DEPARTMENT OF MECHANICAL ENGINEERING

SUNY AT STONY BROOK

# MEC 500 - Modeling and Control of Manufacturing System

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| Course Title: | **MEC500** Modeling and Control of Manufacturing System, Fall 2015 (3 credits) |
| Prerequisites: | Basic probability and statistics (random process, etc.) |
| Blackboard: | http://blackboard.stonybrook.edu<br>(It is required that you use the Blackboard for this course) |
| Lecture/Lab: | Monday 1:00-3:50PM in FREY Hall 224 |
| Instructor: | Dr. Qing Chang email: qing.chang@stonybrook.edu<br>GSI: Jing Zou |
| Office: | Light Engineering, Room 163; Phone (631)632-8329 |
| Office Hours: | Mon: 4:00 – 5:00pm, Wed: 1:30-3:30 & other time by appointment |
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| Course Objective: | Introduction to manufacturing system modeling and analysis. Fundamental principles of production systems. Analytical and simulation approach to production system performance analysis, continuous improvement, and design. Topics include mathematical modeling of production systems, production lines with various statistic distribution models of machine reliability, improvement analysis and real-time decision making. Includes both the relevant fundamental concepts and the extensive practical knowledge base on which manufacturing research, development, and design depend. The students are expected to complete a project, in which they will interpret real-life manufacturing plant operation in the light of course principles and suggest improvement solutions. |
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| Assignments & Deadlines: | (i) Homework problems are due in class one week after they are assigned; late homework will receive penalty up to 90% off and will not be accepted after the solutions are posted. |
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| Textbook: | J. Li and S.M. Meerkov, *Production Systems Engineering*, Springer, 2009 |
| Optional software | 1. PSE tool box: *BBoard->Document*<br>2. Simul8<br>- *Download the SIMUL8 Student Edition from: SIMUL8.com/student*<br>- *Enter Details:*<br>*U: qchang@notes.cc.sunysb.edu*<br>*P: QuUyuU*<br>- *Double click on your downloaded file. This will start the setup program for your student edition.*<br>- *Enter your student details including your University's student license number: 1308-6558-4463.* |

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| | - Simul8 Forum: *SIMUL8.com/café for help* |
| Examinations: | 1 Midterm (in class, 1 ½ hours)<br>1 ~ 2 Quiz<br>Random in class exercise (no make up for in class exercise)<br>• All exams are scheduled in class, open book/notes<br>• NO make-up exams unless arranged **prior** to the exams |
| Project: | 1 term project (team – 2~3 students)<br>• Data collection, performance evaluation, model validation, improvement/bottleneck, etc.<br>• Final report<br>• Final presentation<br>1 MATLAB Assignment (single person)<br>• MATLAB/Simulink model<br>• Due 3 weeks after the assignment<br>Home works<br>• Practically every week, and due next week<br>• Late submissions is not accepted except documented emergency |
| Grading: | Semester letter grade is based upon your performance in the following categories:<br>*Midterm exams* *20%* *Homework* *9%*<br>*Quiz* *10%* *Term project* *40%*<br>*In Class Exercise* *5%* *MATLAB Assignment* *16%*<br><br>A: 90 – 100; B: 89 – 78; C: 77 – 60; D: 50 – 59 |

**Course Outline:**

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| 24-Aug | | introduction; Ch1; Ch2 (Jing & Mike co-lecture) |
| 31-Aug | | Ch 1 recap; Ch2 continue |
| 7-Sep | | No class |
| 14-Sep | | Ch2 - Continue; Ch3 |
| 21-Sep | | show sample project; Introduce Simul8, PSE tool box;Ch3 - Mathematical Modeling of Production System |
| 28-Sep | | Ch4 |
| 5-Oct | | Ch4, Ch5 |
| 12-Oct | | Ch5, Opportunity Window |
| 19-Oct | | MATLAB/Simulink, Quiz |
| 26-Oct | | Ch6, Ch11 |
| 2-Nov | | Ch 11, Ch 12 |
| 9-Nov | | Ch 13, Opportunity window with disruption events (Jing co-lecture) |
| 16-Nov | | EBM, energy index, Ch10 |
| 23-Nov | | Final project presentation |

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| 30-Nov | | Midterm |

****** A team of 2 students need to be formed during the first month of the class for the term project

**Blackboard**

You are required to use the Internet to access Blackboard and online information for important announcements, homework/handouts, and supplementary materials of the course. You can access blackboard at:

http://blackboard.stonybrook.edu

Please note that you have to use your NetID to login to the blackboard system.

**Americans with Disabilities Act:** If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC(Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.http://studentaffairs.stonybrook.edu/dss/index.shtml.

**Academic Integrity:** Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

**Critical Incident Management:** Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.