

Information on Simulation Courses

Updated by S. R. Hunter on Tuesday January 12, 2021.

Adapted from the original description posted on Prof. B. Schmeiser's website.

Below is information about four Industrial Engineering simulation courses taught in recent years:

- IE 580: Systems Simulation, offered each Fall semester (usually by Prof. Lee)
- IE 581: Simulation Design and Analysis, offered most Spring semesters (usually by Prof. Hunter)
- IE 680: Advanced Simulation Design and Analysis, offered occasionally (previously by Prof. Wan)
- IE 690: Simulation Optimization, a new course first offered in Fall 2016 (by Prof. Hunter)

INTRODUCTORY COURSE DESCRIPTIONS & PREREQUISITES

- IE 580 and IE 581
 - Both courses are introductions to simulation of stochastic systems on digital computers; neither assumes the other as a prerequisite or co-requisite. Both courses may be taken for credit.
 - Both courses require the equivalent of the undergraduate IE courses in probability, statistics, and computer programming.
- IE 580 is the usual first course for IE students.
 - It emphasizes creating complex models of dynamic discrete-event systems using commercial simulation software. IE 580 helps with motivating the topics of IE 581, but is not a prerequisite.
 - **Most undergraduates taking only one course choose IE 580.** For students planning to take both IE 580 and IE 581, most students prefer to take IE 580 first.
- IE 581 is another first course.
 - It emphasizes the view of simulation as a statistical experiment, covering classic ideas about random numbers, random variates, input modeling, output analysis, and variance reduction, as well as methods for next-event simulation of dynamic discrete-event systems. Computer assignments are in MSEXCEL and MATLAB. *Commercial simulation software, including animation and visualization, is not discussed.*
 - IE 581 considers simulation as a way of doing probability analysis by performing statistical experiments, so both probability and statistics are central to the course. Many IE 581 lectures contain Greek letters. A solid understanding of IE 230, IE 330, and IE 336 is sufficient, although many students have a deeper background.
 - IE 581 should be an easy course for any student who has taken IE 580 *and* has a good background in probability, statistics, and computer programming. Many students in IE 581 begin the semester weak in one of these topics. *If weak in more than one topic, then don't take IE 581.*
 - **IE 581 is not recommended for students who are concurrently enrolled in STAT 511.**

ADVANCED COURSE DESCRIPTIONS & PREREQUISITES

- IE 680 considers the same topics as IE 581, but at an advanced level.
 - Lectures, journal articles, class discussion, presentations, project
 - Usually, IE 580 *is not* a prerequisite for IE 680.
 - Usually, IE 581 *is* a prerequisite for IE 680.
- IE 690 Simulation Optimization is an in-depth course on selected topics in simulation optimization.
 - Intensive reading (journal articles) and writing or presenting will be required for all students, who should be somewhat mature in their ability to read and comprehend technical scholarly writing.
 - Students should have seen MA 341 Introduction to Real Analysis material or taken MA 504.
 - Usually, *IE 581 is a strictly enforced prerequisite for IE 690.* Students seeking an exception to this policy should contact me; usually exceptions are only granted to students who have taken at least the following three courses (or more): STAT 519, STAT 532, and MA 504.