# Computer Science Programs for Undergraduate Students

### Bachelor of Science in Computer Science with Multiple Concentrations

The requirements of the Bachelor of Science in Computer Science degree can be satisfied with a concentration in one or more of the following areas:

- Artificial Intelligence
- Scientific Software Development
- Game Software Development

- Cybersecurity
- Business Software Development
- Software Engineering

Each of these pathways has its own curriculum flow chart that lays out the unique course requirements. The opportunity to choose from these cutting-edge concentrations ensures that the degree earned will be ideally suited to current market demands as well as the student's personal interests and career goals.

The *Artificial Intelligence* concentration focuses on developing algorithms to deal with Big Data such as machine learning, deep learning, data mining, and pattern recognition. This concentration gives students a competitive edge in today's advance technological landscape. It will also provide an avenue to pursue a Master's Degree in cutting-edge artificial intelligence technologies solving complex problems like autonomous vehicles, big data mining, computer vision, natural language processing, and robotics.

The *Cybersecurity* concentration provides students with opportunities to integrate education and training with the application of problem-solving skills in the lab environment to examine the multi-faceted nature of computer security. It covers the fundamental concepts such as cryptography, threats and vulnerabilities, cybersecure system design from hardware to software, and cutting-edge machine learning and IoT systems. Students will develop a security-oriented way of thinking with deeper understanding of adversaries and building countermeasures to defend against them.

The *Scientific Software Development* concentration offers the computer science graduate maximum flexibility. A well-balanced background in calculus and physics is essential to understand and create scientific applications. Since computer science is based, to a large degree, on mathematics, the more mathematics the student understands, the more satisfying computer science courses will be. For students interested in application development or the science of computing who have strong mathematical skills, this concentration is the best choice.

A variation of the Scientific Software Development concentration has been developed for students interested in pursuing *Game Software Development*. Open electives are replaced by specific courses designed to provide software development experience related to the video game industry.

All computer science concentrations require mathematics, but some concentrations focus more on programming that do not require higher order mathematics or physics. The ***Business Software Development*** concentration may be the ideal choice for students interested in web, database, and business application development without intensive higher-level mathematics.

The ***Software Engineering*** concentration teaches innovative processes, methodologies, and tools to improve the production, quality, performance, and reliability of computer software systems. Through hands-on software project development and management experiences coupled with testing, verification, and validation techniques, graduates earn the expertise to satisfy the most exacting customer requirements, achieve optimum efficiency in software design, reduce production and maintenance costs, improve system reliability, and enhance system security. This concentration does not require higher-level mathematics.

## Direct Entry to Master of Science in Computer Science in 5 (4+1) Years

The 4+1 MSCS (Master of Science in Computer Science) program is an accelerated program for highly motivated and high achieving first year students to earn both a bachelor's and master's degree in five years. Graduates of this program gain a competitive edge for an industry career at a higher salary. This is also an excellent pathway for students interested in pursuing a Ph.D. in computer science. The undergraduate portion of this program is based on the Scientific Software Development concentration explained above. The curriculum flow chart for this innovative five-year program is included in this packet.

You may use the open electives in any of these programs/concentrations to further customize your degree. Your advisor can help you construct a program specifically designed to fit your needs.

**For questions about these or any computer-related programs at LTU, please speak with an advisor.**