

Department of Industrial Engineering
ISEN 425 – Elective Course
Design and Analysis of Industrial Systems with Simulation

CATALOG DESCRIPTION (2-3) Credit 3

In-depth study into the design, modeling, and subsequent analysis of contemporary production/service systems; factory/service systems are modeled using the ARENA/SIMAN simulation-animation language; emphasis is placed on the critical analysis of alternative flow designs of modeled systems using flow and economic parameters to assess system improvement..

PREREQUISITES

ISEN 303 and 424 and proficiency with Excel.

COURSE OBJECTIVES

The course objective is to gain proficiency in simulation modeling and the analysis of its output.

TEXTBOOK AND ADDITIONAL COURSE MATERIAL

Textbook: A. M. Law and W. D. Kelton (2000), *Simulation Modeling and Analysis (3rd Edition)*.

References: W. D. Kelton, R. P. Sadowski, D. T. Sturrock (2004), *Simulation with ARENA (3rd Edition)*.

TOPICAL OUTLINE

Lecture

- Course Introduction
- Random Number & Variate Generation
- Understanding Future Events Chains
- Statistical Analysis for input and output
- Modeling & Simulation with ARENA and animation
- Use of VBA with ARENA

Lab

- Use of animation
- Case studies
- Writing reports
- Integration of VBA with ARENA

CLASS SCHEDULE

Lecture: two 50 minute periods per week

Lab: one 150 minute period per week

(ISEN 425, Continued)

PROFESSIONAL COMPONENT

This course provides case studies to demonstrate the fundamental concepts, theory, and practice in the use of simulation for designing and analyzing various systems. A broad range of systems will be used in the case studies so that students will have an appreciation for the depth of application for simulation modeling. It is expected that this course will prepare students for entering the workforce confident in their ability 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.

Lab assignments will involve the identification, formulation, and the ability to solve engineering problems. 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 and lab assignments.

Academic Integrity

Students in this class are reminded of the Academic Integrity Statement of Texas A&M University: “An Aggie does not lie, cheat, or steal or tolerate those who do.” Further information on Honor Council Rules and Procedures may be found at www.tamu.edu/aggiehonor

To Students with Disabilities:

The Americans with Disabilities Act (ADA) is a federal antidiscrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe that you have a disability requiring an accommodation, please contact the Department of Student Life Services for Students with Disabilities in Room 126 of the Koldus Building, or call 845-1637.

PREPARED BY: R. M. Feldman

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