ME 101: Introduction to Lean Manufacturing Systems
Spring 2015, TTh 11am-12:30pm, 3107 Etcheverry Hall

Instructor: Prof. Sara McMains
852-9359
Office Hours (5145 Etcheverry): Tu 12:30-1:30, Th 2-3 (tentative)

Reaching me: I have an RSI (repetitive strain injury) from typing, so please ALWAYS include a phone number if you email me ! Ask questions of general interest (such as homework clarifications) in lecture. Ask quick questions not of general interest before or after class. For more in-depth discussions, come to my office hours, or if you have a conflict with office hours, see me before or after class to set up an alternate meeting time. You can also call my office at the number above.

Description:

Fundamentals of lean manufacturing systems including manufacturing fundamentals, unit operations and manufacturing line considerations for work in process (WIP), manufacturing lead time (MLT), economics, quality monitoring; high mix/low volume (HMLV) systems fundamentals including just in time (JIT), kanban, buffers and line balancing; class project/case studies for design and analysis of competitive manufacturing systems.

Organization:

Weekly homework assignments.
One group design/analysis project.
Midterm: Thursday, March 19 during class time.
Final examination: 8-11 am, Thursday, May 14.

Availability for lectures and all examinations is required for enrollment in the class. Please see me for accommodation of religious beliefs, disabilities, and other special circumstances before the end of the second week of classes for any foreseeable issues.

Textbooks and Course Materials:

Required:
- R. G. Askin and J. B. Goldberg, *Design and Analysis of Lean Production Systems*.
- One iClicker
- An NCEES-approved-model calculator (http://ncees.org/exams/calculator-policy/).

Reference:
- M. P. Groover, *Automation, Production Systems, and Computer Integrated Manufacturing*, 2nd Ed., 2001 (or 1st edition, 1987).
- R. M. Mahoney, *High Mix Low Volume Manufacturing*, 1997.
- J. O. McClain, L. J. Thomas and J. B. Mazzola, *Operations Management*, 1992.
- S. Kalpakjian, *Manufacturing Engineering and Technology*, 1989.

All texts will be on reserve in the Engineering Library.

Grading:

Homework	15%
Class Participation	5%
Final Project	30%
Midterm Exam	20%
Final Exam	30%

Manufacturing Film Festival

The ME101 "Manufacturing Film Festival" features:

- "Clockwork" video showing developments in manufacturing systems, including the work of F. W. Taylor
- "1924- On the Line" video documenting the development of the Ford moving assembly line, including the social and workplace impact of the technology.
- video of Lucy Ricardo and Ethel Mertz on the "assembly line"
- video showing flexible manufacturing systems (Makino)
- "Building the Dream" video on the manufacturing of the Boeing 777
- "Manufacturing Miracles" video on Mazda/Japanese manufacturing styles
- others as appropriate

Note: videos are an important part of the course. Video material will be included on exams.

Discussion Section:

The discussion section will augment class lecture material. We will use this time for group work on projects, case studies and exercises; homework questions and review for examinations; and additional Manufacturing Film Festival videos not shown in lecture.

Homework:

Homework will be assigned weekly in lecture and will be due one week later. Late homework will be marked off by 50% and will not be accepted past one week after the due date, at which time solutions will be posted. You must turn in all problems together (i.e. you can't turn in some on time and others late). Evaluating the merit of student excuses for late homework is not an activity I enjoy; therefore, *all* students will automatically be given one "free" late homework (without penalty) and the lowest homework score will be dropped. Save these for when you really need them!

Academic Honesty:

For homework assignments in this class, you are allowed (and encouraged!) to *discuss* the problems and techniques with other students in this course, but each student must write up their own solution and do their own Matlab/Excel/etc. work from scratch on the computer. I would **highly** recommend NOT mixing discussion with writing up of solutions or code, since this can result in work that looks like it was copied directly. If you discussed your work with other students, or checked your answers against theirs, **you must describe the collaboration in your write-up and acknowledge the student(s) who assisted you or who you assisted** (all students will receive full credit in this case). Turning in someone else's work as your own (or letting someone else turn in your work as their own), on the other hand, will be treated as cheating, and will result in a grade of zero on the assignment for all students involved in the incident. Because responding to in-class questions with the clicker is worth course credit, responding for another

student will be treated as cheating, and both students will lose all class participation credit for the course. Cheating on a midterm or final exam may result in a failing grade for the entire course. In all cases of cheating, your actions will also be reported to the Center for Student Conduct and Community Standards (http://students.berkeley.edu/osl/sja.asp) for administrative review.

Groups and Project

We will be working in groups of approximately five or six for much of the semester. The groups will work primarily on a term project with a manufacturing company. The objective is to learn about real manufacturing system problems from an engineering perspective, gain experience working in teams, and develop your communication and presentation skills, to complement your analytic skills. The project will be the design and simulation or analysis of a manufacturing system. A couple of examples of final projects from previous semesters are on reserve in the Engineering Library. The project will require periodic progress reports as well as a presentation of your design/analysis in a group formal report and presentation. The project is a major portion of the course and its value in determining your grade weighted appropriately. This is a significant commitment of time. This is also intended as an opportunity for each student to contribute her/his special skills. Pleases note that it is expected that all students will participate in the group project with equal effort. Peer evaluations will be part of the final project grade.

Laboratory:

Some homework assignments will require the use of Excel, MatLab, or other software. The computers in the CAD labs in 2107 Etcheverry Hall are available for use of these programs except when a class is in session. The use schedule will be posted on the doors to the labs. The labs are locked after hours and the building is locked at 7 pm and on weekends. Each student can use their CalNet ID (student ID) and their passphrase to log on to the computers. A small storage quota is provided, but all students are responsible for backing up their own data.

If problems are encountered with a machine, place a note under the keyboard describing the problem, and move to another machine. Notify the system administrators by emailing mesupport@me.berkeley.edu (this address is ONLY to report computer problems). Keep the labs secure; do not allow unauthorized access. Please notify one of the instructors or campus security of any suspicious persons or events in, or near, the labs. Theft of computer equipment and personal property has been a problem in the labs in the past. The doors to the laboratories must be kept closed at all times for security and HVAC purposes. DO NOT BLOCK OPEN THE DOORS.

NO FOOD OR DRINKS IN THE LABS. Accounts subject to termination for violations of this policy.

Chronology of topics to be covered in the course and the corresponding text reading:

Topic	Reading*
Overview, Intro to Manufacturing	pp. 1-17
Basics of Production Systems, Inventory	40-43, 19-35
Forecasting, Production Economics	50-56, 78-79, 84-96
Manufacturing Production, Line Balancing	476-482
Batch Production, Change-overs	169-177, 366-372
Manufacturing Strategy, Supply Chain	43-48, 96-113
Learning, Seasonal Forecasting	35-40, 56-63
Material Requirements Planning	269-291, 299-307
Midterm Exam (Thursday 3/19)	
Decentralized Pull Systems (*kanban*)	221-243, 248-250
Constant Work in Process	250-57, 260-62
Statistical Process Control	373-383
Product Flow, Shop Floor Control	390-396, 502-504, 509-510, 470-476
Quality, Lean, Process Improvement	352-358, 364-366, 385-387, 400-403
Final Project Presentations	

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* Readings from Askin & Goldberg text; additional readings will be assigned and made available

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