Department of Industrial Engineering  
ISEN 424 – Required Course  
Systems Simulation

CATALOG DESCRIPTION

Systems simulation structure, logic and methodologies; generation of random numbers and deviates; system simulation languages, models and analysis; applications to industrial situations.

PREREQUISITES

ISEN 316, STAT 211, STAT 212 and proficiency with Excel.

COURSE OBJECTIVES

The course objective is to understand the following: (1) Statistical issues involved in simulation data preparation and model design, (2) Systems modeling using a commercial simulation language (ARENA), and (3) Interpretation and presentation of relevant modeling results.

TEXTBOOK AND ADDITIONAL COURSE MATERIAL


TOPICAL OUTLINE

Lecture
- Course Introduction
- Review of Probability & Statistics
- Random Number & Variate Generation
- Structure of a Simulation Language
- Statistical Analysis Including Lags & Correlations
- Modeling & Simulation with SIMAN/ARENA
- Use of VBA with ARENA (time permitting)

Lab
- Intro to Simulation
- Statistics and random number generation
- ARENA: Blocks and Elements Templates
- ARENA: Basic Process and Advanced Process Templates
- ARENA: Advanced Transfer Templates
- ARENA: Integration of VBA (time permitting)

CLASS SCHEDULE

Lecture: M and W 8:00 – 8:50
Lab: M or W 12:40 – 3:10
PROFESSIONAL COMPONENT

This course provides fundamental concepts, theory, and practice in the use of simulation for designing and analyzing various systems. There is an emphasis on manufacturing systems, but examples of other systems are also used so that our students have some concept for the wide breadth of the application of simulation. It is expected that this course will prepare students for entering the workforce prepared to use simulation as one of their key design and analysis tools in the study of systems.

ABET OUTCOMES

A. An ability to apply knowledge of mathematics, science, and engineering.
Simulation involves the application of statistics to computerized experiments. In addition, students will be asked to estimate the expected response of a system before the simulation is conducted. Since many of these examples come from manufacturing, the mathematical analysis techniques taught in ISEN 316 will be important. Thus, the use of statistics and queueing theory will be reinforced. Evaluation Method: Tests, homework, lab assignments.

B. An ability to design and conduct experiments, as well as to analyze and interpret data.
The design, analysis, and interpretation of statistical experiments in the context of simulation studies is a primary objective of this course. Evaluation Method: Tests, homework, lab assignments.

E. An ability to identify, formulate, and solve engineering problems.
After the students learn the basics of developing simulation models, some lab assignments will involve the identification, formulation, and the ability to solve engineering problems in the context of a manufacturing facility. Evaluation Method: Lab assignments.

K. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
In this course, we use a current version of a popular, commercial simulation language. Thus, the teaching of simulation concepts involves, at the same time, the use of a modern engineering tool. In addition, visual basic is becoming increasingly used as a necessary tool for enhancing most software packages; thus, we are beginning to integrate the use of visual basic with the simulation package. Evaluation Method: Tests, homework, lab assignments.

PREPARED BY: Departmental Course Committee for ISEN 424
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