

Ph.D. in Engineering
Micro and Nanoscale Systems Concentration

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

Degree Codes: COES PhD ENGR

Contact: Dr. Shengnian Wang

Required General Core Courses

Take all of the following: (9 SCH)

MATH 574

ENGR 641

STAT 620

Numerical solutions of PDE

Formulation of Solutions to Engineering Problems

Theory of Probability

Micro/Nanotechnology Core Courses

Take the **first two** and choose **two** from the remaining three: (12 SCH)

MSE 501

MSE 502

MSE 504

Systems

MSE 505

MSE 512

Fundamentals of Microfabrication Processes

Microsystems Principles

Advanced materials for Micro/Nano Devices &

Nanotechnology Principles

Biotechnology Principles

Qualifying Examinations

ENGR 685

ENGR 686

Written Qualifying Examination

Oral Comprehensive Exam (Preq. or coreq., ENGR 685)

Doctoral Seminar: 3 SCH total

All students are required to enroll in 3 SCH of the Dissertation Enhancement Seminar (ENGR 611 – Section 5) as part of the course work for the degree.

Independent Study and Special Topic (12 SCH total)

Students may enroll in 6 SCH or more of doctoral level special topic courses (ENGR 657) as part of the course work for the degree.

Students may enroll 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 Courses²

Choose four or more of the following to complete to reach 48 SCH of courses: (12+SCH)

BIEN 557

BIEN 557

Special Topics – BioMEMS

Special Topics – Protein Engineering

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

² Courses not listed are also acceptable, provided they are approved by the student's advisory committee.

CMEN 504	Advanced Chemical Engineering Kinetics
CMEN 513	Transport Phenomena
CMEN 522	Advanced thermodynamics
CMEN 557	Special Topics – Chemical Microsystems
CMEN 557	Special Topics – Nanosystems Modeling
CMEN 557	Special Topics – Thermodynamics
CHEM 502	Selected Topics in Organic Chem. – Principles of
Polymers	
MSNT 506/CHEM 523	Nanofabrication by Self-Assembly
ELEN 533	Optoelectronics
ELEN 535	Advanced Topics in Microelectronics
ENGR 566	Quality in Engineering
ENGR 592	Engineering Computational Methods
ENGR 622	The Academic Enterprise
ENGR 631	Global Competitiveness and Management of
Technology	
MEEN 557	Durability of Materials
MEMT 508	Finite Element Analysis
MEMT 511	Modern Engineering Materials
MSE 506	Micro/Nano Scale Materials Measurements &
Analysis	
MSE 507/ELEN 537	Advanced Microfabrication with CAD
MSE 508/ELEN 538	Advanced Microelectronics Devices with CAD
MSE 609	Microsystems Analysis with CAD
MSE 610	Microsystems Design with CAD
PHYS 512	Solid State Physics
STAT 621	Theory of Statistics
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 coursework³ + 3 SCH of doctoral seminar courses + 9 SCH of Pre-candidacy Doctoral Research + 9 SCH of Post-candidacy Dissertation Research = 66 SCH

³ Students must make a B or better in a minimum of 18 SCH of 600 level courses.