

Syllabus

Last updated: 10 August 2015

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Course objectives In this course, we will study the use of simulation as a decision-making tool. By the end of this course, you will be able to: (i) create discrete-event simulations using Python and SimPy, (ii) perform statistical tests to fit input data to probability distributions for use in simulation, (iii) perform statistical tests to compare the output of simulations of alternate systems, and (iv) apply these skills to study and improve an existing real-world system of moderate complexity.

These objectives aim to expand your repertoire of operations research tools, strengthen your ability to rigorously model and analyze complex problems, and develop your capacity to communicate technical ideas in an effective manner.

Schedule This schedule is subject to change.

Date	Topic
Overview	
25 Aug	Introduction to simulation
27 Aug	Introduction to Python and Jupyter
1 Sep	Introduction to SimPy
3 Sep	SimPy: monitors
8 Sep	Monday schedule
10 Sep	Practice with SimPy
15 Sep	Replicating simulations
17 Sep	Comparing alternate systems
22 Sep	Input data analysis: discrete distributions
24 Sep	Input data analysis: continuous distributions
29 Sep	Review
1 Oct	Exam 1
Simulation theory and advanced modeling techniques	
6 Oct	Random number generation, testing for independence
8 Oct	Random variate generation
13 Oct	Variance reduction: common random numbers
15 Oct	SimPy: balking and reneging
20 Oct	SimPy: multiple arrival types, user-defined distributions
22 Oct	SimPy: priority queues and preemptions
27 Oct	SimPy: levels
29 Oct	Practice with advanced SimPy constructs
3 Nov	Review
5 Nov	Exam 2

Date	Topic
10 Nov	SimPy: queueing networks
12 Nov	Transient vs. steady state behavior
Putting it all together: project	
17 Nov	Work on projects
19 Nov	Work on projects
24 Nov	Work on projects, project model walkthroughs
26 Nov	Holiday: Thanksgiving
1 Dec	Work on projects, project model walkthroughs
3 Dec	Work on projects
8 Dec	Project presentations
10 Dec	Project presentations