

# Computer Science

## Contact Information

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- Computer Science (p. 1)
- Graduate Certificate in Information Assurance
- Graduate Certificate in Systems Security

## The Master's Degree

The M.S. program requires students to complete 32 credit hours approved by their academic adviser, of which no more than 12 credit hours may be at the 400-level. The curriculum is structured to provide both breadth and depth in computer science, alongside required foundational courses.

Applicants to the on-campus and online M.S. degree are accepted in the fall, spring, and summer semesters. International on-campus applicants are accepted only in fall and spring semesters.

The Computer Science Department, at its discretion, may consider accepting students needing foundational requirements, thereby allowing students whose baccalaureate degrees are in disciplines other than Computer Science to complete these additional program requirements. A list of these foundational deficiencies will be indicated at the time of admission. For students with deficiencies, foundational requirements must be completed to earn a master's degree. Foundational requirements must be completed before progressing to the graduate core course work. Exceptions may be granted only through departmental approval.

Students have access to an outstanding variety of computing systems including a virtual server farm, a parallel processing cluster, and a hands-on network laboratory.

The Computer Science Department has been designated as a National Center of Academic Excellence in Cyber Defense Education. The National Security Agency (NSA) and the Department of Homeland Security (DHS) jointly sponsor the National Centers of Academic Excellence in Cyber Defense Education Program. The goal of this program is to reduce vulnerability in our national information infrastructure by promoting higher education and research in Information Assurance (IA) and producing a growing number of professionals with Information Assurance (IA) expertise in various disciplines.

Computer laboratories are open evenings and weekends; some systems are available 24 hours a day. On-campus students have high-speed, wired and wireless internet access. The virtual server farm hosts over 2,200 virtual machines that our online and on-campus students leverage to gain a better understanding of material presented in classes.

## Advising

On acceptance, students are assigned to an academic advisor. Before registering for the first time, the student should discuss an appropriate course of study with the academic advisor.

## Grading Policy

Students must earn a grade of B- or better in all courses that apply toward the degree, and a cumulative 3.00 grade point average is required to graduate. In addition, graduate students who do not maintain a 3.00 grade point average will be placed on academic probation according to campus policy. Graduate students enrolled in 400-level courses should expect more stringent grading standards and/or additional assignments. Courses taken on a CR/NC basis will not count toward the degree.

## Program Learning Outcomes

1. Given a specific, solvable symbol manipulation task, develop a specification, a design, and tests for an automated solution for that task.
2. Demonstrate programming efficiency in more than one programming language.
3. Analyze the efficiency of algorithms.
4. Devise new algorithms that incorporate efficiency and transparency.
5. Master communication skills, including technical writing, public speaking, and electronic presentation.
6. Read, understand, and critically report on current research literature in computer science.

## Requirements

### Foundational Courses

CSC 225	Computer Programming Concepts I	3
CSC 275	Computer Programming Concepts II	3
CSC 302	Discrete Structures	4
or MAT 114	Finite Mathematics and Its Applications	
or MAT 302	Discrete Mathematics	
CSC 376	Computer Organization	4
CSC 385	Data Structures and Algorithms <sup>1</sup>	4
CSC 388	Programming Languages	4
CSC 389	Introduction to Operating Systems	4
MAT 113	Business Calculus	4
or MAT 115	Calculus I	
MAT 121	Applied Statistics	3

**Total Hours** **33**

<sup>1</sup> Students must successfully complete CSC 385 (or an equivalent course) before enrolling in CSC 500-level courses.

### Core Courses: <sup>2,3</sup>

Students must complete 32 hours of approved courses. Course work must include:

**The following courses are mandatory and do not count toward the breadth or depth requirements:**

CSC 501	Graduate Programming Practicum (Must be taken in the first semester unless waived via a placement exam. Students who test out of CSC 501 must substitute the 4-credit hour with an additional graduate-level CSC course approved by their academic advisor. ) <sup>4</sup>	4
CSC 540	Graduate Research Seminar (Must be taken in the final semester to fulfill the program's comprehensive closure requirement.)	4

**Breadth Requirements 12**

Students must complete three courses (12 credit hours) to satisfy the breadth requirements. Each of these three courses must come from a different core area, ensuring students gain exposure to multiple domains.

**Depth Requirements 12**

Students must complete three courses (12 credit hours) to satisfy the depth requirements. All three courses must come from the same core area, providing focused expertise in that domain. At least two of the three courses must be at the 500-level. The core areas for the depth requirement are the same as those for the breadth requirements.

**Core Areas**

Software Engineering and Algorithms, AI and Data Science, Cybersecurity, Systems and Networking and Electives.

**Software Engineering and Algorithms**

CSC 478	Software Engineering Capstone
CSC 482	Algorithms and Computation
CSC 571	Graduate Algorithms Design and Applications
CSC 577	Software Testing and Reliability

**AI and Data Science**

CSC 479	Introduction to Artificial Intelligence
CSC 526	Containerization and Bigdata
CSC 532	Introduction to Machine Learning
CSC 533	Data Mining
CSC 534	Big Data Analytics
CSC 535	Deep Learning
CSC 536	Natural Language Processing
CSC 562	Data Visualization
CSC 537	Digital Imaging Processing

**Cybersecurity**

CSC 430	Foundations of Network Security and Information Assurance
CSC 437	Introduction to Cryptography
CSC 438	Systems Security and Information Assurance Capstone
CSC 527	Security Testing Essentials
CSC 531	Artificial Intelligence for Cybersecurity
CSC 564	Computer Security

**Systems and Networking**

CSC 472	Introduction to Database Systems
CSC 484	Introduction to Parallel Processing
CSC 521	Linux Implementation/Administration Practicum
CSC 522	Wireless and Mobile Networks

CSC 523	Cloud Computing
CSC 524	Computer Networking Principles
CSC 561	NoSQL Databases
CSC 572	Advanced Database Concepts

**Electives: May be used to satisfy either the breadth or depth requirement**

CSC 452	Web Design
CSC 453	Web Development and Programming
CSC 471	Computer Ethics for Computing Professionals
CSC 502	Problem-Solving Practicum
CSC 505	Graduate Summer Internship
CSC 525	Beginning 3D Game Development

**Total Hours 32**

<sup>2</sup> CSC electives must be approved by the student's academic advisor.

<sup>3</sup> CSC courses that include "ECCE" in the title may not be counted.

<sup>4</sup> All students have the option to take a placement exam to test out of CSC 501. Students who successfully test out are still required to complete 32 credit hours in total and must substitute the 4 credit hours with a graduate-level CSC course approved by their academic advisor.

**Note:**

CSC 570 topic courses and CSC 470 topic courses can count towards different core area and that each such course must be approved by an academic advisor to confirm its eligibility for a specific core area.

## Transfer Courses

Transfer hours for the M.S. in Computer Science are limited to a minimum and maximum of four graduate semester hours with a grade of B or better. They will be evaluated on a case-by-case basis and approved by a Student Petition. Transferred hours will be counted in the 12 hours of 400 level electives. Transfer students will be required to take a minimum of 16 hours of 500 level elective course work at UIS.

## Master's Closure

Computer Science graduate students must complete a comprehensive closure exercise to demonstrate an ability to formulate, investigate, analyze, and report results on a problem in writing and orally. Computer Science master's degree candidates are expected to fulfill the campus closure requirement by earning a grade of B- or better in CSC 540. Students who have not made satisfactory progress in CSC 540 will be assigned a grade lower than B- and will have to re-register and re-take the course. Students who have made satisfactory progress in CSC 540, but who have not completed the final course documents can petition the department to complete the remaining documents by enrolling in CSC 541 (zero credit hours, one billable hour) each fall and spring semester until the final course documents are completed.

## Graduate Certificates

The Computer Science certificates are designed to provide specialized knowledge and skills in each certificate area. Certificates are awarded on completion of the course work. Information for each is available from the Computer Science Department.

## Grading Policy

Candidates for the certificates will be expected to complete course requirements with a grade of B- or better, and a cumulative 3.00 grade point average is required. Courses taken on a CR/NC basis will not count toward the certificate.

- Graduate Certificate in Information Assurance
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## Online

The online Computer Science graduate curriculum has the same requirements as the on-campus curriculum, allowing students to actively participate in dynamic, diverse, and interactive online learning communities and to complete their degrees on their own time via the Internet. The online format enables students to complete course work using the latest networked information technologies for increased interaction with educational resources, advisors, and materials.

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