

Ph.D. in Engineering

Cyberspace Engineering Concentration

Curriculum for students admitted for or after Spring 2016 (3/2016)¹

Degree Codes: ES PhD ENGR

Contact: Dr. Jean Gourd

Overview

The Cyberspace concentration within the Ph.D. in Engineering aims to graduate engineering researchers who are capable of pushing the frontiers of engineering across the cyberspace domain.

Students without an undergraduate degree in an Engineering program

Take all three of the following:

ENGR 220	Statics & Mechanics of Materials
ENGR 221	Electrical Engineering and Circuits I
ENGR 222	Thermodynamics

(and any other deficiency courses recommended by the Advisory Committee)

General Core courses

Take the **first two** and choose **one** from the remaining two (9 SCH):

ENGR 641	Formulation of Solutions to Engineering Problems
MATH 574	Numerical Solution for PDE I
STAT 620	Theory of Probability
STAT 621	Theory of Statistics

Disciplinary Core courses

Choose four of the following (12 SCH):

CSC 543	Digital Forensics and Cyber Crime
CSC 552	Distributed and Cloud Computing
CSC 554	Advanced Networking
ELEN 512	Electromagnetic Waves
ELEN 535	Advanced Topics in Microelectronics
ELEN 565	Digital Signal Processing
MATH 435	Introduction to Graph Theory
MATH 460	Number Theory
PHYS 511	Electromagnetic Theory

Qualifying Examinations

The qualifying examination (ENGR 685) and the oral comprehensive exam (ENGR 686) is managed by the Chair of the Advisory Committee. ENGR 685 consists of a written paper and presentation discussion of one or more research article(s) in a complementary area to the student's research. The oral comprehensive examination (ENGR 686) involves a presentation focused on student's proposed doctoral research. ENGR 685 and ENGR 686 should be attempted in the same quarter for this track, and may be repeated only once.

Doctoral Seminar (3 SCH)

All students must enroll in ENGR 610 (3 SCH) or three ENGR 611 001 (1 SCH) over the course of the degree.

¹ Optional for students admitted to the program for Winter 2015-16 quarter or before.

Independent Study and Special Topics (12 SCH)

At least two Doctoral level Special Topics courses (ENGR 657) are part of the required coursework for the degree, for a total of 6 SCH. A Ph.D. student must participate in 6 SCH of Doctoral Independent Study (ENGR 650) under the supervision of a faculty member. Independent Study can be a preparation for the research leading to the dissertation.

Recommended Elective courses

In addition to the courses listed in the General and Disciplinary cores (above), a student may take any of the following elective courses. Courses not listed here or in the General and Disciplinary cores are also acceptable, provided they are approved by the Advisory Committee.

Choose four of the following (12 SCH):

CSC 575	Advanced Topics in Artificial Intelligence
CSC 576	Data Analytics Tools and Applications
CSC 579	Data Mining and Knowledge Discovery
CSC 580	Advanced Data Mining, Fusion, and Applications
CYEN 501	Digital Forensics and Cyber Crime
CYEN 502	Access Control Logic & Covert Channels
CYEN 503	Wireless & Mobile Security
ELEN 533	Optoelectronics
ELEN 561	Random Signals and Systems
ELEN 567	Wireless Sensor Networks
ELEN 572	Digital Control Systems I
ELEN 573	Digital Control Systems II
MATH 535	Graph Theory
MATH 575	Numerical Solution for PDE II
PHYS 512	Solid State Physics
PHYS 540	Computational Methods in Physics Modeling and Simulation I
PHYS 541	Computational Methods in Physics Modeling and Simulation II

Research and Dissertation	Minimum 18 hours total (ENGR 651 and ENGR 751).
ENGR 651	Pre-Candidacy Doctoral Research
ENGR 751	Post-Candidacy Dissertation Research

Complete 9 SCH of ENGR 651 prior to ENGR 686. After successful completion of ENGR 686, the student will become a PhD Candidate and will complete at least 9 SCH of ENGR 751. For ENGR 651 or ENGR 751, registration in any quarter is for 1 to 3 semester hours or multiples thereof, up to a maximum of 9 semester hours per quarter.

Total: 45 SCH of coursework + 3 SCH of doctoral seminar courses + 9 SCH of Pre-candidacy Doctoral Research + 9 SCH of Post-candidacy Dissertation Research = 66 SCH