COMPUTER SCIENCE (PHD)

The PhD in Computer Science is a new research-focused doctoral program with the objective to help students develop proficiency in conceptualizing and implementing computer models and tools that address societal needs. This proficiency will enable students to analyze and review critically the scientific work in their area of interest and in the broader field of computer science.

Curriculum

The PhD in Computer Science requires 60 cr hours of coursework and a dissertation.

Required Coursework

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>COMP 413</td>
<td>Intermediate Object-Oriented Development</td>
<td>3</td>
</tr>
<tr>
<td>COMP 417</td>
<td>Social and Ethical Issues in Computing</td>
<td>3</td>
</tr>
<tr>
<td>COMP 460</td>
<td>Algorithms &amp; Complexity</td>
<td>3</td>
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<tr>
<td>Four Electives</td>
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<td>12</td>
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<tr>
<td>Three Doctoral Qualifying Courses</td>
<td></td>
<td>9</td>
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<tr>
<td>COMP 429</td>
<td>Natural Language Processing</td>
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<td>COMP 445</td>
<td>Internet of Things Device and Application Security</td>
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<td>COMP 458</td>
<td>Big Data Analytics</td>
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<td>COMP 462</td>
<td>Advanced Computer Architecture</td>
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<td>COMP 471</td>
<td>Theory of Programming Languages</td>
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<td>COMP 472</td>
<td>Compiler Construction</td>
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<td>COMP 474</td>
<td>Software Engineering</td>
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<tr>
<td>COMP 476</td>
<td>Automata &amp; Formal Languages</td>
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<td>COMP 479</td>
<td>Machine Learning</td>
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<tr>
<td>COMP 487</td>
<td>Deep Learning</td>
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</table>

Dissertation Research | 21

Advanced Electives | 9

Total Hours | 60

1 To establish qualifications for research, students must take three courses covering any three of the four pillars of computer science (theory, systems, software, and artificial intelligence). A grade of A is required in all three courses for successful qualification for doctoral candidacy.

All PhD students and Master’s students who are writing a thesis must successfully complete UNIV 370 Responsible Conduct in Research and Scholarship or other approved coursework in responsible conduct of research as part of the degree requirements. It is strongly recommended that students complete this two-day training before beginning the dissertation/thesis stage of the program.

Research and Dissertation

The doctoral program culminates in a dissertation that makes an original contribution to the discipline. Along the way, doctoral students are expected to write peer-reviewed conference and journal articles, engage in community outreach, develop their pedagogical skills, and pursue increasingly complex research projects. Students are also expected to open-source their research projects. The final dissertation must be deposited in a publicly accessible database in accordance with Graduate School policy.

Learning Outcomes

Upon completion of the PhD in Computer Science, students will be able to demonstrate:

- Fundamental understanding of the principles, major research findings and current open problems in their area of emphasis
- Effective scientific communication skills
- Proficiency in critical thinking (including social impact)
- Appropriate use of the scientific method
- Technical writing proficiency
- Original scholarship and the ability to conduct independent research
- Understanding of equitable and inclusive computer science pedagogy
- Understanding of the grant proposal development process and various funding agencies