

**University Of California, Berkeley**  
**Department of Mechanical Engineering**

**ME 221 – Graduate Introduction to Lean Manufacturing Systems (3 UNITS)**

**Graduate Course**

*Syllabus*

**CATALOG 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.

**COURSE PREREQUISITES**

Graduate standing in Engineering, or consent of instructor.

**TEXTBOOK(S) AND/OR OTHER REQUIRED MATERIAL**

- R. G. Askin and J. B. Goldberg, *Design and Analysis of Lean Production Systems*, 2002.
- One i-clicker transmitter.
- An NCEES-approved-model calculator  
([http://www.ncees.org/Exams/Exam-day\\_policies/Calculator\\_policy.php](http://www.ncees.org/Exams/Exam-day_policies/Calculator_policy.php)).

**COURSE OBJECTIVES**

This course will enable students to analyze manufacturing lines in order to understand the production process and improve production efficiency. The course provides practical knowledge and skills that can be applied in industry, covering the complete manufacturing system from production planning to quality control. Students are given a chance to practice and implement what they learn during lectures by conducting projects with local or global manufacturing companies.

**DESIRED COURSE OUTCOMES**

Students will understand the whole scope of manufacturing systems from production planning to quality control, which can be helpful to set up manufacturing lines for various products. Students will be capable of identifying sources of manufacturing problems by analyzing the production line and produce multi-level solutions to optimize manufacturing efficiency.

**TOPICS COVERED**

Production Systems, Inventory, Layouts, Shortages, Forecasting, Flow lines, Cycle times, Production Economics, Line Balancing, Sensitivity Analysis, Change-overs, Variance Acceleration, Safety Stock, Manufacturing Strategy, Supply Chain Management, Learning, Material Requirements Planning, Pull Systems, Kanban, Constant Work in Process, Process Capability, Statistical Process Control, Quality, Lean, Continuous Process Improvement.

## **CLASS/LABORATORY SCHEDULE**

Three hours of lecture per week, 1 hour of discussion per week.

## **CONTRIBUTION OF THE COURSE TO MEETING THE PROFESSIONAL COMPONENT**

This course contributes to the students' knowledge of manufacturing systems, identifying and defining problems, and problem solving techniques. This course also encourages students in developing entrepreneurial skills. Various practical issues including economic analysis, the global manufacturing environment, concurrent manufacturing issues, and some exposure to social and cultural issues of labor are covered to insure students are well prepared for competitive international manufacturing.

## **ASSESSMENT OF STUDENT PROGRESS TOWARD COURSE OBJECTIVES**

- Weekly homework assignments 15%
- Midterm and final examination 55%
- Class participation and discussion 5%
- Term project and peer evaluation 25%

## **SAMPLE OF WEEKLY AGENDA**

Week	Topic
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1. Overview, Efficiency, Economics, Inventory
2. Inventory, Layouts, Shortages, Forecasting
3. Flow lines, Cycle times, Production Economics
4. Line Balancing, EOQ sensitivity, EMQ
5. Change-overs, Variance Acceleration, Safety Stock
6. Manufacturing Strategy, Supply Chain
7. Learning, Seasonal Forecasting
8. Material Requirements Planning
9. MRP II
10. Pull Systems, Kanban
11. Constant Work in Process, Process Capability
12. Statistical Process Control
13. Quality, Lean, Process Improvement
14. Final Project Presentations

## **ROOMSHARE NOTES**

This course will be roomshared with ME 101. Homework assignments for graduate students will contain an additional, more challenging problem. Otherwise workload will be identical. The grading curve will be established based on the enrolled undergraduates' performance in the class, and the department grading guidelines for undergraduate elective courses typical GPA. Then the graduate students will be graded where they fall on this curve. (So the curve will be set based on the undergrads, but it will apply to all.)

## **PERSON(S) WHO PREPARED THIS DESCRIPTION**

Professor Sara McMains, 2/27/17

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**ABBREVIATED TRANSCRIPT TITLE (19 SPACES MAXIMUM):** GRAD INTRO MAN SYS

**TIE CODE:** LECS

**GRADING:** Letter

**SEMESTER OFFERED:** Fall & Spring

**COURSES THAT WILL RESTRICT CREDIT:** ME101

**INSTRUCTORS:** McMains

**DURATION OF COURSE:** 14 Weeks

**EST. TOTAL NUMBER OF REQUIRED HRS OF STUDENT WORK PER WEEK:** 9

**IS COURSE REPEATABLE FOR CREDIT?** No

**CROSSLIST:** None