

LOM 4322/ LOM 5322 - Lean Production  
Spring, 2017

**Class Meets:** Tuesdays 6:55 p.m. - 9:35 p.m.

**Instructor:** Dr. Joseph Martinich

**Office:** 235 Computer Center Building

**Office Hours:** Tu 6:00 p.m- 6:45 p.m. Other times possible: I am on campus almost every day from 9:00 a.m. - 4:30 p.m., but I may be in meetings or off-campus for some reason, so you should call or email me to make sure I am available before making a special trip to campus.

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**Prerequisites:** LOM 3320 or LOM 5320. Students are expected to have a working knowledge of the material in one of those courses.

**Class Recording Policy:** Video and/or audio recording of class lectures/discussions is prohibited without the expressed written permission of the instructor. If permission is granted, recordings may only be used by the student this semester, and must be erased upon completion of the course.

**Required Book:** *The Goal: A Process of Ongoing Improvement* by E. M. Goldratt and Jeff Cox, North River Press, 3<sup>rd</sup> revised edition.

**Recommended Books:** (1) *Lean Thinking (revised edition)* by Womack and Jones, Free Press, New York, 2003; (2) *The Toyota Way* by Jeffrey Liker, McGraw-Hill, 2003, New York.

**Other Suggested Books:** *Modern Approaches to Manufacturing Improvement* by Shigeo Shingo, edited by Alan Robinson, Productivity Press, Cambridge, MA., 1990. *Learning to See: Value Stream Mapping to Create Value and Eliminate Muda*, by Mike Rother & John Shook, The Lean Enterprise Institute, Brookline, MA, 1999.

**Reference Textbook:** Any version of *Production and Operations Management* by Joseph Martinich, John Wiley & Sons, New York. (Any other introductory POM book may be fine.)

**Supplemental Materials:** There will be notes on MyGateway for most of the topics covered.

<b>Grading:</b>	Exam	20 %	
	Class Discussion	5 %	
	Homework/article reviews		10 %
	LP Book Report	12 %	
	LP Implementation Case Report	18 %	
	Group/Term Project		35 %

**Drop Policy:** An "excused" drop will be given if you drop on or before March 10. If you drop after March 10 you will receive an "excused" or "failing" grade according to your grade at the time you drop. After April 14 dropping will not be allowed except for documented serious illness or comparable extraordinary circumstances (a low grade is not an acceptable excuse).

**Classroom Courtesy:** I realize that I should not have to tell you these things, and I apologize to those of you for whom this is unnecessary, but in the past few years I have noticed a significant increase in bad classroom manners and inconsiderate behavior. So please adhere to the following rules. Repeated violations of these will be grounds for reducing your course grade, and you will be reported to the Office of Homeland Security as a threat to national learning.

- 1) Turn off your phones before entering class; do not talk on the phone in class.
- 2) Come to class on time. In those rare cases where being late is unavoidable, please enter the classroom quietly and take a seat as close to the door as possible. If the class period is more than half done, don't bother to come to the class.
- 3) Open beverage cans and bottles and snack bags before class starts. If you eat during class, please do so quietly.
- 4) Keep talking to your neighbor to a minimum. If you are confused about something in class, please ask me - that is my job and I'm happy to answer course-related questions, such as, "Should we use public money to build a stadium for millionaires/billionaires?"

**Academic Dishonesty:** Academic dishonesty of any form will not be tolerated. Except for the group project ALL GRADED WORK (exam, homework, book reports, papers) SHOULD BE DONE BY YOU ALONE and be in your words, not the words of other sources. Any examination, homework, or paper found not to be the student's own work will be given a grade of zero and the student will be reported to the appropriate officials for disciplinary action. GROUP PROJECT REPORTS should be the work only of the group members. Any group report found not to be the group's own work will be given a grade of zero and the students will be reported to the appropriate officials for disciplinary action.

All written homework and reports should be **IN YOUR OWN WORDS**. DO NOT simply piece together material/excerpts from other sources (books, articles, web sites). Ideas, claims, and facts used from a source should be indicated clearly with a citation or footnote and a list of references used should be given at the end of the paper/report. Exact quotes from sources should be used sparingly and for a good purpose; **they should be clearly marked in quotation marks, with a precise, complete citation, including the page number (or web address) of the source.**

*Exceptions/clarifications:*

1. You **can and should use published sources** (books, articles, government reports, etc. that are either in print or on the internet) to help you learn and do your graded work. However,

use of important ideas, facts, etc., and especially exact wording or close paraphrasing of statements from these sources, should be CLEARLY CITED in your paper/report/homework. Citations should always give the title of the article/book, journal (if appropriate), name(s) of author(s), date of publication, page numbers on which the article appears, name and location of publisher (if book or technical report); for web-based sources give the complete web address and date that it was accessed. Note: Wikipedia is fine **as a starting point** to get an overview of a topic, but it should not be a primary source of information and not be considered an authoritative source (of course, if specific ideas or quotes are used from Wikipedia, then they should be clearly cited). Citations of sources within the text should normally be given by listing the last name(s) of the author(s) and the year/date of the publication.

2. Outside assistance with grammar, wording, spelling, organization, and clarity of writing, as well as preparation of power point slides and other stylistic details (e.g., from the writing lab) is encouraged, but the assistance should be limited to the style, organization, and clarity of the presentation and should not address the detailed content/substance of the report. Having someone else read and critique the report in terms of clarity, depth of coverage, completeness, etc., is acceptable (in fact, recommended), but they should keep comments regarding content at a general level, and they should not assist directly in writing or rewriting the content of the report/homework.

**Disabilities:** Please inform me of any physical disabilities that could affect your learning. I am happy to make reasonable accommodations to improve the learning environment, but I need to know about them in order to help.

## MAJOR ASSIGNMENTS AND DUE DATES

### **Book Report** (Due February 21; 4% penalty for every calendar day late)

You are to read and report on a book related to lean production. Your choice of book should be one of the following: (1) one of the two “Recommended Books”, or (2) the “Suggested” Shingo book, or (3) a book of interest to you that either addresses a specific lean production method/tool (e.g., process analysis, SMED, TPM, kanban, the role of work teams in lean), or (4) a book that discusses lean production more generally. If you choose options (3) or (4) **your choice of book must be approved in writing by the instructor (use email)**. I would recommend searching the web site: [www.productivitypress.com](http://www.productivitypress.com) or use a “Google search” for possible book titles. Book reports should be 3-6 pages in length, typed and double-spaced. The report should include: (1) a complete citation of the book; i.e., name of author(s), title of book, name of publisher, year and location of publication; (2) a substantive summary of the book’s contents (synthesized in your own words); the summary should focus on the important content and **not** be a chapter-by-chapter summary that reads like a shopping list; and (3) an evaluation and critique of the book: How useful was the material presented? How well was it presented? How could it be improved? Should this book be included in the course? Justify and explain your critique. This report should be IN YOUR WORDS; do not use book reports or reviews of the book from other sources.

**Lean Implementation Case Report** (Written report due March 14; there is a 4% penalty for every calendar day late; oral reports are tentatively scheduled for March 14.) You are to select an **actual** organization and report on its implementation of lean production. **Your choice of organization must be approved in writing by the instructor (by email) by February 24, but I recommend you get approval as soon as possible.**

There should be both a written report (4-6 double-spaced pages, typed) and an 8-10 minute oral report to the class. The report(s) should describe: what motivated the organization to implement Lean; what the organization did **specifically**; and what were the results (benefits, problems).

**Focus on one or two specific projects or areas** where lean production was implemented by the organization. Give details of what was done, how it was done, what obstacles were encountered and how they were overcome, and what benefits were achieved; **measurable/quantitative results are especially important. DO NOT** tell me that the sources did not provide enough information to give details of the implementation: **select an organization for which there are details available**; use multiple sources, if necessary/possible (use articles, books, parts of books, interviews, company web sites, etc. as sources of information). Give a detailed list (citations) of all sources used. **DO NOT** simply provide a general overview of the organization's lean production program or the history of lean production in the organization; I want to see details of specific implementations/projects. This report should be **IN YOUR WORDS**; do not simply piece together quotes from various sources. You are to synthesize and organize the information and present it in a clear manner. (Some organizations are off limits, such as Toyota.)

**Group/Term Project** (Written reports are due May 2; 4% penalty for every calendar day late. Oral reports will be given on April 18 and May 2, with "field project" reports presented on April 18 so that you can receive feedback early enough to improve your project work.)

**Group Size:** Your group should have either two or three students. You are to form your own groups; you are to give me a **written statement** listing the group members, and the proposed topic/site by no later than **February 24** (preferably sooner). (There will be a 1 % per day penalty against your term project grade for each day late in submitting your proposed topic.) Submit only one statement per group. **Proposals must be approved by the instructor.**

**Options:** There are two options for the group project: (1) An in-depth discussion and presentation of a specific lean production tool/methodology, or (2) a field project at an actual organization, analyzing some aspect of their operations and making recommendations for improvement based on LP principles and methodologies. **Because the latter option is generally more difficult and time-consuming, the instructor generally grades this option more generously, and in some cases may award bonus points to groups that do an especially outstanding job.**

### 1. Tool/Methodology Report

This option has three deliverables. (1) Your team is to give a 30-45 minute oral presentation in

class on a selected LP tool/methodology (the topic must be pre-approved by the instructor; suggestions are given below). The presentation can be a lecture, instructional exercises, discussions, etc., or a combination. You are encouraged to use visual tools (e.g., power-point slides) and specific examples to illustrate the concepts you present. Detailed illustration of the methodology/tool with real examples of implementation and use is essential. (2) Paper copies and electronic versions of all instructional materials (e.g., power point slides, handouts) should be provided to the instructor and will be considered in the grading. (3) You are to provide a 15-25 page written report (typed, double-spaced) on the topic. (The 15-25 page limit does not include appendices, tables, pictures, references, or other attachments.) The report should describe and explain the tool/methodology, where, when, and how it should be used, how it should be implemented, and you should provide detailed examples of its use in practice. A reference list of all sources that were used should be included. (Although you can decide how you want the paper prepared, the paper should read as if it were written by a single person (i.e., it should flow together), rather than being pieced together with very different writing styles. So it may be a good idea to have a single group member put the final draft together.) Your paper should be written with sufficient clarity, content, and detail so that a manager with little knowledge of lean production should be able to read your paper and understand what the selected topic is, how to use it, how to implement it, what the expected benefits are, and how to measure them.

The paper should have a cover page that contains only the title, names of group members, and date of the paper (so there is blank space for my comments). Also, be sure to **number the pages**. **STAPLE** the paper together; **do not** put it in a plastic cover with a tube sleeve (if you have many appendices or attachments, you may put it in a 3-ring binder).

## 2. Field Project

For the field project you are to act as a *pro bono* lean production consultant. The site you use for the project must be a site you actually visit (probably multiple times) specifically for the project. (You cannot simply write about some previous lean production experience you had or know about at an organization.)

1. You may choose either a real-world manufacturing or a real-world service production system or sub-system (such as an internal business process). You are to (1) describe/explain this system/process; (2) analyze it, including collecting and presenting any necessary data (use appropriate lean production tools where appropriate); (3) identify and describe problems, deficiencies, or areas of improvement; (4) devise recommendations/solutions that will improve the process; and (5) present this information in an oral report and a written report. Although the use of lean production methods to “solve” your problem is not required, it is strongly encouraged that wherever possible and appropriate you should apply the lean production principles and techniques presented in class to improve the company’s production system. **I WOULD MUCH RATHER YOU FOCUS ON ONE OR TWO PROBLEMS and perform detailed, in-depth analysis and provide DETAILED SOLUTIONS to them, than to mention and “solve” superficially ten or fifteen problems. Whatever solutions you recommend, they should be clearly explained and justified (i.e., you need to convince me and the company executives that your recommendations are economically beneficial and technically sound and**

feasible).

2. There are two “deliverables” for your field project: (1) a 25-35 minute oral final report of your project; (2) a written final report, which should be **15-25 pages in length**, not counting appendices, tables, graphs, etc. Reports must be typed, double-spaced, and have 1" margins on all sides. I encourage the use of illustrations, flow diagrams, and photos where appropriate to show what you did. **The written report should be self-contained; do not assume the reader of the report has seen the oral presentation**, so any figures, diagrams, pictures, data, etc. presented in the oral presentation that are important should also be included in the written report if they are essential to understanding your work.

3. Papers should be written in a well-organized and grammatically correct form. The paper should be divided into sections which are clearly identified (i.e., **use section headings**). The paper should probably have: (1) an introduction that describes the company/facility you are studying and the product(s) made or services provided by the process you are studying; (2) a section that describes the process(es) you studied and the problem(s) you addressed; (3) a section that describes your data collection and analysis; (4) a description and justification of your solution or recommendations; and (5) a conclusion. The paper should have a cover page that contains only the title, group member names, and date of the paper (so there is blank space for my comments). Also, be sure to **number the pages**. **STAPLE** the paper together; do **not** put it in a plastic cover with a tube sleeve (if you have many appendices or attachments, you may put it in a 3-ring binder).

## Homework

1. Homework assignments should be completed on-time so that they can be used for class discussion on the due date. I recognize that due to work and personal emergencies, sometimes this is not possible, and I am willing to be accommodating in those cases, but completing assignments late or not at all will hurt your grade both in the homework component and in the class discussion component.

2. Except for numerical problems, all homework should be typed and double-spaced with one inch margins. Neatness counts; prepare your homework as if you were presenting it to the CEO.

## Outline and Approximate Schedule

LT = *Lean Thinking*; POM = *Martinich POM*; MI = *Modern Approaches to Mfg Improvement*

\*\*\*You should read *The Goal* during the two weeks (it is a very fast and easy read, and we will discuss it in week 3. Readings for topics are in order of importance.

Week      Topics and Reading

- 1 What is Lean Production/Lean Thinking? A Lean Production Framework (LT: pp. 5-28; POM: pp. 751-755); Review of Process Structures: Flow, Job-Shop, Cellular Processes (see POM: pp. 326-340; MI: pp. 3-45)
  - 2 Defining and Creating Value; Lean Product Design, QFD, Value Analysis and other product design tools; design principles (LT: pp. 29-37; POM: pp. 212-236)
  - 3 Discussion of *The Goal*; The Curse of Randomness and Variation (*The Goal* -entire book); POM. pp. 385-387; 427-454; 458-461; 494-499; LT: pp. 29-98)
  - 4 Lean Implementation: Analyzing the Process; Kaizen; Continuous Improvement Methods and Tools; IPS Scorecard; VSM; Flow Diagrams; Process Charts
  - 5 More Process & Job Analysis Tools; Redesigning the Process; Creativity in Problem Solving (LT: pp. 37-98; POM: pp. 404-408, 515-528)
  - 6 Basic Tool: 5S; Deviations Dim 1&4: Simplifying the Production System; Cellular Processing and Group Technology (POM: pp. 212-231, 335-339; LT: pp. 99-124); **LP Book Reports Due: February 21**
  - 7 Deviations Dim 2&6: Demand Leveling; Kanban (Pull) Scheduling (POM: pp. 756-762; LT: pp. 67-89)
  - 8 Quick Set-Up Methods (SMED) (POM: pp. 762-767; MI: pp. 285-370)
  - 9 **LP Implementation Oral Presentations; Written Reports Due March 14**
  - 10 Deviations Dim 7,8,9: Quality Management in Lean Production; Cost of Quality; Poka Yoke, Inspection, Six-Sigma (POM: pp. 561-581, 598-605; LT: 102-272; MI: pp. 265-283, 201-263)
- (3/26-4/2) SPRING BREAK**
- 11 Continuation of Quality Management
  - 12 Deviations Dim 10: Total Productive Maintenance (POM: pp. 769-773); Deviations Dim 3,6,7: Lean Supply Chain (POM: pp. 767-769; LT: pp. 275-298)
  - 14 Environmental Aspects of Operations; Lean and Green
  - 13,15 **In-class Presentations of Term Projects (Written Reports Due May 2)**