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/)
Biological Engineering: Ecology, Ethology, and Evolution, MS (http://catalog.illinois.edu/graduate/las/biology-ms/ecology-ethology-evolution/)
Biological Engineering: 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/)
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/)

Admission

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

for the graduate concentration in Computational Science & Engineering
For more information regarding the CSE Graduate Concentration, visit the Computational Science and Engineering website (http://cse.illinois.edu/), or contact the CSE Office at 217-333-3247 or cse@cse.illinois.edu.

### Core Course Work
Complete two courses (4 hours each) from the list below.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 401</td>
<td>Numerical Analysis</td>
<td>8</td>
</tr>
<tr>
<td>CSE 402</td>
<td>Parallel Progrmg: Sci &amp; Engrg</td>
<td></td>
</tr>
<tr>
<td>CSE 408</td>
<td>Applied Parallel Programming</td>
<td></td>
</tr>
<tr>
<td>CSE 510</td>
<td>Numerical Methods for PDEs</td>
<td></td>
</tr>
<tr>
<td>CSE 527</td>
<td>Scientific Visualization</td>
<td></td>
</tr>
</tbody>
</table>

### Computing Elective
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).

**Total Hours**: 16

### 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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**Program Director**: Luke Olson (lukeo@illinois.edu)

**Overview of Admissions & Requirements**: [https://cse.illinois.edu/cse-educational-programs/graduate-concentration/](https://cse.illinois.edu/cse-educational-programs/graduate-concentration/)

**Program Website**: https://cse.illinois.edu

**Program Faculty**: [https://cse.illinois.edu/cse-educational-programs/graduate-concentration/](https://cse.illinois.edu/cse-educational-programs/graduate-concentration/)

**College Website**: https://grainger.illinois.edu/

**Contact**: Bryan Wang (bpcwang@illinois.edu)

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**Phone**: (217) 300-5696

**Email**: cse@cse.illinois.edu

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Information listed in this catalog is current as of 08/2022