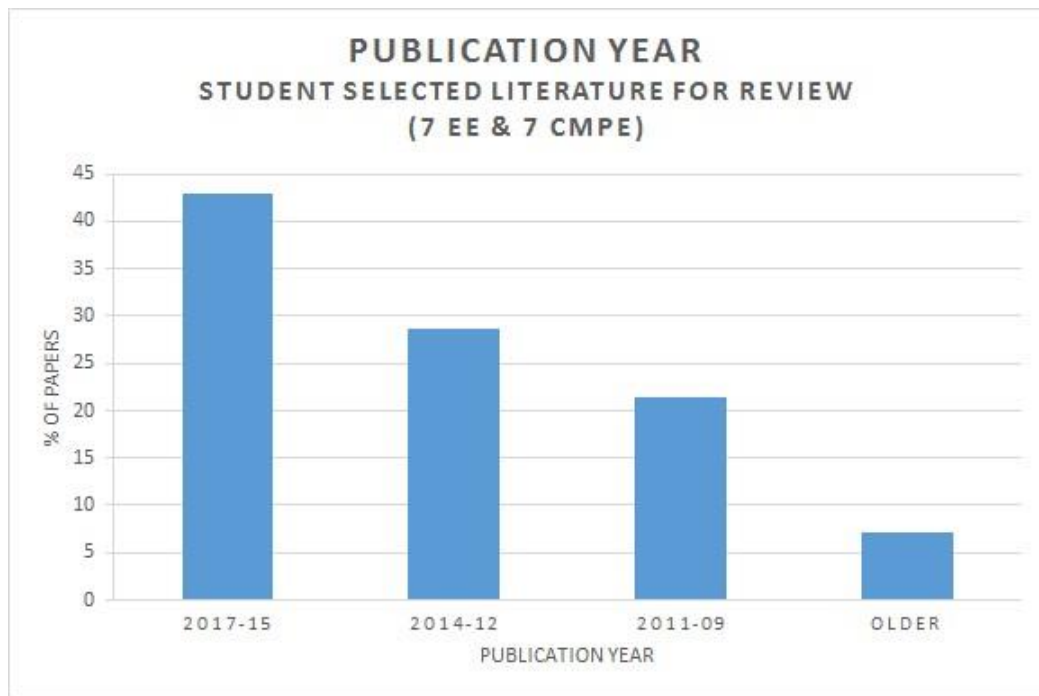


Figure 1 Publication year on student selected primary literature for assignment

New departmental assessment rubric, inspired by (Schwartz and Kranow 2012), was developed to assess both an awareness of contemporary issues and an ability to assess their relevance and impact. As mentioned under Outcome (i), the primary literature assignment was instituted in EEE2214 Digital Electronics and Lab, EEE3124 Signals & Systems, and EEE3414 Electromagnetic Fields and Waves. In this case the material collected was subjected to the new rubric. Seven writing examples were selected from both Fall 2016 and Spring 2017 semesters, and each paper was reviewed by at least two ECE faculty members.

Evaluation: Results show that students exceeded the performance threshold of 60% of students achieving 60% or higher score. Therefore the students demonstrate awareness of contemporary issues in electrical

engineering and the ability to understand the context and/or impact relative to their field. Furthermore, the ages of the selected publications demonstrate that the students are keenly interested in current issues challenging the field of electrical engineering.

- Issues: The tool should be employed during the next assessment cycle of Outcome (j) during 2018-19 in the same group of courses.

To further elicit data for Outcome (j) in the future, the wording of the primary literature assignment starting Fall 2017 will include an additional paragraph as follows:

*New aspect of this assignment (new this academic year) is the necessity to correlate the chosen topic with at least one **contemporary issue** in your report. Examples of "contemporary issue" areas for engineers might include Diversity, Copyright Law, International Collaboration, Privacy, Security, Accessibility, Continuing Education, Licensing Law, Globalization, Sustainability, and Governmental Regulation --- but this list is certainly not exhaustive.*

- Actions: No actions are required at this time.
- Responsibility: Michael Cloud

3. Assessment Plan for 2017-2018 Academic Year

The following student outcomes (SO) will be assessed during the 2017-18 academic year -SO (a), (b), (c), (d), (e) and (k):

- a) an ability to apply knowledge of mathematics, science, and engineering;
- b) an ability to design and conduct experiments, as well as to analyze and interpret data;
- c) an ability to design a computer system, component, or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- d) an ability to function on multidisciplinary teams;
- e) an ability to identify, formulate, and solve engineering problems;
- k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

BS in Electrical Engineering

1. Assessment Plan and Summary

Under the department's working assessment plan, the eleven student outcomes are divided into two groups and assessed in alternating fashion. Outcomes (a), (b), (c), (d), (e), and (k) are assessed during odd-numbered academic years (e.g., 2017-2018) while outcomes (f), (g), (h), (i) and (j) are assessed during even-numbered academic years (e.g., 2016-2017). This implies that all required corrective actions should be completed for the first group of outcomes during even-numbered years and for the second group during odd-numbered years.

The following student outcomes (SO) have been assessed during the 2016-17 academic year: SO (f), (g), (h), (i), and (j):

- f) An understanding of professional and ethical responsibility;
- g) An ability to communicate effectively;
- h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- i) A recognition of the need for, and ability to engage in, lifelong learning;
- j) A knowledge of contemporary issues;

All student outcomes are evaluated in accordance with the ECE program assessment plan shown in Table 1. This plan has been modified so that the program learning outcomes are mapped to the LTU undergraduate learning outcomes.

Table 1. Assessment Plan for the BS in Electrical Engineering

LTU Undergraduate Learning Outcomes	Student Outcomes*	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop Closing Timeline
<p>KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	<p>[a] An ability to apply knowledge of mathematics, science, and engineering to computer engineering situations. [b] an ability to design and conduct experiments, as well as to analyze and interpret data. [c] An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political ethical, health and safety, manufacturability, and sustainability.</p>	<p>Direct assessment of student assignments in EEE3124, 3221, 3231, 3233, 4273, 4514 and 4822.</p>	<p>3 out of 5</p>	<p>Every semester.</p>	<p>Annual</p>
<p>TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	<p>[k] An ability to use the techniques, skills and modern computer engineering tools necessary for engineering practice</p>	<p>Direct assessment of student assignments in EEE3231, 3233, 4822.</p>	<p>3 out of 5</p>	<p>Every semester</p>	<p>Annual</p>
<p>SUSTAINABILITY "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."</p>	<p>[c] An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political ethical, health and safety, manufacturability, and sustainability. [h] The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context. [j] A knowledge of contemporary issues</p>	<p>Direct assessment of student assignments in EEE2214, 3124, 3233, 4273, 4514 and 4822. IAB evaluation of Senior Project.</p>	<p>3 out of 5</p>	<p>Every semester</p>	<p>Annual</p>
<p>COMMUNICATION “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	<p>[g] An ability to communicate effectively</p>	<p>Direct assessment of student assignments in EEE1001, 3231, 4514, and 4822. LTU Core Curriculum</p>	<p>3 out of 5 WPE</p>	<p>Every semester</p>	<p>Annual</p>

<p>MATHEMATICS “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>	<p>[a] An ability to apply knowledge of mathematics, science, and engineering to computer engineering situations.</p>	<p>Direct assessment of student assignments in EEE3231, 4273, 4514, and 4822.</p>	<p>3 out of 5</p>	<p>Every semester</p>	<p>Annual</p>
<p>READING “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>	<p>[g] An ability to communicate effectively [i] a recognition of the need for, and an ability to engage in life-long learning</p>	<p>Direct assessment of student assignments in EEE1001, 2214, 3124, 3231, 4514, and 4822. LTU Core Curriculum</p>			<p>Continuously by the University</p>
<p>SCIENTIFIC ANALYSIS “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”</p>	<p>[e] An ability to identify, formulate, and solve computer engineering problems</p>	<p>Direct assessment of student assignments in EEE3233, 4514, and 4822.</p>	<p>3 out of 5</p>	<p>Every semester.</p>	<p>Annual</p>
<p>LEADERSHIP “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>	<p>[h] The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.</p>	<p>IAB evaluation of Senior Projects. LTU Leadership curriculum</p>	<p>3 out of 5</p>	<p>Every semester.</p>	<p>Annual</p>
<p>TEAMWORK “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	<p>[d] An ability to function on multidisciplinary teams</p>	<p>Direct assessment of student assignments in EGE1001 and EEE3221.</p>	<p>3 out of 5</p>	<p>Every Semester</p>	<p>Annual</p>
<p>PROFESSIONAL ETHICS “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>	<p>[f] An understanding of professional and ethical responsibility</p>	<p>Direct assessment of student assignments in EEE1001 and 4822.</p>	<p>3 out of 5</p>	<p>Every semester</p>	<p>Annual</p>

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

In the 2016-2017 academic year, the following highlighted ECE department supporting program learning objectives f, g, h, i, j have been assessed in ECE department, which are chosen from ABET a-k outcomes. We set Metrics and Indicators as 3.0/5.0. Rubrics have been discussed and updated by all ECE faculty.

- a) An ability to apply knowledge of mathematics, science, and engineering to electrical engineering situations;
- b) An ability to design and conduct experiments, as well as to analyze and interpret data;
- c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- d) An ability to function on multidisciplinary teams;
- e) An ability to identify, formulate, and solve engineering problems;
- f) An understanding of professional and ethical responsibility;
- g) An ability to communicate effectively;
- h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context;
- i) A recognition of the need for, and an ability to engage in life-long learning;
- j) A knowledge of contemporary issues ;
- k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice;

Several ECE faculty members are involved in evaluating the following outcomes:

Outcome f): An understanding of professional and ethical responsibility;

- Assessment: Outcome (f) was assessed in EEE1001 Introduction to ECE in Spring 2017. All students in this class were required to write a paper on engineering ethics. Several ECE faculty members applied a new departmental rubric to evaluate the samples of student work.
- Evaluation: Outcome (f) is satisfied at the level of this course.
- Issues: The ECE faculty-at-large did suggest that the new ethics rubric should be given to the EEE1001 course instructor for distribution to the next group of students during Fall 2017.
- Actions: Since Outcome (f) appears to be attained by students in the EE Program, no corrective action will be taken next year.
- Responsibility: Michael Cloud

Outcome g): An ability to communicate effectively;

- Assessment: During the 2016-2017 academic year, Outcome (g) was assessed via three independent mechanisms: a). Capstone project presentations were evaluated by six faculty members looking at both written and oral aspects of professional communication skills; b). Capstone project reports were evaluated by the senior project instructor and coordinator (Dr. Jaber), using a rubric he had

developed for the purpose. The four rubric dimensions were (I) punctuation, mechanics, and grammar, (II) writing style, (III) report content, and (IV) format and source acknowledgment. C). To add some longitudinal aspect to the assessment of Outcome (g), a new departmental rubric was designed specifically to score a writing assignment given in EEE1001 Intro to ECE. This year's assignment was a paper on engineering ethics.

- Evaluation: For mechanism a), six out of eight EE students (75%) demonstrated ability to communicate effectively in a technical presentation via slides and prototype demos, which exceeds the 60%-60% target; for mechanism b), twelve out of fifteen (80%) of EE students demonstrated effective written communication, better than the target; for mechanism c), six of thirteen EE students exceeded the departmental scoring threshold of 60%, which is less the target 60% students should achieve this threshold. Fortunately, by the time the EE students leave the program they have acquired the necessary skills and convincingly demonstrate attainment of Outcome (g) in both its oral and written phases.
- Issues: The program also monitored student success on LTU's mandatory Writing Proficiency Exam (WPE) as a measure of written communication ability derived from the general education courses in the curriculum. Dr. Jensen reported that for the May 2017 EE graduates, the time to graduation was impacted in 1 of 14 cases because of the WPE (the student could have graduated one semester earlier if not required to take the Writing Seminar (1 cr), as he/she had failed the WPE twice). On this basis it was concluded that the general education portion of the curriculum provides students with an adequate written communication ability and does so in a timely manner. No corrective action is required. However, the program is considering removal of the WPE as a program assessment tool for Outcome (g), as direct student evidence is now being collected, analyzed, and acted on in program specific courses.
- Actions: Since Outcome (g) appears to be attained by students in the EE Program, no corrective action will be taken next year.
- Responsibility: Michael Cloud, Nabih Jaber

Outcome h): The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context;

- Assessment: Assessment of Outcome (h) has been based on the Industrial Advisory Board (IAB) members' evaluations of the senior project poster presentation. This presentation occurs one week prior to semester end. The evaluation data are collected using a rubric, first deployed in Fall 2015. Outcome (h) was assessed in Fall 2015, Spring 2016, Fall 2016 and, most recently, in Spring 2017. The assessment of Outcome (h) was presented during the ABET visit with data from Fall 2015 and Spring 2016. During the current academic year the IAB assessed five projects in the fall and six projects in the spring. During this academic year, data was not collected from EEE4423 Communication Systems.
- Evaluation: Analysis showed that the program met the target threshold by having 100% of the students achieve 60% or higher in at least one of the dimensions listed above (see Outcome (h)).
- Issues: No issues.
- Actions: Since Outcome (h) appears to be attained by students in the EE Program, no corrective action will be taken next year.

- Responsibility: Michael Cloud, Elin Jensen

Outcome i): A recognition of the need for, and an ability to engage in life-long learning;

- Assessment: Recognition of the need for, and an ability to engage in, lifelong learning was assessed via two distinct mechanisms this year.

First mechanism, in EEE3233 Microprocessors, the instructor and course coordinator (Chase) instituted a take-home quiz with the following items:

1. A technical question pertaining to material that was not presented in class.
2. A thought question on why the student's ability to answer question #1 might be attractive to an employer.

The student responses were marked using a simply binary scheme: the technical question was marked "s" for satisfactory if the student was able to learn a new piece of information; the thought question was marked "s" if the student mentioned an ability to learn new information.

Second mechanism, in EEE2214 Digital Electronics and Lab, EEE3124 Signals & Systems, and EEE3414 Electromagnetic Fields and Waves, an instructor and coordinator of the latter two courses (Cloud) instituted a new assignment as follows:

Primary Literature Report

"Primary literature" is defined as a document written by the person or persons who actually did the work described in the document. Obvious examples would be engineering journal papers and industry technical reports. The assignment is to choose, read, and summarize (in your own words of course) one such item of primary literature. Your report should include full citation information for your chosen item, your reason for choosing this particular item, an executive summary of the information it contains, and your assessment of potential application areas for the information. An LTU Reference Librarian would be an excellent resource person to help you locate potential items in the open literature.

One relation between lifelong learning and this task is the direct assessment of reading comprehension that the latter provides. The ECE faculty judge reading comprehension to be an essential indicator of an ability to learn throughout the professional lifespan. Moreover, the assignment requires comprehension of the sorts of non-textbook literature sources that practicing engineers must often read.

Another relation between lifelong learning and this task is the way in which the latter can serve as a gauge of student curiosity. One can see whether students reach for topics of strong individual interest, or simply choose to expand on topics already covered in the course.

For these reasons the primary literature report assignment was selected as a second mechanism for the assessment of Outcome (i).

A selection of student papers was scored by multiple faculty using a rubric composed for the purpose . The results strongly demonstrate satisfaction of Outcome (i).

- Evaluation: First mechanism, results from Fall 2016 and Spring 2017 show that at least 70% of students in the sample group do understand the need for, and are able to engage in, lifelong learning.
- Issues: No issues
- Actions: Considering data from the two assessment mechanisms presented above, the ECE faculty judged that no further action was required to address Outcome (i) during the present assessment cycle.
- Responsibility: Michael Cloud, Richard Chase

Outcome j): A knowledge of contemporary issues;

- Assessment: The primary literature assignment described under Outcome (i) was also used as a vehicle for assessing a knowledge of contemporary issues. Although the term “contemporary issues” did not appear in the statement of the assignment, students showed a marked tendency to choose recently published literature items and this increased the probability that Outcome (j) would be addressed. As a group 13 of 14 papers (93%) were recent and published after January 2009. One paper was published in 2002, see Figure 1.

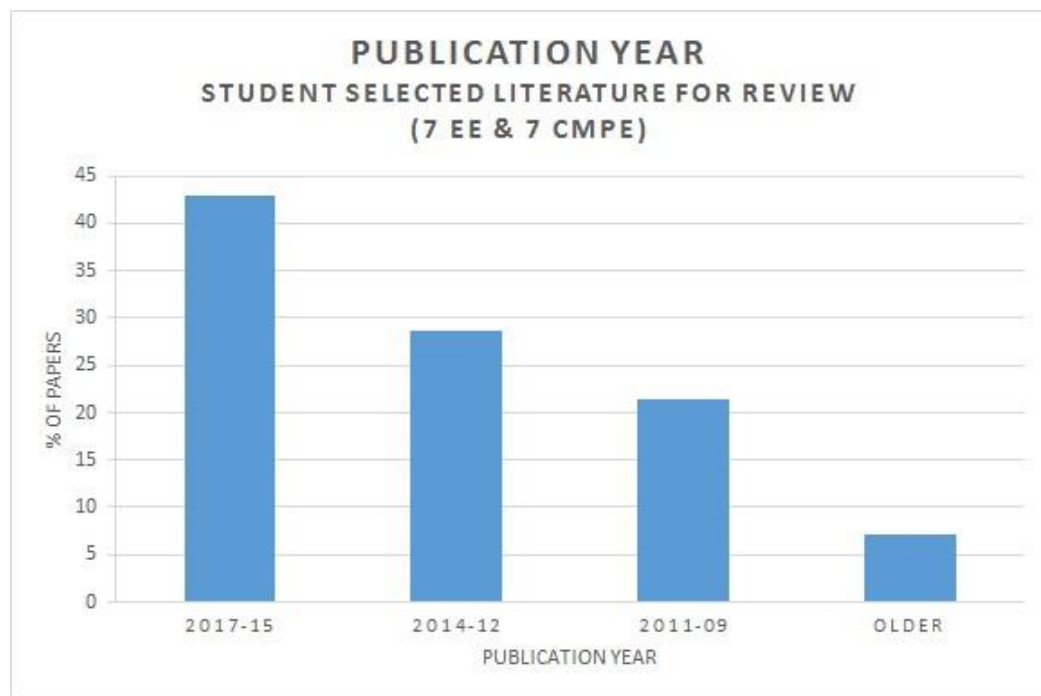


Figure 1 Publication year on student selected primary literature for assignment

New departmental assessment rubric, inspired by (Schwartz and Kranow 2012), was developed to assess both an awareness of contemporary issues and an ability to assess their relevance and impact. As mentioned under Outcome (i), the primary literature assignment was instituted in EEE2214 Digital Electronics and Lab, EEE3124 Signals & Systems, and EEE3414 Electromagnetic Fields and Waves. In this case the material collected was subjected to the new rubric. Seven writing examples were selected from both Fall 2016 and Spring 2017 semesters, and each paper was reviewed by at least two ECE faculty members.

Evaluation: Results show that students exceeded the performance threshold of 60% of students achieving 60% or higher score. Therefore the students demonstrate awareness of contemporary issues in electrical engineering and the ability to understand the context and/or impact relative to their field. Furthermore, the ages of the selected publications demonstrate that the students are keenly interested in current issues challenging the field of electrical engineering.

- Issues: The tool should be employed during the next assessment cycle of Outcome (j) during 2018-19 in the same group of courses.

To further elicit data for Outcome (j) in the future, the wording of the primary literature assignment starting Fall 2017 will include an additional paragraph as follows:

*New aspect of this assignment (new this academic year) is the necessity to correlate the chosen topic with at least one **contemporary issue** in your report. Examples of "contemporary issue" areas for engineers might include Diversity, Copyright Law, International Collaboration, Privacy, Security, Accessibility, Continuing Education, Licensing Law, Globalization, Sustainability, and Governmental Regulation --- but this list is certainly not exhaustive.*

- Actions: No actions are required at this time.
- Responsibility: Michael Cloud

3. Assessment Plan for 2017-2018 Academic Year

The following student outcomes (SO) will be assessed during the 2017-18 academic year -SO (a), (b), (c), (d), (e) and (k):

- a) an ability to apply knowledge of mathematics, science, and engineering;
- b) an ability to design and conduct experiments, as well as to analyze and interpret data;
- c) an ability to design a computer system, component, or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- d) an ability to function on multidisciplinary teams;
- e) an ability to identify, formulate, and solve engineering problems;
- k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;

BS in Industrial Engineering**1. Assessment Plan and Summary**

Table 1 shows the curriculum map for the BSIE and Table 2 shows the details of the assessment plan for Bachelor of Science in Industrial Engineering (BSIE) program. LTU undergraduate learning outcomes are related to program learning objectives which are ABET program outcomes. Various assessment tools and metric/indicators are used. The table directly below this paragraph depicts timelines for data collection, analysis and closing the loop. An assessment plan and data collection for selected BSIE courses is given. Some outcomes will be direct assessment and some will have indirect assessment.

Table 1. Curriculum Map for the BSIE Program.

	Assessment Tools/Measures	Courses	Fall	Spring	Fall	Spring
a	Evaluate exam problems using problem solving rubrics	EIE 3653, EIE 3123, EIE 3353		X		X
		EIE 3043, EIE 3453, EIE 4453	X		X	
b	Evaluate exam problems using problem solving rubrics	EIE 3753		X		X
c	Faculty advisor evaluate written proposals using proposal rubric	EIE 4252, EIE 4253	X	X	X	X
	Faculty advisor evaluate final reports using final report rubric	EIE 4252, EIE 4253	X	X	X	X
d	Students evaluate teammates using peer evaluation form/rubric	EIE 4252, EIE 4253	X	X	X	X
	Faculty Advisor meeting with team to discuss team functionality	EIE 4252, EIE 4253	X	X	X	X
	Faculty & IAB evaluation of teamwork at final presentation	EIE 4252, EIE 4253	X	X	X	X
e	Evaluate final exam problem using problem solving rubric	EIE 3043, EIE 3453	X		X	
		EIE 3123, EIE 3753, EIE 4553		X		X
f	10 multiple choice ethics questions	EIE 4252, EIE 4253	X	X	X	X
	Case study assignment on ethics	EIE 4013	X		X	
	Ethics/integrity statement on final report	EIE 4252, EIE 4253	X	X	X	X
g	Evaluate oral presentations using presentation rubric	EIE 3043, EIE 3453	X		X	
		EIE 3753, EIE 4013		X		X
	Evaluation of technical report writing using writing rubric	EIE 3043, EIE 3453	X		X	
		EIE 3753, EIE 4013		X		X
h	Mandatory attendance at seminar series/workshops (3 in Fall, 3 in Spring)	EIE 4252, EIE 4253	X	X	X	X
	Assignment on how engineering solutions impact global, economic, environmental and societal issues	EIE 4252, EIE 4253	X	X	X	X
	Discuss sustainability, recyclability, and disposal in final report	EIE 4252, EIE 4253	X	X	X	X

i	Number of LTU BSME students that enroll in a graduate program at LTU	Registrar Data	X			
	Number of students enrolled in a graduate program or who attended a short course, workshop, or seminar in the past two years	Alumni Survey			X	
	Statement of current professional organization memberships	Exit Interview		X		
	Statement of professional goals and plans for graduate studies	Exit Interview		X		
	Discuss professional organizations and membership benefits	EGE1012	X	X	X	X
j	Identify and discuss a contemporary engineering issue	Exit Interview		X		
	Mandatory attendance at seminar series / Workshops (3 in Fall, 3 in Spring)	EIE 4252, EIE 4253	X	X	X	X
	Attend lecture on contemporary engineering issue and write one page paper on the lecture	EIE 4252, EIE 4253	X	X	X	X
k	Evaluate technology uses using rubrics	EIE 2012	X	X	X	X
		EIE 3043, EIE 3453	X		X	
		EIE 3753		X		X

Listed here is an interpretation of the second column for Table 2:
ABET Criterion 3: B.S. Industrial Engineering Program Outcomes

- Upon successful completion of the B.S.I.E. degree program, the graduate will have a) an ability to apply knowledge of mathematics, science, and engineering,
- b) an ability to design and conduct experiments, as well as to analyze and interpret data,
- c) an ability to design a robotic system, component, or process to meet desired needs, within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability,
- d) an ability to function on multidisciplinary teams,
- e) an ability to identify, formulate, and solve engineering problems,
- f) an understanding of professional and ethical responsibility,
- g) an ability to communicate effectively,
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context,
- i) a recognition of the need for, and an ability to engage in life-long learning,
- j) a knowledge of contemporary issues, and
- k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Table 2. Assessment Plan for the BS in Industrial Engineering

LTU Undergraduate Learning Outcomes	Student Outcomes*	Assessment Tools	Metrics/ Indicators**	Administration Timeline	Loop- Closing Timeline
KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”	Outcome a Outcome c Outcome e	Graded problems based on rubric in EIE 3353, EIE 4453, EIE 3043, EIE 3123 Rubric used for reports in senior projects sequence. Graded problems based on rubric in EIE 3043, EIE 3123, EIE 3453, EIE 3753, EIE 4553	70% of students receive a score of 60% or higher 100% of students will score 40% or higher. 50% of students receive a score of 70% or higher	Every semester.	Annual
TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”	Outcome k Outcome b	Evaluation of assignments in EIE 3353, EIE 2012, EIE 4013, EIE 3043 Exam questions on human factors	Identifying assignments to use for each course. In progress. 70% of students receive a score of 60% or higher	Every semester	Annual
SUSTAINABILITY "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."	Outcome h	Evaluation of coursework in, EIE 4252 or EIE 4253 EIE 4013 (environment and economic - part of project)	In progress Rubric Evaluation by DEMS and IAB (metric goal?)	Every semester	Annual
COMMUNICATION “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”	Outcome g	Writing rubric will be used in EIE 3043, EIE 3453 and EIE 4013 Oral presentation rubric will be used in EIE 3043, EIE 3453, EIE 3753, EIE 4013 Graphical assignments and presentations from EIE 3043, EIE 3453, EIE 3753, EIE 4013. Presentations from EIE senior design projects.	80% of students will score 85% or higher EME4412: 80% of students receive a score of 85% or higher EME2011: 70% of students will receive a score of 70% Elements of written rubric: (80% will receive 80%) Elements of oral rubric: (80% of students will score 80%)?? Elements of new Outcome C Rubric (metric?) Projects Posters rubric being updated.	Every semester	Annual

<p>MATHEMATICS “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>	Outcome a	<p>Evaluation of coursework in in EIE 3353, EIE 3653, EIE 4453</p> <p>Mathematics Dept. will be addressing this too.</p>	70% of students receive score of 60% or higher	Every semester	Annual
<p>READING “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>					Continuously by the University
<p>SCIENTIFIC ANALYSIS “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”</p>	Outcome a Outcome b	<p>Evaluation of coursework in EIE 3043, EIE 3123, EIE 3353, EIE 4453, EIE 3653</p> <p>Natural Sciences Dept. will be addressing this too.</p>	70% of students receive a score of 60% or higher 70% of students receive a score of 60% or higher	Every semester.	Annual
<p>LEADERSHIP “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>	Outcome h Outcome i	<p>IE Seminar Series, Third Tuesday ME or Entrepreneurial Seminars (with critique) and / or workshops on contemporary engineering topics in EIE 4252, EIE 4253</p> <p>Exit Survey</p> <p>IE and Smart Manufacturing Seminar and workshop. Third Thursday ME Seminars (with exit survey) on contemporary engineering topics. Also critique in EIE 4252, EIE4253 on required seminars.</p>	<p>Required attendance and completion of critique. Need metric. Assignment on engineering soln impact</p> <p>50% will have membership in at least one prof. society. 50% will state two professional goals to achieve in 2-5 years.</p>	Every semester.	Annual
<p>TEAMWORK “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	Outcome d	<p>Peer evaluations of teamwork projects in EIE 4252, EIE 4253</p> <p>Faculty Advisor meeting in EIE 4252 or EIE 4253 with Teamwork evaluation form</p> <p>Faculty Teamwork Evaluation form after final presentation</p>	<p>80% of students achieve a score of 70% or higher</p> <p>60% of students will achieve a score of 60% or higher</p> <p>60% of students will achieve a score of 60% or higher</p>	Every Semester	Annual

PROFESSIONAL ETHICS “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”	Outcome f	Ethics quiz (multiple choice) in EIE 4252 or EIE 4253 Ethics case study assignment in EIE 4553 Ethics/Integrity statement on final report in EIE 4252, EIE 4253	70% of students will achieve a score of 70% or higher	Every semester	Annual
--	-----------	---	---	----------------	--------

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

Rigorous data have been collected for assessment of the BSIE program. Each course is not offered every year. Assessment data were collected from the selected courses of offering in each semester. Few courses data will be collected each semester. The following courses assessment data was collected for the 2016-2017 assessment of BSIE program:

Fall 2016

EIE 3043	Production Planning & Control
EIE 4453	Applied Operations Research
EIE 4653	Industrial and Engr Finance
EIE 4253	Senior Capstone Project

Spring 2017

EIE 3453	Statistical Methods for Process Improvement
EIE 3653	Stochastic Modeling
EIE 3753	Simulation in System Design

ABET A-K outcomes were measured and close the loop were presented at the A. Leon Linton Department of Mechanical Engineering. Some selected results from close the loop results can be found at the end of this assessment report.

ABET version of the Syllabi are being prepared for major BSIE courses. LTU has joined as a member of the CIEDAH (Council of Industrial Engineering Department Academic Head). Students of industrial engineering are involvement with IISE Student Chapter and SME Student Chapter.

Objective/Outcome: Knowledge in Discipline

1. *Assessment:* See Table 2
2. *Evaluation:* All
3. *Issue and Actions:* Outcome a data from EIE 3043, EIE 4453, EIE 3453, EIE 3653 and EIE 3753 were collected. It indicates that goals were met except EIE 3043 Production Planning and Control.
4. *Responsibility:* Course instructors implement the plan; Dr. Ali tracks the results.

Objective/Outcome: Technology

1. *Assessment:* See Table 2
2. *Evaluation:* All
3. *Issue and Actions:* Outcome k was measured for EIE 4453 for LINDO software usage, EIE 3453 for Minitab software and EIE 3753 for Arena software. Additional software usages will be measured for other courses.
4. *Responsibility:* Course instructors implement the plan; Dr. Ali tracks the results.

Objective/Outcome: Sustainability

1. *Assessment:* See Table 2
2. *Evaluation:* All
3. *Issue and Actions:* Sustainability data was collected however it was integrated with BSME students. Sustainable project is used in manufacturing processes course. ABET outcome c was used partly to measure it.
4. *Responsibility:* Course instructors implement the plan; Dr. Ali tracks the results.

Objective/Outcome: Communication

1. *Assessment:* See Table 2
2. *Evaluation:* All
3. *Issue and Actions:* Outcome g covers all three forms of communication (written, oral, graphic). A writing rubric was used. All were collected from the project reports and presentations of EIE 3043, EIE 4453, EIE 3753, and EIE 4253.
4. *Responsibility:* Course instructors and senior project advisors; Dr. Ali and tracks the results.

Objective/Outcome: Mathematics

1. *Assessment:* See Table 2
2. *Evaluation:* All (and soon, Mathematics Department)
3. *Issue and Actions:* Mathematics outcome was collected from EIE 4453: Applied Operations Research, EIE 3453: Statistical Methods for Process Improvement and EIE 3653: Stochastic Modeling. It has meet the target mentioned in the assessment plan.
4. *Responsibility:* Course instructors implement the plan; Dr. Ali tracks the results.

Objective/Outcome: Scientific Analysis

1. *Assessment:* See Table 2
2. *Evaluation:* All
3. *Issue and Actions:* Outcome a and Outcome b data are collected for some scientific analysis from EIE 4453 and EIE 3453, EIE 3753 and EIE 4253 courses. Outcome is met. Some improvement strategies are planned.
4. *Responsibility:* Course instructors implement the plan; Dr. Ali tracks the results.

Objective/Outcome: Leadership

1. *Assessment:* See Table 2
2. *Evaluation:* All
3. *Issue and Actions:* For the most part, the Leadership outcome is being assessed by the Leadership Program Assessment Team (Dr. Gerhart, Assistant Provost Jim Jolly, and Director Brian Craig). Nonetheless, Outcome h may also address leadership. This includes a critique of Entrepreneurial Series Lecture, ThirdTuesday Seminars and IE Seminar Series. The metric for the critique was used based on the BSME criteria.
4. *Responsibility:* Course instructors implement the plan; Dr. Ali tracks the results.

Objective/Outcome: Lifelong Learning

1. *Assessment:* See Table 2
2. *Evaluation:* All
3. *Issue and Actions:* IE Seminar Series, Smart Manufacturing Workshops, and Third Tuesday ME Seminars with be used for lifelong learning criteria. Students can see a broader learning from it and real-life integration.
4. *Responsibility:* Course instructor Dr. Ali implements the plan and tracks the results.

Objective/Outcome: Teamwork

1. *Assessment:* See Table 2
2. *Evaluation:* All
3. *Issue and Actions:* Senior Design Fundamentals project is used to evaluate team performance. One senior project team was in industrial engineering program. They worked one industrial engineering project at Elring Klinger for the plant layout optimization and process and systems improvement. The team with members of three worked effectively for the project. More senior design team and

course team data will be collected since two teams are doing IE senior projects with DTE Energy and Elring Klinger. Updated rubric will be used for industrial engineering projects.

4. *Responsibility*: Faculty advisors/students implement the plan; Dr. Ali will find a new rubric and track the results.

Objective/Outcome: Ethics

1. *Assessment*: See Table 2
2. *Evaluation*: All
3. *Issue and Actions*: Outcome f was collected from ethics assignment of EIE 4253. It seems nearly all students meet the target. Ethics will be added as part of the foundation of industrial engineering course and evaluated.
4. *Responsibility*: Course instructors implement the plan; Dr. Ali tracks the results.

3. Assessment Plan for 2017-2018 Academic Year

Student Outcome a: An ability to apply knowledge of mathematics, science, and engineering.					
Course #	Course Title	Assessment Tool	Metric/Target	Semester	Results
EIE 3123	Plant Layout	Selected exam questions	70 % of students will score 60 % or above	Sp 16	80% met target (4/5)
EIE 4453	Applied Operations Research	Selected exam questions	70 % of students will score 60 % or above	F 16	71% met target (5/7)
EIE 3043	Production Planning & Control	Selected exam questions	70 % of students will score 60 % or above	F 16	60% not met target (3/5)
EIE 3453	Statistical Methods for Process Improvement	Selected exam questions	70 % of students will score 70 % or above	Sp 17	71% met target (5/7)
Results from first cycle: Selected exam questions are used for assessment. Target is met for applied operations research and production planning and control was not meet.					
Actions taken after first cycle: Revisiting course outcome and deliveries. A new rubric will be developed.					

Student Outcome b: An ability to design and conduct experiments, as well as to analyze and interpret data.					
Course #	Course Title	Assessment Tool	Metric/Target	Semester	Results
EIE 3453	Statistical Methods for Process Improvement	Selected exam questions	60 % of students will score 70 % or above	Sp 17	85% met target (6/7)

EIE 3753	Simulation in System Design	Selected exam questions	60 % of students will score 70 % or above	Sp 17	66% met target (4/6)
Results from first cycle: Targets were met. Actions taken after first cycle: Continue with current assessment.					

Student Outcome c: An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

Course #	Course Title	Assessment Tool	Metric/Target	Semester	Results
EIE 4013	Work Design and Measurement	Rubric to evaluate course project report	60 % of students will score 70 % or above	Sp 16	83% met target (5/6)
EIE 4453	Applied Operations Research	Rubric to evaluate course project report	60 % of students will score 70 % or above	F 16	66% met target (4/6)
EIE 3753	Simulation in System Design	Rubric to evaluate course project report	60 % of students will score 70 % or above	Sp 17	66% met target (4/6)
EIE 4252	Senior Project Fundamentals	Rubric to evaluate final report	100 % of teams will score 65 % or above	Sp 16	100% met target (1/1)
EIE 4253	Senior Capstone Project	Rubric to evaluate final report	100 % of teams will score 65 % or above	F 16	100% met target (1/1)
Results from first cycle: Targets were met. Actions taken after first cycle: Continue with assessment plan					

Student Outcome d: An ability to function on multidisciplinary teams.

Course #	Course Title	Assessment Tool	Metric/Target	Semester	Results
EIE 4252	Senior Project Fundamentals	Teamwork peer evaluation form	80 % of students will score 70 % or above	Sp 16	75% met target (0/0)
EIE 4253	Senior Capstone Project	Teamwork peer evaluation form	80 % of students will score 80 % or above	F 16	80% met target (0/0)

Results from first cycle: Peer evaluation effectiveness was used for assessment.

Actions taken after first cycle: A new rubric will be developed. This year we have two senior design teams of 7 students for DTE Energy and Elring Klinger projects. Developed new rubric will be used for proper multidisciplinary assessment.

Student Outcome e: An ability to identify, formulate, and solve engineering problems.

Course #	Course Title	Assessment Tool	Metric/Target	Semester	Results
EIE 4013	Work Design and Measurement	Selected exam questions	50 % of students will score 70 % or above	Sp 16	80% met target (4/5)
EIE 3043	Production, Planning & Control	Selected exam questions	50 % of students will score 70 % or above	F 16	60% met target (3/5)
EIE 4453	Applied Operations Research	Selected exam questions	50 % of students will score 70 % or above	F 16	67% met target (4/6)
EIE 4653	Industrial and Engr Finance	Selected exam questions	50 % of students will score 70 % or above	F 16	83% met target (5/6)
EIE 3653	Stochastic Modeling	Selected exam questions	50 % of students will score 70 % or above	Sp 17	50% met target (3/6)
EIE 3753	Simulation in System Design	Selected exam questions	50 % of students will score 70 % or above	Sp 17	50% met target (3/6)

Results from first cycle: EIE 3653 and EIE 3753 barely met targets.

Actions taken after first cycle: Exam question selections will be reviewed.

Student Outcome k: An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Course #	Course Title	Assessment Tool	Metric/Target	Semester	Results
EIE 4013	Work Design and Measurement	Rubric to evaluate final course project report	60 % of students will score 60 % or above	Sp 16	83% met target (5/6)
EIE 4453	Applied Operations Research	Rubric to evaluate final course project report	60 % of students will score 60 % or above	F 16	67% met target (4/6)

EIE 3753	Simulation in System Design	Rubric to evaluate final course project report	60 % of students will score 60 % or above	Sp 17	67% met target (4/6)
EME 4252	Senior Project Fundamentals	Rubric to evaluate final report	100 % of teams will have used 5 or more techniques/tools	Sp 16	100% met target (1/1)
EME 4253	Senior Capstone Project	Rubric to evaluate final report	100 % of students will have used 5 or more techniques/tools	F 16	100% met target (1/1)

Results from first cycle: Only one senior project team data was available

Actions taken after first cycle: Two senior design teams will be for the next year

BS in Mechanical Engineering

1. Assessment Plan and Summary

See Table 1 below. Listed here is an interpretation of the second column for Table 1:

Upon successful completion of the B.S.M.E. degree program, the graduate will have

- m) an ability to apply knowledge of mathematics, science, and engineering;
- n) an ability to design and conduct experiments, as well as to analyze and interpret data;
- o) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- p) an ability to function on multidisciplinary teams;
- q) an ability to identify, formulate, and solve engineering problems;
- r) an understanding of professional and ethical responsibility;
- s) an ability to communicate effectively;
- t) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- u) a recognition of the need for, and an ability to engage in life-long learning
- v) a knowledge of contemporary issues;
- w) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Table 1: Assessment Plan for the BS in Mechanical Engineering

LTU Undergraduate Learning Outcomes	Student Outcomes*	Assessment Tools	Metrics/ Indicators**	Administration Timeline	Loop- Closing Timeline
KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”	Outcome a Outcome c Outcome e	FE style questions on final exams in EME3033, EME3133, EME3043 New Rubric Graded problems based on rubric in EGE2013, EME3013, EME4003, EGE3003, EME3123, EME4013	70% of students receive a score of 60% or higher 100% of students will score 40% or higher. 50% of students receive a score of 70% or higher	Every semester.	Annual
TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”	Outcome k Outcome b	Evaluation of application of technology in EME 4212 and EME 4222 Exam questions on laboratory technique in EME4412	In progress. 70% of students receive a score of 60% or higher	Every semester	Annual
SUSTAINABILITY "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."	Outcome h N/A N/A	Evaluation of coursework in EME 4212, EME4222, and EME4252 or EME4253 EME 3023 Manf. Processes (environment and economic - part of project) EGE2233 (economic - rubric under development)	In progress Rubric Evaluation by DEMS and IAB (metric goal?) Rubric for Presentation evaluation (by industry reps, LTU instructor, current working student, alum)	Every semester	Annual
COMMUNICATION “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”	Outcome g	Writing rubric will be used in EME 3043, EME4013 Oral presentation rubric will be used in EME 2011, EME4412 Graphical assignments from Dynamics, Heat Transfer, and Projects 2 reports. Presentations from EME 2011 and EME 4412.	80% of students will score 85% or higher EME4412: 80% of students receive a score of 85% or higher EME2011: 70% of students will receive a score of 70% Elements of written rubric: (80% will receive 80%) Elements of oral rubric: (80% of students will score 80%)?? Elements of new Outcome C Rubric (metric?) Projects Posters rubric being updated.	Every semester	Annual

MATHEMATICS “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”	Outcome a	FE style questions on final exams in EME3033, EME3133, EME3043 Mathematics Dept. will be addressing this outcome too.	70% of students receive a score of 60% or higher	Every semester	Annual
READING “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”					Continuously by the University
SCIENTIFIC ANALYSIS “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”	Outcome a Outcome b	FE style questions on final exams in EME3033, EME3043, EME3133 Exam questions on laboratory technique in EME4412 Natural Sciences Dept. will be addressing this outcome too.	70% of students receive a score of 60% or higher 70% of students receive a score of 60% or higher	Every semester.	Annual
LEADERSHIP “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”	Outcome h Outcome i	Third Tuesday ME or Entrepreneurial Seminars (with critique) on contemporary engineering topics in EME4212, EME4222 or EME4252, EME4253 Exit and Alumni Survey (which may be discontinued based on feedback from ABET assessor) Third Thursday ME Seminars (with exit survey) on contemporary engineering topics. Also critique in EME4212, EME4222 on required seminars.	Required attendance and completion of critique. Need metric. Assignment on engineering soln impact TBD Required attendance and completion of survey/critique	Every semester.	Annual
TEAMWORK “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”	Outcome d	Peer evaluations of teamwork projects in EME4212, EME4222 or EME4252, EME4253 Faculty Advisor meeting in EME4212 or EME4252 with Teamwork eval form Faculty and IAB Teamwork Eval form at final presentation	80% of students achieve a score of 70%, 80%, 75% and 75%, respectively, or higher 60% of students will achieve a score of 60% or higher 60% of students will achieve a score of 60% or higher	Every Semester	Annual

<p>PROFESSIONAL ETHICS “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”</p>	<p>Outcome f</p>	<p>Ethics quiz (multiple choice) in EME4222 or EME4253- new quiz coming soon. Ethics case study assignment in EGE2233 Ethics/Integrity statement on final report in EME4212, EME4222 or EME4252, EME4253 (updated for NSPE)</p>	<p>70% of students will achieve a score of 70% or higher ? (new) Need to develop metric</p>	<p>Every semester</p>	<p>Annual</p>
---	------------------	---	---	-----------------------	---------------

f	10 multiple choice ethics questions	EME4222, EME4253			X		X		X		X		X	
	Case study assignment on ethics	EGE1012			X									
	Ethics/integrity statement on final report	EME4212, EME4222, EME4252, EME4253	X	X	X	X	X	X	X	X	X	X	X	X
g	Evaluate oral presentations using presentation rubric	EME2011, EME4412	X	X	X	X	X	X	X	X	X	X	X	X
	Evaluation of technical report writing using writing rubric	EME3043, EME4013		X		X		X		X		X		X
h	Mandatory attendance at seminar series (3 in Fall, 3 in Spring)	EME4212, EME4222, EME4252, EME4253	X	X	X	X	X	X	X	X	X	X	X	X
	Assignment on how engineering solutions impact global, economic, environmental and societal issues	EME4212, EME4252	X	X	X	X	X	X	X	X	X	X	X	X
	Discuss sustainability, recyclability, and disposal in final report	EME4222, EME4252, EME4253	X	X	X	X	X	X	X	X	X	X	X	X
i	Number of LTU BSME students that enroll in a graduate program at LTU	Registrar Data			X						X			
	Number of students enrolled in a graduate program or who attended a short course, workshop, or seminar in the past two years	Alumni Survey					X						X	
	Statement of current professional organization memberships	Exit Interview		X				X				X		
	Statement of professional goals and plans for graduate studies	Exit Interview		X				X				X		
	Discuss professional organizations and membership benefits	EGE1001	X	X	X	X	X	X	X	X	X	X	X	X
j	Identify and discuss a contemporary engineering issue	Exit Interview		X				X				X		
	Mandatory attendance at seminar series (3 in Fall, 3 in Spring)	EME4212, EME4222, EME4252, EME4253	X	X	X	X	X	X	X	X	X	X	X	X
	Attend lecture on contemporary engineering issue and write one page paper on the lecture	EME4212, EME4252	X	X	X	X	X	X	X	X	X	X	X	X
k	Fulfilled by passing EGE1102, EME2012, EME3033, EME3214													

During the 2015-2016 Academic Year, the BSME curriculum was mapped to indicate where ABET outcomes were being introduced, reinforced, or emphasized. The results are shown on the following figures. Note that column 2 of Table 1 indicates which ABET Outcomes apply to each University Outcome.

KEY to Figures 2 and 3

- Introduce (I): corresponds to instances where the student outcomes are supported at an introductory level in a course.
- Reinforce (R): achieved when a course serves to reinforce the attainment of a student outcome that was supported previously at an introductory level in another course.
- Emphasize (E): achieved when a student outcome is supported at a more focused and advanced level.

Figure 2. – Mapping of the BSME Engineering Core Classes to the ABET Outcomes

Course	Student Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
EEE 2123 Circuits & Electronics	R	-	-	R	-	R	-	R	-	-	-
EGE 1001 Fund. of Eng. Design Proj.	I	I	I	I	I	I	I	I	I	I	I
EGE 1023 Engineering Materials	I	I	I	I	I	I	I	I	I	I	I
EGE 1102 Engineering Computer Application Lab	I	-	I	-	I	-	-	-	-	-	I
EGE 2013 Statics	E	R	R	-	I	-	-	-	-	-	I
EGE 2123 Entrepreneurial Engineering Design Studio	I	I	I	I	I	I	I	I	I	I	I
EGE 2233 Entrepreneurial Mindset for Engineers	I	I	I	I	I	I	I	I	I	I	I
EGE 3003 Thermodynamics	R	R	R	-	E	-	R	-	-	-	R
EGE 3012 Engineering Cost Analysis	R	I	-	-	R	-	-	-	-	-	R
EME 1011 Foundations of Mech. Eng.	I	I	I	I	I	I	I	I	I	I	I
EME 2011 Materials Lab	R	E	I	R	I	I	R	-	-	-	I
EME 2012 Mechanical Eng. Graphics	I	-	I	-	I	-	-	-	-	-	I
EME 3011 Introduction to Eng. Projects	R	-	R	E	E	R	E	E	-	R	R
EME 3013 Mechanics of Materials	E	I	R	-	R	-	-	-	-	-	R
EME 3023 Manufacturing Processes	R	R	R	-	R	I	R	-	-	-	R
EME 3033 Engineering Numerical Methods	R	-	-	-	-	-	-	-	-	-	E
EME 3043 Dynamics	R	R	R	-	R	I	R	I	-	I	R
EME 3123 Fluid Mechanics	E	R	R	-	E	-	R	-	-	-	E
EME 3133 Kinematics & Dynamics of Machines	E	R	E	-	E	-	-	-	-	-	E
EME 3214 Mechatronics	E	R	R	R	E	-	R	R	R	R	E
EME 4003 Design of Machine Elements	E	R	E	R	E	E	R	R	R	R	R
EME 4013 Heat Transfer	E	-	R	-	E	-	R	-	-	-	R
EME 4212 Engineering Projects 1	E	R	E	E	E	E	E	E	R	E	E
EME 4222 Engineering Projects 2	E	E	E	E	E	E	E	E	E	E	E
EME 4252 Senior Project Fundamentals	E	R	E	E	E	E	E	R	-	R	E
EME 4253 Sr. Capstone Project	E	R	E	E	E	E	E	E	-	R	E
EME 4402 Mechanics Lab	R	E	-	-	-	-	R	-	-	-	E
EME 4412 Thermal Science Lab	R	E	R	E	E	R	E	R	R	R	E

Figure 3. – ABET Outcome Assessment Mapping

	a	b	c	d	e	f	g	h	i	j	k
EGE 1102 Engineering Computer Applications Lab											I
EGE 2103 Statics					I						
EGE 3003 Thermodynamics					R						
EME 2011 Engineering Materials Lab							I				
EME 2012 Mechanical Engineering Graphics											I
EME 3013 Mechanics of Materials					R						
EME 3123 Fluid Mechanics					R						
EME 3033 Engineering Numerical Methods	R										R
EME 3133 Kinematics and Dynamics of Machines	E										
EME 3043 Dynamics	R						R				
EME 3214 Mechatronics										E	E
EME 4003 Design of Machine Elements					E						
EME 4013 Heat Transfer					E		E				
EME 4212 Engineering Projects 1				E				R		R	
EME 4222 Engineering Projects 2			E	E		E					
EME 4252 Senior Project Fundamentals			E	E				R		R	
EME 4253 Senior Capstone Project			E	E		E					
EME 4412 Thermal Science Lab		E					E				
Alumni Survey									x		
Registrar's Data									x		
Exit interview									x	x	

As a general overview to the report on the 2016-2017 Academic Year, selecting and using appropriate rubrics has been difficult. Over the past five years, a few rubrics have proven to be outdated or multiple rubrics were being used by different faculty members for the same outcome (e.g., written reports). While a teamwork rubric is still being finalized, the writing rubric was standardized and put to use by all faculty in 2013-2014. An ME Department Rubrics Committee was formed in Fall 2012 and continues to address issues as they arise. During 2013-2014, a “rubrics folder” has been added to the department Blackboard website so that there is no confusion about which rubric is the most current to be used for assessment. Any other details of changes made to rubrics are noted below in their related outcome section. Following is a summary of our loop-closing meeting. Note that the highlighted portions of Table 1 indicate where changes have/will occur.

Questions for each objective:

- *Objective/Outcome:* Knowledge in Discipline
- *Assessment:* All of those indicated in Table 1
- *Evaluation:* All

- *Issue:* Outcome a data from EME 3033 indicates that goals were not met for 2016-2017. The goals were not met consistently through five prior cycles, because (1) a change in textbook with questions that were based upon older material, (2) concept questions as opposed to calculation problems, or (3) “all or nothing” grading of a multiple choice quiz. Even after calculation problems were given with students showing their work for 2015-2016, students did not meet the target. This for 2016-2017, partial credit was given for the questions. The students still did not meet the target. It was discussed that a tool other than multi-choice should be used. For the remaining courses where data are gathered for outcome a, the metric was met and seems to be a fair representation, although EME 3133 scores have been very high. EME 3133 problems will be checked if needing updated. The new rubric (for three years) has been working for Outcome c, and the metric has been met. Metric analysis from Outcome e indicates that targets were met. EME 4003 metrics have fluctuated over time, with some students indicating dissatisfaction with the textbook.
- *Current/Future Actions:* EME 3033 and its prerequisite (EGE 1102) will be reviewed. Non FE-style questions may be adopted. EME 3133 problems will be checked if needing updated because of consistently high scores (90%+). Review EME 4003 exam question and textbook.
- *Responsibility:* Dr. Fernandez will investigate EME 3033. EME 4003 course coordinator will review exam question and textbook.
- *University/College Support for Objective:* N/A.

- *Objective/Outcome:* Technology
- *Assessment:* All of those indicated in Table 1
- *Evaluation:* All
- *Issue:* Outcome k did not have a succinct metric; students passing the courses indicated in the table above was the metric’s best measure. ABET approved of this for the past two accreditations reviews, but this measure is for a lower Bloom’s Taxonomy. The University outcome is “to apply,” and therefore requires a rubric with a measure. During the October 2016 ABET review, our measure was viewed as a weakness. Thus we began using a checklist to measure use of technology in Senior Projects 1 and 2 courses. This has been effective and ABET approved the changes over the summer of 2017. During 2018, the department will consider adding 3-D printing to the list, and adding a weighting to each tool. Outcome b tool continues to work well. The metric had been refined multiple times between 2003 and 2010 and appears to be at the appropriate level. Loopclosing has been occurring every semester and will likely continue that sequence. Finally, as noted in last year’s report, Dr. Riedel assessed the MATLAB project in EME 3133 (KDM) for further application of using technology (applied in Fall 2016).
- *Current/Future Actions:* Add weight and 3-D printing to list of tools used in Projects courses 1 and 2. Continue using EME 3133 MATLAB project for assessment.
- *Responsibility:* Senior projects advisors will collect outcome k data. Dr. Riedel will track results. Dr. Gerhart collects data for outcome b. • *University/College Support for Objective:* N/A.
- *Objective/Outcome:* Sustainability
- *Assessment:* All of those indicated in Table 1
- *Evaluation:* All

- *Issue:* For the sixth year, sustainability assessment continues to be difficult. ABET Outcome h, while useful, is difficult to apply a metric. A classroom session was added to EME 4212 on sustainability and the students are being asked to elaborate on such in their project reports. Dr. Yee used a rubric to analyze the results. Results are pending and early indications are that the projects teams focused mostly on environmental sustainability, not social and economic sustainability. The class session properly addresses this, and it is hoped more focus will arise in future project reports. For environmental and economic sustainability two assessment tools were added in two separate courses. The instructors (Dr. Ahad and Prof. Reimer) collected data from 2011-2017 but results analysis was not completed. In the past, Dr. Ahad collected data for EME 2033 Manufacturing Process and the students exceeded the target metric. Economic sustainability should be addressed in EGE 2233 and Cost Analysis courses. Cost Analysis was extensively overhauled in 2014-2015 but the professor is no longer with the university. He was to be contacted and a course committee was to convene to determine an assessment plan. This did not occur and there are no plans to do so for 2017-2018.
 - *Current/Future Actions:* Continue new section in senior project report on social, economic and environmental sustainability. Data collection from Dr. Ahad should be evaluated.
 - *Responsibility:* Senior project advisors will collect data. Dr. Ahad should collect and assess data for EME 3023. No one is available currently to collect data for EGE 2233. Dr. Riedel tracks results.
 - *University/College Support for Objective:* Possibly use LDR 2001 survey data for social sustainability.
-
- *Objective/Outcome:* Communication
 - *Assessment:* All of those indicated in Table 1
 - *Evaluation:* All
 - *Issue:* All courses met their target in Fall 2016 and Spring 2017 (with a slight change in target for EME 2011). Graphical communication assessment began in 2015. The outcome c rubric covers graphical communication. Results from senior project oral presentation visual aids and their posters were to be analyzed in 2015-2016 and 2016-2017. While data was collected the results were not rigorously analyzed. Qualitative assessment indicates that graphical communication is not a problem with graduating seniors.
 - *Current/Future Actions:* No changes for written and oral communication. Graphical data should be collected and analyzed.
 - *Responsibility:* Course instructors will collect and analyze written and oral communication data. Graphical data will be collected and analyzed by senior project advisors. Dr. Gerhart will track “graphical” results.
 - *University/College Support for Objective:* N/A.
-
- *Objective/Outcome:* Mathematics
 - *Assessment:* All of those indicated in Table 1
 - *Evaluation:* All
 - *Issue:* As noted under “Knowledge in Discipline,” Outcome a data collection and metric continues to be evaluated for changes. While the department is comfortable that our students are reaching acceptable proficiency in math, we do not have sufficient data to directly support the mathematics outcome. Nonetheless, without sufficient math skills the engineering problems under assessment could not be solved.

- *Current/Future Actions:* Continue as appropriate.
 - *Responsibility:* Course instructors implement the plan. Dr. Riedel tracks the results.
 - *University/College Support for Objective:* The Mathematics Department will soon begin a thorough assessment within the math courses (based on new University Outcomes)
-
- *Objective/Outcome:* Reading
 - *Assessment:* Not assessed at the department level
 - *Evaluation:* N/A
 - *Issue:* N/A
 - *Current/Future Actions:* HSSC department will address this in the new Critical Thinking Outcome
 - *Responsibility:* Unknown
 - *University/College Support for Objective:* The Humanities and Social Sciences Department has begun assessment of reading, and the ME Department would like this to continue.
-
- *Objective/Outcome:* Scientific Analysis
 - *Assessment:* All of those indicated in Table 1
 - *Evaluation:* All
 - *Issue:* Outcome a needs further refinement as noted earlier. On the other hand, Outcome b data collection and metric continues to be acceptable as is. The department is comfortable that our students are reaching acceptable proficiency in scientific analysis, or more specifically, the ability to design and conduct experiments as well as to analyze and interpret data.
 - *Current/Future Actions:* Continue as appropriate. In addition the Natural Sciences Department will begin new assessment for the new University Outcomes.
 - *Responsibility:* Course instructors implement the plan. Dr. Riedel tracks the results.
 - *University/College Support for Objective:* The Natural Science Department should have an assessment plan for University Physics and University Chemistry with results available for the ME Department.
-
- *Objective/Outcome:* Leadership
 - *Assessment:* All of those indicated in Table 1
 - *Evaluation:* All
 - *Issue:* For the most part, the Leadership outcome is being assessed by the Leadership Program Assessment Team (Dr. Gerhart, Assistant Provost Jim Jolly, and Director Brian Craigo). Nonetheless, Outcome h may also address leadership and continues to be investigated by the department. This includes a critique that senior projects students write after attending an “Entrepreneurial Series Lecture” and we are adding our “ThirdTuesday Seminars.” Unfortunately the Entrepreneurial Lectures have been discontinued, but they are all on video. These are a viewing assignment for senior projects students. The metric for the critique was to be decided during the summer of 2014, but a final decision was never made. Nonetheless a new engineering leadership course will be required in Fall 2018, and may be used for leadership assessment.
 - *Current/Future Actions:* Continue as appropriate. Investigate if outcome h has appropriate leadership assessment.

- *Responsibility:* Leadership Assessment Team continues to collect data. It will be assessed as the need arises (last done in 2015). Senior Projects Advisors will investigate outcome h lecture series assignment.
 - *University/College Support for Objective:* Leadership Assessment Team needs to continue as appropriate.
-
- *Objective/Outcome:* Lifelong Learning
 - *Assessment:* All of those indicated in Table 1
 - *Evaluation:* All
 - *Issue:* Outcome i does not map to the university goals in a meaningful way (i.e., without being forced). The department has therefore added a row to the table. Metrics from Exit Surveys of seniors had been met for one of the two indicators in Spring 2017. This may be due to small sample size variation. Also, the question phrasing was changed for 20152016 from “do you feel” to “where do you see yourself.” (In other words, changed from a yes or no answer to more detailed descriptions.) This may not address the issue. This question will have further changes. For better return rates (i.e., bigger sample), the exit survey was administered in EME 4212, but still only yielded 14 responses. In addition, a tool/survey for our “Third-Tuesday Seminars” has not been finalized. Finally, the required seminar attendance and critique assignment may be used for this outcome.
 - *Current/Future Actions:* Require(?) exit survey in EME 4212.
 - *Responsibility:* Dr. Riedel implements the plan and tracks the results.
 - *University/College Support for Objective:* N/A.
-
- *Objective/Outcome:* Teamwork
 - *Assessment:* All of those indicated in Table 1
 - *Evaluation:* All
 - *Issue:* For outcome d, the students are meeting the recently raised metrics with one exception. In third semester projects (EME 4222, “Projects 2”) the low scores are a reflection of some project students lacking substantial contribution in their final semester. It was determined that ~50% of the students are doing the work (which is not atypical in team projects).
 - *Current/Future Actions:* Teamwork is being more heavily addressed by the project faculty advisors with harsher penalties for non-participation. 2016-2017 data showed improvement.
 - *Responsibility:* Course instructors/advisors implement the plan. Dr. Riedel tracks the results.
 - *University/College Support for Objective:* N/A.
-
- *Objective/Outcome:* Ethics
 - *Assessment:* All of those indicated in Table 1
 - *Evaluation:* All
 - *Issue:* Outcome f results reveal that nearly all students meet the target. While the metric may be too low, that does not solve the issue that 85% to 100% of students meet target. A new Ethics tool was investigated in 2014 that potentially is more in-depth without obvious answers. It was not. A new course in Leadership and Ethics will be required beginning Fall 2018; thus a new metric will likely be devised. As a trial in 2017, a statement by the students was included in their report which is related to the Professional Engineering Code of Ethics. It was not analyzed.
 - The department is considering college-wide ethics assessment should be performed in EGE 1001 since two class periods (with a written paper) are focused on ethics.

- *Current/Future Actions:* Await new course with ethics assignments. Include senior project report statement relating project to Professional Engineering Code.
- *Responsibility:* Course instructors implement the plan. Dr. Riedel tracks the results.
- *University/College Support for Objective:* EGE 1001 instructors to send results of ethics assignment. A metric should be developed with an assessment tool.

Other Assessment: ABET outcome j (contemporary issues) is not used in the University Outcomes. We began collecting Mechatronics course data in 2015-2016. Target was met for Fall 2016 and Spring 2017. Actions: Keep assessment in EME3214 and continue to make assignment very clear to students with regard to format and content.

3. Assessment Plan for 2017-2018 Academic Year

- *Objective/Outcome:* Knowledge in Discipline
- *Actions:* EME 3033 and its prerequisite (EGE 1102) will be reviewed. Non FE-style questions may be adopted. EME 3133 problems will be checked if needing updated because of consistently high scores (90%+). Review EME 4003 exam question and textbook.
- *Objective/Outcome:* Technology
- *Actions:* Senior Projects courses 1 and 2 continue checklist for which technologies were applied (outcome k). Add weight and 3-D printing to list of tools used in Projects courses 1 and 2. Continue using EME 3133 MATLAB project for assessment.
- *Objective/Outcome:* Sustainability
- *Actions:* Continue new section in senior project report on social, economic and environmental sustainability. Data collection from Dr. Ahad should be evaluated. Cost Analysis course should be included in plan.
- *Objective/Outcome:* Communication
- *Actions:* No changes for written and oral communication. Graphical data needs to be collected and analyzed. (Check also for EME 2011 and EME 3043 for graphical communication in reports.)
- *Objective/Outcome:* Mathematics • *Actions:* Continue with no changes.
- *Objective/Outcome:* Scientific Analysis • *Actions:* Continue with no changes.
- *Objective/Outcome:* Leadership
- *Actions:* Investigate if outcome h has appropriate leadership assessment. Otherwise, continue with no changes.
- *Objective/Outcome:* Lifelong Learning
- *Actions:* Potentially require exit survey in EME 4212.
- *Objective/Outcome:* Teamwork

- *Actions:* Teamwork is being more heavily addressed by the project faculty advisors with harsher penalties for non-participation. 2017-2018 data will be critically analyzed.
- *Objective/Outcome:* Ethics
- *Actions:* creating new course and class activities. In senior projects, include report statement relating senior project to Professional Engineering (NSPE) Code.

BS in Robotics Engineering

1. Assessment Plan and Summary

Table 1 provides a mapping of the university-wide undergraduate learning outcomes to the BSRE program-specific learning outcomes, in addition to the corresponding assessment techniques, metrics, and loop closing information that has been identified to date. The BSRE program learning outcomes, which were adopted from the a through k ABET engineering outcomes are:

- a) an ability to apply knowledge of mathematics, science, and engineering,
- b) an ability to design and conduct experiments, as well as to analyze and interpret data,
- c) an ability to design a robotic system, component, or process to meet desired needs, within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability,
- d) an ability to function on multidisciplinary teams,
- e) an ability to identify, formulate, and solve engineering problems,
- f) an understanding of professional and ethical responsibility,
- g) an ability to communicate effectively,
- h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context,
- i) a recognition of the need for, and an ability to engage in life-long learning,
- j) a knowledge of contemporary issues, and
- k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Table 1: Assessment Plan for the BS in Robotics Engineering

LTU Undergraduate Learning Outcomes	Student Outcomes*	Assessment Tools	Metrics/ Indicators**	Administration Timeline	Loop- Closing Timeline
KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”	Outcome a	FE style questions on final exams in EME3043	70% of students receive a score of 60% or higher	Every semester.	Annual
		FE style questions on final exams in ERE2024 and ERE3024	70% of students receive a score of 60% or higher		
	Outcome c	Rubric used to evaluate final reports in senior projects sequence Rubric used to evaluate final reports in ERE4014	100% of teams will score 75% or higher 80 % of teams will score 70 % or above		
	Outcome e	Graded problems using a rubric in EGE2013 and EME3013 Graded problems using a rubric in ERE3014 Graded problems using a rubric in ERE4014	50% of students receive a score of 70% or higher 60% of students receive a score of 70% or higher 70% of students receive a score of 70% or higher		
TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”	Outcome k	Term project grade in ERE3114 Rubric to grade take-home MATLAB assignment in ERE4113 Term project grade in ERE2024 Term project grade in ERE3024	Identifying assignments to use for each course. In progress. 70 % of students will score 80 % or above	Every semester	Annual
	Outcome b		75 % of students will score 70 % or above		
SUSTAINABILITY "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."	Outcome h	Rubric to score paper in EME4252 Rubric to score entrepreneurial assignment in ERE3024	50 % of students will score 70 % or above	Every semester	Annual
COMMUNICATION “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”	Outcome g	Writing rubric used for technical paper in EME 3043 Writing rubric used for technical paper in ERE3024 Oral presentation rubric used in ERE4014 Oral presentation rubric used in EME4253	50% of students will score 80% or higher 70% of students will score 80% or higher 70% of students will score 80% or above	Every semester	Annual

<p>MATHEMATICS “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>	<p>Outcome a</p>	<p>FE style questions on final exams in EME3043</p> <p>FE style questions on final exams in ERE2024 and ERE3024</p>	<p>70% of students receive a score of 60% or higher</p> <p>70% of students receive a score of 60% or higher</p>	<p>Every semester</p>	<p>Annual</p>
<p>READING “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>	<p>Not assessed in program (Assessed in LTU Core Curriculum)</p>				<p>Continuously by the University</p>
<p>SCIENTIFIC ANALYSIS “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”</p>	<p>Outcome a Outcome b</p>	<p>FE style questions on final exams in EME3043</p> <p>FE style questions on final exams in ERE2024 and ERE3024</p> <p>Term project grade in ERE 2024</p> <p>Term project grade in ERE 3024</p>	<p>70% of students receive a score of 60% or higher</p> <p>70% of students receive a score of 60% or higher</p> <p>70 % of students will score 70 % or above</p> <p>75 % of students will score 70 % or above</p>	<p>Every semester.</p>	<p>Annual</p>
<p>LEADERSHIP “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>	<p>Outcome h</p>	<p>Third Tuesday ME or Entrepreneurial Seminars (with critique) on contemporary engineering topics in EME4252, EME4253</p>	<p>Required attendance and completion of critique. Need metric.</p>	<p>Every semester.</p>	<p>Annual</p>
<p>TEAMWORK “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	<p>Outcome d</p>	<p>Peer evaluations of teamwork projects in EME4252 and EME4253</p> <p>Faculty Advisor meeting in EME4252 with Teamwork evaluation form</p> <p>Faculty and IAB teamwork evaluation at final presentation</p>	<p>80% of students achieve a score of 75% or higher</p> <p>60% of students will achieve a score of 60% or higher</p> <p>60% of students will achieve a score of 60% or higher</p>	<p>Every Semester</p>	<p>Annual</p>

PROFESSIONAL ETHICS “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”	Outcome f	Ethics quiz (multiple choice) in EME4253	70% of students will achieve a score of 70% or higher Need to develop metric	Every semester	Annual
--	-----------	--	--	----------------	--------

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

Assessment data for all program learning objectives is collected and analyzed every academic year as detailed in Table 1. The review of the assessment process and data are performed in two different forums: the yearly Department of Mechanical Engineering close-the-loop meeting, and the yearly Mechatronics and Robotics Curriculum Committee (MRCC) close-the-loop meeting. The MRCC is responsible for reviewing the assessment data from all ERE-coded classes to decide on continuous improvement actions or changes to the assessment plan for the Program. Any major curriculum changes proposed by the committee are passed on to the Department of Mechanical Engineering faculty meetings for approval.

The details of the Department close-the-loop meeting results can be found in the BSME portion of the report. Below is a summary of the close-the-loop meeting for the BSRE-specific classes, broken down by program outcome. As a general note, the committee decided to undertake a comprehensive review of the BSRE program assessment plan to switch to a KPI-based assessment platform. As such, no specific actions were taken in the close-the-loop meeting to modify specific parts of the assessment plan.

- **Outcome a (ERE2024):** Students met the target for the third year in a row since the solid mechanics curriculum change.
- **Outcome a (ERE3024):** The target was met for this class.
- **Outcome b (ERE 2024 and ERE3024):** Students met the target in both classes. A new rubric will be designed as part of the new assessment plan for more consistent evaluation of the specific components of the experiment.
- **Outcome c (ERE3014 and ERE4014):** Data was collected for both classes but the filled out rubrics were lost before data was recorded. ✍️ **Outcome d (ERE3024):** All students met the target.
- **Outcome e (ERE3014 and ERE4014):** Students met the targets in ERE3014. Data was not collected for ERE4014.
- **Outcome g (ERE3024 and ERE4014):** Students met targets for ERE3024. Data was not collected for ERE4014.
- **Outcome h (ERE3024):** Students met the target in the class.
- **Outcome k (ERE3114):** Target was not met in ERE3114.
- **Outcome k (ERE4113):** Target was met in ERE4113.

3. Assessment Plan for 2017-2018 Academic Year

Please refer to the BSME section of the report on plans for EME and EGE classes. A comprehensive review of the assessment plan will be conducted this year to create a KPI-based approach and adapt for the pending changes of the ABET outcomes.

*MS in Automotive Engineering***1. Assessment Plan and Summary****Table 1: Assessment Plan for MS in AE**

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	Demonstrate the ability to understand and analyze a problem by applying science, math and engineering principles to interpret data; to develop advanced knowledge to design mechanical components and systems and to recommend design changes; to verify calculations and support assumptions and recommendations.	Major design problem in EME6353 (Automotive Mechanical Systems), (e.g., brake drum crack; or final drive gear box and axle housing crack.) Use the “Developing Advanced Knowledge” rubric.	75% of the students will score 85% or better.	Every Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	Demonstrate the ability to take the collected data, understand them and plot them correctly, producing effective written communication (graphical format); to conduct understeer analysis; to summarize the understeer behavior of various vehicles and compare them insightfully.	“Understeer Gradient” project in EME5433 (Vehicle Dynamics 1). Use the “Analyze & Interpret” rubric.	80% of the students will score 85% of better.	Every Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	Demonstrate the ability to review and evaluate the literature, to utilize ethical judgment and strong communication skills to contribute to the literature.	Final oral presentation or written report in EME6373 (Powertrain Systems 1). Use the “Oral Presentation Evaluation” or Report” rubrics.	75% of students will score 85% of better.	Every Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	Demonstrate the ability to produce effective oral communications.	Final oral project presentation in EME6623 (Automotive Control Systems1). Use the “Oral Presentation Evaluation” rubric.	80% of students will score 85% of better.	Every Semester	Annual
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	Understand professional and ethical responsibilities of engineers, the impact of engineering solutions in a global and societal context, be aware of contemporary issues, and recognize the need for life-long learning.	Mandatory attendance at a minimum of three seminars per semester: EME5XX0 (M.E. Graduate Seminar) Students must submit a one page summary of each seminar. Use the “Graduate Seminar” rubric.	80% of the students will score 85% or better.	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

A.

- *Outcome:* LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.
- *Objective:* Demonstrate the ability to understand and analyze a problem by applying science, math and engineering principles to interpret data; to develop advanced knowledge to design mechanical components and systems and to recommend design changes; to verify calculations and support assumptions and recommendations.
- *Assessment:* The assessment tool was the major design problem in EME6353 (Automotive Mechanical Systems). Assessment was done using the “developing advanced knowledge” rubric by Dr. Shan Shih in Spring 2017.
- *Evaluation:* 47% of the students scored 85% or better.
- *Issue:* The metric of “75% of the students will score 85% or better” was not met. Dr. Shih noted that “the readiness of the students was shy.”
- *Actions:* No actions were taken based on the above results. See what happens in Spring 2018.
- *Responsibility:* Dr. Kingman Yee, Director of M.S. Automotive Engineering, is responsible for implementing the plan or tracking the results.

B.

- *Outcome:* LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies.
- *Objective:* Demonstrate the ability to take the collected data, understand them and plot them correctly, producing effective written communication (graphical format); to conduct understeer analysis; to summarize the understeer behavior of various vehicles and compare them insightfully.
- *Assessment:* The assessment tool was the “Understeer Gradient” project in EME5433 (Vehicle Dynamics 1). Assessment was done using the “analyze and interpret information” rubric by Dr. Joe DeRose in Fall 2016.
- *Evaluation:* 80.8% of the students scored 85% or better.
- *Issue:* The metric of “80% of the students will score 85% or better “ was met.
- *Actions:* No actions were taken based on the above results.
- *Responsibility:* Dr. Kingman Yee, Director of M.S. Automotive Engineering, is responsible for implementing the plan or tracking the results.

C.

- *Outcome:* LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.
- *Objective:* Demonstrate the ability to review and evaluate the literature, to utilize ethical judgment and strong communication skills to contribute to the literature.

- *Assessment:* The assessment tool was the final oral presentation in EME6373 (Powertrain Systems 1). Assessment was done using the “Project Elements” rubric by Dr. Kristofor Norman in Spring 2017.
- *Evaluation:* 83% of the students scored 85% or better.
- *Issue:* The metric of “75% of the students will score 85% or better” was met.
- *Actions:* No actions were taken.
- *Responsibility:* Dr. Kingman Yee, Director of M.S. Automotive Engineering, is responsible for implementing the plan or tracking the results.

D.

- *Outcome:* LTU graduates will communicate effectively using written, oral, graphical, and digital formats.
- *Objective:* Demonstrate the ability to produce effective oral communications.
- *Assessment:* Based on the 2013-2014 assessment report, the assessment tool was changed to the final oral project presentation in EME5453 (Vehicle Crashworthiness) instead of EME6623 (Automotive Control Systems 1). Assessment was done using the “oral presentation” rubric by Dr. Pattabhi Sitaram in Fall 2016.
- 83% of the students scored 85% or better.
- *Issue:* The metric of “80% of the students will score 85% or better” was met.
- *Actions:* No actions were taken based on the above results.
- *Responsibility:* Dr. Kingman Yee, Director of M.S. Automotive Engineering, is responsible for implementing the plan or tracking the results.

3. Assessment Plan for 2017-2018 Academic Year

During the 2017-2018 academic year, above assessments will continue for the sixth round.

In Fall 2017:

EME5433 (Vehicle Dynamics 1): no changes are planned.

EME5433 (Vehicle Crashworthiness): no changes are planned.

In Spring 2018:

EME6373 (Powertrain Systems 1): no changes are planned.

EME6353 (Automotive Mechanical Systems): no changes are planned.

Closing the loop will be conducted on the following learning outcomes:

B. LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies

D. LTU graduates will communicate effectively using written, oral, graphical, and digital formats.

The following activity did not occur: *In Fall 2014 and Spring 2015, in a new course called “M.E. Graduate Seminar”, the fifth learning outcome will be assessed for the first time: LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.*

Master of Civil Engineering/MS in Civil Engineering

1. Assessment Plan and Summary

The student outcomes of the Master of Science in Civil Engineering (MSCE) degree program are listed below (a-f). They have been adopted from the Body of Knowledge 2 (BOK2) promulgated by the American Society of Civil Engineers (ASCE). The outcome titles based on BOK2 are given in parenthesis (e.g. BOK2, Technical Specialization).

- (a) *Formulate* and solve ill-defined engineering problem appropriate to civil engineering by *selecting* and applying appropriate techniques and tools (BOK2: Problem Recognition and Solving)
- (b) *Apply* specialized tools or technologies to solve problems in a traditional or emerging specialized technical area appropriate to civil engineering (BOK2, Technical Specialization)
- (c) *Analyze* a complex system or process in a traditional or emerging specialized technical area appropriate to civil engineering (BOK2, Technical Specialization)
- (d) *Design* a system or process or create new knowledge or technologies in a traditional or emerging specialized technical area appropriate to civil engineering (BOK2, Technical Specialization)
- (e) *Plan, compose* and *integrate* the verbal, written, virtual, and graphical communication of a project to technical and non-technical audiences (BOK2, Communication)
- (f) *Evaluate* the design of a complex system or process, or *evaluate* the validity of newly-created knowledge in a traditional or emerging advanced specialized technical area appropriate to civil engineering (BOK2, Technical specialization)

MSCE student outcomes support the university graduate learning outcomes as described in the 2017-2018 assessment plan as summarized in Table 1. Please refer to the second column in Table 1 to see the inter-relationship between the university graduate learning outcomes and the MSCE student outcomes. Program assessment is conducted using the following tools:

Direct Assessment of Courses: Direct assessment of student learning is performed in selected courses. The selected courses cover the different concentrations including transportation, structural, geotechnical, water resources, and environmental. Most courses are offered once in two years with some exceptions.

Presentations: Formal presentations are mandated in some courses of the MSCE program. It is required that students take a minimum amount of courses with formal presentations. Depending on the structure of the course, the presentations are not always carried out (e.g. ECE 5773 went online fall 2016 and no presentation required). A rubric is filled out by the course instructor evaluating the graphical and oral communication skills as well understanding of technical content. The presentations are meant to serve one of the university graduate learning goals. A copy of the rubric used for course presentations is included in the Appendix.

Assessment of Thesis and Graduate Projects: The members of the defense committee for a thesis or graduate project are to provide their evaluations outlining the quality of the thesis or project using the rubric provided to them. The rubric performs assessment of the final presentation and final report. A copy of the rubric is included in the Appendix.

Exit Interviews: The objective of the exit interview is to receive a summative view of what is happening in the department and an indication of overall student satisfaction. The program director conducts exit interviews. The process includes a survey form to be filled out by students regarding their education at LTU and specific graduate program outcomes. To encourage participation, the program

director allows the students to simply use the forms or to use the forms and then conduct a verbal interview. A copy of the exit interview survey is included in the Appendix.

Columns 3-6 in Table 1 represent the plan for the academic year 2017-2018. The results of the assessment of the student outcomes are presented to the department faculty during the annual close loop meeting in the summer. Any actions that need to be taken to improve the graduate curriculum are handled by the Chair and the program director on an annual basis.

Table 1: Assessment Plan for the MCE/MSCE Program

University Graduate Learning Outcomes	Supporting Program Outcomes*	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop-Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	(b) <i>Apply</i> specialized tools or technologies to solve problems in a traditional or emerging specialized technical area appropriate to civil engineering (d) <i>Design</i> a system or process or create new knowledge or technologies in a traditional or emerging specialized technical area appropriate to civil engineering	Direct assessment of assignments or exams in ECE 5343, ECE 5773, ECE 5823, ECE 6423, ECE 5473, ECE 5763, ECE 5523 and ECE 5813.	80% should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	(a) <i>Formulate</i> and solve ill-defined engineering problem appropriate to civil engineering by <i>selecting</i> and applying appropriate techniques and tools (c) <i>Analyze</i> a complex system or process in a traditional or emerging specialized technical area appropriate to civil engineering	Direct assessment of assignments or exams in ECE 5343, ECE 5773, ECE 5823, ECE 6423, ECE 5473, ECE 5763, ECE 5523 and ECE 5813.	80% should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	(d) <i>Design</i> a system or process or create new knowledge or technologies in a traditional or emerging specialized technical area appropriate to civil engineering (f) <i>Evaluate</i> the design of a complex system or process, or <i>evaluate</i> the validity of newly-created knowledge in a traditional or emerging advanced specialized technical area appropriate to civil engineering	Direct assessment of assignments or exams in ECE 5343, ECE 5773, ECE 5823, ECE 6423, ECE 5473, ECE 5763, ECE 5523 and ECE 5813. Evaluation of Thesis and Graduate Project Reports using a rubric (only for MSCE).	80% should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	(e) <i>Plan, compose</i> and <i>integrate</i> the verbal, written, virtual, and graphical communication of a project to technical and non- technical audiences	Direct assessment of assignments or exams in ECE 5343, ECE 5773, ECE 5823, ECE 6423, ECE 5473, ECE 5763, ECE 5523 and ECE 5813. Oral Presentation rubrics in various classes per department brochure. Evaluation of Thesis and Graduate Project Reports using a rubric (only for MSCE).	80% should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual

<p>“LU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”</p>	<p>(d) <i>Design</i> a system or process or create new knowledge or technologies in a traditional or emerging specialized technical area appropriate to civil engineering (f) <i>Evaluate</i> the design of a complex system or process, or <i>evaluate</i> the validity of newly-created knowledge in a traditional or emerging advanced specialized technical area appropriate to civil engineering</p>	<p>Exit Interview</p>	<p>Exit interview survey, 80% should reach the highest expected achievement level for each outcome based on BOK2.</p>	<p>Each Semester</p>	<p>Annual</p>
---	--	-----------------------	---	----------------------	---------------

*See section 1 in the report for details on program outcome

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

The assessment activities that were originally planned for the 2016-2017 academic year were not all performed. Below is a summary of the assessment activities performed or in some cases not performed. The list includes the specific outcomes targeted as well as a description of activities planned but not performed.

1. **Direct Assessment in ECE 5773, ECE 5413, ECE 5753 and ECE 53533.** *Outcomes (a), (b), (c) and (d).* Originally, 8 classes were deemed to be assessed. However, direct assessment of courses in the MSCE program was not performed well in the fall of 2016 due to the presence of ABET and assessment of the undergraduate program. After the completion of the six-year ABET cycle, it will be more plausible for the department to focus on assessment at the graduate level as well.
2. **Exit Interviews.** *Outcomes (d) and (f).* Exit interview survey was sent to all students graduating spring 2017. Only three students responded. The survey was not sent to students graduating fall 2016 by mistake. However, the population of students graduating in the spring of 2017 was much higher.
3. **Student Class Presentations.** *Outcomes (b), (c) and primarily (e).* Assessment of student presentations performed for ECE 5473 and ECE 5813. More formal presentations were held in other classes but only two classes targeted for assessment.
4. **Student Thesis/Graduate Project.** *Outcomes (d) and (f).* Three students completed thesis requirements in last academic year and one student completed graduate project. However, rubrics only kept for three students. The final student did exceptionally well.

Item 1: Direct Assessment in ECE 5773, ECE 5813, ECE 5353, and ECE 5753

Not all classes proposed in last year's assessment plan were assessed. Two classes were cancelled and two classes lacked faculty participation. Direct assessment in the four classes listed above was performed to evaluate Outcomes (a), (b), (c), and (d). Outcome (b) was only assessed in ECE 5773 and will be discussed first.

Outcome (b) was assessed by reviewing students' performance using Excel and performance using RISA 3D. In regards to Microsoft Excel, programming was performed in which the students had not seen before. Overall, the student response was favorable. All students did the homework with at least 80%, which is the target. Overall, the results show that 100% of the students achieved the anticipated level for this outcome.

Outcome (a), (c), and (d) were evaluated using all three courses listed above. A general description of how assessment was performed is discussed in last year's assessment report, Section 2b. In general, the results are favorable in all three courses. In ECE 5773, approximately 54% of students achieved the level anticipated for Outcome (a), approximately 73% of students achieved the level anticipated for Outcome (c) and approximately 73% of the students achieved the level anticipated for Outcome (d). The results were similar for ECE 5753, which was taught by the same professor. In ECE 5353, the assessment results are questionable. The initial plan to perform assessment revealed that close to 100% received the target level of achievement for all three categories. It is believed that the new instructor of the course was very generous in grading and needs to be talked to make the class more challenging. In ECE 5813, approximately 80% of students achieved the level anticipated for Outcome (a), approximately 62% of students achieved the level anticipated for Outcome (c) and approximately 73% of the students achieved the level anticipated for Outcome (d).

Overall, direct assessment needs to be performed more effectively in the future. For three of the classes noted, faculty was ill-prepared to do the assessment and it became a task performed at the end. All faculty needs a plan at the beginning of the semester to execute proper assessment methods.

Item 2: Exit Interviews

In regards to Item 2, messages were sent to all MSCE students graduating in the spring 2017. Three students filled out the survey and the feedback on the specific questions mapped to student outcomes were usually favorable. One student was from the United States and two students were from India. There were complaints regarding one full-time faculty member and two adjuncts. The cost of the program and laboratory testing opportunities were other complaints. However, no complaint was consistent between more than one interview. Therefore, making significant changes to anything seems inappropriate and evidence does not clearly reveal that any issues need to be addressed. Overall, there is limited data to reflect on with respect to exit interviews. However, the results and therefore, assessment of Outcomes (d) and (f) are favorable.

Item 3: Student Class Presentations

In regards to Item 3, formal presentations were performed in multiple classes. Assessment was limited to two classes which included ECE 5473 and ECE 5813. A copy of the rubric for “Course Presentations” is provided in the Appendix. For the most part, Outcome (e) is assessed using the rubrics. However, Outcomes (b) and (c) are slightly assessed as well. Average scores for each outcome mapped using the rubric is summarized below.

- Outcome (b) Average 7.45 / 10.
- Outcome (c) Average 8.00 / 10.
- Outcome (e) Average 8.17 / 10.

Per the rubric, a 7/10 meets expectations. However, the target is to have 80% of graduates meet expectations. Therefore, an average value is not sufficient. However, the faculty have decided that a good estimate to assume 80% of students meet expectations is 8/10. Therefore, the data shows that the students did not obtain this goal in the previous academic year for Outcome (b). However, the mark was obtained for Outcome (e) which was the most critical for course presentations. The results are more favorable than the previous year. The department still has a high amount of international students that have performed little or no presentations in the past and a more favorable result is encouraging.

Item 4: Student Thesis/Graduate Project

In regards to Item 4, three students completed a thesis in the previous academic year. One student completed the graduate project. Rubrics to assess the outcomes were completed for all four students. Please see the Appendix for a copy of the rubric. Assessment of the thesis primarily incorporates Outcomes (e) and (f), although some other student outcomes are also listed on the rubric. Outcomes (e) and (f) are the most important and most frequent outcomes on the rubric. To simplify the results, the average scores on the rubrics for all items mapped to Outcomes (e) and (f) and for all four students were calculated. This includes average scores from multiple evaluators as well. The results are as follows:

- Outcome (e) Average 7.94 / 10.
- Outcome (f) Average 8.14 / 10.

The target for the outcome is 80% or 8/10. In general, two students did not meet expectations in multiple categories and two students often exceeded expectations. One student was from India, which has been a region where graduate students have struggled. Considering this, she completed above expectations as well. Overall, the results are favorable and close to the target outcome.

3. Assessment Plan for 2017-2018 Academic Year

Similar to last previous year, there was not enough participation from faculty during the year for assessment at the graduate level. This is also the program directors fault. This is primarily due to the ABET visit and concerns about accreditation for the BSCE program. It seems to be a continuing trend that graduate assessment is not as formal as undergraduate assessment due to the high demands of faculty. In this academic year, the program director must be more diligent in reminding the faculty to perform the assessment tasks as outlined in the 2013-2014 assessment plan for the MSCE program.

The assessment plan is shown in Table 1. In the next academic year, eight courses will be directly assessed across the five disciplines. This includes ECE 5713, ECE 5783 and ECE 6773 from structural engineering, ECE 5323 from environmental engineering, ECE 5543 from water resource engineering, ECE 5833 from transportation engineering, and ECE 5413 from geotechnical engineering. An extra emphasis will be made towards structures since the most classes are taught in this area. With the exception of ECE 5783 and ECE 5323, all of these classes are taught by full-time faculty members. This is advantageous since full-time faculty are familiar with the assessment procedures at the undergrad levels and more appropriate measures will be made for various categories. Primarily, Outcomes (a), (b), (c), and (d) will be assessed using direct assessment. Outcome (d) is the only of the four that will also be assessed using the exit interviews.

Outcome (e) (Plan, compose and integrate the verbal, written, virtual, and graphical communication of a project to technical and non-technical audiences) requires multiple forms of assessment. Oral or verbal and graphical communication skills will be evaluated using rubrics and formal presentations as in previous years. A list of classes that are slated to have formal presentations can be found in the brochure for the MSCE program. However, outcome (e) will also be assessed using direct assessment for primarily written communication. Finally, Outcome (e) will also be assessed using the final presentation and written report (thesis or graduate project) for students completing the thesis option or graduate project option.

Outcome (f) will be assessed as part of; the graduate project, as part of the thesis and thesis defense, and during exit interviews. We consider this outcome the highest level and we will anticipate that only students completed or near completion will be able to achieve the expected level of this outcome.

The specific assessment tools used for Outcomes (a-d) in each class are still being determined. It is known that Outcome (b) will only be assessed in ECE 6743 and a select spring course to be determined in which specialized technology is used for the class assignments. Specific tools for Outcomes (a, b, c, and d) are still being deciphered but an example is given from the program director for each outcome below; on how assessment will be performed in ECE 6743.

Outcome a: Formulate and solve ill-defined engineering problems

Actions: This outcome will be assessed in all courses listed in Table 1. For instance, in ECE 6743, Problem 1 of Exam 1, Problem 1 of Exam 2, and Problem 1 of the final exam will be assessed. All topics on exams at this level are considered ill-defined and therefore, the first

problems of each test should accommodate an assessment tool.

Outcome b: Applied specialized tools and technologies

Actions: This outcome will be assessed in ECE 6743 and a class to be determined spring 2017. For instance, in ECE 6743, students are required to use MathCAD and Excel for several topics. The problems cannot be solved in a reasonable amount of time in these software programs are not used. Therefore, Homework assignments 5-11 will be assessed using the software since these are the assignments in which they must be used.

Outcome c: Analyze a complex system or process

Actions: This outcome will be assessed in all courses listed in Table 1. For instance, in ECE 6743, Problem 3 of Exam 1, Problem 4 of Exam 2, and Problem 4 of the final exam will be assessed. These are all longer problems that require critical thinking beyond that addressed in previous assignments. As with Outcome (a), a higher sample size over multiple exams allows one to assess development of a student during a semester.

Outcome d: Design a system or process

Actions: ECE 6743 is not a design course. It is an analysis and theoretical course. However, some topics are code-based topics including Homework 12 and Problem 3 of the final exam.

The course coordinators have been asked to develop course purpose documents similar to that used in the department at the undergraduate level. However, several of the documents still need to be developed. More participation is required in exit interviews.

Master of Construction Engineering Management

1. Assessment Plan and Summary

The student outcomes of the Master of Construction Engineering Management (MCEM) program are listed below (a-e). They have been adopted from the Body of Knowledge 2 (BOK2) promulgated by the American Society of Civil Engineers (ASCE). The outcome titles based on BOK2 are given in parenthesis.

- a) *Create* appropriate processes, subsidiary plans and contract documents for incorporation into the project management plan (BOK2: Project Management)
- b) *Plan, compose* and *integrate* the verbal, written, virtual and graphical components of a project and communicate them to technical and non-technical audiences (BOK2, Communication)
- c) *Apply* techniques to simple public policy problems related to civil engineering projects (BOK2, Public Policy)
- d) *Synthesize* case studies, experiences and lessons learned to cultivate professional and ethical conduct (BOK2, Professional and Ethical Responsibility)
- e) *Apply* business and public administration concepts and process (BOK2, Business and Public Administration)

Table 1 summarizes the assessment plan for the upcoming academic year, 2017-2018. MCEM student outcomes support the university graduate learning outcomes as described in Table 1. Please refer to the second column in Table 1 to see the inter-relationship between the university graduate learning outcomes and the MCEM student outcomes.

Student assessment is conducted using the following tools:

Direct Assessment: Direct assessment of student learning is performed in selected courses each year. These courses vary from year to year and include all core courses and select “popular” electives (meaning a large amount of students generally take). Electives are generally assessed within a four year period. However, each core course is assessed at a minimum, every two years.

Presentations: Presentations are mandated in various courses. A rubric will be filled out by the course instructor evaluating the graphical and oral communication skills as well as understanding of technical content. The presentations are meant to serve one of the university graduate learning goals related to oral communication skills (copy of rubric in appendix, generic for any class).

Exit Interviews: The exit interview is used to receive a summative view of what is happening in the department and an indication of overall student satisfaction. The program director conducts exit interviews. The process includes a survey form to be filled out by students regarding their education at LTU and specific graduate student outcomes followed by a brief interview by the program director.

Table 1: Assessment Plan for the MCEM Program

University Graduate Learning Outcomes	Supporting Program Outcomes*	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop-Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	(a) <i>Create</i> appropriate processes, subsidiary plans and contract documents for incorporation into the project management plan (c) <i>Apply</i> techniques to simple public policy problems related to civil engineering projects (e) <i>Apply</i> business and public administration concepts and process	Direct assessment of assignments or exams in ECE 5113, ECE 5233, ECE 5923, and ECE 5273.	80% should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	(a) <i>Create</i> appropriate processes, subsidiary plans and contract documents for incorporation into the project management plan (c) <i>Apply</i> techniques to simple public policy problems related to civil engineering projects (e) <i>Apply</i> business and public administration concepts and process	Direct assessment of assignments or exams in ECE 5113, ECE 5233, ECE 5923, and ECE 5273.	80% should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	(d) <i>Synthesize</i> case studies, experiences and lessons learned to cultivate professional and ethical conduct	Direct assessment of assignments or exams in ECE 5113, ECE 5233, ECE 5923, and ECE 5273.	80% should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	(b) <i>Plan, compose and integrate</i> the verbal, written, virtual and graphical components of a project and communicate them to technical and non-technical audiences	Direct assessment of assignments or exams in ECE 5113, ECE 5233, ECE 5923, and ECE 5273. Oral Presentation rubrics in ECE5113 and ECE 5273.	80% should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual
“LU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	(d) <i>Synthesize</i> case studies, experiences and lessons learned to cultivate professional and ethical conduct	Exit Interview	Exit interview survey, 80% should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual

*See section 1 in the report for details on program outcome

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

Tools used per the assessment plan of the previous academic year include the following:

1. Exit Interviews
2. Direct Assessment of all core classes and ECE 5283
3. Course Presentations

In regards to Item 2, the courses listed above include two core classes and two elective classes. Two classes were taught in the fall 2016 and two classes were taught in the spring 2017. The program director performed the assessment himself based on class performance on exams and reports. Materials used were guided by the course instructors.

ECE 5113: The course had 25 students and taught by a full-time faculty member. The students in ECE 5113 performed adequately on the items selected for the assessment materials. Overall, 60% of the students performed at the expected level of achievement for the course on the selected material. That is lower than the target of 80%. However, the course has a significant mix of international students who exceeded expectations in comparison to previous semesters. Overall, none of the students in the class scored grades lower than a B- and therefore, the term is considered a success. The results show the graduate program is stronger with respect to student body than the previous year.

ECE 5233: The course had 25 students and taught by an adjunct faculty member. Again, a positive response was found after evaluating the assessment materials for the course. Overall, 96% met the expected level of achievement from the materials selected. This course has shown trends of having more favorable grades than other courses taught in the MCEM program. However, the results are still more favorable in comparison to previous fall semesters. Therefore, trends in the results compare favorably to other classes and shows improvement of students in the MCEM program.

ECE 5923: The course had 10 students and taught by an adjunct faculty member. Not all students in the class were MCEM students. Of MCEM students, 100% of the students met the expected level of achievement from the materials selected. Again, the year before showed more variation in grades for the course. Even though the adjunct professor may have been lenient on grading, improvement was still significant.

ECE 5273: The course had 25 students but only 19 were enrolled in the MCEM program, which will be used for assessment. The course was taught by a full-time faculty member. Of the 19 students, 17 (89%) met the expected level of achievement from the materials selected. This was an exceptional result. The course has traditionally been the most challenging in the program and taught by a professor is who known to be the most challenging as well. It is believed that this demonstrates more than anything the significant progress made in the last two years in the MCEM program. The international student body has really worked to become good students with a lot of dedication to the graduate program.

In regards to Item 1, email messages were sent to all MCEM students in the spring of 2017. Two students completed the questionnaire including two international students. The responses from the international students were all favorable and there was minimal information to reflect on. Overall, the program director needs to find measures to ensure the MCEM students complete the exit interview process.

In regards to Item 3, only one faculty member provided the presentation rubrics at the end of the semester. This was ECE 5113. The program director forgot to remind the professor of ECE 5273 about

the rubric. Considering all students and all four categories noted on the rubric, the average score was 8.3/10 meaning that the average score “meets expectations”. It is assumed based on this result that 80% met expectations for oral and graphical content which was the target. The faculty in the department have agreed that rubric evaluation can be quite critical and a good target for the rubrics is 8/10. It simplifies the relationship between the rubrics and the targets. Based on this evaluation, the results on the oral presentation skills were improved in comparison to the previous academic year.

3. Assessment Plan for 2017-2018 Academic Year

The faculty and program director did a better job following up on the classes used for assessment. However, the focus was still on the bachelor’s program due to the visit from ABET. Therefore, not much was still anticipated from the full-time faculty. Now that the department has been accredited, more focus can be turned on the master’s degrees in the upcoming year. A detailed assessment plan is outlined in the 2013-2014 assessment plan.

The current year will be assessed by targeting two core classes and two electives. The two core classes that will be assessed include ECE 5223 and ECE 5213 (see Table 1). The two electives that will be assessed are popular electives for graduates to take in the department and are ECE 5283 (fall 2017 and spring 2018) and ECE 5263 (spring 2018). The two electives are taught by faculty that are accomplished professionals and have been teaching in the department for multiple years. The two core classes are taught by full-time faculty.

Not all courses in the program have required presentations. Therefore, only presentations in ECE 5223 and ECE 5263 will be used for assessment. This information is also summarized in Table 1. Both of these courses are planned to be offered in the spring of 2018. .

The program director is responsible for motivating students to complete the exit interview responses as a minimum and for conducting the interview. The lack of participation in the last couple of years has been discouraging. Overall, three students completed the exit interviews in the spring of 2017. The results reveal multiple discouraging thoughts about one particular professor and one class taught. One student made suggestions for new courses such as an additional course on estimating and an additional course on risk management. Overall, this students feedback was helpful in moving forward with the program. Remaining comments from the three students were positive. Students really appreciated the industry experience of faculty and even with high demands, appreciated the most challenging professors.

In previous years, the population of graduate students in the MCEM program has been high due to the high push of international students. However, a decline has been seen. The program must go back to its routes and become one that serves the working professional in the Detroit area.

MS in Electrical and Computer Engineering

1. Assessment Plan and Summary

The ECE Department did not complete Assessment of the Master of Science in Electrical and Computer Engineering 2016-17. Dr. Nabih Jaber was assigned program director in August 2016 and the focus of his first year was completion of the APPR report for the MSECE. The 2016-17 Assessment Plan for the MSECE Program outlined assessment of graduate student thesis only and no courses. One graduate student completed the thesis option in 2016-17, whereas more than 20 students graduated with the course option.

The ECE Department University Assessment Committee representative Dr. Jinjun Xia is working with Dr. Nabih Jaber to develop and implement a comprehensive course based assessment plan for 2017-18. Table 1 contains the current assessment plan.

Table 1: Assessment Plan for MS in ECE

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	Objective – a	Thesis, Assessment Night	See Appendix	Annual	Every two years starting in 2015
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	Objectives – b and c	Thesis, Assessment Night	See Appendix	Annual	Every two years starting in 2015
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	Objective – d	Thesis, Assessment Night	See Appendix	Annual	Every two years starting in 2015
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	Objective – e	Thesis, Assessment Night	See Appendix	Annual	Every two years starting in 2015
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	Objective – f	Thesis, Assessment Night	See Appendix	Annual	Every two years starting in 2015

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

Not available,

3. Assessment Plan for 2017-2018 Academic Year

Follow assessment plan as shown in Table 1.

Master of Engineering Management
1. Assessment Plan and Summary

Table 1: Assessment Plan for MEM

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	Students will learn and apply engineering management principles and theories.	EEM 6803 or EEM 6763 Project presentation and common final exam problem which is scored using a rubric.	80% of students will score 85% or better on the Projects & common final exam problem.	Every Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	Students will develop analytical and problem solving skills for engineering management.	EMS 7613, EEM 6753 Analysis and interpretation of a peer reviewed technical paper using software which is scored using a rubric.	80% of students will score 85% or better in analysis and interpretation.	Every Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	Students will be able to evaluate engineering management publications and prepare technical papers for conferences.	EEM 6763, EEM 6583, EEM 6803 and EMS 6713 Evaluation of a peer reviewed technical papers.	80% of students will score 85% or better for their overall evaluation.	Every Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	Students will be able to effectively communicate technical information in their field.	Written report and oral presentation of one of the course projects which is scored using a rubric.	80% of students will score 85% or better for written, oral and graphical communication.	Every Semester	Annual
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	Students will understand the importance of lifelong learning and the professional and ethical responsibilities of the engineering profession.	EEM 6763, EEM 6803, EEM 6583 Must present a project dealing with critical issues in industry.	Must orally present their projects to their peers and receive a score of at least 85% in their project	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

The following outcomes measured for EEM 6753 Engineering Supply Management (fall 2016), EMS 7613 Technology Management (Fall 2016) and EEM 6803 (spring 2017).

- LTU graduates will apply and in accordance with their course of study, develop advanced knowledge with their discipline.
- LTU graduates will analyze and interpret information and implement decisions using modern techniques & methodologies
- LTU graduates will evaluate recent scholarly literature and in accordance with their course of study, contribute to the literature.
- LTU graduates will communicate effectively using written, digital, graphical and oral formats.

Course projects are used assessment tool. Results were analyzed used using a scale of 1-10 (1= worst, 10 = best) from each project of each student. 85% students have scored above 8.5 out of 10 scale. There are some improvements in the application of advanced knowledge, literature review, analysis and presentation of projects. International students in the MEM program still need improvement in communication and oral presentation.

3. Assessment Plan for 2017-2018 Academic Year

Assessment of courses planned for: EEM 6803 Engineering Management and EEM 6763 Quality Engineering Systems.

Master of Engineering in Manufacturing Systems

1. Assessment Plan and Summary

Table 1: Assessment Plan for MEMS

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	Demonstrate analytical and problem solving proficiency in application of Mfg. Eng. solutions to Manufacturing problems Understand the roles of Manufacturing Eng. Manager in today’s complex manufacturing industry, & define and provide solutions to manufacturing problems..	Administer knowledge tests in MEMS core classes: EME 6203, EME 6403, EME 6703 and EME 6583 Projects, case studies, in-class exercises and oral presentations. Using a “Systems Design” rubric in the EME 6203 course.	80% of the students receive a Score of 85% or higher	Every Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	Define and develop lean strategic production plans that will enhance product design quality, productivity and reduce manufacturing costs. Utilize tools such Excel, Word, PPT, Minitab, Arena, and DOE in coursework, and projects	Evaluate in EME 6203, EME 6703, EME 6403, using a “requirements gathering” rubric Exams, projects, case studies, in-class exercises and oral presentations.	75% of the students receive a Score of 80% or higher	Every Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	MEMS students should have the skills to search the literature and summarize the essence of the concepts presented there Course projects and case studies.	Using a “literature search” rubric in EME 6203, EME 6703, EME 6583, Projects and case studies.	80% of the students receive a Score of 85% or higher	Every Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	Define, analyze and effectively communicate typical functional Manufacturing Systems and identify how they meet the specific needs of the industry to deliver efficiency and competitive advantage.	Using a “writing” rubric in EME 6583 and EME 6203. Projects, case studies, and in-class exercises and presentations.	75% of the students receive a Score of 80% or higher	Every Semester	Annual
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	Understand critical ethical, social and sustainability issues in Manufacturing Engineering	Administer a case study and project in EME 6203, EME 6583 & use a “writing” rubric	80% of the students receive a Score of 75% or higher	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

The program curriculum is being absorbed in the MSME program as a concentration in manufacturing. This plan was voted on by the ME faculty and hence the MEMS program is being phased out. Currently there are only two students in the program and after their graduation (most likely this year) the program will be discontinued.

Due to this condition the sample size for assessment can potentially be either one or at the most two and hence is insufficient for any study. Hence assessment of the MEMS program was not done last year.

3. Assessment Plan for 2017-2018 Academic Year

No assessment is planned the program will be closed. This is the last assessment report for the program.

*MS in Industrial Engineering***1. Assessment Plan and Summary****Table 1: Assessment Plan for MSIE**

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	Understand and solve industrial engineering problems by selecting and applying appropriate techniques and tools	Course project evaluation rubric for the course projects of advanced optimization techniques, quality control and simulation	75% score of 3 or higher on 5 point scale.	Every Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	Utilization of Excel, Word, PPT, Bb in coursework Utilization of Minitab in QC and Simulation Courses Utilization of ARENA Software in Eng. Sys. Simulation Course Utilization of Lindo / Lingo / Solver Software for Optimization	Software usage evaluation rubric for the selected course projects and assignment contents (EME 5603, EME 6403, EME 6653)	75% score of 3 or higher on 5 point scale.	Every Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	Identify and critically review the scholarly literature relevant to core course projects.	Evaluate scholarly paper review and literature review section of the course projects (EME 5603, EME 6403, EME 6653)	75% score of 3 or higher on 5 point scale.	Every Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	Demonstrate the communication ability to write and present through course project presentations and reports	Project presentation and project written report evaluation rubric	75% score of 3 or higher on 5 point scale.	Every Semester	Annual
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	Analyze and assess these issues	Course project evaluation rubric on ethics / sustainability	75% score of 3 or higher on 5 point scale	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

The following outcomes are measured for EIE 6653 Advanced Optimization Techniques (Fall 2016), EMS 5603 Engineering Systems Simulation (Fall 2016), EIE 5983 Special Topics in IE: Supply Chain Optimization & Logistics (Spring 2017), and EIE 5983: Special Topics in IE: Enterprise Resource Planning Systems (Spring 2017) and EIE 6663 Applied Stochastic Processes (Spring 2017).

The following graduate outcomes were measures for MSIE program from the above mentioned courses:

- LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.
- LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies.
- LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.
- LTU graduates will communicate effectively using written, oral, graphical, and digital formats.

Course project is used as assessment tool. The results were analyzed using a scale of 1-10 (1worst, 10-best) from each project for each student. 80% students have scored above 86% for “advanced knowledge, analysis, and literature review outcome. It is above the expected goal”. 75% students have scored above 81% for “interpret information and implement decisions using the latest techniques and technologies outcome”. 78% students have scored above 88% for “evaluate scholarly literature and, in accordance with their course of study, contribute to the literature outcome”. 74% students have scored above 79% for “communicate effectively using written, oral, graphical, and digital formats outcome”. Oral presentation had some concerns in previous assessments mainly for international students. After first proposal presentations, some guidelines are provided for improvement for oral communication. It has helped in some aspects. Written communication has a concern. Students were asked to submit project report earlier to provide some comments for improvising report writing.

3. Assessment Plan for 2017-2018 Academic Year

Two courses are planned for Fall 2017 (EIE 76653 Advanced Optimization Techniques and EMS 6403 Quality Control) and two courses for are planned for Spring 2018 (EMS 6673 Six Sigma Processes, and EME 5983 Special Topics on Industrial Automotive Manufacturing Systems).

*MS in Mechanical Engineering***1. Assessment Plan and Summary****Table 1: Assessment Plan for MS in ME**

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	Students will learn and apply advanced mechanical engineering principles and theories.	EME5333 Advanced Dynamics or EME5213 Mechanical Vibrations I. Common final exam problem which is scored using a rubric.	80% of students will score 85% or better on the common final exam problem	Every Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	Students will refine their analytical and problem solving skills.	EME 5363 Transport Phenomena II or EME 5153 Applied Thermodynamics and EME5333 Advanced Dynamics or EME5213 Mechanical Vibrations I. Analysis and interpretation, using an assigned design project.	80% of students will score 85% or better in analysis and interpretation.	Every Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	Students will be able to evaluate technical engineering publications.	EME 5353 Transport Phenomena I or EME 5153 Applied Thermodynamics Evaluation of a peer reviewed technical paper which is scored using a rubric.	80% of students will score 85% or better for their overall evaluation.	Every Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	Students will be able to effectively communicate technical information.	EME 5363 Transport Phenomena II or EME 5153 Applied Thermodynamics and EME5333 Advanced Dynamics or EME5213 Mechanical Vibrations I. Written report and oral presentation of a technical paper which is scored using a rubric.	80% of students will score 85% or better for written, oral and graphical communication.	Every Semester	Annual
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	Students will understand the importance of lifelong learning and the professional and ethical responsibilities of the engineering profession.	Survey of graduating MSME students	All students will be able to explain the importance of lifelong learning and professional responsibilities	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

Outcome 1: Advanced knowledge in discipline

Assessment: A common problem for students to solve in the final exam. Students worked on the problem individually during the exam.

Results: No data was collected during 2016-2017 academic year.

Outcome 2: Analytic and problem-solving skills

Assessment: This objective was assessed in Fall 2016 in EME5213 Mechanical Vibrations. Students were assigned a design project and the analytical and problem solving skills were assessed by using rubrics. Students worked on the project individually.

Results: 39% of the students scored 85% or higher (9/23)

Outcome 3: Evaluate technical publications

Assessment: This objective was assessed in Spring 2017 in EME5353 Transport Phenomena I. Students were asked to find experimental or computational journal papers on the field of momentum transport phenomena, study and evaluate the recent advances in this field. This task was assigned as a project which was 15% of their total grade and the students worked in teams of four.

Results: 52% of the students scored 85% or higher (17/33)

Outcome 4a: Effective communication-written

Assessment: EME5353 Transport Phenomena I course in Spring 2017 was used to evaluate this outcome. Communication skills in written were assessed in the same project described in the previous Outcome 3. Rubrics were used to score the written reports. Reports were graded by the instructor.

Results: 39% of the students scored 85% or higher (13/33)

Outcome 4b: Effective communication-oral

Assessment: EME5353 Transport Phenomena I course in Spring 2017 was used to evaluate this outcome. Communication skills in oral were assessed in the same project described in the previous Outcomes 3 and 4a. Rubrics were used to score the oral presentation of their reports. The presentations were graded both by the instructor as well as student peer evaluation.

Results: 38% of the students scored 85% or higher (12/33)

Outcome 5: Lifelong learning, responsibilities

Assessment: This outcome will be assessed by conducting survey of graduating MSME students.

Results: Incomplete. Graduate student exit survey has not been deployed yet.

3. Assessment Plan for 2017-2018 Academic Year

The 2017-2018 plan will focus on two action items: (1) A close-loop meeting will be scheduled to review the current data as well as the learning outcomes they address. Modifications to the assessment plan as well as the rubrics will be proposed based on the discussion. (2) Continue to collect data for all learning outcomes. (3) Develop an exit survey for MSME graduating students for assessing Outcome #5.

*MS in Mechatronic Systems Engineering***1. Assessment Plan and Summary****Table 1: Assessment Plan for MS in MSE**

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	Students will learn and apply mechatronic engineering principles and theories.	MSE 5523 or MSE 6313 Common final exam problem which is scored using a rubric.	80% of students will score 85% or better on the common final exam problem.	Every Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	Students will develop analytical and problem solving skills for mechatronic systems.	MSE 6183 Analysis and interpretation of a peer reviewed technical paper using software which is scored using a rubric.	80% of students will score 85% or better in analysis and interpretation.	Every Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	Students will be able to evaluate technical mechatronics engineering publications.	MSE 6183 Evaluation of a peer reviewed technical paper which is scored using a rubric.	Using a rubric, 80% of students will score 85% or better for their overall evaluation.	Every Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	Students will be able to effectively communicate technical information.	MSE 5183/6183 Written report and oral presentation of one of the course projects which is scored using a rubric.	80% of students will score 85% or better for written, oral and graphical communication.	Every Semester	Annual
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	Students will understand the importance of lifelong learning and the professional and ethical responsibilities of the engineering profession.	EME 5323/6183 Mandatory attendance at seminars. Must also submit one page summary of each seminar which is scored using a rubric.	Must attend at least 3 seminars and receive a score of at least 85% for all summaries.	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

Data were collected based on the assessment plan, as modified in 2016.

Outcome 1: Advanced knowledge in discipline

Assessment: See Table 1 Results: Fail at

14.3% Issues and Actions:

Data were collected with the same common final exam problem in Spring 2017. Loop closing will be in 2018.

Responsibility:

Implementing: James Mynderse, course coordinator

Tracking: James Mynderse, program director

Outcome 2: Analytic and problem-solving skills

Assessment: See Table 1 Results: Fail at

60.0% Issues and Actions:

Based on the previous loop closing, assessment of this outcome was modified. The final project in MSE 6183 was scored with a common rubric. Results after one semester are not significant with only five MSMSE students enrolled in MSE 6183. Loop closing will be in 2018.

Responsibility:

Implementing: James Mynderse, course coordinator

Tracking: James Mynderse, program director

Outcome 3: Evaluate technical publications

Assessment: See Table 1 Results: Fail at

40.0% Issues and Actions:

Data was collected in Spring 2017. Results after one semester are not significant with only five MSMSE students enrolled in MSE 6183. Loop closing will be in 2018.

Responsibility:

Implementing: James Mynderse, course coordinator

Tracking: James Mynderse, program director

Outcome 4: Effective communication

Assessment: See Table 1

Results: Pass at 100% (oral), ??? (written) Issues and Actions:

Oral communication data was collected in both MSE 5183 and MSE 6183.

Written communication data was collected in all sections but not yet tallied.

Results are calculated based only on MSMSE students. Loop closing will be in 2018.

Responsibility:

Implementing: James Mynderse, course coordinator

Tracking: James Mynderse, program director

Outcome 5: Lifelong learning, responsibilities

Assessment: See Table 1 *Results:*

Incomplete Issues and Actions:

Recommendations were made in 2016 for changing this assessment but were not yet implemented. I recommend that “professional issues” be assessed using a rubric to evaluate the entrepreneurially minded learning (EML) component of existing projects in MSE 5183 and MSE 6183.

Responsibility:

Implementing: James Mynderse, course coordinator

Tracking: James Mynderse, program director

3. Assessment Plan for 2017-2018 Academic Year

A revised assessment plan based on the recommendations above was developed. Data-taking began in 2016-2017 based on the revised assessment plan. Loop closing will begin in 2017-2018.

PhD in Civil Engineering

1. Assessment Plan and Summary

The student outcomes for the PhD in Civil Engineering program are assessed primarily with research outputs only. PhD students have coursework requirements. However, the assessment of all graduate level civil engineering courses including the 6000 level courses is administered within the MCEM and MSCE programs. The primary components for assessing the PhD program are; (i) independent research (ECE 7993), (ii) proposal examination, (iii) final defense, and (iv) exit interviews. The PhD program is assessed yearly although limited output is often available.

The student outcomes associated with all civil engineering programs have been adopted from the Body of Knowledge 2 (BOK2) promulgated by ASCE. The three student outcomes specifically for the PhD program are shown below (a, b, and c). Outcome titles based on BOK2 are given in parenthesis.

- (a) *Evaluate* the effectiveness of a designed experiment in meeting an ill-defined realworld need (BOK2: Experiments)
- (b) *Evaluate* a complex system or process, or evaluate the validity of newly-created knowledge in a traditional or emerging advanced specialized technical area appropriate to civil engineering (BOK2, Technical specialization)
- (c) *Plan, compose and integrate* the verbal, written, virtual, and graphical communication of a project to technical and non-technical audiences (BOK2, Communication)

The PhD student outcomes support the university graduate learning outcomes as described in Table 1 which outlines the assessment plan for the 2016-2017 academic year. Please refer to the second column in Table 1 to see the inter-relationship between the university graduate learning outcomes and the PhD student outcomes. Program assessment is conducted using the following methods:

Independent Research: May not be applicable for all students. It is common for a PhD student to take ECE 7993 CE Independent Research at least once in the first two years as a means to initiate research. These credits are not assessed at the master's level and need to be assessed as part of the PhD program. A rubric is filled out by the instructor in regards to student performance. The results are meant to assess early research capabilities.

Evaluation of Dissertation Research Components (i.e. Proposal Exam and Final Defense): The members of the committee are to provide their evaluations outlining the quality of the proposal as well as the dissertation and final defense using the rubric provided to them. The final defense and written report (dissertation) are the most important elements when evaluating the performance of the student.

Exit Interviews: The objective of the exit interview is to receive a summative view of what is happening in the department and an indication of overall student satisfaction. The program director conducts exit interviews. The process includes a survey form to be filled out by students regarding their education at LTU and specific graduate student outcomes followed by a brief interview by the program director.

The results of the assessment of the student outcomes are to be presented to the department faculty during the annual close loop meeting in summer. However, very minimal results needed to be discussed in the previous year due to the small number of PhD students in the program and since no students have completed the program as discussed in Section 2.

Table 1: Assessment Plan for the PhD in CE Program

University Graduate Learning Outcomes	Supporting Program Outcomes*	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop-Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	(a) <i>Evaluate</i> the effectiveness of a designed experiment in meeting an ill-defined real-world need (b) <i>Evaluate</i> the design of a complex system or process, or evaluate the validity of newly- created knowledge in a traditional or emerging advanced specialized technical area appropriate to civil engineering	Evaluation of Dissertation Proposal and Final Defense using a rubric Performance in ECE 7993 Independent Research is assessed	85% of graduating students should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	(a) <i>Evaluate</i> the effectiveness of a designed experiment in meeting an ill-defined real-world need (b) <i>Evaluate</i> the design of a complex system or process, or evaluate the validity of newly- created knowledge in a traditional or emerging advanced specialized technical area appropriate to civil engineering	Evaluation of Dissertation Proposal and Final Defense using a rubric Performance in ECE 7993 Independent Research is assessed	85% of graduating students should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	(a) <i>Evaluate</i> the effectiveness of a designed experiment in meeting an ill-defined real-world need (b) <i>Evaluate</i> the design of a complex system or process, or evaluate the validity of newly- created knowledge in a traditional or emerging advanced specialized technical area appropriate to civil engineering	Evaluation of Dissertation Proposal and Final Defense using a rubric Performance in ECE 7993 Independent Research is assessed	85% of graduating students should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	(c) Plan, compose and integrate the verbal, written, virtual, and graphical communication of a project to technical and non- technical audiences	Evaluation of Dissertation Proposal and Final Defense using a rubric	85% of graduating students should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual
“LU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	(a) <i>Evaluate</i> the effectiveness of a designed experiment in meeting an ill-defined real-world need (b) <i>Evaluate</i> the design of a complex system or process, or evaluate the validity of newly- created knowledge in a traditional or emerging advanced specialized technical area appropriate to civil engineering	Exit Interview	Exit interview survey, 85% of graduating students should reach the highest expected achievement level for each outcome based on BOK2.	Each Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

Multiple forms of assessment were utilized in the previous academic year. However, only one or two students completed one general requirement that was assessed. One student performed ECE 7993 Independent Research, one student completed the qualifying examination, one student completed a proposal examination, and two students completed the PhD requirements and therefore, assessment data are available from the final defense rubric and from the exit interviews. There are three students in the program that continue to work on their PhD but no assessment information is available.

Independent Research, Falah Al-Almery, Instructor: Keith Kowalkowski, Spring 2017. Student performed subpar with all scores of 9 or 10 in merits, complexity, and technical performance. However, the report submitted was not as expected. The research was challenging and the student completed the research work but the report was subpar. Therefore, the student did not perform well on graphics and report writing. The student was asked to perform a more comprehensive literature review, which was also inadequate. A score of 5 was given to all three categories. Overall, the performance in the course was below the performance in the students previous independent research class.

Qualifying Examination, Falah Al-Almery. There is no rubric for the qualifying examination. However, one student did complete in the summer of 2017. The student performance was well below expectations. The discussion afterwards from the faculty reveals we may need a new format for the qualifying examination all together. The new qualifying examination will have more of an emphasis on research components and allow the student to present on previous research work done at LTU or elsewhere. The student in question had a significant break between previous academics at the mater's level and the qualifying. Some of the classes in which the qualifying covers were taken at another university.

Proposal Examination, Abdulla Ali. Student completed the proposal in May 2017. The student performance on the proposal examination was average. The student did not perform well on the proposal. The student focused on work done to setup simulations but it was not clear what the student was going to do or how the research would be evaluated. Also, the format and appearance of the presentation was subpar. However, the student later followed up with the defense committee in the summer of 2017 and the committee was pleased with the updates made. The rubric scores were low but the final proposal was adequate. Therefore, the scores are somewhat misleading with ranges of 5-8 of 10 from the various committee members.

Final Defense, Haithem Aboujrad and Samer Alsharif, Samer Alsharif did an exceptional job on the final dissertation and did very good explaining. All scores on the final rubric from all three evaluators were 8 of 10 or above with one score of a 7. The student average was well above the 8.5 minimum level of achievement expected from a PhD student. The work of Haithem Aboujrad was not quite as adequate. However, this student's advisor, Dr. Luis Mata moved to the Univeristy of Toledo, which made the completion of the research challenging. Final scores on the rubrics ranged primarily from 6-8 out of 10. Therefore, of the two PhD students, one had what was considered an acceptable level of achievement and the other did not.

Exit Interview, Haithem Aboujrad. Both students completing the PhD were asked to complete the Exit Interview questionnaire. However, only one responded. A copy of the responses are found in the

Appendix. Overall, the comments of Dr. Aboujrad are favorable with the only negative comments suggesting that LTU needs to broaden their research capabilities for students. Overall, the student responses were favorable since the student was shuffled around after the advisor moved to the University of Toledo.

3. Assessment Plan for 2017-2018 Academic Year

The program director will continue to use the same assessment techniques in the following academic year as in the previous academic year. Thus far, there is too small of a sample size to deviate from the assessment plan. It is unknown how many students will complete in the next academic year. It is assumed that at least two students will.

In general, the activities of three PhD students have been slow. Some of them continue to work on their dissertation and are taking longer than an average PhD student. Of the current 5 PhD students, 4 are in the stage of currently working on their dissertation. The remaining student recently completed their qualifying exam but will need to retake it. A more thorough assessment of the program can be performed after the completion of at least 4 students. Thus far, only two students have completed the program. Then, all assessment measures can be looked at together.

As discussed in last year's assessment report, the department has struggled with some of the initial group of PhD students with respect to English skills, attitude, and their previous education. The department is in need of new applications of students starting the PhD program as the two students that are currently working on course work are both in structural engineering.

*Doctorate in Mechanical Engineering***1. Assessment Plan and Summary**

See Table 1.

Table 1: Assessment Plan for DEME

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	Students will demonstrate a mastery of knowledge and understanding in their chosen sub-discipline specialization within mechanical engineering.	Dissertation Assess using rubric	All students will receive 85% or higher from dissertation committee	Every Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	Students will be able to identify a topic for research in their chosen sub-discipline specialization within mechanical engineering and formulate a proposal for conducting the research.	Dissertation Assess using rubric	All students will receive 85% or higher from dissertation committee	Every Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	Students will conduct and disseminate independent research which results in new knowledge in their chosen sub- discipline specialization within mechanical engineering.	Dissertation Assess using rubric	All students will receive 85% or higher from dissertation committee	Every Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	Students will be able to effectively document and communicate their research.	Dissertation Assess using rubric	All students will receive 85% or higher from dissertation committee	Every Semester	Annual
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	Students will understand the importance of lifelong learning and the professional and ethical responsibilities of the engineering profession.	Survey of graduating DEME students	All students must explain the importance of lifelong learning and professional responsibilities,	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

The rubric for assessing student performance in their dissertation proposal exam stayed the same as the previous year (shown in Table 2). The grading covers eight evaluation items and each has a 1-5 scale: 1 = Needs significant improvement, 5 = Excellent. The rubric for final dissertation defense is very similar, with one additional evaluation item 9 “Publications: Journal or conference publications have resulted or are anticipated from this research”.

Every single student who had his/her proposal exam or final defense during the past year was assessed using the rubrics and data from all committee members were recorded. During the past year 2016 Fall – 2017 Summer, there were three DEME students who successfully defended their dissertations and graduated, and one student who passed his proposal exam. Assessment data are shown in Table 1b.

The Doctoral Procedures Committee had a close-loop meeting on February 3rd, 2017 and reviewed the current data as well as the learning outcomes they address. Two modifications to the assessment plan were proposed and approved based on the discussion:

First of all, because an evaluation item 8. Broader Impact (Demonstrates awareness of broader implications of the proposed research. Broader implications may include social, economic, technical, ethical, business, etc. aspects) has been included on the current rubrics, which addresses Outcome #5, the committee decided to eliminate the exit survey and use item 8 on rubrics to cover the sustainability and social, ethical, etc. aspects. Currently, the item 7 on rubrics shown in Table 1a is used for assessing Learning Outcome #1; item 4 is used for Learning Outcome #2; item 2 for Learning Outcome #3; item 6 for Learning Outcome #4; and item 8 for Learning Outcome #5.

Secondly, because of the difference between dissertation exams and traditional course exams, the committee decided to change metrics from Table 1 from 85% to "Students should receive ‘Acceptable’ from all members on the dissertation committee", which is scale 3 out of 5. The data shown in Table 2 indicate that all the students met the requirements overall, with one student not meeting requirement on item 6.

Table 2. Final Defense Assessment Data from Fall 2016-Summer 2017

Evaluation Items	Munther Hermez (Defense)	Mohamad Kheirallah (Defense)	Saleh Morjan (Defense)	Abdallah Hamieh (Proposal)
1. Problem Definition	4.50	3.80	4.20	3.83
2. Literature and Previous Work	4.17	3.60	4.20	4.17
3. Impact of Proposed Research	4.33	4.00	4.20	4.17
4. Solution Approach	3.83	3.80	4.20	3.50
5. Results	3.67	3.40	4.00	3.67
6a. Quality of Written Communication	3.67	2.80	3.80	4.00
6b. Quality of Oral Communication	3.83	2.80	3.80	4.33
7. Critical Thinking	3.83	3.25	4.00	4.00
8. Broader Impact	4.17	4.20	4.40	4.17
9. Publications	4.40	4.00	4.60	N/A
Overall Assessment	4.00	3.25	4.25	3.67

3. Assessment Plan for 2017-2018 Academic Year

The 2017-2018 plan will be to continue to collect data for all DEME students who defend/propose their dissertations in the next year.

Doctorate in Manufacturing Systems

1. Assessment Plan and Summary

See Table 1. In addition, the tools for the first four Learning Objectives were for both the Proposal Exam and the Final Defense Exam. However, last year there were no students who did a Proposal Exam. With the program being shut down and no more students entering program as of Fall 2015, a review of all the remaining active students (some students in the program have not been active in more than a year and are not returning) in the program revealed that nearly all of them have already passed their Proposal Exam. Because of this, the tools have been changed so that only the Final Defense Exam is evaluated for attainment of the first four learning objectives.

Table 1. Assessment Plan for DEMS

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	Students will demonstrate a mastery of knowledge and understanding of manufacturing systems.	Dissertation Assess using rubric	Student will receive at least “Acceptable” rating from all committee members	Every Semester	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	Students will provide a plan, including the methods/tools, for solving their problem and conducting their research.	Dissertation Assess using rubric	Student will receive at least “Acceptable” rating from all committee members	Every Semester	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	Students will conduct and disseminate independent research which results in new knowledge.	Dissertation Assess using rubric	Student will receive at least “Acceptable” rating from all committee members	Every Semester	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	Students will be able to effectively document and communicate their work.	Dissertation Assess using rubric	Student will receive at least “Acceptable” rating from all committee members	Every Semester	Annual
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	Students will understand the importance of lifelong learning and the professional responsibilities of the engineering profession.	Survey of graduating DEMS students	All students will be able to explain the importance of lifelong learning and professional responsibilities	Every Semester	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

Assessment data for this year includes five students who graduated from the program in May 2017. Results are as follows:

Learning Objective #1: Students will demonstrate a mastery of knowledge and understanding of manufacturing systems.

Student #1 score: 1 Acceptable, 2 Very Good, 2 Excellent

Student #2 score: 2 Acceptable, 3 Very Good

Student #3 score: 1 Acceptable, 3 Very Good, 4 Excellent

Student #4 score: 3 Acceptable, 2 Very Good, 1 Excellent

Student #5 score: 1 Acceptable, 3 Very Good, 1 Excellent

The results show that the student met the required metrics (received at least Acceptable from all committee members). There are no issues/concerns at this time.

Learning Objective #2: Students will provide a plan, including the methods/tools, for solving their problem and conducting their research.

Student #1 score: 1 Acceptable, 2 Very Good, 2 Excellent

Student #2 score: 3 Acceptable, 1 Very Good, 1 Excellent

Student #3 score: 3 Very Good, 5 Excellent

Student #4 score: 6 Acceptable

Student #5 score: 1 Acceptable, 3 Very Good, 1 Excellent

The results show that the student met the required metrics (received at least Acceptable from all committee members). There are no issues/concerns at this time.

Learning Objective #3: Students will conduct and disseminate independent research which results in new knowledge

Student #1 score: 1 Acceptable, 1 Very Good, 3 Excellent

Student #2 score: 3 Acceptable, 2 Very Good

Student #3 score: 1 Acceptable, 2 Very Good, 5 Excellent

Student #4 score: 1 Acceptable, 4 Very Good, 1 Excellent

Student #5 score: 1 Acceptable, 3 Very Good, 1 Excellent

The results show that the student met the required metrics (received at least Acceptable from all committee members). There are no issues/concerns at this time.

Learning Objective #4: Students will be able to effectively document and communicate the results of their research.

Student #1: Written – 1 Acceptable, 3 Very Good, 1 Excellent
Oral – 1 Acceptable, 4 Very Good

Student #2: Written – 3 Acceptable, 2 Very Good
Oral – 3 Acceptable, 2 Very Good

Student #3:	Written – 5 Very Good, 3 Excellent Oral – 1 Very Good, 6 Excellent
Student #4:	Written – 1 Acceptable, 4 Very Good, 1 Excellent Oral – 1 Needs Improvement, 1 Acceptable, 1 Very Good, 1 Excellent
Student #5:	Written – 2 Acceptable, 2 Very Good, 1 Excellent Oral – 1 Acceptable, 3 Very Good, 1 Excellent

The results show that student #4 received one ‘Needs Improvement’ for the oral communication (written communication was ok). The other committee members rated that student at least Acceptable, indicating that there does not appear to be an issue with the student’s oral communication and that the one committee members response of “Needs Improvement” was maybe an outlier.

Learning Objective #5: Students will understand the importance of lifelong learning and the professional responsibilities of the engineering profession.

An exit survey of graduating students was sent out and two out of five (40 %) responded. The survey asked the students to respond regarding Learning Objective #5 and the responses were:

- LTU Graduates specific DEMS will develop very strong leadership, ethics learning..etc. When I said specific DEMS I mean it because I see most of the DEMS Graduates are very successful doctors, like supervisors, directors, chief engineers and even several CEOs.
- I think the only class that stressed out these perspectives is the Strategic planning class.

It appears that students do recognize having addressed the issues pertaining to the Learning Objective, however, the question on the survey may not be well stated. The question will be revised to try and get more detailed information from the student as it pertains to this Learning Objective.

3. Assessment Plan for 2017-2018 Academic Year

The rubric appears to be working well - will continue to use it to evaluate only the Final Defense exam.

The question on the exit survey related to Learning Objective #5 will be reviewed and revised. Will work to get a higher response rate in the future.

College of Management

BS in Business Administration

1. Assessment Plan and Summary

The assessment plan for the BSBA program is designed to address the functional areas of business pertinent to an undergraduate degree in Business Administration. When students complete the BSBA at Lawrence Tech, they should be knowledgeable about fundamental business issues and processes in business. In addition to demonstrating overall Knowledge in business, BSBA graduates should demonstrate specific knowledge or skills in Technology, Sustainability, Communication, Mathematics, Reading, Scientific Analysis, Leadership, Teamwork, and Ethics.

The assessment plan for the BSBA program is provided in Table 1 and the plan for continuous improvement is shown in Figure 1. As shown in Table 1, annual assessment and closing the loop of student overall knowledge and specific knowledge in sustainability and mathematics occurs via the ETS Major Field Test in Business, a comprehensive examination organized into multiple content areas of business knowledge administered to all business seniors. The ETS Major Field Test in Business is also used to assess student reading. Table 1 also shows triennial assessment and closing the loop of student skills in technology, communication, scientific analysis, leadership, teamwork and ethics, via course embedded rubrics that assess required assignments in specific BSBA courses.

Table 1: Assessment Plan for the BSBA Program

LTU Undergraduate Learning Outcomes	Student Outcomes*	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop Closing Timeline
<p>KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	<p>Students will demonstrate knowledge of core business administration concepts in accounting, economics, management, quantitative business analysis, finance, marketing, legal and social environment, information systems, and international issues.</p>	<p>A comprehensive standardized examination organized into multiple content areas of business knowledge administered to all seniors.</p>	<p>ETS Major Field Test in Business. Results of the overall score in scaled range of 120-200. Target scaled score = within 1 standard deviation (SD) below the standardized scale mean = 152, SD = 13.8, (i.e., > 138.2).</p>	<p>Fall/Spring: INT4303 and MGT4213</p>	<p>Annual</p>
<p>TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	<p>Students will demonstrate mastery of communication of technology via use of media and quality of slides, or via use of online discussion board.</p>	<p>Course embedded rubric of required oral presentation or online discussion board in HRM 3023, Human Resource Management; MGT 2203, Principles of Management; MKT 2013, Principles of Marketing.</p>	<p>Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary</p>	<p>Fall/Spring: HRM3023, MGT2203, MKT2013</p>	<p>Annual</p>
<p>SUSTAINABILITY "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."</p>	<p>Students will demonstrate knowledge of core business concepts in business sustainability (i.e., knowledge related to managing the triple bottom line in terms of financial, social and environmental risks).</p>	<p>A comprehensive standardized examination organized into multiple content areas of business knowledge administered to all seniors.</p>	<p>ETS Major Field Test in Business. Results of the Economics subtest scored in percentage range of 0-100. Target percentage = within 1 standard deviation (SD) of the standardized percentage mean = 39.6, SD = 6.1 (i.e., > 33.5).</p>	<p>Fall/Spring: INT4303 and MGT4213</p>	<p>Annual</p>
<p>COMMUNICATION “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	<p>Students can develop and deliver a compelling oral presentation grounded in relevant information and facts; Students can deliver a compelling oral presentation with clarity and appropriate poise; and Students can write professional-quality documents.</p>	<p>Course embedded rubric of required oral and written presentations in HRM 3023, Human Resource Management; MGT 2203, Principles of Management; MKT 2013, Principles of Marketing.</p>	<p>Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary</p>	<p>Fall/Spring: HRM 3023, MGT 2203, MKT 2013</p>	<p>Annual</p>

<p>MATHEMATICS “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>	<p>Students will demonstrate knowledge of core business concepts in mathematics (i.e., knowledge related to accounting and finance).</p>	<p>A comprehensive standardized examination organized into multiple content areas of business knowledge administered to all seniors.</p>	<p>ETS Major Field Test in Business. Combined mean results of the Accounting and Finance subtests scored in percentage range of 0-100. Target percentage = within 1 standard deviation (SD) of the combined standardized percentage mean = 41.8, SD = 6.25 (i.e., > 35.6).</p>	<p>Fall/Spring: INT4303 and MGT4213</p>	<p>Continuously by the University</p>
<p>READING “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>	<p>Students will demonstrate proficiency in reading and interpreting brief case studies about core business administration concepts in accounting, economics, management, quantitative business analysis, finance, marketing, legal and social environment, information systems, and international issues.</p>	<p>A comprehensive standardized examination organized into multiple content areas of business knowledge administered to all seniors.</p>	<p>ETS Major Field Test in Business. Results of the overall score in scaled range of 120-200. Target scaled score = within 1 standard deviation (SD) below the standardized scale mean = 152, SD = 13.8, (i.e., > 138.2).</p>	<p>Fall/Spring: INT4303 and MGT4213</p>	<p>Continuously by the University</p>
<p>SCIENTIFIC ANALYSIS “LTU graduates will demonstrate critical thinking and apply analytical and problem- solving skills in scientific fields.”</p>	<p>Students can identify main problem and key assumptions, can evaluate the relevance of data, and can present feasible solution.</p>	<p>Course embedded rubric of required written presentations in FIN 3103, Financial Management; MGT 2203, Principles of Management; MGT 3103, Project Management; MGT 3113, Operations Management; MGT 4213, Strategic Management and Business Policy.</p>	<p>Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary</p>	<p>Fall/Spring: MGT2203, MGT3103, MGT3113</p>	<p>Annual</p>
<p>LEADERSHIP “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>	<p>Students can demonstrate effective leadership skills in a team project in terms of motivation, delegation, and conflict resolution.</p>	<p>Course embedded rubric of required assignment in HRM 3023, Human Resource Management; MGT 2203, Principles of Management; MGT 3103, Project Management; MKT 2013, Principles of Marketing.</p>	<p>Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary</p>	<p>Fall/Spring: HRM3023, MGT2203, MKT2013, MGT3103</p>	<p>Continuously by the University</p>
<p>TEAMWORK “LTU graduates will demonstrate team- building and collaboration skills by making decisions, building</p>	<p>Students can demonstrate appropriate group techniques to participate in a team task that results in effective performance in terms of attendance,</p>	<p>Course embedded rubric of required assignment in HRM 3023, Human Resource Management;</p>	<p>Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient</p>	<p>Fall/Spring: HRM3023, MGT2203, MKT2013,</p>	<p>Annual</p>

<p>consensus, resolving conflicts, and evaluating team members' contributions."</p>	<p>preparation, contribution, participation, and accountability.</p>	<p>MGT 2203, Principles of Management; MGT 3103, Project Management; MKT 2013, Principles of Marketing.</p>	<p>3, 4 = competent 5, 6 = exemplary</p>	<p>MGT3103</p>	
<p>PROFESSIONAL ETHICS "LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions."</p>	<p>Students can recognize the ethical issues implicit in a business situation, can describe and use ethical frameworks application to business situations, and can develop a variety of ethical alternatives for resolving or at least addressing, a problem in business.</p>	<p>Course embedded rubric of required assignment in ACC 2013, Introduction to Financial Accounting; FIN 3103, Financial Management; HRM 3023, Human Resource Management.</p>	<p>Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary</p>	<p>Fall/Spring: ACC2013, ACC2023, FIN3103, HRM3023</p>	<p>Annual</p>

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

1. Knowledge of Business

- Objective/Outcome: Students will demonstrate knowledge of core business administration concepts in accounting, economics, management, quantitative business analysis, finance, marketing, legal and social environment, information systems, and international issues.
- Assessment: ETS® major-field test (MFT) for the bachelor's degree in business—overall score. Target scaled score = within 1 standard deviation (SD) below the standardized scale mean = 152, SD = 13.8, (i.e., > 138.2).
- Evaluation: 16 seniors completed the ETS MFT in business, Fall 2016, Spring 2017. Mean scaled score = 141, SD = 14 (i.e., 127-155).
- Issue: While student mean performance fell within the target score, given the SD of 14, some students performed below the target mean.
- Current/Future Actions: The College is in its third year of ownership of the BSBA program (prior, the College of Arts and Sciences had ownership of the BSBA). Beginning in Fall 2019 the program will have its first graduates that completed the full 4-year BSBA program which now has courses in the core business concepts assessed by the ETS test (with the exception of Economics which is still taught by the College of Arts of Sciences). Students who have completed the ETS to date are either BSBA transfer students or students who started the program in the College of Arts and Sciences.
- Responsibility: All faculty in the College.
- University/College Support for Objective: The College Curriculum and Standards Committee is involved with addressing ETS scores to determine possible changes to the curriculum in response to the overall score.

2. Technology

- Objective/Outcome: Students will demonstrate mastery of communication of technology via use of media and quality of slides, or via use of online discussion board.
- Assessment: Oral communication rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Assigned oral presentations in HRM3023 and MGT2203, Spring 2017. Oral communication mean scores for Use of Media = 4.0, Quality of Slides = 4.0.
- Issue: Oral communication assessment scores in all content areas of Technology are above target mean score of 3.5.
- Current/Future Actions: Faculty will continue to support student use of technology for communication.
- Responsibility: All faculty in the College.
- University/College Support for Objective: University offers the Academic Achievement Center and Computer Help Desk.

3. Sustainability

- Objective/Outcome: Students will demonstrate knowledge of core business concepts in business sustainability (i.e., knowledge related to managing the triple bottom line in terms of financial, social and environmental risks).
- Assessment: ETS® major-field test (MFT) for the bachelor's degree in business—Economics subtest. Target percentage = within 1 standard deviation (SD) of the combined standardized percentage mean = 39.6, SD = 6.1, (i.e., > 33.5).
- Evaluation: 16 seniors completed the ETS MFT in business, Fall 2016, Spring 2017. Mean percentage for Economics = 30 (SD not reported).

- Issue: Student performance was below the target percentage.
 - Current/Future Actions: Although the Economics courses are taught by the College of Arts of Sciences, the College of Management has directed faculty to address economics in their courses.
 - Responsibility: All faculty in the College.
 - University/College Support for Objective: The College Curriculum and Standards Committee is involved with addressing changes to college curriculum involving the teaching of economics.
4. Communication
- Objective/Outcome: Students can develop and deliver a compelling oral presentation grounded in relevant information and facts; Students can deliver a compelling oral presentation with clarity and appropriate poise; and Students can write professional-quality documents.
 - Assessment: Oral communication and Written communication rubrics scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
 - Evaluation: Assigned oral presentations in HRM3023 and MGT2203, Spring 2017; Assigned written assignments in HRM3023 and MGT2203, Spring 2017. Oral communication mean scores for Opening Statement = 3.8, Organization = 4.0, Content = 3.9, Conclusion = 3.7, Timing = 3.9, Clarity of Speech = 3.2, Engages Audience = 3.2, Appearance = 3.9; Written communication mean scores for Introduction = 4.4, Organization = 4.6, Content = 4.6, Conclusion = 3.9, Grammar & Spelling = 4.0, APA Style = 3.6.
 - Issue: Oral communication assessment scores are above target mean score of 3.5 for Opening Statement, Organization, Content, Conclusion, Timing, and Appearance; Oral communication assessment scores are at or below target mean score of 3.5 for Clarity of Speech, and Audience Engagement. Written communication assessment scores are above target mean score of 3.5 for Introduction, Organization, Content, Conclusion, and Grammar & Spelling; Written communication assessment scores are at or below target mean score of 3.5 for APA Style.
 - Current/Future Actions: Students need to increase oral presentation dress rehearsals to improve performance in the areas of Clarity of Speech and Audience Engagement. Students need to improve written communication performance in the area of APA Style. Courses will include more detailed instruction on APA Style. Students should use the Academic Achievement Center.
 - Responsibility: All faculty in the College.
 - University/College Support for Objective: University offers the Academic Achievement Center which is available to help students increase written communication performance; College offers Toastmasters program to help students increase oral communication performance.
5. Mathematics
- Objective/Outcome: Students will demonstrate knowledge of core business concepts in mathematics (i.e., knowledge related to accounting and finance).
 - Assessment: ETS® major-field test (MFT) for the bachelor's degree in business—Economics subtest. Target percentage = within 1 standard deviation (SD) of the combined standardized percentage mean = 41.8, SD = 6.25, (i.e., > 35.6).
 - Evaluation: 16 seniors completed the ETS MFT in business, Fall 2016, Spring 2017. Mean combined percentage for Accounting + Finance = 35.5 (SD not reported).
 - Issue: Student performance was below the target percentage.
 - Current/Future Actions: Faculty in the Accounting and Finance areas are directed to review ETS practice test questions in account and finance to determine areas for improving student performance.
 - Responsibility: All faculty in the College.

- University/College Support for Objective: The College Curriculum and Standards Committee is involved with addressing changes to college curriculum involving the teaching of accounting and finance.
6. Reading
- Objective/Outcome: Students will demonstrate proficiency in reading and interpreting brief case studies about core business administration concepts in accounting, economics, management, quantitative business analysis, finance, marketing, legal and social environment, information systems, and international issues.
 - Assessment: ETS® major-field test (MFT) for the bachelor's degree in business—overall score. Target scaled score = within 1 standard deviation (SD) below the standardized scale mean = 152, SD = 13.8, (i.e., > 138.2).
 - Evaluation: 16 seniors completed the ETS MFT in business, Fall 2016, Spring 2017. Mean scaled score = 141, SD = 14 (i.e., 127-155).
 - Issue: While student mean performance fell within the target score, given the SD of 14, some students performed below the target mean.
 - Current/Future Actions: The College will stress reading and interpretation of all material read in its courses.
 - Responsibility: All faculty in the College.
 - University/College Support for Objective: The College Curriculum and Standards Committee is involved with addressing ETS scores to determine possible changes to the curriculum in response to the overall score.
7. Scientific Analysis
- Objective/Outcome: Students can identify main problem and key assumptions, can evaluate the relevance of data, and can present feasible solution.
 - Assessment: Critical Thinking rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
 - Evaluation: Not assessed this academic year.
 - Issue: N/A
 - Current/Future Actions: Next assessment is Spring 2018.
 - Responsibility: All faculty in the College.
 - University/College Support for Objective: College curriculum and standards committee.
8. Leadership
- Objective/Outcome: Students can demonstrate effective leadership skills in a team project in terms of motivation, delegation, and conflict resolution.
 - Assessment: Teamwork rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
 - Evaluation: Not assessed this academic year.
 - Issue: N/A
 - Current/Future Actions: Next assessment is Spring 2018.
 - Responsibility: All faculty in the College.
 - University/College Support for Objective: College teaches leadership within the course MGT2203, Principles of Management.
9. Teamwork

- Objective/Outcome: Students will demonstrate appropriate group techniques to participate in a team task that results in effective performance in terms of attendance, preparation, contribution, participation, and accountability.
- Assessment: Teamwork rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Assigned team-based project in HRM3023 and MGT2203, Spring 2017. Teamwork mean scores for Attendance = 4.7, Preparation = 4.6, Contribution = 4.7, Participation = 4.7, Accountability = 4.5.
- Issue: Assessment scores in all content areas of Teamwork are above target mean score of 3.5.
- Current/Future Actions: Faculty will continue to support team-based projects and activities.
- Responsibility: All faculty in the College.
- University/College Support for Objective: College provides team-building activities at the beginning of each semester.

10. Ethics

- Objective/Outcome: Students will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.
- Assessment: Ethics rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Assigned written assignments in ACC2013, Fall 2016, and HRM3023, Spring 2017. Ethics mean scores for Identification of Issues = 4.1, Accuracy of Legal Considerations = 3.8, Evaluate Ethical Alternatives = 3.3.
- Issue: Assessment scores in the Ethics content areas Identification of Issues, and Accuracy of Legal Considerations are above target mean score of 3.5; Ethics assessment score is below the target mean score of 3.5 for the content area Evaluate Ethical Alternatives.
- Current/Future Actions: Modification to course content to provide more case studies with ethical dilemmas and ethical decision making, and address teaching ethics and increasing student competency as ethical decision makers.
- Responsibility: All faculty in the College.
- University/College Support for Objective: College curriculum and standards committee consulted to address teaching ethics.

3. Assessment Plan for 2017-2018 Academic Year

1. Overall Knowledge in business will be assessed via the ETS Major Field Test (MFT) in Business in the course MGT4213 during Fall 2017 and Spring 2018.
2. Technology skill will be assessed via the Oral communication course embedded rubric in the courses HRM3023 and MKT2013 during the Fall 2017 semester.
3. Sustainability knowledge will be assessed via the ETS Major Field Test (MFT) in Business in the course MGT4213 during Fall 2017 and Spring 2018.
4. Communication skill will be assessed via the Oral and Written communication course embedded rubrics in the courses ACC2013, HRM3023 and MKT2013 during Fall 2017.
5. Mathematics knowledge will be assessed via the ETS Major Field Test (MFT) in Business in the course MGT4213 during Fall 2017 and Spring 2018.
6. Reading skill will be assessed via the ETS Major Field Test (MFT) in Business in the course MGT4213 during Fall 2017 and Spring 2018.

7. Scientific Analysis skill will be assessed via the Critical Thinking course embedded rubric in the courses MGT2203, MGT3103 or MKT3113 during Spring 2018.
8. Leadership skill will be assessed via the Leadership in Teams course embedded rubric in the courses HRM3023, MGT2203, MGT3103 or MKT2013 during Spring 2018.
9. Teamwork skill will be assessed via the Teamwork course embedded rubric in the courses HRM3023, MGT2203, MGT3103 or MKT2013 during Spring 2018.
10. Ethics skill will be assessed via the Ethics course embedded rubric in the courses ACC2013 and HRM3023 during Fall 2017.

BS in Information Technology

1. Assessment Plan and Summary

The assessment plan for the BSIT program is designed to address the functional areas of business pertinent to an undergraduate degree in Information Technology (IT). When students complete the BSIT at Lawrence Tech, they should be knowledgeable about fundamental business issues and processes in IT. In addition to demonstrating overall Knowledge in IT, BSIT graduates should demonstrate specific knowledge or skills in Technology, Sustainability, Communication, Mathematics, Reading, Scientific Analysis, Leadership, Teamwork, and Ethics.

The assessment plan for the BSIT program is provided in Table 1 and the plan for continuous improvement is shown in Figure 1. As shown in Table 1, annual assessment and closing the loop of student knowledge in IT and specific knowledge in sustainability and mathematics occurs via the ETS Major Field Test in Business, a comprehensive examination organized into multiple content areas of business knowledge administered to all seniors. The ETS Major Field Test in Business is also used to assess student reading. Table 1 also shows triennial assessment and closing the loop of student skills in technology, communication, scientific analysis, leadership, teamwork and ethics, via course embedded rubrics that assess required assignments in specific BSIT courses.

Figure 1. Continuous improvement process and outcomes assessment for BSIT

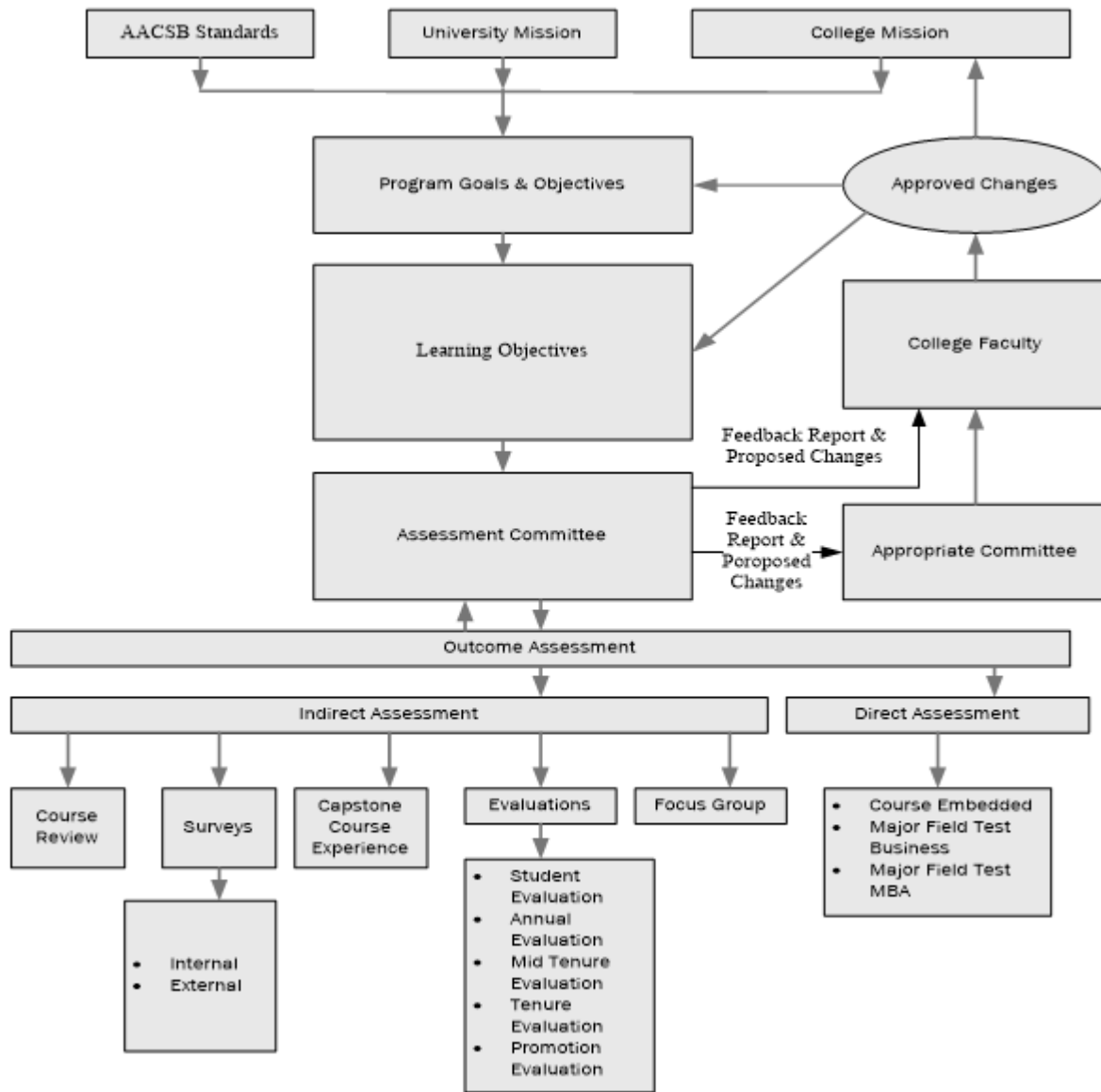


Table 1: Assessment Plan for the BSIT

LTU Undergraduate Learning Outcomes	Student Outcomes*	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop- Closing Timeline
<p>KNOWLEDGE IN DISCIPLINE “LTU graduates will demonstrate a mastery of the knowledge base in their discipline and an expertise in solving practical and theoretical problems.”</p>	<p>Students will demonstrate knowledge of core information systems concepts.</p>	<p>A comprehensive standardized examination organized into multiple content areas of business knowledge administered to all seniors.</p>	<p>ETS Major Field Test in Business. Results of the Information Systems subtest scored in percentage range of 0-100. Target percentage = within 1 standard deviation (SD) of the standardized percentage mean = 49.9, SD = 6.5 (i.e., > 43.4).</p>	<p>Fall/Spring: MGT4213 and INT4303</p>	<p>Annual</p>
<p>TECHNOLOGY “LTU graduates will demonstrate the ability to apply advanced technologies to practical and theoretical problems in their disciplines.”</p>	<p>Students will demonstrate mastery of communication of technology via use of media and quality of slides, or via use of online discussion board.</p>	<p>Course embedded rubric of required oral presentation or online discussion board in INT2103, Information Technology Management; INT3803, Database Systems II.</p>	<p>Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary</p>	<p>Fall/Spring: INT2103, INT3803, MGT2203</p>	<p>Annual</p>
<p>SUSTAINABILITY "LTU graduates will demonstrate an awareness of sustainability concepts within their discipline and their impact on the social, economic, and environmental needs of individuals and communities."</p>	<p>Students will demonstrate knowledge of core business concepts in business sustainability (i.e., knowledge related to managing the triple bottom line in terms of financial, social and environmental risks).</p>	<p>A comprehensive standardized examination organized into multiple content areas of business knowledge administered to all seniors.</p>	<p>ETS Major Field Test in Business. Results of the Economics subtest scored in percentage range of 0-100. Target percentage = within 1 standard deviation (SD) of the combined standardized percentage mean = 39.6, SD = 6.1 (i.e., > 33.5).</p>	<p>Fall/Spring: MGT4213 and INT4303</p>	
<p>COMMUNICATION “LTU graduates will demonstrate professional standards in written, oral and graphical communication by mastering the fundamentals of writing mechanics and integrating evidence and analysis within a coherent structure. In their oral communication, they will organize and deliver content with poise and articulation.”</p>	<p>Students can develop and deliver a compelling oral presentation grounded in relevant information and facts; Students can deliver a compelling oral presentation with clarity and appropriate poise; and Students can write professional-quality documents.</p>	<p>Course embedded rubric of required oral and written presentations in INT2103, Information Technology Management; INT4203 Systems Analysis & Design; MGT2203, Principles of Management.</p>	<p>Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary</p>	<p>Fall/Spring: INT2103, INT4203, MGT2203</p>	<p>Annual</p>

<p>MATHEMATICS “LTU graduates will demonstrate their mastery of mathematics to solve real-world problems by isolating relevant factors, constructing abstract models, communicating precisely and reasoning logically.”</p>	<p>Students will demonstrate knowledge of core business concepts in mathematics (i.e., knowledge related to accounting and finance).</p>	<p>A comprehensive standardized examination organized into multiple content areas of business knowledge administered to all seniors.</p>	<p>ETS Major Field Test in Business. Combined mean results of the Accounting and Finance subtests scored in percentage range of 0-100. Target percentage = within 1 standard deviation (SD) of the combined standardized percentage mean = 41.8, SD = 6.25 (i.e., > 35.6).</p>	<p>Fall/Spring: MGT4213 and INT4303</p>	<p>Continuously by the University</p>
<p>READING “LTU graduates will demonstrate proficiency in reading and interpreting complex, intellectually challenging texts and evaluating their analytical architecture from an independent point of view.”</p>	<p>Students will demonstrate proficiency in reading and interpreting brief case studies about core business administration concepts in accounting, economics, management, quantitative business analysis, finance, marketing, legal and social environment, information systems, and international issues.</p>	<p>A comprehensive standardized examination organized into multiple content areas of business knowledge administered to all seniors.</p>	<p>ETS Major Field Test in Business. Results of the overall score in scaled range of 120-200. Target scaled score = within 1 standard deviation (SD) below the standardized scale mean = 152, SD = 13.8, (i.e., > 138.2).</p>	<p>Fall/Spring: INT4303 and MGT4213</p>	<p>Continuously by the University</p>
<p>SCIENTIFIC ANALYSIS “LTU graduates will demonstrate critical thinking and apply analytical and problem-solving skills in scientific fields.”</p>	<p>Students can identify main problem and key assumptions, can evaluate the relevance of data, and can present feasible solution.</p>	<p>Course embedded rubric of required oral and written presentations in INT2103, Information Technology Management; INT4203 Systems Analysis & Design; MGT2203, Principles of Management.</p>	<p>Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary</p>	<p>Fall/Spring: INT2103, INT4203, MGT2203</p>	<p>Annual</p>
<p>LEADERSHIP “LTU graduates will demonstrate civic, team, and global leadership skills by identifying a personal leadership philosophy, exhibiting entrepreneurial skills, and becoming agents of positive change.”</p>	<p>Students can demonstrate effective leadership skills in a team project in terms of motivation, delegation, and conflict resolution.</p>	<p>Course embedded rubric of required assignment in INT2103, Information Technology Management; MGT2203, Principles of Management.</p>	<p>Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary</p>	<p>Fall/Spring: INT2103, INT4203, MGT2203</p>	<p>Continuously by the University</p>
<p>TEAMWORK “LTU graduates will demonstrate team-building and collaboration skills by making decisions, building consensus, resolving conflicts, and evaluating team members’ contributions.”</p>	<p>Students can demonstrate appropriate group techniques to participate in a team task that results in effective performance in terms of attendance, preparation, contribution, participation, and accountability.</p>	<p>Course embedded rubric of required assignment in INT2103, Information Technology Management; MGT2203, Principles of Management.</p>	<p>Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary</p>	<p>Fall/Spring: INT2103, INT4203, MGT2203</p>	<p>Annual</p>

PROFESSIONAL ETHICS “LTU graduates will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.”	Students can recognize the ethical issues implicit in a business situation, can describe and use ethical frameworks application to business situations, and can develop a variety of ethical alternatives for resolving or at least addressing, a problem in business.	Course embedded rubric of required assignment in INT2103, Information Technology Management; MGT2203, Principles of Management.	Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary	Fall/Spring: INT2103, INT4203, MGT2203	Annual
--	--	---	---	--	--------

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

1. Knowledge of Information Systems

- Objective/Outcome: Students will demonstrate knowledge of core business administration concepts in Information Systems.
- Assessment: ETS® major-field test (MFT) for the bachelor's degree in business—Information Systems subtest. Target percentage = within 1 standard deviation (SD) of the combined standardized percentage mean = 49.9, SD = 6.5 (i.e., > 43.4).
- Evaluation: 16 seniors completed the ETS MFT in business, Fall 2016, Spring 2017. Mean percentage for Information Systems = 48 (SD not reported).
- Issue: Student performance met criterion level.
- Current/Future Actions: Continue to utilize the ETS Business Information Systems subtest to assess Knowledge of Information Systems, but develop specific test just for BSIT seniors.
- Responsibility: All faculty in the College.
- University/College Support for Objective: The College Curriculum and Standards Committee is involved with addressing ETS scores to determine possible changes to the curriculum in response to the overall score.

2. Technology

- Objective/Outcome: Students will demonstrate mastery of communication of technology via use of media and quality of slides, or via use of online discussion board.
- Assessment: Oral communication rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Assigned oral presentations in MGT 2203, Spring 2017. Oral communication mean scores for Use of Media = 4.1, Quality of Slides = 4.1.
- Issue: Oral communication assessment scores in all content areas of Technology are above target mean score of 3.5.
- Current/Future Actions: Faculty will continue to support student use of technology for communication.
- Responsibility: All faculty in the College.
- University/College Support for Objective: University offers the Academic Achievement Center and Computer Help Desk.

3. Sustainability

- Objective/Outcome: Students will demonstrate knowledge of core business concepts in business sustainability (i.e., knowledge related to managing the triple bottom line in terms of financial, social and environmental risks).
- Assessment: ETS® major-field test (MFT) for the bachelor's degree in business—Economics subtest. Target percentage = within 1 standard deviation (SD) of the combined standardized percentage mean = 39.6, SD = 6.1, (i.e., > 33.5).
- Evaluation: 16 BSBA seniors completed the ETS MFT in business, Fall 2016, Spring 2017. Mean percentage for Economics = 30 (SD not reported).
- Issue: Student performance was below the target percentage.
- Current/Future Actions: Although the Economics courses are taught by the College of Arts of Sciences, the College of Management has directed faculty to address economics in their courses.
- Responsibility: All faculty in the College.
- University/College Support for Objective: The College Curriculum and Standards Committee is involved with addressing changes to college curriculum involving the teaching of economics.

4. Communication

- Objective/Outcome: Students can develop and deliver a compelling oral presentation grounded in relevant information and facts; Students can deliver a compelling oral presentation with clarity and appropriate poise; and Students can write professional-quality documents.
- Assessment: Oral communication and Written communication rubrics scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Assigned oral presentations in MGT2203, Spring 2017; Assigned written assignments in INT4203, Fall 2016. Oral communication mean scores for Opening Statement = 3.9, Organization = 4.0, Content = 3.9, Conclusion = 3.9, Timing = 3.9, Clarity of Speech = 3.5, Engages Audience = 3.3, Appearance = 4.0; Written communication mean scores for Introduction = 3.7, Organization = 3.7, Content = 3.6, Conclusion = 3.5, Grammar & Spelling = 3.3, APA Style = 3.5.
- Issue: Oral communication assessment scores are above target mean score of 3.5 for Opening Statement, Organization, Content, Conclusion, Timing, and Appearance; Oral communication assessment scores are at or below target mean score of 3.5 for Clarity of Speech, and Audience Engagement. Written communication assessment scores are above target mean score of 3.5 for Introduction, Organization, Content, Conclusion, and Grammar & Spelling; Written communication assessment scores are at or below target mean score of 3.5 for APA Style.
- Current/Future Actions: Students need to increase dress rehearsals to improve performance in the areas of Clarity of Speech and Audience Engagement. Students need to improve written communication performance in the area of APA Style. Courses will include more detailed instruction on APA Style. Students should use the Academic Achievement Center.
- Responsibility: All faculty in the College.
- University/College Support for Objective: University offers the Academic Achievement Center which is available to help students increase written communication performance; College offers Toastmasters program to help students increase oral communication performance.

5. Mathematics

- Objective/Outcome: Students will demonstrate knowledge of core business concepts in mathematics (i.e., knowledge related to accounting and finance).
- Assessment: ETS® major-field test (MFT) for the bachelor's degree in business—Economics subtest. Target percentage = within 1 standard deviation (SD) of the combined standardized percentage mean = 41.8, SD = 6.25, (i.e., > 35.6).
- Evaluation: 16 seniors completed the ETS MFT in business, Fall 2016, Spring 2017. Mean combined percentage for Accounting + Finance = 35.5 (SD not reported).
- Issue: Student performance was below the target percentage.
- Current/Future Actions: Faculty in the Accounting and Finance areas are directed to review ETS practice test questions in account and finance to determine areas for improving student performance.
- Responsibility: All faculty in the College.
- University/College Support for Objective: The College Curriculum and Standards Committee is involved with addressing changes to college curriculum involving the teaching of accounting and finance.

6. Reading

- Objective/Outcome: Students will demonstrate proficiency in reading and interpreting brief case studies about core business administration concepts in accounting, economics, management, quantitative business analysis, finance, marketing, legal and social environment, information systems, and international issues.

- Assessment: ETS® major-field test (MFT) for the bachelor's degree in business—overall score. Target scaled score = within 1 standard deviation (SD) below the standardized scale mean = 152, SD = 13.8, (i.e., > 138.2).
 - Evaluation: 16 BSBA seniors completed the ETS MFT in business, Fall 2016, Spring 2017. Mean scaled score = 141, SD = 14 (i.e., 127-155).
 - Issue: While student mean performance fell within the target score, given the SD of 14, some students performed below the target mean.
 - Current/Future Actions: The College will stress reading and interpretation of all material read in its courses.
 - Responsibility: All faculty in the College.
 - University/College Support for Objective: The College Curriculum and Standards Committee is involved with addressing ETS scores to determine possible changes to the curriculum in response to the overall score.
7. Scientific Analysis
- Objective/Outcome: Students can identify main problem and key assumptions, can evaluate the relevance of data, and can present feasible solution.
 - Assessment: Critical Thinking rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
 - Evaluation: Not assessed this academic year.
 - Issue: N/A
 - Current/Future Actions: Next assessment in INT2013, Spring 2018.
 - Responsibility: All faculty in the College.
 - University/College Support for Objective: College curriculum and standards committee.
8. Leadership
- Objective/Outcome: Students can demonstrate effective leadership skills in a team project in terms of motivation, delegation, and conflict resolution.
 - Assessment: Teamwork rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
 - Evaluation: Not assessed this academic year.
 - Issue: N/A
 - Current/Future Actions: Next assessment is Spring 2018.
 - Responsibility: All faculty in the College.
 - University/College Support for Objective: College teaches leadership within the course MGT 2203, Principles of Management.
9. Teamwork
- Objective/Outcome: Students will demonstrate appropriate group techniques to participate in a team task that results in effective performance in terms of attendance, preparation, contribution, participation, and accountability.
 - Assessment: Teamwork rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
 - Evaluation: Assigned team-based project in MGT2203, Spring 2017. Teamwork mean scores for Attendance = 4.7, Preparation = 4.6, Contribution = 4.7, Participation = 4.6, Accountability = 4.3.
 - Issue: Assessment scores in all content areas of Teamwork are above target mean score of 3.5.
 - Current/Future Actions: Faculty will continue to support team-based projects and activities.
 - Responsibility: All faculty in the College.

- University/College Support for Objective: College provides team-building activities at the beginning of each semester.

10. Ethics

- Objective/Outcome: Students will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.
- Assessment: Ethics rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Not assessed this academic year.
- Issue: N/A
- Current/Future Actions: Next assessment is Spring 2018.
- Responsibility: All faculty in the College.
- University/College Support for Objective: College curriculum and standards committee.

3. Assessment Plan for 2017-2018 Academic Year

1. Knowledge in Information Systems will be assessed via the ETS Major Field Test (MFT) in Business during Fall 2017 and Spring 2018.
2. Technology skill will be assessed via the Oral communication course embedded rubric in the course INT2103 during the Spring 2018 semester.
3. Sustainability knowledge will be assessed via the ETS Major Field Test (MFT) in Business during Fall 2017 and Spring 2018.
4. Communication skill will be assessed via the Oral and Written communication course embedded rubrics in the course INT2103 during Fall 2017 and Spring 2018.
5. Mathematics knowledge will be assessed via the ETS Major Field Test (MFT) in Business during Fall 2017 and Spring 2018.
6. Reading skill will be assessed via the ETS Major Field Test (MFT) in Business during Fall 2017 and Spring 2018.
7. Scientific Analysis skill will be assessed via the Critical Thinking course embedded rubric in the course INT2103 during Fall 2017.
8. Leadership skill will be assessed via the Leadership in Teams course embedded rubric in the course INT2103 during Spring 2018.
9. Teamwork skill will be assessed via the Teamwork course embedded rubric in the course INT2103 during Spring 2018.
10. Ethics skill will be assessed via the Ethics course embedded rubric in the course INT2103 during Spring 2018.

Master of Business Administration

1. Assessment Plan and Summary

The assessment plan for the MBA program is designed to address the functional areas of business pertinent to a graduate degree in Business Administration. When students complete the MBA at Lawrence Tech, they should be knowledgeable about fundamental business issues and processes in business. In addition to demonstrating overall Knowledge in business, MBA graduates should demonstrate specific knowledge or skills in Technology, Critical Thinking, Communication, Leadership, Teamwork, and Ethics.

The assessment plan for the MBA program is provided in Table 1 and the plan for continuous improvement is shown in Figure 1. As shown in Table 1, annual assessment and closing the loop of student overall knowledge occurs via the ETS Major Field Test in Business, a comprehensive examination organized into multiple content areas of business knowledge. Table 1 also shows triennial assessment and closing the loop of student skills in technology, critical thinking, communication, leadership, teamwork and ethics, via course embedded rubrics that assess required assignments in specific MBA courses.

Figure 1: Continuous improvement process and outcomes assessment for MBA

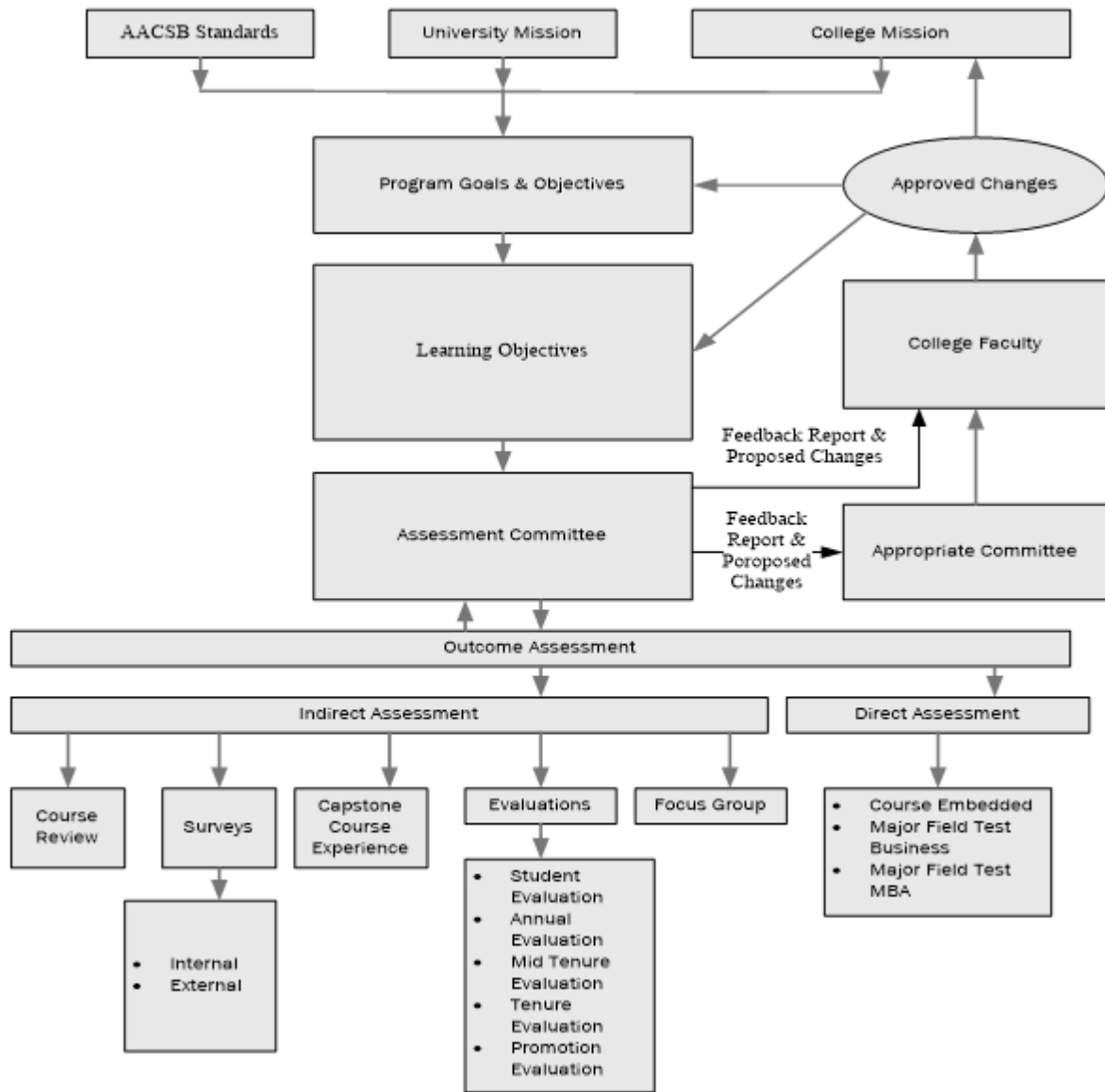


Figure 1: Continuous improvement process and outcomes assessment for MBA

Table 1. Assessment Plan for MBA

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop-Closing Timeline
"LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline."	Students will demonstrate knowledge of core business administration concepts in marketing, management, finance, accounting, and strategic integration.	A comprehensive standardized examination organized into multiple content areas of business knowledge administered to all students during their final semester in the program.	ETS Major Field Test in Business. Results of the overall score in scaled range of 220-300. Target scaled score = within 1 standard deviation (SD) below the standardized scale mean = 248.2, SD = 8.4 (i.e., > 239.8).	Fall/Spring: MBA6073	Annual
"LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies"	Students will demonstrate mastery of communication of technology via use of media and quality of slides, or via use of online discussion board.	Course embedded rubric of required oral presentation or online discussion board in ACC6003, Managerial Accounting; MBA6043, Global Leadership; MBA6053, Strategic Marketing Management.	Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary	Fall/Spring: ACC6003, MBA6043, MBA6053	Annual
"LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature."	Students can identify main problem and key assumptions, can evaluate the relevance of data, and can present feasible solution.	Course embedded rubric of required written presentations in ACC6003, Managerial Accounting; ECN6023, Global Business Economics; MBA6043, Global Leadership; MBA6053, Strategic Marketing Management.	Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary	Fall/Spring: ACC6003, ECN6023, MBA6043, MBA6053	Annual
"LTU graduates will communicate effectively using written, oral, graphical, and digital formats."	Students can develop and deliver a compelling oral presentation grounded in relevant information and facts; Students can deliver a compelling oral presentation with clarity and appropriate poise; and Students can write professional-quality documents.	Course embedded rubric of required oral and written presentations in in ACC6003, Managerial Accounting; ECN6023, Global Business Economics; MBA6003, Financial Management; MBA6043, Global Leadership; MBA6053, Strategic Marketing Management.	Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary	Fall/Spring: ACC6003, ECN6023, MBA6003, MBA6043, MBA6053	Annual

<p>“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”</p>	<p>Students can recognize the ethical issues implicit in a business situation, can describe and use ethical frameworks application to business situations, and can develop a variety of ethical alternatives for resolving or at least addressing, a problem in business.</p>	<p>Course embedded rubric of required oral and written presentations in in ACC6003, Managerial Accounting; ECN6023, Global Business Economics; MBA6043, Global Leadership; MBA6053, Strategic Marketing Management.</p>	<p>Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary</p>	<p>Fall/Spring: ACC6003, ECN6023, MBA6043, MBA6053</p>	<p>Annual</p>
--	---	---	--	--	---------------

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

1. Knowledge of Business

- Objective/Outcome: Students will demonstrate knowledge of core business administration concepts in marketing, management, finance, accounting, and strategic integration.
- Assessment: ETS® major-field test (MFT) for the MBA—overall score. The overall score in scaled range of 220-300. Target scaled score = within 1 standard deviation (SD) below the standardized scale mean = 248.2, SD = 8.4 (i.e., > 239.8).
- Evaluation: 16 students completed the ETS MFT in MBA, Fall 2016, Spring 2017. Mean scaled score = 242, SD = 12 (i.e., 230-254).
- Issue: While student mean performance fell within the target score, given the SD of 12, some students performed below the target mean.
- Current/Future Actions: Review the MFT in MBA practice test and content areas with MBA faculty.
- Responsibility: All faculty in the College.
- University/College Support for Objective: The College Curriculum and Standards Committee is involved with addressing ETS scores to determine possible changes to the curriculum in response to the overall score.

2. Technology

- Objective/Outcome: Students will demonstrate mastery of communication of technology via use of media and quality of slides, or via use of online discussion board.
- Assessment: Oral communication rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Assigned oral presentations in MBA6043 and MBA6053, Fall 2016; and MBA6003, Spring 2017. Oral communication mean scores for Use of Media = 4.3, Quality of Slides = 4.5.
- Issue: Oral communication assessment scores in all content areas of Technology are above target mean score of 3.5.
- Current/Future Actions: Faculty will continue to support student use of technology for communication.
- Responsibility: All faculty in the College.
- University/College Support for Objective: University offers the Academic Achievement Center and Computer Help Desk.

3. Critical Thinking

- Objective/Outcome: Students can identify main problem and key assumptions, can evaluate the relevance of data, and can present feasible solution.
- Assessment: Critical Thinking rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Not assessed this academic year.
- Issue: N/A
- Current/Future Actions: Next assessment in ECN6023, MBA6043 or MBA6053, Spring 2018.
- Responsibility: All faculty in the College.
- University/College Support for Objective: College curriculum and standards committee.

4. Communication

- Objective/Outcome: Students can develop and deliver a compelling oral presentation grounded in relevant information and facts; Students can deliver a compelling oral presentation with clarity and appropriate poise; and Students can write professional-quality documents.

- Assessment: Oral communication and Written communication rubrics scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
 - Evaluation: Assigned oral presentations in MBA6043 and MBA6053, Fall 2016; and MBA6003, Spring 2017. Assigned written assignments in ACC6003, Spring 2017. Oral communication mean scores for Opening Statement = 4.8, Organization = 4.7, Content = 4.7, Conclusion = 4.7, Timing = 4.6, Clarity of Speech = 4.6, Engages Audience = 4.4, Appearance = 4.9; Written communication mean scores for Introduction = 4.5, Organization = 4.2, Content = 4.4, Conclusion = 3.9, Grammar & Spelling = 3.9, APA Style = 3.4.
 - Issue: Oral communication assessment scores are above target mean score of 3.5 for all indicators. Written communication assessment scores are above target mean score of 3.5 for all indicators with the exception of APA Style which is below target mean score of 3.5.
 - Current/Future Actions: Students need to improve written communication performance in the area of APA Style. Courses will include more detailed instruction on APA Style.
 - Responsibility: All faculty in the College.
 - University/College Support for Objective: University offers the Academic Achievement Center which is available to help students increase written communication performance; College offers Toastmasters program to help students increase oral communication performance.
5. Leadership
- Objective/Outcome: Students can demonstrate effective leadership skills in a team project in terms of motivation, delegation, and conflict resolution.
 - Assessment: Teamwork rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
 - Evaluation: Not assessed this academic year.
 - Issue: N/A
 - Current/Future Actions: Next assessment in MBA6043, Fall 2017.
 - Responsibility: All faculty in the College.
 - University/College Support for Objective: College curriculum and standards committee.
6. Ethics
- Objective/Outcome: Students will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.
 - Assessment: Ethics rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
 - Evaluation: Assigned written assignment in ACC6003, Fall 2016. Ethics mean scores for Identification of Issues = 4.6, Accuracy of Legal Considerations = 3.4, Evaluate Ethical Alternatives = 3.1.
 - Issue: Assessment scores in the Ethics content areas Accuracy of Legal Considerations and Evaluate Ethical Alternatives are below the target mean score of 3.5 for the content area.
 - Current/Future Actions: Modification to course content to provide more case studies with ethical dilemmas and ethical decision making, and address teaching ethics and increasing student competency as ethical decision makers.
 - Responsibility: All faculty in the College.
 - University/College Support for Objective: College curriculum and standards committee consulted to address teaching ethics.

3. Assessment Plan for 2017-2018 Academic Year

1. Overall Knowledge in business will be assessed via the ETS Major Field Test (MFT) in MBA in the course MBA6073 during Fall 2017 and Spring 2018.
2. Technology skill will be assessed via the Oral communication course embedded rubric in the course MBA6053 during the Fall 2017 semester.
3. Critical Thinking skill will be assessed via the Critical Thinking course embedded rubric in the courses ACC6003, ECN6023, MBA6043 or MBA6053 during Spring 2018.
4. Communication skill will be assessed via the Oral and Written communication course embedded rubrics in the course MBA6053 during Fall 2017.
5. Leadership skill will be assessed via the Leadership in Teams course embedded rubric in the course MBA6043 during Fall 2017.
6. Ethics skill will be assessed via the Ethics course embedded rubric in the course ACC6003 during Fall 2017.

Master of Science in Information Technology

1. Assessment Plan and Summary

The assessment plan for the MSIT program is designed to address the functional areas of information technology pertinent to a graduate degree in Information Technology. When students complete the MSIT at Lawrence Tech, they should be knowledgeable about fundamental issues and processes in information technology. In addition to demonstrating overall Knowledge, MSIT graduates should demonstrate specific knowledge or skills in Technology, Critical Thinking, Communication, Leadership, Teamwork, and Ethics.

The assessment plan for the MSIT program is provided in Table 1 and the plan for continuous improvement is shown in Figure 1. As shown in Table 1, annual assessment and closing the loop of student overall knowledge occurs via the ETS Major Field Test in Business, a comprehensive examination organized into multiple content areas of business knowledge. Table 1 also shows triennial assessment and closing the loop of student skills in technology, critical thinking, communication, leadership, teamwork and ethics, via course embedded rubrics that assess required assignments in specific MBA courses.

Table 1. Assessment Plan for MSIT

University Graduate Learning Outcomes	Supporting Program Learning Objectives	Assessment Tools	Metrics/ Indicators	Administration Timeline	Loop-Closing Timeline
“LTU graduates will apply and, in accordance with their course of study, develop advanced knowledge within their discipline.”	Students will demonstrate knowledge of core concepts in information technology.	A comprehensive examination organized into multiple content areas of information technology to all students in INT7593, IT Capstone.	Original comprehensive test scored from 0-100 percentage.	Fall/Spring: INT7593	Annual
“LTU graduates will analyze and interpret information and implement decisions using the latest techniques and technologies”	Students will demonstrate mastery of communication of technology via use of media and quality of slides, or via use of online discussion board.	Course embedded rubric of required oral presentation or online discussion board in INT6123, Systems Analysis and Design; INT7593, IT Capstone.	Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary	Fall/Spring: INT6123, INT7593	Annual
“LTU graduates will evaluate scholarly literature and, in accordance with their course of study, contribute to the literature.”	Students can identify main problem and key assumptions, can evaluate the relevance of data, and can present feasible solution.	Course embedded rubric of required written presentations in INT6123, Systems Analysis and Design; INT6143, Enterprise Network Infrastructure; INT7213, Business Intelligence and Analytics.	Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary	Fall/Spring: INT6123, INT6143, INT7213	Annual
“LTU graduates will communicate effectively using written, oral, graphical, and digital formats.”	Students can develop and deliver a compelling oral presentation grounded in relevant information and facts; Students can deliver a compelling oral presentation with clarity and appropriate poise; and Students can write professional-quality documents.	Course embedded rubric of required oral and written presentations in INT6123, Systems Analysis and Design; INT6143, Enterprise Network Infrastructure; INT7213, Business Intelligence and Analytics; INT7593, IT Capstone.	Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary	Fall/Spring: INT6123, INT6143, INT7213, INT7593	Annual
“LTU graduates will develop a broad perspective on professional issues, such as lifelong learning, sustainability, leadership, and ethics.”	Students can recognize the ethical issues implicit in a business situation, can describe and use ethical frameworks application to business situations, and can develop a variety of ethical alternatives for resolving or at least addressing, a problem in business.	Course embedded rubric of required written presentations in INT6123, Systems Analysis and Design; INT6143, Enterprise Network Infrastructure; INT7213, Business Intelligence and Analytics.	Course embedded rubric scored on a 6-point scale, with target mean score = 3.5: 1, 2 = deficient 3, 4 = competent 5, 6 = exemplary	Fall/Spring: INT6123, INT6143, INT7213	Annual

2. Report on 2016-2017 Academic Year and Action Plan (Loop Closing)

1. Knowledge of Business

- Objective/Outcome: Students will demonstrate knowledge of core concepts in information technology.
- Assessment: Original comprehensive test scored from 0-100 percentage.
- Evaluation: Not assessed this academic year.
- Issue: Test is in modification.
- Current/Future Actions: Review test by college assessment committee and MSIT faculty. Next assessment in INT7593 in Spring 2018.
- Responsibility: All faculty in the College.
- University/College Support for Objective: The College Curriculum and Standards Committee is involved with addressing knowledge scores to determine possible changes to the curriculum.

2. Technology

- Objective/Outcome: Students will demonstrate mastery of communication of technology via use of media and quality of slides, or via use of online discussion board.
- Assessment: Oral communication rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Assigned oral presentations in INT6123, Spring 2017. Oral communication mean scores for Use of Media = 4.4, Quality of Slides = 4.3.
- Issue: Oral communication assessment scores in all content areas of Technology are above target mean score of 3.5.
- Current/Future Actions: Faculty will continue to support student use of technology for communication.
- Responsibility: All faculty in the College.
- University/College Support for Objective: University offers the Academic Achievement Center and Computer Help Desk.

3. Critical Thinking

- Objective/Outcome: Students can identify main problem and key assumptions, can evaluate the relevance of data, and can present feasible solution.
- Assessment: Critical Thinking rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Not assessed this academic year.
- Issue: N/A
- Current/Future Actions: Next assessment in INT6123, Fall 2017.
- Responsibility: All faculty in the College.
- University/College Support for Objective: College curriculum and standards committee.

4. Communication

- Objective/Outcome: Students can develop and deliver a compelling oral presentation grounded in relevant information and facts; Students can deliver a compelling oral presentation with clarity and appropriate poise; and Students can write professional-quality documents.
- Assessment: Oral communication and Written communication rubrics scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Assigned oral presentations in INT6123, Fall 2016. Assigned written assignments in INT6123, Fall 2016 and Spring 2017. Oral communication mean scores for Opening Statement = 4.7, Organization = 4.3, Content = 4.3, Conclusion = 3.9, Timing = 4.1, Clarity of Speech = 4.4,

Engages Audience = 4.4, Appearance = 4.3; Written communication mean scores for Introduction = 4.2, Organization = 3.9, Content = 3.8, Conclusion = 3.3, Grammar & Spelling = 3.2, APA Style = 3.1.

- Issue: Oral communication assessment scores are above target mean score of 3.5 for all indicators. Written communication assessment scores are above target mean score of 3.5 for all indicators with the exception of Conclusion, Grammar & Spelling, and APA Style which are below target mean score of 3.5.
- Current/Future Actions: Students need to improve written communication performance in the area of Conclusion, Grammar & Spelling, and APA Style. Courses will include more detailed instruction on the performance indicators.
- Responsibility: All faculty in the College.
- University/College Support for Objective: University offers the Academic Achievement Center which is available to help students increase written communication performance.

5. Leadership

- Objective/Outcome: Students can demonstrate effective leadership skills in a team project in terms of motivation, delegation, and conflict resolution.
- Assessment: Teamwork rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Not assessed this academic year.
- Issue: N/A
- Current/Future Actions: Next assessment in INT6123, Fall 2017.
- Responsibility: All faculty in the College.
- University/College Support for Objective: College curriculum and standards committee.

6. Ethics

- Objective/Outcome: Students will demonstrate an understanding of the ethical issues related to their disciplines, the ethical codes adopted by relevant professional associations, and the social consequences of their ethical decisions.
- Assessment: Ethics rubric scored on a 6-point scale (1, 2 = deficient; 3, 4 = competent; 5, 6 = exemplary), with target mean score = 3.5.
- Evaluation: Not assessed this academic year.
- Issue: N/A
- Current/Future Actions: Next assessment in INT6123, INT6143 or INT7213, Spring 2018.
- Responsibility: All faculty in the College.
- University/College Support for Objective: College curriculum and standards committee consulted to address teaching ethics.

3. Assessment Plan for 2017-2018 Academic Year

1. Overall Knowledge in information technology will be assessed via the IT comprehensive knowledge exam in the course IT7593 during Spring 2018.
2. Technology skill will be assessed via the Oral communication course embedded rubric in the course INT6123 or INT7593 during the Spring 2018 semester.
3. Critical Thinking skill will be assessed via the Critical Thinking course embedded rubric in the course INT6123 during Fall 2017.
4. Communication skill will be assessed via the Oral and Written communication course embedded rubrics in the course INT6123 during Fall 2017 and Spring 2018 semesters.

5. Leadership skill will be assessed via the Leadership in Teams course embedded rubric in the course INT6123 during Fall 2017.
6. Ethics skill will be assessed via the Ethics course embedded rubric in the courses INT6123, INT6143 or INT7213 during Spring 2018.