

**Course No:** MET4500  
**Course Name:** Lean Manufacturing Concepts  
**Credits:** 3 semester credits, ( 0 – 2 – 1 )  
**Semester:** Spring 2008  
**Section:** R01  
**Day / Time:** Recitation W, F 9:05 – 09:55 (07-314)  
 LAB Thursday 11:05 – 12:55

**Instructor:** Mark A. Johnson Ph.D.  
**Office:** 325 EERC Building  
**Mailbox:** 426 EERC Building  
**Telephone:** 487 - 1662  
**e-mail:** marjohns@mtu.edu  
**Office Hours** M & W 10:00 – 12:00  
 F 10:00 – 11:00

**Textbook:** Hopp Wallace J, Spearman Mark L. (2000). **Factory Physics**, 2nd edition, McGraw-Hill, New York: ISBN#0-256-24795-1.

**Prerequisites: Senior Standing**

**Additional Materials/References:** There may be additional reading, homework, etc. distributed via email or on reference in the library. Even though it is not listed on the syllabus, it is your responsibility to make sure that you review the material. This material could be included on exams.

**Course Description:** This course provides an understanding of current concepts required to implementing lean manufacturing in various manufacturing sectors. Course focus is on the essentials required to provide products and services that meet customer demand with reduced lead times, elimination of waste and improvements in safety.

**Course Objectives:** After completing this course, you should be able to:

- Understand and apply the major tools and procedures that a lean system uses to achieve its objectives.
- Lean about TAKT time and the process to balance process flow and achieve one-piece part flow.
- Develop the skills that can be readily applied to any manufacturing or service organization.
- Develop your problem solving, team building, and communication skills.
- Obtain cutting edge skills that will provide an advantage in the manufacturing and service environment.

**Class Sessions:**

**Instructional Methods**

A variety of methods will be used to transfer the knowledge and skills of manufacturing to you as a student. The following methods will be used:

- Lecture
- Class Discussion
- Student Presentation
- Team Activities and Exercises
- Case Study Analysis

**Skills**

You will be using many different skills in this course. There are several prerequisites prior to taking this course, which serve as the foundation for topics covered. It is important to have completed the prerequisites prior to taking this course. You will use the following skills:

- Problem solving skills
- Critical thinking skills
- Analytical skills
- Presentation skills
- Statistical skills
- Team interaction skills

**Course Evaluation:** Grades will be based on the following:

• Exams	60%	600 pts
• Perfect Attendance	Bonus	50 pts
• Research Paper/Project/Presentation	40%	400 pts
• <b>Total Points</b>	100%	1000pts MAX

**Grading Scale:**

<b>A</b>	93% and above (Excellent, with 4.0 grade points per credit)
<b>AB</b>	88-92 (Very good, with 3.5 grade points per credit)
<b>B</b>	82-87% (Good, with 3.0 grade points per credit)
<b>BC</b>	76-81% (Above average, with 2.5 points per credit)
<b>C</b>	70-75% (Average, with 2.0 points per credit)
<b>CD</b>	65-69% (Below average, with 1.5 points per credit)
<b>D</b>	60-64% (Inferior, with 1.0 points per credit)
<b>F</b>	59% and below (Failure, with 0.0 points per credit)
<b>I</b>	Incomplete; given only when a student is unable to complete a segment of the course because of circumstances beyond the student's control. It must be made up by the close of the next four quarters in residence or the incomplete grade becomes a failure. A grade of incomplete maybe given only when approved in writing by the department chair. Incomplete grades at graduation are considered (F) grades in computing the final grade

**Homework:**

ALL ASSIGNMENTS ARE DUE IN THE BEGINNING OF CLASS ON THE DUE DATE. NO LATE ASSIGNMENTS WILL BE ACCEPTED. **ALL homework assignments should be completed using appropriate word processing, spreadsheet, or presentation software. If problems require calculations, these can be done neatly using pencil and standard paper (8 1/2" X 11" white), no spiral notebook paper will be accepted. All assignments must be stapled.** Show detail when working on homework solutions. If you have any questions, please feel free to contact the instructor for further information or direction.

## Additional Guidelines for Homework Assignments

- Please make a copy of your homework to have when problems are reviewed in class.
- Please identify at the top of each page which question, exercise, or problem you are answering.
- Please make sure your name is on the top of each page.
- Please make sure to staple your assignment together. Please do not fold the corner over because pages could be misplaced.
- Each assignment must be turned in on time. Late assignments will receive zero points.
- Please show all the calculations. Homework will be reviewed in class after it is returned, only if there are questions. Answers for problems will be posted on my website for your review.
- Sloppy, incomplete, or hard to understand homework will lose points.
- Discussion and review questions will be used for the basis of class discussions.

**Hour Examinations:**

There will be three exams. The exams will consist of a combination of multiple choice, short answer, and problems. There will be no makeup exams except in extreme, documented circumstances.

**Cheating or Plagiarism:**

Proper professional and ethical behavior is expected of all students in this class. If cheating is suspected the Dean of Students will be notified and standard MTU policies will be followed.

**Student Expectations:**

The most important expectation would be to learn about Lean Manufacturing and be able to apply that knowledge in your working life. However, to be able to be successful in this course, the following are expectations I have to ensure your completion and a good grade:

- Attend every class (outlined in the university attendance policy) [www.mtu.edu/studenthandbook/academic\\_info/attendance.html](http://www.mtu.edu/studenthandbook/academic_info/attendance.html)
- Read the required material prior to attending the course.
- Complete all assignments on time.
- Participate in class and group discussions.
- Be prepared for class.
- Present professional reports and presentations.
- Abide by the Academic Integrity policy.
- Use recommended software and word processing for required assignments.
- Interact with class members and be respectful of other's opinions.
- Apply continuous improvement and make recommendations to instructor.

This class is designed for you to participate in the learning experience. You are responsible for being a learner and a teacher of information. You can learn as much from the instructor as you can from exchanges and discussions with other students in the class. Many of the students bring valuable work experience that is relevant to the subjects being discussed.

If you are not in class, it is hard to participate. If you have an extreme situation, which prevents you from attending the course, please document the circumstance and provide the written notice to the instructor. Universities excused absences include documented plant trips and other university related business. Please provide **written notice of absence in advance** of missing class. Class participation includes full attendance, being prepared for in-class group work and discussions, and responding to discussion topics.

Since attendance is such an integral part of participating in class discussions I will be giving 50 bonus points for perfect attendance.

**Notice:**

If you have any special needs because of personal circumstances, please feel free to meet with me in the beginning of the semester or as soon as possible. MTU complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disability Act of 1990 (ADA). If you have a disability and need reasonable accommodation for equal access to education or services at MTU, Associate Dean of Students at 487-2212. For other concerns about discrimination, you may contact your advisor, department head, or the Affirmative Action Office at 487-3310.

***Time Management***

This course is one of several courses you are required to complete for your degree. It is always helpful to have an idea of the time requirements associated with a particular course. It is estimated that outside of class you will need to spend approximately, on average, 2-3 hours per credit hour or 6-9 hours a week to complete the recommended assignments. It is possible in some weeks that it will be more and other weeks it will be less.

**Web**

All current material is on the WebCT Blackboard

**Research Paper/Project/Presentation**

Each team will select a topic for a research paper or community project. All teams will present their findings in a professional presentation at the end of the course. Additional guidelines for presentation and report will be provided to each team. If your team wants to meet with the instructor to get ideas or discuss recommended approaches, they should make an appointment. Also, the instructor may provide your team with additional ideas and resources, if you ask. Each team member will receive the same grade for the project. However, adjustments could be made downward based on extremely poor team evaluations.

**Date Chapter/Required Reading/Suggested Problems****Week 1**

- 1/16 Course Introduction**  
Review of course syllabus
- 1/17 DVD Modern Marvels: The Assembly Line**
- 1/18 Chapter 0: Factory Physics?**  
Required reading: Text pages 1-11  
Review Study Questions

**Week 2**

- 1/23 Chapter 0: Factory Physics?**  
Required reading: Text pages 1-11  
Review Study Questions
- 1/24 Library (learn how to research)**
- 1/25 Chapter 1: Manufacturing In America**  
Required Reading: Text pages 14 - 47

**Week 3**

- 1/30 Chapter 1: Manufacturing In America (Cont)**  
Text Pages 14 - 47  
Review Study Questions
- 1/31 DVD Modern Marvels: Machine Tools**
- 2/01 Chapter 4: The JIT Revolution**  
Required Reading: Text Pages 151 - 167

**Week 4**

- 2/06 Chapter 4: The JIT Revolution (Cont)**  
Review Study Questions
- 2/07 SME Lean Manufacturing DVD**
- 2/08 Chapter 5: What Went Wrong**  
Required Reading: Text pages 168 - 184

**Week 5**

- 2/13 Chapter 5: What Went Wrong (Cont)**  
Problem Set Review & Exam Review
- 2/14 Review**
- 2/15 Exam #1 (Chapters 0, 1, 4, 5)**

**Week 6**

- 2/20 Chapter 6: A Science of Manufacturing**  
Required reading: Text pages 186-212  
Review Study Questions  
Suggested Problem Set 1, 2, 3
- 2/21 LAB (Problem Set Review)**
- 2/22 Chapter 6: A Science of Manufacturing (Cont)**

**Week 7**

- 2/27 Chapter 7: Basic Factory Dynamics**  
Required reading: Text pages 213-247  
Review Study Questions  
**Suggested Problem Set:**
- 2/28 LAB (Work selected problems)**
- 2/29 Chapter 7: Basic Factory Dynamics (Cont)**

**Week 8**

- 3/05 Chapter 11: The Human Element In Operations Management**  
Required reading: Text pages 365-379  
Review Study Questions
- 3/06 LAB (DVD SME VISUAL CONTROLS)**
- 3/07 Chapter 11: The Human Element In Operations Management (Cont)**

**Spring Break March 08-16**

**Week 9**

- 3/19 Introduction to Visual Controls**  
Required reading : Handout
- 3/20 LAB**
- 3/21 Introduction to Visual Controls (continued)**

**Week 10**

- 3/26 Exam Review and Problem Review**
- 3/27 LAB Exam #2 Chapters 6, 7, 11 & visual controls**
- 3/28 Mistake Proofing**

**Week 11**

- 4/02 Mistake Proofing SME DVD
- 4/03 LAB (Plant Trip)
- 4/04 Introduction To Quick Changeover

**Week 12**

- 4/09 Quick Changeover DVD
- 4/10 LAB (work on team presentations)
- 4/11 Value Stream Mapping

**Week 13**

- 4/16 Value Stream Mapping (cont)  
Required reading: Handout
- 4/17 LAB (Value Stream Mapping Exercise)
- 4/18 Team Presentations

**Week 14**

- 4/23 Team Presentations
- 4/24 Plant Trip
- 4/25 DVD (TBD)

**Finals Week April 24-28, Wednesday, 12:45 – 2:45 pm  
Room TBD**