

SYLLABUS: system modeling and simulation

Date / Revision 23 May 2015 / 02 May 2017 / PP
Faculty Engineering
Study Program Industrial Engineering (INE)

SUBJECT: SYSTEM MODELING AND SIMULATION

1 Basic Information

1.01	Subject Name	System Modeling and Simulation
1.02	Semester	6
1.03	Level	0
1.04	SKS	3
1.05	Mandatory / Curriculum	D-02
1.06	Subject Code	SMSI
1.07	Subject Code	INE-D-SMSI-605
1.08	Year	2017 (7)
1.09	Quality Control	Final Test, OFSE, see evaluation
1.10	Limitations	Min 12 and Max 32 students in one class
1.11	Combined with	
1.12	Prerequisite	Engineering Mathematics 1,2; Engineering Statistics; Operation Research 1,2; Manufacturing Processes
1.13	Responsible	To be assigned
1.14	Revision	15-05-2017/pp

2 Description of Subject

This course is about Modeling and simulation of Industrial Systems. Consisting of modeling fundamentals and designing DES (Discrete Event System) Simulation environment for visualizing industrial activities.

3 Objectives

- Introduce fundamental fundamentals theory of modeling and simulation
- Develop ability for solving problems of industrial situation (activities) to provide a set of solution

- thru visualization
- Develop skills for experimentation software systems for DES (Discrete Event Simulation)
 - Develop skills for modeling and simulation
 - Capable to analyze and synthesis of industrial activities through simulation

4 Competency

- After having the course, students are expected to:
- Explain modeling, queuing theory, and simulation modeling
 - Apply concepts of probability and statistics in simulation
 - Understanding the elements of Discrete Simulation
 - Gathering statistical observation in simulation
 - Apply a software application for modeling and simulation activities

5 Learning Approach / Methodology

- Lectures/ Class contact (time-tabled) supplemented with interactive questions and answers;
- Circuit simulation using Electronic Workbench Software;
- Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing;
- Student Study Effort: homework/assignment; preparation for test/quizzes/ examination.

6 Evaluation

5.1	Absence maximum	25%
5.2	Participation in Discussion	05 Points
5.3	Homework / Classwork	05 Points
5.4	Presentation /Simulation	10 Points
5.5	Daily Quiz	20 Points
5.6	Final Examination	60 Points
	Total	100 Points

7 Text Book and Reference

- 1 Main Text Book:**
"Performance Evaluation of Industrial Systems 2nd Edition, 2012", **Authors:** David Elizandro and Hamdy Taha, Publisher: CRC Press Taylor & Francis Group, **ISBN:** 978-1-4398-7135-5
- 2 Supplement Textbooks:**
"Object Oriented Discrete Event Simulation with Java - A Practical Approach 2001", Author: Jose M

8 Content / Topics of Lecture

Wee	Content/ Topics of Lecturing	Text Book	Remark
1	Introduction to Modeling: Introduction. Model Design, Hierarchical Modeling. Analytic Models. Simulation Models	Ch1	
2	Basic Queuing Models: Introduction. Elements of a queuing model. Role of the exponential distribution. Pure arrival and departure models. General Poisson Queuing Model. Jackson Network Models. Closed forum versus discrete event simulation models	Ch2	
3	Simulation Modeling : Introduction. Types of simulation. The simulation clock. Randomness in simulation. Discrete simulation languages. Simulatoin projects. Design environment for Event-Driven Simulation	Ch3:	Quiz
4	Probability and Statistics in Simulation : Role of probability and statistics in simulation. Characteristization of common distributions. Statistical output analysis.	Ch4	
5,6	Element of Discrete Simulation : Concept of events in simulation. Common simulation approaches. Computational of random deviates. Collecting data in simulation.	Ch5	Quiz
6,7	Gathering statistical observations in simulation: Introduction. Peculiarities of the simulation experiment. Accounting for the peculiarities of the simulation experiment. Methods of gathering simulation observations. Variance reduction technique	Ch6	
8	MIDTERM SEMESTER BREAK		
9-10	Overview of DEEDS: Introduction. Modeling Philosophy. Basic Elements. Basic Features. Develop and execute a DEEDS model.	Ch7	Quiz
11-12	DEEDS Network Representation: Introduction. Nodes. Transactions. Lists. Classes and Procedures. Simulation program. Program initial conditions. Model development.	Ch8	
13	Overview of Object Oriented Modeling and Simulation DEEDS : Simulation with Java. Simulation Models. Types of Simulation Models. Phases in Model Development. Performance Measures	Ch1[2] 1.2-1.10	

14-15	Developing A Prototype Object-Oriented DEEDS : Discrete Event Simulation	Ch 4[2]	Quiz
16	Final Examination		