

University of Virginia
Department of Engineering Systems and Environment
Systems Engineering

PHD COURSEWORK

Any student enrolled in the Ph.D. program prior to the Fall 2019 semester has the option of adhering to either (a) the curriculum presented below or (b) the curriculum that was effective when the student first enrolled in the Ph.D. program.

Mandatory Courses

SYS 6001 – Introduction to Systems Analysis and Design (*Foundation Course*)
SYS 7096 – Systems Engineering Colloquium (2 semesters as SE Ph.D. student)

Foundations (3 courses selected from the following)

SYS 6003 – Optimization Models and Methods I
SYS 6005 – Stochastic Modeling I
SYS 6007 – Human Factors I
SYS 6021 – Statistical Modeling I

Methodological Areas (4 courses from at least 2 areas)

Students must take four courses from at least two of the methodological areas below. The courses in each of the areas below are only exemplars as course offerings change from year to year. Other courses in these areas may be used to fulfill methodological requirements as approved by the student's doctoral advisory committee. Additionally, certain courses are listed in multiple areas. In these cases, the student must decide which area the course satisfies for their plan of study. Each course may only satisfy one area for the student's plan of study.

Autonomy and Controls

APMA 6548 – Introduction to Chaos, Bifurcation, and Stability
ECE 6502 – Introduction to Control Systems
ECE 7856 – Nonlinear Control Systems
ECE 8825 – Adaptive Control
SYS 60XX – Autonomous Mobile Robotics
SYS 60XX – Reinforcement Learning
SYS 7005 – Stochastic Systems II

Human Factors

SYS 6036 – Design of Experiments
SYS 60XX – Human Factors Design for Community Health
SYS 6024 – User Experience Design
SYS 6026 – Quantitative Models of Human Perceptual Information Processing
SYS 6064 – Applied Human Factors Engineering
SYS 60XX – Mobile Sensing and Health

Optimization

SYS 6042 – Network and Combinatorial Optimization
SYS 7063 – Simulation Optimization
CS 6161 – Design and Analysis of Algorithms

Decision and Risk Analysis

SYS 6014 – Decision Analysis
SYS 6034 – Discrete-Event Stochastic Simulation
SYS 6035 – Agent-Based Modeling and Simulation of Complex Systems
SYS 6041 – Ethics in Engineering Research and Practice
SYS 6050 – Risk Analysis
SYS 6070 – Environmental Systems Processes
SYS 7001 – System and Decision Sciences
SYS 7005 – Stochastic Systems II
SYS 7075 – Bayesian Forecast-Decision Theory

Statistical Modeling

STAT 5170 – Applied Time Series
STAT 6440 – Introduction to Bayesian Methods
SYS 6016 – Machine Learning
SYS 6018 – Data Mining
SYS 7063 – Simulation Optimization

Research Electives (3 courses)

Courses at the 6000 and 7000 levels are chosen in consultation with the advisory committee to support the student's research program.

Receiving Credit for Prior Graduate Coursework

PhD students entering the SE program with a Master's degree from another institution are bound by the coursework requirements in Table A; however, they may use their prior graduate coursework to fulfill the above requirements. The request for credit transfer must be submitted separately and must include the following documents: a petition form, a description of course content or syllabus, and an official transcript. Regardless of transfer credit, students must take at least 6 hours of ESE graduate course offerings.