

**SIE 482**  
**Lean Operations and Manufacturing Systems**  
**Spring 2015**

**Class hours:** Mondays & Wednesdays 6:00 – 7:15 p.m.

**Course URL:** This course uses D2L

**Instructors:** Frank M. Jacobs, Anne McBride

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**Office hours:** By appointment; will attempt to be available after class

**Designation:** Elective in IE, SE, and EM Program

**Prerequisite(s):**

1. Concurrent registration, Probability and Statistics – SIE305

**Text:**

Goldratt, *The Goal*, North River Press, 2004 Third Edition

**Overall educational goals:**

1. Understand relationship between Work in Progress, cycle time, takt
2. Understand the integration of batch size, setup, manufacturing processes, and waste
3. Understand techniques to sustain lean implementation
4. Provide students with a comprehensive overview of lean manufacturing allowing them to contribute immediately to manufacturing, operations or service industries.

**Lecture Notes:** Lecture notes will be uploaded by 10:00 p.m. the date prior to class date. Therefore, students are required to visit the course web site and print out new handouts before they come to the class.

**Course Content:**

Week 1 starts January 13, 2016 (no class January 18)

Jan 13: Syllabus review, overview of major lean elements, history and fundamental purpose of lean manufacturing

**Homework:** read *The Goal* by end of week 3

Jan 20: Constraints management: Capacity and utilization modeling

**Homework:** design an Excel-based capacity and utilization model per specified requirements. Due: Monday 1/25

Jan 25/27: Before and after Lean Simulation (Lego rocket); history and fundamental purpose of lean manufacturing (cont.)

**Homework:** Goal homework, write up 2.5-4 page overview of key lean strategies. Due Monday 2/1

Feb 1/3: The Goal discussion

**Quiz** on The Goal

- Feb 8/10: Value Stream Mapping and Process Mapping, plan for every part  
**Homework:** VSM assignment. Due Monday 2/15
- Feb 15/17: Visual controls systems, 5S  
**Homework:** examples of real-life visuals. Due Monday 2/22
- Feb 22/24: Kanban pull systems (single card and visual location control, WIP/takt/inventory overview, inventory reduction, line balancing.  
**Homework:** kanban system design. Due Monday 2/29  
**Quiz** on visual controls, Kanban, inventory mgmt
- Feb 29/Mar 2: Set-up reduction (SMED), Error Proofing (poka-yoke)  
**Homework:** SMED, error proofing. Due Monday 3/7
- Mar 7/9: Mid-term review, Midterm
- Mid-term exam** – Wednesday March 9
- Mar 14/16: Spring Break (March 12 - 20)
- Mar 21/23: Toyota Production System, Autoliv Production System, Discrete-event simulation  
**Quiz** on set up reduction, error proofing
- Mar 28/30: Total Productive Maintenance, industrial machinery  
**Homework:** TPM formula set up, calculations; TPM card for a machine Due Monday 4/4
- Apr 4/6: Work Measurement Techniques (e.g., work sampling, standard time measurement systems, motion and time study)  
**Homework:** Time study analysis. Due Monday 4/11  
**Quiz** on TPM
- Apr 11/13: Standard work, sustainment, management systems of lean, culture – how it affects implementation and sustainment; interrelationships of quality management techniques pull systems, mission assurance manufacturing, total productive maintenance, poka-yoke, and SMED; Work cell design and layout, flow optimization (spaghetti diagrams, from/to charts, simulation)  
**Homework:** define interrelationships of SMED, TPM, inventory, and manufacturing cycle time. Due Monday 4/18  
**Quiz** on time and motion study
- Apr 18/20: Variability reduction: Ishikawa diagram, 5 Whys, process capability ( $C_{pk}$  analysis, statistical process control, 20 minute simulation with poker chips and dice), root cause and corrective action systems and methods
- Apr 25/27: Mission Assurance Management: foreign object elimination (FOE), Critical Handling, discipline auditing, enhanced electrostatic discharge (ESD) awareness, tool control  
**Homework:** create a discipline audit form. Due Monday 5/2  
**Quiz** on variability reduction
- May 2/4: Review
- May 6: **Final exam:** Friday May 6 scheduled from 8:30-10:30 pm

**Grading:**

1. Class homework: 25 %
2. Quizzes: 20 %
3. Midterm Exam: 25 %
4. Final Exam: 30 %

**Course Rules:**

1. Homework need to be done individually unless otherwise instructed. Paper copies will usually be expected as well as loading to D2L. Homework assignments received after the D2L deadline will be graded at 50% off. Homework not turned in within 7 days of D2L deadline will receive a zero grade.
2. For group projects, each group should submit a single report listing all names involved. The same group must be used throughout the semester. Each group member must contribute equally to all projects.
3. Students are expected to attend all lectures.
4. The instructor reserves the right to give a pop quiz at any time.
5. You can not miss any quizzes or exams. Missed quizzes and exams will result in a zero grade.
6. If a student chooses to contest any grades, they must do so within seven (7) calendar days of grade disbursement.
7. All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion; Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored.
8. Students are not allowed to use pagers, Blackberries, cell phones and/or other unapproved electronic devices during the class.
9. Plagiarism and/or cheating is not allowed to any extent for the assignments, quizzes, and exams.
10. Threatening behavior by students is prohibited (refer to the University policy at <http://policy.web.arizona.edu/~policy/threaten.shtml>).
11. Students with Disabilities: If you anticipate the need for reasonable accommodations to meet the requirements of this course, you must register with the Disability Resource Center (DRC) and request that the DRC send us official notification of your accommodation needs as soon as possible. Please plan to meet with one of us by appointment to discuss accommodations and how the course requirements and activities may impact your ability to fully participate.
12. The information contained in the syllabus (except the grade and absence policies) may be subject to change with reasonable advance notice, as deemed appropriate by the instructors.