Computer Science and Engineering

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Graduate study is offered in the Department of Computer Science and Engineering leading to the degrees of Master of Science in Computer Science, Master of Science in Cyber Security and Operations, and Doctor of Philosophy in Computer Science.

Master's and Ph.D. Degrees in Computer Science

The program of study of a Master of Science in Computer Science (MS CS) degree includes advanced courses in Computer Science that are selected according to the goals of the student. Master students may choose between a professional degree with a "General" concentration or a more specialized "Research" concentration. The program of study of a Doctor of Philosophy (PhD) degree in Computer Science includes advanced courses in Computer Science and significant scholarly research in Computer Science, presented in a dissertation. Starkville-campus and online programs are available.

The department's core research areas include the following:

- Artificial Intelligence
- Computational Science
- Graphics
- Human-Centered Computing
- Software Engineering
- Systems & Security

These core competencies support research applications in areas such as Bioinformatics, Visualization, Computer Security and Forensics, Human-Computer Interactions, Robotics, and High-Performance Computing. Faculty, research assistants, thesis students, and dissertation students participate in a wide variety of research projects. Many research projects are multi-disciplinary or multi-specialty in nature.

Master's Degree in Cyber Security and Operations

The Master of Science in Cyber Security and Operations (MS CYSO) is designed for students who wish to help meet the challenges posed by increasing cyber-threats. Using a multidisciplinary approach, the program is designed to provide students with a focused education within a broad analytical framework for evaluating; understanding; and solving cyber security problems. Either concentration will allow a thesis or non-thesis option. Starkville-campus and online programs are available.

The Cyber Defense concentration will focus on those aspects of cyber security needed to prepare an enterprise level system to protect itself. Material will prepare the students for developing cyber security policies to comply with existing and future laws, conducting risk assessment in enterprise to determine compliance with requirements and implementing security solutions for the enterprise.

The Cyber Operations concentration will focus on those aspects of cyber security that are needed to operate in the cyber domain. Material will prepare the student for advanced operations in the cyber domain such as Penetration Testing, After-Action Analysis, and Malware Analysis. This concentration is designed to satisfy the requirements for the Center of Academic Excellence in Cyber Operations program of the Department of Defense.

For a list of online tuition; instructional support; and other distance fees, please see the Controller's website (https://www.controller.msstate.edu/accountservices/tuition/).

Requirements

MS CS and CYSO applicants are required to have a 3.00/4.00 GPA in overall undergraduate work and complete the GRE with a competitive score before admission. International students require a suitable demonstration of English proficiency. Candidates for the master's degree must have completed all pre-requisite courses or their equivalents. For additional details, consult the Computer Science Department's Graduate Handbook.

An entering PhD student with an MS degree should have a 3.50/4.00 grade point average on MS work, while a PhD student entering with only a BS degree (applicable only to Starkville students) is expected to have a 3.50/4.00 on overall undergraduate work. A student with a lower GPA may still be eligible for admission based on outstanding qualifications in other areas. A student must complete the GRE with a competitive score before admission; graduates of Mississippi State University with a 3.50 GPA do not have to take the GRE. International students require a suitable demonstration of English proficiency. Candidates for the PhD degree must have completed all prerequisite courses or their equivalents. Finally, a student must possess

those qualifications and research interests that indicate to the Computer Science and Engineering Graduate Studies Committee that the applicant will be successful in the doctoral program. Online students doing research must identify a research area at application time. For additional details, consult the Computer Science Department's Graduate Handbook.

For a list of online tuition; instructional support; and other distance fees, please visit the Controller's website (https://www.controller.msstate.edu/accountservices/tuition/).

Accelerated Program

Highly qualified undergraduates are encouraged to apply to the Accelerated Program. Doing so will enable the undergraduate student in a bachelor's degree program in Computer Science or Software Engineering to earn up to 9 hours of graduate-level coursework during the final year of their undergraduate studies. The student takes graduate-level courses and earns both undergraduate and graduate credit simultaneously. The student needs to consult with a potential graduate advisor to ensure graduate credit could be applied to a program of study for the graduate degree. Application to this program may be made as early as the end of the junior year (i.e., after completion of 90 or more hours of graded undergraduate courses). See Accelerated Programs (https://www.cse.msstate.edu/undergrad/accelerated/) for more information. Students interested in applying should also contact the department's Graduate Coordinator, Dr. T.J. Jankun-Kelly, for more details.

Master of Science in Computer Science - Research Concentration

CS Core		4
CSE 8011	Graduate Seminar	
Select one of the following: [1]		
CSE 8813	Theory of Computation	
CSE 8843	Complexity of Sequential and Parallel Algorithms	
CSE 8833	Algorithms	
Depth Requirement [2,3]		9
CSE 6/8XXX Coursework from same research area		
Breadth Requirement [2,3]		6
CSE 6/8XXX Coursework from different areas (and from breadth area)		
Additional Coursework [2,3]		6
CSE 6/8XXX Graduate Coursework, excluding CSE 8080		
Research/Thesis		
CSE 9000	Research in Computer Science and Engineering	6
Total Hours		31

[1] Classes designated as theory in advance by the faculty can be used to substitute for the theory requirement on a case-by-case basis.
[2] Courses applying directly to the student's areas and approved by the student's Graduate Committee may be included, even if they are offered from another area or by another department. The majority of hours must be from CSE.
[3] A minimum of 9 credit hours of the courses in the total program of study must be at the full graduate level (numbered 8000 or 9000).

Master of Science in Computer Science - General Concentration

Core Courses		4
CSE 8011	Graduate Seminar	
Select one of the following: [1,2]		
CSE 8813	Theory of Computation	
CSE 8843	Complexity of Sequential and Parallel Algorithms	
CSE 8833	Algorithms	
Breadth Requirement [2,3]		9
CSE 6/8XXX Coursework from three different areas		
Additional Coursework [3,4,5]		18
CSE 6/8XXX Graduate Coursework, possibly including directed project		
Total Hours		31

[1] Classes designated as theory in advance by the faculty can be used to substitute for the theory requirement on a case-by-case basis.
[2] Courses applying directly to the student's areas and approved by the student's Graduate Committee may be included, even if they are offered from another area or by another department. The majority of hours must be from CSE.
[3] A minimum of 12 credit hours of the courses in the total program of study must be at the full graduate level (numbered 8000 or 9000).

4   Students, in cooperation with their committee, can choose to do a directed project to replace some of these additional 12 hours. A directed project requires taking course CSE 8080 under the direction of the student's major professor or other member of the student's committee.

Students who complete a directed project present the results of the directed project to his/her Graduate Committee at the time of the comprehensive examination. All M.S. students must perform satisfactorily on an oral comprehensive examination. The master's comprehensive examination is held in conjunction with the student's project presentation.

Master of Science in Cyber Security and Operations - Thesis

CYSO Core [1]		22
CSE 8011	Graduate Seminar	
CSE 6243	Information and Computer Security	
CSE 6173	Cryptography	
CSE 6253	Secure Software Engineering	
CSE 6363	Software Reverse Engineering	
CSE 6383	Network Security	
CSE 8713	Advanced Cyber Operations	
CSE 8753	Wireless Networks (ECE 8823 Wireless Networks)	
CYSO Elective [2]		**3**
8000-level Cyber Operations Elective [2]		
Thesis Option		
CSE 9000	Research in Computer Science and Engineering	6
Total Hours		**31**

1   Any required courses in the Core or a Concentration previously completed by a student may be applied for completion and replaced with another free course of the student's and committee's choosing.
2   Electives are listed in the CS Graduate Handbook.

Master of Science in Cyber Security and Operations - Non-Thesis

CYSO Core [1]		22
CSE 8011	Graduate Seminar	
CSE 6243	Information and Computer Security	
CSE 6173	Cryptography	
CSE 6253	Secure Software Engineering	
CSE 6383	Network Security	
CSE 6363	Software Reverse Engineering	
CSE 8713	Advanced Cyber Operations	
CSE 8753	Wireless Networks (ECE 8823 Wireless Networks)	
CYSO Elective [2,3]		**3**
6/8000-level Cyber Operations Elective [1]		
Non-Thesis Option [3,4]		**6**
Free Electives		
Total Hours		**31**

1   Any required courses in the Core or a Concentration previously completed by a student may be applied for completion and replaced with another free course of the student's and committee's choosing.
2   Electives are listed in the CS Graduate Handbook.
3   A minimum of 12 credit hours of the courses in the total program of study must be at the full graduate level (numbered 8000 or 9000).
4   Students, in cooperation with their committee, can choose to do a directed project to replace some or all of these additional 6 hours. A directed project requires taking course CSE 8080 under the direction of the student's major professor or other member of the student's committee.

Doctor of Philosophy in Computer Science - Students admitted directly from Bachelor's Degree

CS Core [2]		7
Please note that online students must have an MS degree to apply.		
CSE 8011	Graduate Seminar	
Select two of the following: [1]		
CSE 8813	Theory of Computation	
CSE 8833	Algorithms	
CSE 8843	Complexity of Sequential and Parallel Algorithms	
Depth Requirement [2, 3]		**15**
Student will complete 15 hours in a research area approved by their committee.		
Breadth Requirement [2, 3]		**9**
Students will complete an additional 9 hours outside of their research area. These hours should be from 3 different areas.		
Additional Coursework [3]		**12**
For direct admit students, students must complete 12 additional graduate credit hours.		
CSE 6/8XXX Graduate Coursework		
Dissertation [4]		**20**
CSE 9000	Research in Computer Science and Engineering	
Total Hours		**63**

[1]   Classes designated as Theory in Advance by the faculty can be used to substitute for the theory requirement on a case-by-case basis.
[2]   Courses applying directly to the student's Depth or Breadth requirements and approved by the student's Graduate Committee may be included, even if they are offered from another area or by another department. The majority of hours must be from CSE.
[3]   A minimum of 9 credit hours of the courses in the total program of study excluding dissertation must be at the full graduate level (numbered 8000 or 9000).
[4]   A student may enroll in dissertation hours only with the approval of his/her major proessor, who is the instructor of record and will assign a grade (S or U).

Doctor of Philosophy in Computer Science - Students admitted with Master's Degree

CS Core [1]		7
CSE 8011	Graduate Seminar	
Select two of the following: [1]		
CSE 8813	Theory of Computation	
CSE 8833	Algorithms	
CSE 8843	Complexity of Sequential and Parallel Algorithms	
Depth Requirement [1, 3, 4]		**12**
Students will complete 12 hours in a research area approved by their committee		
Breadth Requirement [1, 3, 4]		**6**
Students will complete an additional 6 hours outside of their research area. These hours should be from 3 different areas		
CSE 6/8XXX Graduate Coursework		
Dissertation [5]		**20**
CSE 9000	Research in Computer Science and Engineering	
Additional Hours [4, 5]		**10**
Additional coursework or dissertation hours		
Total Hours		**55**

[1]   Up to 12 course credit hours may be transferred from another institution or shared from MSU; 6 hours is the maximum that can be transferred to the Depth area.
[2]   Classes designated as Theory in advance by the faculty can be used to substitute for the theory requirement on a case-by-case basis.
[3]   Courses applying directly to the student's Depth or Breadth requirements and approved by the student's Graduate Committee may be included, even if they are offered from another area or by another department. The majority of hours must be from CSE.
[4]   A minimum of 9 credit hours of the courses in the total program of study excluding dissertation must be at the full graduate level (numbered 8000 or 9000).

[5]   A student may enroll in dissertation hours only with the approval of his/her major professor, who is the instructor of record and will assign a grade (S or U).

Examination Procedure

During preparation for the doctoral degree, the student will be required to complete three examinations and present an oral dissertation proposal. The examinations are the qualifying examination, typically taken during the student's first year of study; a proposal defense, taken after the student has completed (or is within 6 hours of having completed) all coursework and has had a dissertation topic approved; and the final examination, taken when all other examinations and the dissertation have been completed.

At the time that the student takes the qualifying examination, the graduate faculty will conduct a review of the student's status in the program. This review will include, as a minimum, the following:

- performance on the qualifying examination
- progress and performance in courses
- possible serious impediments to further progress toward the doctorate

Such a review could result in binding recommendations from the graduate faculty or strong recommendations that the student address a problem within a certain time frame or could even result in dismissal from the program.

Minor in Computer Science, Master's Degree Program

The Graduate Council requires that a student who wishes to earn a minor in computer science in a master's degree program complete at least 9 semester hours of computer science graduate credit, not to include CSE 6613. In addition, the Department of Computer Science and Engineering requires that the following requirements be satisfied:

- At least 3 semester hours must be at the full graduate (8000) level.
- At least 6 semester hours must be in one of the research focus areas, or theory.
- CSE 2383 or CSE 6753 or equivalent must have been completed by the student. This required background may have been completed during undergraduate study. CSE 6753 may count toward the minor.
- The student must pass a comprehensive examination over minor coursework, as determined by the minor professor. This may be in conjunction with an examination for the primary degree program.

 The student must be accepted by a minor professor in the Department of Computer Science and Engineering and have the approval of both the minor professor and the Graduate Coordinator in Computer Science and Engineering of the minor program of study. The minor professor will be included in the student's supervisory committee.

Minor in Computer Science, Doctoral Degree Program

The Graduate Council requires that a student who wishes to earn a minor in computer science in a Ph.D. degree program complete at least 12 semester hours of computer science graduate credit, not to include CSE 6613. In addition, the Department of Computer Science and Engineering requires that the following requirements be satisfied:

- At least 3 semester hours must be at the full graduate (8000) level.
- At least 6 semester hours must be in one of the research focus areas, or theory.
- CSE 2383 or CSE 6753 or equivalent must have been completed by the student. This required background may have been completed during undergraduate study. CSE 6753 may count toward the minor.
- The student must pass a comprehensive examination over minor coursework, as determined by the minor professor. This may be in conjunction with an examination for the primary degree program.

The student must be accepted by a minor professor in the Department of Computer Science and Engineering and have the approval of both the minor professor and the Graduate Coordinator in Computer Science and Engineering of the minor program of study. The minor professor will be included in the student's supervisory committee.

University policy on graduate minors is located in the Master of Science and Doctor of Philosophy sections in this publication.