

EIN4451: Lean Production Systems
Class Periods and Location (Dr. Tufekci): MWF 6, FLI 0105
Academic Term: Spring 2020

Instructor:

Dr. Tufekci, tufekci@ise.ufl.edu.

Office Hours: Every Tuesday and Thursday 2-3 PM, Weil 468

Teaching Assistants: Bhat Gawtam

Catalog Description

History of manufacturing. Principles, design, and analysis of lean manufacturing systems. Small lot production, setup-time reduction, continuous improvement. Principles and control of push and pull manufacturing systems. Production planning and operations scheduling (3 credits).

Course Pre-Requisites

ESI 4312 Operations Research I, STA 4321 Mathematical Statistics I.

Course Objectives

In this course, we will cover the following topics: history of manufacturing systems, design of different manufacturing systems, design and control of lean manufacturing systems, and planning and control problems encountered in manufacturing systems. At the end of the semester the students should be have a basic understanding of the design, operation and control of lean manufacturing systems and be able to use quantitative methods to model, analyze, and optimize such systems.

Professional Component (ABET):

This course contributes to the professional component criterion 4 part (b) by applying optimization models and methods to design manufacturing systems to convert raw materials and semi-finished assemblies into finished goods using manufacturing resources optimally to meet the stated customer needs in a cost effective way.

This course supports the ISE undergraduate program educational objectives of producing graduates who

- “will be successful professionals in industrial and systems engineering or other disciplines”,
- “can acquire advanced knowledge through continuing education or advanced degree programs”
- “can become active leaders in their profession and/or community”

Relation to Program Outcomes (ABET):

This course accomplishes the following program outcomes: (1) apply knowledge of mathematics, science and engineering; (2) design a system, component, or process to meet desired needs; (3) identify, formulate and solve engineering problems; (4) understand contemporary engineering issues; and (5) use the techniques, skills, and modern engineering tools necessary for engineering practice.

Required Textbooks and Software

No textbook is required.

Textbooks Recommended

Askin, R.G. and J.B. Goldberg. 2002. Design and Analysis of Lean Production Systems. John Wiley & Sons Inc. ISBN 0-471-11593-2

Recommended Reading

Lecture notes can be supplemented using following textbooks:

- Askin, R.G. and C.R. Stanridge. 1993. Modeling and Analysis of Manufacturing Systems. John Wiley & Sons Inc. ISBN 0-471-51418-7
- Nicholas, J. 1998. Competitive Manufacturing Management. Irwin/McGraw Hill. ISBN 0-256-21727-0
- Nahmias, S. 2004. Production and Operations Analysis. 5th Edition. McGraw Hill/Irwin. ISBN 0-07-241741-2

Course Schedule

The instructors reserve the right to change the topics covered as they see fit.

Session	Topic	Lecture notes
1	Course introduction	-
1,2	World Class Manufacturing	1
3	Order Winners and Qualifiers	2
4	Agile Manufacturing	3
5,6,7	Lean Manufacturing - 5S Principles	4
8	TPM	5
9	Setup Operations	6
10	Pull System	7
11	Takt Time	8
12	The Philosophy of Opt	9
13	Value Stream Mapping	10
14	Factory Physics Laws and Bottleneck Scheduling	11
15,16	Kanban Card Calculations	12
17	Review	
18	Lot Streaming	13
19	Heijunka Scheduling	14
20	Heijunka Scheduling - Miltenburgs Heuristic	15
21	Scheduling	16
22,23,24	Job-shop scheduling	17
25,26	Project Management	18
27	Project Time-Cost Tradeoff	19
28	Review	
29,30	Project Scheduling (Activity on Node Job Shop)	20
31	Assembly Line Balanceing	21
32,33	Materials Requirements Planning (MRP)	22
34	Materials Requirement Planning Heuristic Lot sizing Models	23
35	Materials Requirement Planning Wagner Whitin Algorithm	
36,37	Aggregate Production Planning - Linear Programming and Mixed Integer Programming Models	25
38	Group Technology and Cellular Manufacturing	26
39	Quality Through Design and Taguchi's Loss	27
40,41	Lean 6 Sigma	28
42	General Review	

Attendance Policy and Class Expectations

- a. Students will be assigned several homework assignments each with 3-5 questions (some of which may require simple spreadsheet implementations). All homework assignments will be collected at or prior to the beginning of the class period on the assigned date. No late homework assignments will be accepted and you will get a credit of zero in case you do not submit the homework on time. Homework assignments submitted at the end of the class period will be considered as late submissions and will receive a credit of 0. Homework policy is non-negotiable.
- b. The mid-term exams will be given in the evenings, and the final exam during the evening.
- c. Attendance is required and will be taken at each class. In addition, periodic unscheduled quizzes will take place at the end of class. These will be short (less than 5 minutes) quizzes on the material that was covered in class.
- d. You are responsible for all announcements made in class.
- e. You are responsible for printing the assignments from the class web page located at <https://elearning2.courses.ufl.edu>. Paper copies of assignments will not be distributed in class. The instructor will prepare lecture notes to accompany class discussions, which will be made available to the students through the class web site also.
- f. Requests for re-grading of assignments and exams will be considered only with a written explanation and only within a one-week period from the time graded work is returned in class.
- g. Grades will be posted on the web. Throughout the semester, you have to ensure that they are entered correctly. Corrections will be considered only within a one-week period after the grades have been posted on the web.
- h. Please remember to turn off cell phones before you come to class.
- i. Please come to class in time. Late arrivals as well as walking out and in during the lectures disrupt the flow of the lecture.

Make-Up Policy

Excused absences require appropriate documentation.

If you missed an exam due to a health problem, you will need to provide documentation that indicates the date of the visit. In case of an exam conflict, you will need to present evidence of the conflict to the instructor. Please do not ask for a make-up exam to attend a job interview.

Grading Policy

Assignment	Percentage of Final Grade	Grade	Range	Grade Points
Homework	15%	A	[92-100]	4.00
Attendance	5%	B+	[88-90)	3.33
Quizzes	5%	B	[83-88)	3.00
Midterm Exam 1	25%	B-	[80-83)	2.67
Midterm Exam 2	25%	C+	[78-80)	2.33
Final Exam	25%	C	[73-78)	2.00
		C-	[70-73)	1.67
		D+	[68-70)	1.33
		D	[63-68)	1.00
		D-	[60-63)	0.67

Please note that this is a required course for ISE students. This means that you must earn, at a minimum, a C in order to satisfy the requirement.

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:

<http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling.
<https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.