

COMPUTER & INFORMATION SCIENCE, MSE

The CIS/ MSE program offers scholars the opportunity for advanced study in the scientific foundations of the rapidly growing field of computer science. Applicants to the MSE program should have strong undergraduate training in mathematics and computer science; prior coursework should include such areas as operating systems, programming languages, data structures, discrete mathematics, linear algebra, algorithms and theory; coursework should be similar to the courses taken by computer science undergraduates at the University of Pennsylvania.

Candidates who do not have an undergraduate major in computer science should consider applying to the Master of Computer and Information Technology program (MCIT). Dual degree/transfer information for current students can be accessed here. Submatriculation information for current students can be accessed here.

CIS/MSE students can pursue many areas within their curriculum, including AI, databases, security, programming languages, etc. The CIS Graduate Program prepares our students to be tomorrow's innovators, leaders, and visionaries. Our MSE graduates have obtained a wide range of positions in industry and continued in doctoral studies. Here's a sample:

- Senior Programmer/Analyst, Computational Biology & Informatics Laboratory, University of Pennsylvania
- Software Development Engineer, Microsoft
- Researcher, Lincoln Laboratory, MIT
- Systems Engineer, Lockheed Martin
- Researcher, School of Medicine/Radiology, University of Pennsylvania
- Doctoral Student, Computer & Information Science, University of Pennsylvania
- Doctoral Student, Computer Science, Brown University,
- Doctoral Student, Computer Science, University of Illinois, Urbana-Champaign

A more extensive list can be found here.

For more information: <http://www.cis.upenn.edu/prospective-students/graduate/mse.php>

Curriculum

The MSE degree requires completion of ten course units that satisfies all of the following requirements:

Code	Title	Course Units
CIS Courses		
At least seven of the ten course units required for the degree must be CIS courses. These seven courses include four core courses and three CIS elective courses described below.		
Core Courses		
Select four courses from the following:		4
<i>Theory Courses</i>		
CIS 5020	Analysis of Algorithms	
CIS 5110	Theory of Computation	

<i>Systems Courses</i>	
CIS 5050	Software Systems
CIS 5480	Operating Systems Design and Implementation
CIS 5530	Networked Systems
CIS 5550	Internet and Web Systems

<i>Machine-Learning Courses</i>	
CIS 5200	Machine Learning
CIS 5190	Applied Machine Learning
CIS 5210	Artificial Intelligence

<i>Other Courses</i>	
CIS 5000	Software Foundations
CIS 5710	Computer Organization and Design

The four core courses must include 1) at least one systems course, or CIS 5010; 2) at least one theory course; and 3) at most one machine-learning course. (the other machine-learning courses can still be taken as electives.)

CIS Elective Courses	
Any CIS courses numbered from CIS 5000 to CIS 7000	3
At most one CIS 7000 class can be included	

CIS or Non-CIS Elective Courses	
Each of the three remaining courses must be a CIS course (numbered from CIS 5000 to CIS 8000) or a course from the list of approved non-CIS courses	3

Total Course Units **10**

Advanced study in a specific area of computer science is encouraged. Besides coursework, students may pursue Independent Studies to increase their depth of knowledge in a specific area - a maximum of two independent study credits can be used as electives for the CIS/MSE degree. Students are also encouraged to submit a master's thesis (see below) which may count as two course units of Masters Student Thesis Research, CIS 5970.

FORMS: Click **here** to access SEAS graduate forms, including the Graduate Petition for Action; click **here** to access CIS graduate forms.

Master's Thesis

A student wishing to complete a master's thesis may enroll in two course units of CIS 5970/Masters Thesis Research, which count as electives towards the ten credits needed for the CIS/MSE degree. The student first chooses a thesis advisor, who must belong to the CIS Graduate Group, proposing a suitable thesis topic. The thesis advisor and student discuss and determine the topic, scope, etc. of the thesis. The advisor and student also determine one other faculty member to be a reader for the thesis. Once the advisor, reader, and topic have been chosen, the student should email Redian Furxhiu (<http://catalog.upenn.edu/graduate/programs/computer-information-science-mse/redian@seas.upenn.edu>) who will provide a google doc master's thesis approval form which can be shared with the thesis advisor, reader, and CIS/MSE, for approval. The advisor and reader will evaluate the thesis and make the determination of its suitability as a research document. An oral presentation of the thesis is required. This can take the form of a public presentation open to all CIS faculty and students to attend, or in lieu of that, a conference presentation or poster presentation (decided by the thesis adviser). Once the final thesis document is approved, it is signed by the advisor, reader, and CIS/MSE Program Chair, Dr. Swapneel Sheth (swapneel@cis.upenn.edu). Information re: thesis formatting and

submission of the thesis to the SEAS Research and Academic Services Office can be accessed here. (<http://www.cis.upenn.edu/current-students/graduate/advising/graduation.php>) A copy of the approved version of the thesis should be emailed to the CIS Master's chair.

Cumulative GPA Requirement

- A minimum GPA of 2.7 for master's students must be maintained in order to be considered in good academic standing.
- If this minimum is not maintained, academic probation or dismissal from the program will be invoked.
- A 2.7 final GPA must be achieved to graduate in all situations. (Effective Fall 2007 class). Students are permitted to graduate with an F grade in a course; however, no grade lower than a C- will be counted towards the degree.
- In particular, a C- grade or better must be achieved in the core courses or they must be retaken.

Graduation Checklist for MSE Students

- Watch for email announcements regarding applying for graduation. Information on applying for a degree/graduation can be found here (<http://www.cis.upenn.edu/current-students/graduate/advising/graduation.php>).
- If needed, master's thesis instructions should be obtained early on in the writing stage. You should make your advisor aware of the need for a timely reading and signature before graduation.
- Check that your academic record is cleared of *Incompletes*, *No Grade Reported*, and *Unsatisfactory Progress*. and that your GPA meets the requirements..
- Students who graduate in August or December may participate in the following May Commencement; a student graduating in August may participate in the May Commencement prior to graduation - contact Redian Furxhiu (<http://catalog.upenn.edu/graduate/programs/computer-information-science-mse/redian@seas.upenn.edu>) for information.
- Make sure that your bursar's bill is cleared before the end of the final semester.
- Students are allowed a maximum of seven years to complete the MSE degree program.

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2022 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.
