

# COMPUTATIONAL SCIENCE & ENGINEERING CONCENTRATION

*for the graduate concentration in Computational Science & Engineering*

The heart of Computational Science and Engineering (CSE) is to develop innovative ways of solving engineering and scientific problems using computation as a tool. This new form of science compresses the development process in engineering and engenders knowledge discovery with a new paradigm in many areas because it enables “virtual experiments” and helps focus physical experiments to reduce or eliminate trial-and-error laboratory-based approaches. Further, it teaches students to solve complex problems with prevailing computer technology.

The CSE graduate concentration is designed to provide graduate students at both the Masters and PhD levels with a solid base in problem-solving using computation as a major tool for modeling complicated problems in science and engineering. This concentration is not part of the MEng in Engineering degree program.

This concentration requires students to complete 16 graduate credit hours. Courses taken toward this concentration will count towards the student's graduate degree for students enrolled in:

- Actuarial Science, MS (<http://catalog.illinois.edu/graduate/las/actuarial-science-ms/>)
- Aerospace Engineering, MS (<http://catalog.illinois.edu/graduate/engineering/aerospace-engineering-ms/>)|Aerospace Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/aerospace-engineering-phd/>)
- Agricultural & Biological Engineering, MS (<http://catalog.illinois.edu/graduate/engineering/agricultural-biological-engineering-ms/>)|Agricultural & Biological Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/agricultural-biological-engineering-phd/>)
- Applied Mathematics, MS (<http://catalog.illinois.edu/graduate/las/applied-mathematics-ms/>)
- Astronomy, PhD (<http://catalog.illinois.edu/graduate/las/astronomy-phd/>)
- Atmospheric Sciences, MS (<http://catalog.illinois.edu/graduate/las/atmospheric-sciences-ms/>)|Atmospheric Sciences, PhD (<http://catalog.illinois.edu/graduate/las/atmospheric-sciences-phd/>)
- Bioengineering, PhD (<http://catalog.illinois.edu/graduate/engineering/bioengineering-phd/>)
- Biology: Ecology, Ethology, and Evolution, MS (<http://catalog.illinois.edu/graduate/las/biology-ms/ecology-ethology-evolution/>)|Biology: Ecology, Ethology, and Evolution, PhD (<http://catalog.illinois.edu/graduate/las/biology-phd/ecology-ethology-evolution/>)
- Biophysics & Quantitative Biology, PhD (<http://catalog.illinois.edu/graduate/las/biophysics-quantitative-biology-phd/>)
- Chemical Engineering, PhD (<http://catalog.illinois.edu/graduate/las/chemical-engineering-phd/>)
- Chemistry, PhD (<http://catalog.illinois.edu/graduate/las/chemistry-phd/>)
- Civil Engineering, MS (<http://catalog.illinois.edu/graduate/engineering/civil-engineering-ms/>)|Civil Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/civil-engineering-phd/>)
- Computer Science, MCS (<http://catalog.illinois.edu/graduate/engineering/computer-science-mcs/>)|Computer Science, MS (<http://catalog.illinois.edu/graduate/engineering/computer-science-ms/>)|Computer Science, PhD (<http://catalog.illinois.edu/graduate/engineering/computer-science-phd/>)
- Electrical & Computer Engineering, MS (<http://catalog.illinois.edu/graduate/engineering/electrical-computer-engineering-ms/>)|Electrical & Computer Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/electrical-computer-engineering-phd/>)
- Entomology, MS (<http://catalog.illinois.edu/graduate/las/entomology-ms/>)|Entomology, PhD (<http://catalog.illinois.edu/graduate/las/entomology-phd/>)
- Environmental Engineering in Civil Engineering, MS (<http://catalog.illinois.edu/graduate/engineering/environmental-engineering-civil-engineering-ms/>)|Environmental Engineering in Civil Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/environmental-engineering-civil-engineering-phd/>)
- Financial Engineering, MS ([http://catalog.illinois.edu/graduate/bus\\_engineering/financial-engineering-ms/](http://catalog.illinois.edu/graduate/bus_engineering/financial-engineering-ms/))
- Geography, MS (<http://catalog.illinois.edu/graduate/las/geography-ms/>)|Geography, PhD (<http://catalog.illinois.edu/graduate/las/geography-phd/>)
- Industrial Engineering, MS (<http://catalog.illinois.edu/graduate/engineering/industrial-engineering-ms/>)
- Materials Science & Engineering, MS (<http://catalog.illinois.edu/graduate/engineering/materials-science-engineering-ms/>)|Materials Science & Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/materials-science-engineering-phd/>)
- Mathematics, MS (<http://catalog.illinois.edu/graduate/las/mathematics-ms/>)|Mathematics, PhD (<http://catalog.illinois.edu/graduate/las/mathematics-phd/>)
- Mechanical Engineering, MS (<http://catalog.illinois.edu/graduate/engineering/mechanical-engineering-ms/>)|Mechanical Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/mechanical-engineering-phd/>)
- Nuclear, Plasma, & Radiological Engineering, MS (<http://catalog.illinois.edu/graduate/engineering/nuclear-plasma-radiological-engineering-ms/>)|Nuclear, Plasma, & Radiological Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/nuclear-plasma-radiological-engineering-phd/>)
- Physics, PhD (<http://catalog.illinois.edu/graduate/engineering/physics-phd/>)
- Plant Biology, MS (<http://catalog.illinois.edu/graduate/las/plant-biology-ms/>)|Plant Biology, PhD (<http://catalog.illinois.edu/graduate/las/plant-biology-phd/>)
- Statistics, PhD (<http://catalog.illinois.edu/graduate/las/statistics-phd/>)
- Systems & Entrepreneurial Engineering, MS (<http://catalog.illinois.edu/graduate/engineering/systems-entrepreneurial-engineering-ms/>)
- Teaching of Mathematics MS (<http://catalog.illinois.edu/graduate/las/teaching-mathematics-ms/>)
- Theoretical & Applied Mechanics, MS (<http://catalog.illinois.edu/graduate/engineering/theoretical-applied-mechanics-ms/>)|Theoretical & Applied Mechanics, PhD (<http://catalog.illinois.edu/graduate/engineering/theoretical-applied-mechanics-phd/>)

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For more information regarding the CSE Graduate Concentration, visit the Computational Science and Engineering website (<http://cse.illinois.edu/>), contact the CSE Office at (217) 333-3247, or email us ([cse@cse.illinois.edu](mailto:cse@cse.illinois.edu)).

Code	Title	Hours
Core Course Work: Complete two courses (4 hours each) from the list below.		8
CSE 401	Numerical Analysis	
CSE 402	Parallel Progrmg: Sci & Engrg	
CSE 408	Applied Parallel Programming	
CSE 510	Numerical Methods for PDEs	
CSE 527	Scientific Visualization	
Computing Elective		8
Complete two courses (4 hours each) from the approved list. The application coursework must be distinct from the core courses (no double-counting is allowed).		
<b>Total Hours</b>		<b>16</b>
Additional Requirement		
M.S. and Ph.D. Thesis Requirement: The graduate thesis must have a significant computational component, and the thesis committee must include at least one CSE-affiliated faculty.		
M.S., Non-thesis Requirement: Must complete a 4- hour independent study/Capstone Project course, where the project is supervised by a CSE-affiliated faculty. The independent study project must comprise sufficient computational work, to be designed in consultation with the faculty supervisor overseeing the independent study.		

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## Admission

Students wishing to enroll in the Computational Science & Engineering Concentration should follow the enrollment procedure (<https://cse.illinois.edu/cse-educational-programs/graduate-concentration/>) on the program's website.

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Program Director: Luke Olson ([lukeo@illinois.edu](mailto:lukeo@illinois.edu))  
Program website (<https://cse.illinois.edu>)  
Concentration website (<https://cse.illinois.edu/cse-educational-programs/graduate-concentration/>)  
Program faculty (<https://cse.illinois.edu/about-us/faculty-affiliates/>)  
1205 W Clark St, Suite 2029, Urbana, IL 61801  
(217) 300-5696  
[cse@cse.illinois.edu](mailto:cse@cse.illinois.edu)

## Grainger College of Engineering

Grainger College of Engineering website (<https://grainger.illinois.edu/>)

## Admissions

Overview of Program Admissions & Requirements (<https://cse.illinois.edu/cse-educational-programs/graduate-concentration/>)  
Overview of Graduate College Admissions & Requirements (<https://grad.illinois.edu/admissions/apply/>)