

# Software Engineering / Software and Security Engineering

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## Department Information

- **Department Chair:**  
Simone Ludwig, Ph.D.
- **Program Coordinator:**  
Changhui Yan, Ph.D.
- **Department Location:**  
258 QBB
- **Department Phone:**  
(701) 231-8562
- **Department Email:**  
gradinfo@cs.ndsu.edu
- **Department Web Site:**  
ndsu.edu/cs/ (<http://ndsu.edu/cs/>)
- **Application Deadline:**  
February 1 priority deadline for fall admission; September 1 for spring admission\* No summer admission for any Software Engineering Program
- **Credential Offered:**  
Ph.D., M.S., M.S.E, Certificate
- **Test Requirement:**  
GRE (waived for fall 2022 applicants)
- **English Proficiency Requirements:**  
TOEFL ibt 79; IELTS 6.5; Duolingo 105

## Software Engineering Certificate

Code	Title	Credits
CSCI 713	Software Development Processes	3
<b>Select two of the following:</b>		<b>6</b>
CSCI 714	Software Project Planning and Estimation	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 716	Software Design	
CSCI 717	Software Construction	
CSCI 718	Software Testing and Debugging	
CSCI 848	Empirical Methods in Software Engineering	3
<b>Total Credits</b>		<b>12</b>

## Master of Software Engineering (online)

Code	Title	Credits
<b>Core Courses - 15 Credits</b>		
CSCI 713	Software Development Processes	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 716	Software Design	
CSCI 718	Software Testing and Debugging	
CSCI 848	Empirical Methods in Software Engineering	
<b>Electives - 15 Credits</b>		
CSCI 714	Software Project Planning and Estimation	
CSCI 717	Software Construction	
CSCI 724	Survey of Artificial Intelligence	
CSCI 736	Advanced Intelligent Systems	

CSCI 765	Introduction To Database Systems
CSCI 834	Knowledge Based Systems
CSCI 846	Development of Distributed Systems
CSCI 847	Software Complexity Metrics
<b>Total Credits - 30</b>	

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## Master of Science in Software and Security Engineering

Code	Title	Credits
<b>Core Courses</b>		<b>12</b>
CSCI 702	Survey of Cybersecurity	
CSCI 706	Data-Driven Security	
CSCI 713	Software Development Processes	
CSCI 716	Software Design	
<b>Additional required courses</b>		<b>6</b>
CSCI 848	Empirical Methods in Software Engineering	
CSCI 790	Graduate Seminar	
<b>Software engineering focus (required courses)</b>		<b>9</b>
CSCI 715	Software Requirements Definition and Analysis	
CSCI 718	Software Testing and Debugging	
CSCI 765	Introduction To Database Systems	
<b>Cybersecurity focus - select from:</b>		<b>9</b>
CSCI 604	Ethical Hacking	
CSCI 609	Cybersecurity Law and Policy	
CSCI 610	Computer Crime and Forensics	
CSCI 773	Foundations of the Digital Enterprise	
CSCI 765	Introduction To Database Systems	
<b>Plan A: Master's Thesis</b>		<b>6</b>
CSCI 798	Master's Thesis (6 credits)	
<b>Plan B: Master's Paper</b>		<b>6</b>
Other Computer Science or Software Engineering Courses (3 credits)		
CSCI 797	Master's Paper (3 credits)	
<b>Total Credits</b>		<b>33</b>

- Research advisor should be selected by the end of the second semester at NDSU.
- A maximum of two courses (6 credits) at the 600 level.
- All course work must be approved by the student's advisor, supervisory committee, and graduate coordinator through the Plan of Study.
- A Plan of Study listing coursework and examination committee members should be completed by the end of the second semester at NDSU.
- A maximum of 9 credits may be transferred into the program.
- Successful completion of the final defense for Plan A or B students.

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## Doctor of Philosophy in Software and Security Engineering

### Bachelor's to Doctor of Philosophy

Code	Title	Credits
<b>Core courses:</b>		<b>12</b>
CSCI 702	Survey of Cybersecurity	
CSCI 706	Data-Driven Security	
CSCI 713	Software Development Processes	
CSCI 716	Software Design	
<b>Additional required courses</b>		<b>6</b>
CSCI 848	Empirical Methods in Software Engineering	

CSCI 790	Graduate Seminar	
<b>Software engineering focus (required courses)</b>		<b>9</b>
CSCI 715	Software Requirements Definition and Analysis	
CSCI 718	Software Testing and Debugging	
CSCI 765	Introduction To Database Systems	
<b>Cybersecurity focus - select from:</b>		<b>9</b>
CSCI 604	Ethical Hacking	
CSCI 609	Cybersecurity Law and Policy	
CSCI 610	Computer Crime and Forensics	
CSCI 765	Introduction To Database Systems	
CSCI 773	Foundations of the Digital Enterprise	
<b>All Students:</b>		
Software engineering & cybersecurity courses approved by the student's Supervisory Committee. (15-27 credits)		
CSCI 899	Doctoral Dissertation (36-48 credits)	
<b>Total Credits</b>		<b>90</b>

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**Master's to Doctor of Philosophy**

Code	Title	Credits
<b>Core courses:</b>		<b>12</b>
CSCI 702	Survey of Cybersecurity	
CSCI 706	Data-Driven Security	
CSCI 713	Software Development Processes	
CSCI 716	Software Design	
<b>Additional required courses</b>		<b>6</b>
CSCI 848	Empirical Methods in Software Engineering	
CSCI 790	Graduate Seminar	
<b>Software engineering focus (required courses)</b>		<b>9</b>
CSCI 715	Software Requirements Definition and Analysis	
CSCI 718	Software Testing and Debugging	
CSCI 765	Introduction To Database Systems	
<b>Cybersecurity focus - select from:</b>		<b>9</b>
CSCI 604	Ethical Hacking	
CSCI 609	Cybersecurity Law and Policy	
CSCI 610	Computer Crime and Forensics	
CSCI 773	Foundations of the Digital Enterprise	
CSCI 765 - Introduction to Database Systems		
<b>All Students:</b>		
Software engineering & cybersecurity courses approved by the student's Supervisory Committee. (0-3 credits)		
CSCI 899	Doctoral Dissertation (30-33 credits)	
<b>Total Credits</b>		<b>60</b>

- Research advisor should be selected by the second semester at NDSU.
- A minimum of 15 didactic credits numbered 700 -789 or 800-898, of which at least 9 are not included in the Software and Security Engineering core courses listed above; none of these can be individual study course credits.
- A maximum of two courses at the 600 level.
- Students who took core courses as part of their M.S. studies at NDSU should discuss replacement courses with the advisor and the graduate program coordinator.
- All course work must be approved by the student's advisor, supervisory committee, and graduate coordinator through the plan of study.
- A Plan of Study listing coursework and supervisory committee members should be completed by the end of the second semester at NDSU.
- 30-48 credit hours of research – The Ph.D. requires a research contribution to be made under the supervision of one of the Computer Science department's graduate faculty members.

- Students who applied the listed core courses towards a M.S. degree obtained from NDSU can take up to 42 research credits.
- Satisfactory completion of the comprehensive exam at the Ph.D. level (written exam based on the core courses).
- Research proposal presentation and preliminary oral examination (Qualifying Exam) should be completed by the fourth semester at NDSU after passing the Comprehensive Exam.
- Successful completion of the final defense of the dissertation.