ISE 105 Introduction to Industrial and Systems Engineering (2 Units)

Lecturer: Raymond Rakhshani
Electronic mail address: rakhshan@usc.edu

Class: Mondays, Wednesdays, and Fridays from 10:00 to 10:50 a.m., in RTH 105
Friday classes are occasional and are for reviews, make-up classes & plant tours.

Office Hrs: Mondays, and Wednesdays, in TBD 11 a.m. to 12:00 p.m.

Grading: .....

Homework	20% (10 assignments - 2% each weekly assignment)
Midterm Exam 1	15% (3 problems - 5% each problem)
Midterm Exam 2	20% (3 problems - 6-7% each problem)
Final Exam	40% (4 problems - 10% each problem)
Participation	5% (Attendance, punctuality, and teamwork)

The grade for the course will only be based on the required work listed below and **cannot** be improved with additional work.

Assignments: Readings and Problems will be included in each week's assignment. Problems are assigned on Wednesdays and are due before the following Wednesday. Graded assignments will be returned by the following Monday to the class.
Reading assignments are due when the material will be covered in class. It is imperative that you prepare for class as you will find it difficult to follow the discussion if you do not read the material.

Late homework will not be accepted, unless prior arrangements have been made (e.g. out of town funeral, etc.).
Homework is to be in an Excel, PowerPoint and Word file formats. Your name and/or group name, assignment number, the date and whom you worked with should be in the header. Use a consistent template. Be sure to look at the "Print Preview" before submitting your assignment. NO hand-written HOMEWORK WILL BE ACCEPTED.

The assignments should be as professional in appearance as if you were preparing reports at work or for publication. Presentation of results using graphical tools is highly recommended. The assignments are graded based on data acquisition, analysis of data, presentation and report appearance. Clearly label the problem number and your conclusions for each problem, followed by the supporting calculations.
The problems must be in the order assigned.

Generated data and essay questions must be unique to each student/group. If the answer is given in a book, please do not just copy it, explain how you interpreted it.

Course Text:

Introduction to Industrial and Systems Engineering, by Turner, Third Edition, Prentice-Hall, Inc.
Optional:
Lean Thinking, by James Womack
Engineering Fundamentals, by Saeed Moaveni – 2nd Edition

References: There are many similar texts. All have advantages and disadvantages. You may wish to consult one or two for a different viewpoint or for background, but there is no requirement to do so.

You are encouraged to work in teams and use computer applications to solve the homework problems. However working in groups, requires participation by all team members. One warning about group work: If you are simply a reader and a copier, you will likely do poorly on the exams.

Throughout the semester, I will selectively solve problems from the textbook and explain the concepts, however, it is imperative for you to do the problems on your own and/or get actively involved in problem-solving with the group to be able to ultimately do it by yourself. Our goal here at USC is to provide you with the conditions for learning.

Course Goal:

To make the student excited about embarking upon this educational endeavor by introducing the fundamental changes that the Industrial and Systems Engineering principles have brought about in the industry and the economy, and to familiarize the students with some of the current and prevalent engineering tools and techniques.

Specific course objectives include:

1. Understanding the concepts of Industrial and Systems Engineering principles.
2. Learning the ability to analyze a situation in a team environment and use the appropriate tools/techniques of Industrial and Systems Engineering to solve the issues, and present solutions.
3. Introducing to the students the current ISE analytical tools and engineering techniques.
4. Becoming familiar with the professional reports through the weekly team assignments, project document design, and the professional presentation.
5. Enabling the students to communicate and present results effectively.
6. Offering the students at least three manufacturing and distribution plant tours to familiarize them with how the ISE tools are being utilized in Industry.

It is up to the students to become familiar with and learn the mechanics of the material in the text. The lecture is a supplement to what is contained in the book.

Course schedule:

NOTE: CHECK HOMEWORK ASSIGNMENTS EVERY WEDNESDAY (on the blackboard blackboard.usc.edu) FOR THE WEEK THAT YOU ARE IN, AS THEY MAY CHANGE ACCORDING TO THE PROGRESS AND/OR NEED OF THE CLASS. ASSIGNMENT CHANGES WILL BE DONE LATE TUESDAY EVENINGS AND POSTED ON THE COURSE HOMEPAGE ON http://blackboard.usc.edu.

"The School of Engineering adheres to the University's policies and procedures governing academic integrity as described in SCampus. Students are expected to be aware of, and to observe the academic integrity standards described in SCampus, and to expect those standards to be enforced in this course."

"Any Student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213)740-0776."

Weekly Schedule

Week 1 (Monday Aug. 23rd)
Reading assignment: Chapter One – History of Engineering and Development of Industrial Engineering

Week 1 (Wednesday)
Reading assignment: Chapter 2 – Industrial and Systems Engineering
Homework Assignment 1(due week 2 –Wed.): Chapter 2 problems: 1, and 4(d)
Homework Assignment 1- Individual (due week 2 –Wed.): Essay in one page on why you have chosen Industrial & Systems Engineering, and what your ideal vision of your future career is.

Week 2 (Monday Aug. 30th)
Reading assignment: Chapter 2 – Industrial and Systems Engineering (Continued)

What is a system?
Reading assignment: Chapter 18 – Systems Concept
Homework Assignment 2 (due week 3 –Wed.): Chapter 18 Discussion question: 1

Week 2 (Wednesday Sept. 1st)
What is a system? (Continued)
Reading assignment: Chapter 18 – Systems Concept

Week 2 (Friday)
Reading assignment: Chapter 19 – What is a Management Systems Design? What is the role of ISE?
Homework Assignment 2 (due week 3 –Wed.): Chapter 19 Discussion question: 16 (U.S. & Japan only)

Week 3 (Monday Sept. 6th)

Week 3 (Wednesday)
Introduction to the Engineering Ethics & Professionalism. What is ethics, anyway? Is it the same as morality?
Reading assignment: Chapter 5 in the "Engineering Fundamentals" – Engineering Ethics
Homework Individual Assignment 3 (due week 6 –Wed.): Write a one page essay on "The differences and similarities between Ethics & Morality."

Week 3 (Friday)

Week 4 (Monday Sept. 13th)
What is Scientific Method? What is Industrial Engineering Today? What do ISEs do in the fields of Operations, Manufacturing, Project Management, Operations Research and Human Factors?

Week 4 (Wed. Sept.)
Introduction to Operations Management. Where do ISEs fit in operations?
Reading assignment: Chapter 7 – Operations Management (Planning and Control)

Week 4 (Friday)

Week 5 (Monday Sept. 20th)
Introduction to Manufacturing Engineering. What are the typical ME activities that ISEs do?
Reading assignment: Chapter 3 – Manufacturing Engineering & Manufacturing Processes
Homework Assignment 3(due week 6 –Wed.): Chapter 3 problems: 1, 2, and 7 (Assume the product is a plastic PaperMate stickpen)

Week 5 (Wednesday)
Introduction to Facilities Engineering. What is the multidisciplinary nature of the facilities engineering? What are the typical activities of ISEs in the field of Facilities Engineering?
Reading assignment: Chapter 4 – Facilities Location and Layout
Individual Assignment 4(due week 7 –Wed.): Choose 10 location factors from the presentation slides and describe how each factor can affect the location decision (2-4 pages)
Homework Assignment 4(due week 7 –Wed.): Chapter 4 Question: 1

Week 6 (Monday Sept. 27th)
Reading assignment: Chapter 5 – Material Handling, Distribution and Routing. Am I studying ISE to become a truck driver?!
Homework Assignment 5 (due week 8 –Wed.): Chapter 5 problem: 5
Homework Assignment 5 (due week 8 –Wed.): Chapter 5 problem: 1

Week 6 (Wednesday)
Reading assignment: Chapter 6 – Work Design and Organizational Performance. What do ISEs measure for organizational performance?
Homework Assignment 6 (due week 9 –Wed.): Chapter 6 problems: 1
Homework Assignment 6 (due week 9 –Wed.): Chapter 7 problems: 2

Week 7 (Monday Oct. 4th)
Introduction to Information Systems Engineering & Management
Reading assignment: Chapter 20 – Computers and Information Systems
Homework Assignment 7 (due week 10 –Wed.): Write an essay to distinguish between "Data", "Information" and "Knowledge." 1-2 page.

Week 7 (Wednesday, Oct.)
Introduction to Project Management.
Reading assignment: Chapter 17 – Project Management
Homework Assignment 7 (due week 10 –Wed.): Chapter 17 Problem 4

Week 7 (Friday, Oct.)
Introduction to Project Management Tools
Review Session

Week 8 (Monday Oct. 11th)
Plant Tour 1 - Aramark

Week 8 (Wednesday)
Midterm Examination 1 -

Week 8 (Friday)
Introduction to the Statistics for Engineers. What is statistics? What do ISEs use statistics for?
Introduction to Data Analysis, Probability Distribution and Statistical Software applications
Reading assignment: Chapter 8 – Quality Control
Reading assignment: Appendix A – Probability and Statistics
Homework Assignment 8 (due week 11 –Wed.): Chapter 8 problems: 2, and Calculate the sample variance and the standard deviation for the weights of the people from the lecture slides.

Week 9 (Monday Oct. 18th)
Introduction to Operations Research
Reading assignment: Chapter 14 – Deterministic Operations Research
Homework Assignment 8 (due week 11 –Wed.): Chapter 14 problems: 8
Homework Assignment 8- Individual (due week 11 –Wed.): Chapter 14 Problem 10 & Chapter 6 Problem 12

Week 9 (Wednesday)
Reading assignment: Chapter 15 – Probabilistic Models
Homework Assignment 9 (due week 12 –Wed.): Chapter 15 problems: 1

Week 10 (Monday Oct. 25th)
Reading assignment: Chapter 16 - Simulation
Homework Assignment 9 (due week 12 –Wed.): Chapter 16 problems: 1 and 3

Week 10 (Wednesday)
Introduction to Ergonomics and Human Factors. What role do ISEs play in workplace safety?
Reading assignment: Chapter 11 – Human Factors
Homework Assignment 10 (due week 13 –Wed.): Write an essay (2 pages) on the significance of the decision-making process by the "Human element" in the workplace.
Homework Assignment 10 (due week 13 –Wed.): Write an essay (2 pages) on the CAL-OSHA Safety Program in the workplace.

Week 10 (Friday)
Reading assignment: Chapter 10 – CAD/CAM, Robotics and Automation
Homework Assignment 10 (due week 13 –Wed.): Chapter 10 Discussion questions: 1 and 5 **(due week 13 –Wed.)**

Week 11 (Monday Nov. 1st)
Introduction to Lean Thinking and Business Communication

Week 11 (Wednesday Nov. 3rd)
Proposed Plant Tour 2 - ASCO Sintering

Week 12 (Monday Nov. 8th)
Midterm Examination 2 -

Week 12 (Wednesday, Nov.)
Review of Midterm Examination 2 Questions

Week 13 (Monday, Nov. 15th)

Introduction to the Engineering Economy
Reading assignment: Chapter 9 – Financial Compensation
Homework Assignment 11(due week 14 –Wed.): Chapter 9 problems: 3 and 5

Week 13 (Wednesday)
Introduction to the "Theory of Constraint"

Week 13 (Friday)
Proposed Plant Tour 3 - TBD

Week 14 (Monday, Nov. 22nd)
Review of Lean Philosophy and Principles

Week 14 (Wednesday)
No Class scheduled due to Thanksgiving Weekend

Week 15 (Monday, Nov. 29th)
Review session of chapters 18, 19 and 20

Week 15 (Wednesday)
More Review of Lean Philosophy and Principles
Review of Final Examination Requirements

Week 16 (Monday Dec. 6th)
Final Exam – 8 am to 10 am.

Week 16 (Appointments with students)

Week 17 (Monday, Dec. 13th)
(Appointments with students)

I AM LOOKING FORWARD TO A CHALLENGING AND LEARNING SEMESTER.

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