ECE 4520 Simulation and Modelling
Course Outline – Winter Term 2012

Course Objectives
The course will cover both analytical methods (Markov Models and Queuing Networks) and simulation techniques (Monte Carlo Techniques and Event Driven Simulation) applied in performance modeling of communication systems and networks.

Prerequisites
STAT 2220 Contemporary Statistics for Engineers
COMP 2140 Data Structures and Algorithms

Course Content
The following topics will be covered:
  • The Essentials of Probability
  • Monte Carlo Techniques
  • Discrete Event Stochastic Models
  • Markov Models with Applications to Data Networks
  • Queuing Models

Accreditation Units
Mathematics: 0
Natural Science: 0
Complementary Studies: 0
Engineering Science: 75%
Engineering Design: 25%

Web Page
http://courses.ece.umanitoba.ca/ECE4520

Textbook

Evaluation Details
The final course grade is determined by the student’s performance on assignments, in laboratories, and on examinations. Students must complete all the laboratories in order to be eligible to receive a passing grade.

Mid-Term(s)
TBA

Instructor
Prof. Miroslaw Pawlak
Room: E1-528 EITC
Telephone: (204) 474-8881
Email: pawlak@ece.umanitoba.ca
Office Hours
M, W, F, after class or by appointment.

Teaching Assistants
TBA

Voluntary Withdrawal Date
Friday, March 16th, 2012.

Requirements/Regulations
- Attendance at lectures and laboratories is essential for successful completion of this course. Students must satisfy each evaluation component in the course to receive a final grade.
- It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with incomplete term work, deferred examinations, attendance and withdrawal.
- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, wireless communication or data storage devices) are allowed in examinations unless approved by the course instructor.

Academic Integrity
Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations and Requirements of the University of Manitoba, Section 7.1, students are reminded that plagiarism or any other form of cheating in examinations, assignments, laboratory reports or term tests is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty.
Learning Outcomes (approximately 5 recommended)

1. Describe the role of important elements of simulation and modeling paradigm.
2. Analyze and design Monte Carlo simulation algorithms.
3. Analyze and design discrete-event simulation algorithms.
4. Output analysis for discrete-event simulation algorithms.
5. Modeling techniques for event systems.

Expected Competency Level **

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<th>Learning Outcome</th>
<th>A1</th>
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*Attributes:
A1 A knowledge base for engineering
A2 Problem analysis
A3 Investigation
A4 Design
A5 Use of engineering tools
A6 Individual and team work
A7 Communication skills
A8 Professionalism
A9 Impact of engineering on society/environment
A10 Ethics and equity
A11 Economics and project management
A12 Life-long learning

**Competency Levels:
1 - Knowledge (Able to recall information)
2 - Comprehension (Able to rephrase information)
3 - Application (Able to apply knowledge in a new situation)
4 - Analysis (Able to break problem into its components and establish relationships)
5 - Synthesis (Able to combine separate elements into whole)
6 - Evaluation (Able to judge of the worth of something)

Student Contact Time (Hrs)

- Lectures: 3 hrs lecture/week × 13 weeks/term = 39 hrs
- Laboratories: 3 hrs laboratory × 5 weeks = 15 hrs
- Tutorials: 0 hr tutorial × 0 weeks = 0 hrs

Evaluation

<table>
<thead>
<tr>
<th>Component</th>
<th>Value (%)</th>
<th>Methods of Feedback *</th>
<th>Learning Outcomes Evaluated</th>
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* Methods of Feedback: F - formative (written comments and/or oral discussion), S - summative (number grades)