Software Engineering / Software and Security Engineering

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:**
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- **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
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5; Duolingo 105

Software Engineering Certificate

Code	Title	Credits
CSCI 713	**Software Development Processes**	**3**
Select two of the following:		**6**
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**
Total Credits		**12**

Master of Software Engineering (online)

Code	Title	Credits
Core Courses		
CSCI 713	Software Development Processes	3
CSCI 715	Software Requirements Definition and Analysis	3
CSCI 716	Software Design	3
CSCI 718	Software Testing and Debugging	3
CSCI 714	Software Project Planning and Estimation	3
CSCI 717	Software Construction	3
CSCI 848	Empirical Methods in Software Engineering	3
Electives - 9 Credits		9
Online CSCI courses at the 600, 700, and 800 levels		
Total Credits		**30**

Master of Science in Software and Security Engineering

Code	Title	Credits
Core Courses		**12**
CSCI 702	Survey of Cybersecurity	
CSCI 706	Data-Driven Security	
CSCI 713	Software Development Processes	
CSCI 716	Software Design	
Additional required courses		**5**
CSCI 790	Graduate Seminar	
CSCI 848	Empirical Methods in Software Engineering	
Software engineering focus select from:		**9**
CSCI Courses in the ranges of 611-619 and 711-719		
CSCI 765	Introduction to Database Systems	
Cybersecurity focus - select from:		**9**
CSCI Courses in range 601-610 excluding 603 and 605		
CSCI Courses in range 701-710, excluding core courses		
CSCI 765	Introduction to Database Systems	
CSCI 773	Foundations of the Digital Enterprise	
Plan A: Master's Thesis		**6**
CSCI 798	Master's Thesis (6 credits)	
Plan B: Master's Paper		**6**
Other Computer Science or Software Engineering Courses (3 credits)		
CSCI 797	Master's Paper (3 credits)	
Total Credits		**32**

Additional requirements for Master of Science in Software and Security Engineering:

- Research adviser should be selected by the end of the second semester at NDSU.
- A maximum of two courses (6 credits) at the 600 level.
- Field Experience/Practicum credits do not count.
- Courses on topics that are typically considered to be part of computer science, such as AI, machine learning, software engineering, etc. should be taken in the Computer Science Department. Outside courses (courses without a CSCI prefix) need prior approval by the graduate coordinator and the research advisor and should only be approved if a course with similar content is not already offered by our department. A syllabus might need to be submitted by the student wanting to take a particular course from another department to ensure adequate coverage of computer science content.
- All course work must be approved by the student's adviser, Supervisory Committee, graduate coordinator, and graduate dean 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 Oral Examination on the dissertation for Plan A and B.

Doctor of Philosophy in Software and Security Engineering

Bachelor's to Doctor of Philosophy in Software and Security Engineering

Code	Title	Credits
Core courses:		**12**
CSCI 702	Survey of Cybersecurity	
CSCI 706	Data-Driven Security	
CSCI 713	Software Development Processes	
CSCI 716	Software Design	
Additional required courses		**6**
CSCI 790	Graduate Seminar	
CSCI 848	Empirical Methods in Software Engineering	

Software engineering focus select from:		**9**
CSCI Courses in the ranges of 611-619 and 711-719		
CSCI 765	Introduction to Database Systems	
Cybersecurity focus - select from:		**9**
CSCI Courses in range 601-610 excluding 603 and 605		
CSCI Courses in range 701-710, excluding core courses		
CSCI 765	Introduction to Database Systems	
CSCI 773	Foundations of the Digital Enterprise	
All Students:		
Software engineering & cybersecurity courses approved by the student's Supervisory Committee. (15-27 credits)		
CSCI 899	Doctoral Dissertation (36-48 credits)	
Total Credits		90

Master's to Doctor of Philosophy in Software and Security Engineering

Code	Title	Credits
Core courses:		**12**
CSCI 702	Survey of Cybersecurity	
CSCI 706	Data-Driven Security	
CSCI 713	Software Development Processes	
CSCI 716	Software Design	
Additional required courses		**6**
CSCI 848	Empirical Methods in Software Engineering	
CSCI 790	Graduate Seminar	
Software engineering focus select from:		**9**
CSCI Courses in the ranges of 611-619 and 711-719		
CSCI 765	Introduction to Database Systems	
Cybersecurity focus - select from:		**9**
CSCI Courses in range 601-610 excluding 603 and 605		
CSCI Courses in range 701-710, excluding core courses		
CSCI 773	Foundations of the Digital Enterprise	
CSCI 765 - Introduction to Database Systems		
All Students:		
Software engineering & cybersecurity courses approved by the student's Supervisory Committee. (0-3 credits)		
CSCI 899	Doctoral Dissertation (30-33 credits)	
Total Credits		60

Doctor of Philosophy + Master of Science in Software and Security Engineering

Code	Title	Credits
Core courses:		**12**
CSCI 702	Survey of Cybersecurity	
CSCI 706	Data-Driven Security	
CSCI 713	Software Development Processes	
CSCI 716	Software Design	
Additional required courses		**6**
CSCI 790	Graduate Seminar	
CSCI 848	Empirical Methods in Software Engineering	
Software engineering focus select from:		**9**
CSCI Courses in the ranges of 611-619 and 711-719		
CSCI 765	Introduction to Database Systems	
Cybersecurity focus - select from:		**9**
CSCI Courses in range 601-610 excluding 603 and 605		

CSCI Courses in range 701-710, excluding core courses		
CSCI 765	Introduction to Database Systems	
CSCI 773	Foundations of the Digital Enterprise	
All Students:		
Software engineering & cybersecurity courses approved by the student's Supervisory Committee. (15-27 credits)		
CSCI 899	Doctoral Dissertation (36-48 credits)	
Total Credits		90

Additional requirements for the Bachelor's to Doctor of Philosophy and Master's to Doctor of Philosophy options:

- Research adviser 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. Field Experience/Practicum credits do not count.
- Students who took core courses as part of their M.S. studies at NDSU should discuss replacement courses with the adviser and the Graduate program coordinator.
- Courses on topics that are typically considered to be part of computer science, such as AI, machine learning, software engineering, etc. should be taken in the Computer Science Department. Outside courses (courses without a CSCI prefix) need prior approval by the graduate coordinator and the research advisor and should only be approved if a course with similar content is not already offered by our department. A syllabus might need to be submitted by the student wanting to take a particular course from another department to ensure adequate coverage of computer science content.
- All course work must be approved by the student's adviser, supervisory committee, graduate coordinator, and graduate dean 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 Oral Examination on the dissertation.

Additional requirements for the Doctor of Philosophy + Master of Science option:

- Ph.D. students in this option will earn a Master of Science degree after they pass the preliminary oral examination (Qualifying Exam).
- Students will need to submit a Ph.D. Plan of Study indicating "Ph.D. + Master's" as the degree.
- Before a student can apply to take the preliminary oral examination (Qualifying Exam), they must have

    1. passed the comprehensive exam.
    2. completed 30 credits, of which 21 credits need to be didactic credits at the graduate level at NDSU.
    3. submitted a paper as first author to a high-quality journal or conference on a topic related to their Ph.D. dissertation.

- After students have passed the preliminary examination, they must complete the Graduate School Graduation Application (https://powerforms.docusign.net/71b00c0e-af21-4473-bb23-cdbd85983676/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7) in order for their M.S. degree to be posted to their academic record.
- Students will be eligible to participate in commencement of their M.S. degree the term they pass the preliminary oral examination (Qualifying Exam).
- 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.
- 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.
- Successful completion of the final defense of the dissertation.