Al Imam Mohammad ibn Saud Islamic University
College of Computer and Information Sciences

Computer Science Department

Course Syllabus

CS411 - Simulation and Modeling

Catalog Description: This course covers a comprehensive introduction to the modeling and simulation of real systems. Techniques of simulation modeling as a decision-support tool and a problem-solving approach are presented to students. These course emphases on discrete-event simulation model development methodologies and implementation techniques. The course also includes statistical analysis of simulation input, random number generation and their validation, and queuing theory.

Credit Hours: **3 Credit hours:** **3** Lectures per week **0** Labs. per week **0** Recitation per week

Prerequisites: CS330

Course Learning Outcomes:
1. Discuss methodologies for modeling and simulation of complex systems
2. Compare between various modeling methodologies.
3. Develop an understanding of basic concepts of discrete-event simulation
4. Validate and verify a given simulation model
5. Analyze and interpret simulation output.
6. Develop a hands-on experience in some of the simulation software.

Major Topics:
- Introduction to Modeling
- Introduction to Simulation
- Discrete Event Simulation Concept
- Discrete Event Simulation Concept
- Statistical Models in Simulation
- Statistical Models in Simulation
- Monte Carlo simulation
- Monte Carlo simulation
- Introduction to Arena
- Random Numbers generation
- Analysis of Simulation Data
- Analysis of Queuing Models
- Agent-based models
- Model Verification and Validation

Text Books:
• Simulation Modeling and Analysis with Arena, Tayfur Altiok - Benjamin Melamed. 2007. ISBN-10: 0123705231
• Simulation Modeling and Analysis, 3rd Edition by Averill M. Law & W. David Kelton . 2000. ISBN-10: 0070592926
• Optional : System Modeling and Simulation: An Introduction, Severance, Wiley, 2001.
• Optional : Discrete-Event System Simulation, Banks, China Machine Press, 2005.
• Optional : Principles of Discrete Event Simulation, Fishman, John Wiley & Sons, 2000.

• Optional : Fundamentals of Queueing Theory, Gross and Harris, Wiley, 1998.
• Optional : Network Calculus: A Theory of Deterministic Queuing Systems for the Internet, Le Boudec and Thiran, Springer, 2001.

Grading:

- The grading scale for this course is:
  - . 95 - 100 A+ Passing
  - . 90 - 94 A Passing
  - . 85 - 89 B+ Passing
  - . 80 - 84 B Passing
  - . 75 - 79 C+ Passing
  - . 70 - 74 C Passing
  - . 65 - 69 D+ Passing
  - . 60 - 64 D Passing
  - . 0 - 59 F Failing

- Final grades will be determined based on the following components:
  - . 60% Semester Work
  - . 40% Final Exam

- Students may not do any additional work for extra credit nor resubmit any graded activity to raise a final grade.

- Late submissions will not be accepted for any graded activity for any reason.

- Studentshave one week to request the re-grading of any semester work.

Attendance Policy:

Students should attend 80% of the overall course hours taught in the semester as per the University regulations.

If a student fails to achieve this portion, he/she shall not be allowed to appear in the final exam and shall be awarded “DN” grade and repeat the course.

Cheating and Plagiarism Policy:

The instructor will use several manual and automated means to detect cheating and/or plagiarism in any work submitted by students for this course.

When a student is suspected of cheating or plagiarism, the instructor raises the issue to the disciplinary committee.

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Communications:

Registered students will be given access to a section of the Blackboard Learning System for this course. Bb will used as the primary mechanism to disseminate course information, including announcements, lecture slides, assignments, and grades.

Communication with the instructor on issues relating to the individual student should be conducted using CIS email, via telephone, or in person.