

# BACHELOR OF SCIENCE IN COMPUTER SCIENCE

## OVERVIEW

The computer science program at Lewis University provides a solid foundation for students who wish to pursue a career in computer science and information technology. The program strives to achieve an effective balance between theory and practice throughout the curriculum. This balanced approach to computer education equips students with both the skills they need to contribute immediately to an organization, and the depth of understanding required to advance the frontiers of the field.

Students in computer science at Lewis study a wide variety of topics to gain an appreciation for the cornerstones of the field. These include programming and algorithms, computer organization, network design and security, file systems, database design and implementation, artificial intelligence, software engineering, and scientific and mathematical computing. As they become more familiar with the areas that comprise computer science, they can then focus on the topics of greatest interest to them by taking more advanced courses. The curriculum is sufficiently diverse to convey the general ideas; it is sufficiently comprehensive to convey the implementation details that interest the practitioner.

The department administers and maintains strong laboratory facilities that provide students with access to the latest versions of both commercial and open-source software. Students become familiar working with a number of popular development and analysis tools on a variety of operating platforms. They graduate with an impressive set of skills that make them technically competent and nimble and, thus, highly marketable.

## HIGHLIGHTS

Computer science is a field that is constantly changing. New technologies gain prominence quickly, and the old ways of doing things quickly fall out of favor. As the industry has evolved, the computer science curriculum at Lewis has also changed. The department has been able to keep pace with innovations in programming, software engineering, networking, and security, both in terms of course content and the laboratory equipment needed to explore new developments. The department has been so conscientious in keeping up with changes in the industry because the faculty embrace their responsibility to provide the best, most current education to their students.

That commitment to students is one of the distinguishing traits of the computer science program at Lewis. Professors know students on a first-name basis. Even more importantly, professors know the strengths, interests, and aspirations of their students as well as the challenges and weaknesses they must struggle to overcome. The relationship between professor and student is very much like a partnership.

How do students and faculty build this kind of familiarity? The department's small class sizes pay a big dividend in this regard. Classes range from as few as three students to usually no more than 20 students. Most classes in the major, even the introductory ones, have only ten students. At Lewis, computer science students enjoy a level of interaction with their teachers, both within and outside of the classroom, that few other institutions can provide.

## CONTACT

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## BACHELOR OF SCIENCE IN COMPUTER SCIENCE AND MASTER OF SCIENCE IN INFORMATION SECURITY (MSIS)

Total Credit Hours: 154

The Bachelor of Science in Computer Science and Master of Science in Information Security (MSIS) program enables computer science students to earn both degrees within five years. Information security is a uniquely interdisciplinary field, requiring professionals who are well-versed both in project planning, risk management, and project assessment, as well as in the technical details of securing today's and tomorrow's information systems and networks. This program provides computer science majors an opportunity to take advantage of their excellent technical preparation as they round out their expertise with an extra year of study that focuses primarily on information security's management issues.

The dual degree program features the curriculum of the Bachelor of Science in Computer Science program supplemented with additional coursework at the graduate level. Most of the additional coursework is designed to teach the necessary management concepts to our students to ensure that they are ready to pursue a career in information security upon graduation. The course 68-595: Information Security Project serves as the capstone for the dual degree program.

Any computer science student who has achieved a cumulative GPA of 3.0 or better, has earned between 72 and 96 hours of course credit, has successfully completed 70-200, 70-210, 70-245, 13-200, 13-201, and 13-210, and has achieved a GPA of 3.0 or better in courses in the computer science major may apply for admission to the BS Computer Science / MS Information Security dual degree program.

The applicant must complete a Graduate Application, provide letters of reference from two faculty members, and write a two-page statement of purpose explaining why he or she wishes to pursue the MSIS degree. The MSIS program director will review the student's application and make a recommendation to the Graduate Council of the College of Arts and Sciences.

The student may not take graduate courses while he or she is an undergraduate. After the student is awarded the Bachelor of Science in Computer Science, he or she will begin taking graduate-level coursework toward the Master of Science in Information Security. No graduate course credit may count toward baccalaureate degree requirements, and no graduate coursework may be taken until the baccalaureate is earned.

Total Hours in the Combined Major: 80 hours (54 undergraduate, 26 graduate).

Total Hours to Graduate with Both Degrees:  $128 + 26 = 154$  (includes undergraduate general education requirements and free electives).

### I. Core Courses (80)

#### A. Required Undergraduate Courses (54)

- 13-200 Calculus I (4)
- 13-201 Calculus II (4)
- 13-210 Discrete Mathematics (4)
- 70-200 Computer Science I: Programming and Algorithm Design (3)
- 70-210 Computer Science II: Data Structures (3)
- 70-220 Introduction to Unix (3)
- 70-245 Computer Science III: Object-Oriented Development Using JAVA (3)
- 70-250 File Organization (3)
- 70-300 Assembly Language Programming (3)
- 70-330 Database Theory and Design (3)
- 70-350 Operating Systems (3)
- 70-420 Firewalls and Security (3)
- 70-425 Encryption (3)
- 70-440 Software Engineering (3)
- 70-460 Programming Languages (3)
- 70-480 Communications and Networking (3)
- 70-485 Advanced Communications and Networking (3)

## CAREER OPPORTUNITIES

The field of computer science grew out of the disciplines of mathematics and electrical engineering. Because of its mathematical origins, computer science emphasizes the technical aspects of hardware and software design, the mathematical analysis of algorithms, and the theoretical principles that govern system performance and organization from both hardware and software perspectives. In light of its engineering pedigree, computer science is also a hands-on discipline that strongly emphasizes problem-solving and implementation at the component level. In other words, computer science is a strongly analytical field that strives to provide organizations with better tools and systems for accomplishing the tasks they need to perform.

Students graduate from the computer science program at Lewis ready to begin careers in:

- application programming and development
- database design and administration
- network design, implementation, and troubleshooting
- information security
- systems analysis and design
- web design and e-commerce
- office systems troubleshooting and support

Because computer science focuses more on principles than on specific applications and settings, graduates are prepared to pursue careers in a variety of fields. They are not asked to specialize in specific disciplines like business or engineering. They learn how to solve problems using technology regardless of the specific setting.

Graduates of the program have gone on to pursue master's degrees in software engineering, network security, systems design, and human-computer interaction.

## INTERNSHIPS

Lewis' computer science students have ample opportunities to pursue internships to gain vital work experience. Students have participated in internships with Argonne National Laboratories as well as with the Office of Information Technology Services on campus. These internships are often taken for course credit as well. Beyond these formal internship arrangements, many students have found technical employment at several other firms in the Chicago area.

## INDEPENDENT / INTERDISCIPLINARY STUDY

Faculty members are very interested in pursuing independent study coursework with students. These arrangements provide students with one-on-one instruction in an area that is of interest to them. In the past, professors have offered independent study courses in Java, security, network architecture, systems analysis, and the application of artificial intelligence to the field of psychology.

The department also actively encourages interdisciplinary study. Students have pursued minors in fields such as mathematics, physics, chemistry, psychology, computer graphics, and business. Some students have also decided to pursue a double-major, combining their training in computer science with in-depth instruction in another field. Computer science is a discipline that fits well into an interdisciplinary study program, since computer technology is so often used as a tool for making practitioners of other disciplines more informed and more productive.

## ACTIVITIES

The department participates in the annual Associated Colleges of the Chicago Area (ACCA) competition in computer science. Students find this to be both beneficial and stimulating. It provides them with the opportunity to work challenging problems while honing their skills.

The department also hosts an active computer science club, open not only to computer science students, but to students in other majors as well.

Application has also been made on behalf of outstanding computer science students to Upsilon Pi Epsilon, an international computer science honor society.

## REQUIREMENTS

Computer Science majors may choose between two different tracks, one that leads to a Bachelor of Science (B.S.) degree, and the other that leads to a Bachelor of Arts (B.A.) degree. The B.S. degree has a greater amount of required coursework and is designed to provide a stronger background in mathematics, particularly calculus.

## FACULTY

Seven professors teach full-time in the Department of Mathematics and Computer Science. Four of these professors focus either exclusively or strongly on the computer science curriculum, and the remainder focus more heavily on mathematics instruction. The computer science faculty have received their degrees at various Big 10 universities and other quality institutions. Their strong interest in the computer science field helps keep them current with new developments. Some also perform research and consulting work outside of the classroom to keep current. Their technical competence, strong communication skills, and dedication to teaching undergraduates make them excellent computer science educators.

In conjunction with the College of Business, the department now offers a Masters of Science in Information Security (MSIS), featuring either a managerial concentration or a technical concentration. Interested persons can either contact the department chair or find further information on the University Web site.

**BACHELOR OF SCIENCE /  
COMPUTER SCIENCE**

Total Credit Hours: 128  
Major Credit Hours: 51 or 52

**I. Core Courses (39)**

- 13-200 Calculus I (4)
- 13-201 Calculus II (4)
- 13-210 Discrete Mathematics (4)
- 70-200 Computer Science I: Programming and Algorithm Design (3)
- 70-210 Computer Science II: Data Structures (3)
- 70-220 Introduction to UNIX (3)
- 70-350 Operating Systems (3)
- 70-300 Assembly Language (3)
- 70-245 Computer Science III: Object-Oriented Programming Using Java (3)
- 70-460 Programming Languages (3)
- 70-480 Communications and Networking (3)
- xx-xxx One elective programming language course (3)

**II. Elective Courses (12 or 13)**

An additional four computer science courses.  
13-275: Linear Algebra (4) or 13-350: Numerical Analysis (4)  
may substitute for one computer science elective.

**BACHELOR OF ARTS /  
COMPUTER SCIENCE**

Total Credit Hours: 128  
Major Credit Hours: 40 or 41

**I. Core Courses (28)**

- 13-210 Discrete Mathematics (4)
- 70-200 Computer Science I: Programming and Algorithm Design (3)
- 70-210 Computer Science II: Data Structures (3)
- 70-220 Introduction to UNIX (3)
- 70-350 Operating Systems (3)  
OR
- 70-300 Assembly Language (3)
- 70-330 Database: Concepts and Design (3)
- 70-245 Computer Science III: Object-Oriented Programming Using Java (3)
- 70-460 Programming Languages (3)
- xx-xxx One elective programming language course (3)

**II. Elective Courses (12 or 13)**

An additional four computer science courses.  
13-275: Linear Algebra (4) or 13-350: Numerical Analysis (4)  
may substitute for one computer science elective.

**MINOR / COMPUTER SCIENCE**

Minor Credit Hours: 22 or 23

**I. Core Courses (9)**

- 13-210 Discrete Mathematics (4)
- 70-200 Computer Science I: Programming and Algorithm Design (3)
- 70-210 Computer Science II: Data Structures (3)

**II. Electives (12 or 13)**

An additional four computer science courses.  
13-275: Linear Algebra (4) or 13-350: Numerical Analysis (4)  
may substitute for one computer science elective.

*B. Required Graduate Courses (14)*

(Course descriptions are found in the Graduate Catalog.)

- 68-505 Introduction to Information Security (3)
- 68-520 Intrusion Detection and Response (3)
- 68-530 Legal Issues of Information Security (3)
- 68-595 Information Security Project (3)
- 68-596 CISSP I (1)
- 68-597 CISSP II (1)

*C. Graduate students choose any four of the following: (12)*

- 68-523 Computer Forensics (3)
- 68-550 Operational and Organizational Security (3)
- 68-551 Information Security Strategies and Risk Management (3)
- 68-552 IT Governance (3)
- 68-555 Security Assurance Principles (3)
- 68-564 Wireless Security (3)
- 68-565 Secure Programming (3)

**II. The advanced writing requirement within the undergraduate major is fulfilled by taking both 70-440 (Software Engineering) and 70-460 (Programming Languages).**