

DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING
ISEN 424: SYSTEMS SIMULATION

REQUIRED or ELECTIVE: Required Course

CATALOG DESCRIPTION (2-3) Credit 3

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

PREREQUISITES

STAT 212

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. This is one of the university required writing intensive courses that allows students to communicate their engineering knowledge to a non-engineer audience.

COURSE LEARNING OUTCOMES

At the end of the course, students should be able to

- understand the statistical issues involved in simulation data preparation and model design,
- use a commercial simulation language,
- interpret properly the results of a simulation study, and
- effectively communicate model results in a written form.

TEXTBOOK

Discrete Event System Simulation, 5th edition, by J. Banks, J. Carson, B. Nelson, and D. Nicol.

References

Simulation with ARENA, 4th Edition (2007) by W.D. Kelton, R.P. Sadowski and D.T. Sturrock
Simulation Modeling and Analysis, 2nd Edition (1991) by A.M. Law and W.D. Kelton

TOPICS COVERED

Lecture

1. Modeling Fundamentals
2. Structure of a Simulation Language
3. Review of Probability and Statistics
4. Modeling and Simulation with SIMAN/ARENA

5. Random Number and Random Variate Generation
6. Input Analysis
7. Output Analysis
8. Verification and Validation

Lab

1. Introduction to Simulation
2. Statistics and random number generation
3. ARENA: Blocks and Elements Templates
4. ARENA: Basic Process and Advanced Process Templates
5. ARENA: Advanced Transfer Templates

CLASS AND LAB SCHEDULE

One hundred minutes of lectures per week; two days a week for 50 minutes per day. Laboratory meetings are 150 minutes per week.

CONTRIBUTION TO MEETING REQUIREMENTS OF CRITERION 5:

Subject	Semester hrs	Subject	Semester hrs	Subject	Semester hrs
Mathematics		Engineering Science	2	General	
Basic Science		Engineering Design	1		

RELATIONSHIP OF COURSE TO PROGRAM OUTCOMES:

- A. Ability to apply knowledge of mathematics, science and engineering
- B. Ability to design and conduct experiments, as well as to analyze and interpret data
- E. Ability to identify, formulate and solve engineering problems
- G. Ability to communicate effectively
- K. Ability to use the techniques, skills and modern engineering tools necessary for engineering practice

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