IE 4773/6773 Systems Simulation I
Syllabus – Spring 2010

Department of Industrial & Systems Engineering
Mississippi State University

CATALOG DESCRIPTION:
The principles of simulating stochastic systems with an emphasis on the statistics of simulation and the use of discrete-event simulation languages.

COURSE OBJECTIVES & GOALS:
To provide students with a fundamental understanding of the principles of discrete-event simulation so that they can develop and analyze computer simulation models of existing and proposed manufacturing, service, and business systems. Upon successful completion of this course, students should be able to:

- understand the behavior of dynamic and stochastic queueing systems,
- understand basic discrete-event simulation concepts,
- design and construct discrete-event simulation models using simulation software,
- validate simulation models of systems,
- conduct experiments with simulation models to analyze, interpret, and communicate results (statistical and pragmatic),
- determine appropriate level of model detail,
- collect, analyze, and document data,
- model randomness in systems (select appropriate probability distributions), and
- plan and execute simulation projects.

PREREQUISITES:
At least a grade of C in IE 4613/6613, Engineering Statistics I, or equivalent; and, at least a grade of C in IE 4934, Information Systems for IE, or equivalent. Specific topics include: probability distributions, random sampling, point and interval estimation, hypothesis testing, goodness-of-fit tests, programming concepts and constructs, basic spreadsheet modeling.

PROFESSOR:
Dr. Allen G. Greenwood, P.E., Professor of Industrial and Systems Engineering.

Education: BSIE (manufacturing) from North Carolina State University, MSIE (operations research) from University of Tennessee, Ph.D. Management Science (with minors in IE and statistics) from Virginia Tech.

Academic Experience: Mississippi State University since Fall 1994, Virginia Tech, Northeastern University, American University of Armenia.

Industry Employment Experience: American Enka Company (IE), General Dynamics Corp. (operations research), Virginia Tech (systems analysis and development).

Consulting/Research Experience: Air Force Research Laboratory, Bull HN Worldwide Information Sys., Center for Advanced Vehicular Systems (MSU), Center for Financial Engineering in Development (United States Agency for International Development), NASA Stennis Space Center, Nissan/NA, Northrop Grumman Ship Systems, Office of Naval Research, Tecumseh Products, VT Halter Marine, and others.

Teaching and Research Interests/Expertise: design and analysis of production and process systems; simulation modeling, analysis, and optimization; decision-support systems.

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Class: 12:30 – 1:45 TTh 175 McCain Engineering Building
Office hours: 10:00 – 11:00 Wednesday, 10:00 – 11:00 Friday, and by appointment

TEXT AND COURSE MATERIALS:

- *Simulation: The Practice of Model Development and Use* by Stewart Robinson, John Wiley & Sons, 2004, ISBN 0-470-84772-7.
- *Simulation with Flexsim* by Beaverstock, Lavery, & Nordgren, Flexsim Simulation Software, 2009.
- *Flexsim* simulation software. Student version included with text; full version is available on network.
- Statistics text, e.g. from IE 4613/6613, Engineering Statistics I.

- Additional materials and readings will be distributed in class or placed on the course's *WebCT* website, as needed, throughout the semester.

GRADING:

Quizzes	20%	most Thursdays
Mid-term exam	30%	Thursday, 25 February
Final Exam (comprehensive)	30%	Monday, 26 April, 3:00 – 6:00 p.m.
Project	20%	

Notes:

1. No make-up quizzes or exams are given; see the *Course Policies Document* in the Course Documents folder on the course's website for more information.
2. Topical coverage, readings and assignments are maintained in the Course Schedule in the Course Documents folder on the course's WebCT site. The schedule will be updated throughout the semester.
3. In order to obtain a grade of at least a *C* in the course, the weighted average of quizzes and exams must be at least a *C*. However, an average of at least *C* on the quizzes and exams does not guarantee a grade of at least *C* in the course.
4. In order to obtain graduate credit for the course, graduate students must complete a research or review paper. The work defined above will comprise 90% of the final course grade; the paper will comprise the remaining 10%. The paper is due on or before the last day of class, Thursday, 22 April. Please see the *Graduate Student Paper Requirements Document* in the Course Documents folder on the course's WebCT site.

HONOR CODE:

"As a Mississippi State University student I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do."

Upon accepting admission to Mississippi State University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor Code. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the MSU community from the requirements or the processes of the Honor Code. For additional information please visit: http://students.msstate.edu/honorcode/

COURSE POLICIES:

Please see the *Course Policies Document* in the Course Documents folder on the course's website.

TOPICAL COVERAGE (and estimated number of T,Th classes)
(subject to change during the semester)

Introduction to the course. Example applications of discrete-event simulation.	1
Overview of simulation as a tool for thinking and analysis. Key issues.	2
Simulation as a project. Key activities. Types of models. Documentation.	2
How discrete-event simulators work.	2
Conceptual modeling.	2
Modeling stochastic systems using the *Flexsim* software.	9
Output analysis. Simulation experiments.	4
Model validation and verification. Implementation.	2
Modeling randomness; input modeling.	2
Project discussions.	1
Mid-term exam (Thursday, 25 February)	1
Comprehensive Final Exam (Monday, 26 April; 3:00 – 6:00 p.m,	