**Course Syllabus**  
**IE 589M Lean Production Principles and Practice**  
**Fall Semester 2008**

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**Purpose of Course:** This course will introduce graduate and advanced undergraduate students and practicing engineers to lean production principles and practice. Industrial engineers and others responsible for continuously improving operational performance must develop systems that are fast, flexible, focused and friendly for their companies, customers and production associates. The course will provide the student with an introduction to lean production describing the background behind its development and how evaluations and assessments of production systems are performed. Lean production tools and techniques will be described and in some cases demonstrated in simulation exercises. Issues relating to employee involvement, improvement teams, training and culture will be presented. Planning for lean process implementation and the necessity of sustain improvements will be discussed. Examples of applications in manufacturing and business processes will be presented.

**Conduct of Course:** For the spring semester of 2008, this class will be conducted on-line only using lectures recorded in the fall semester 2007. Grading will be based upon performance on an assigned book report, one quiz, and a final exam. Students can add to their grade by completing a project as a part of the course.

**Prerequisites:** Senior or graduate standing in industrial engineering or a related discipline and consent of instructor. The course is open to graduate students, advanced undergraduates and practicing engineers who wish to learn more about lean principles and practice. No prior background in lean production will be assumed.
Course Topics:

1. What is lean production? – Introduction, background, and lean thinking.
2. Importance of philosophy, strategy, culture, alignment, focus and systems view. Discussion of Toyota Production System.
4. Lean production processes, approaches and techniques.—Importance of focusing upon flow. Tools include:
   a. Workplace organization – 5S.
   b. Stability.
   c. Just-In-Time – One piece flow – Pull.
   d. Cellular systems.
   e. Quick change and set-up reduction methods.
   f. Total productive maintenance.
   g. Poka-Yoke – mistake proofing, quality improvement.
   h. Standards.
   i. Leveling.
   j. Visual management.
6. Startup of lean processes and examples of applications.
7. Sustaining improvement and change, auditing, follow-up actions.

Textbooks:

As textbooks for the course students may wish to choose to use one or both of the following two books:


A book report will be assigned. Books must be drawn from a book list distributed at the beginning of the course. An application project may be elected for extra credit.

Other References:


Course Requirements:

Homework:
There will be an assigned book report. Some students may elect to complete a project during the course for extra credit.

Examinations:
There will be two quizzes during the course and a final exam.

Grading:

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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Book report</td>
<td>35 %</td>
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<tr>
<td>One Quiz</td>
<td>30 %</td>
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<tr>
<td>Final Exam</td>
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<td>Total</td>
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For students that choose to complete a project, an additional 10 percent may be added based upon the quality of the project report.

Course Objectives:

1. You will learn a brief history of manufacturing approaches employed and the background and philosophy of lean production. You will also learn the concept of waste and that the quest for truly lean production is a journey and not a destination.
2. The need for strategy, alignment with other corporate or plant objectives, and preparation for lean production will be presented.
3. You will learn some evaluation techniques that one can use in preparation for and use in lean production activities.
4. You will learn a set of approaches used in implementing lean production in production operations. While these tools are often useful, they are not an end in themselves and they are not necessarily the essence of lean production either.
5. Concepts as workplace organization, pull production, cellular arrangement and layout improvement, visual management, quick change, mistake reduction, employee involvement, need for employee creativity and
motivation for lean implementation will be discussed and examples will be given.
6. Methods for promoting success in implementing lean transformations will be discussed.
7. The change process, why some change processes fail and the importance of culture will be presented.
8. You will have an opportunity to enrich the learning of yourself and others by completing a book report and a possible project report.

Instructor:

Dr. Wilbur L. Meier, Jr., a Professor Emeritus of Industrial and Systems Engineering at NC State University, has worked as a consultant and trainer in lean operations in industry, and has served as a Program Manager for ABB, Inc. He has led lean manufacturing training and applications in ABB and other companies for more than 10 years. At ABB and in other companies such as Black & Decker, Nokia, Eaton, Square D, Duff-Norton, Kaiser Fluid Technologies and Data General, he has had the opportunity to lead and participate in making improvements in production systems in a variety of industrial settings. He has also worked jointly with consultants from the Kaizen Institute of America.