

Engineering 10: Introduction to Engineering

Section 10.62, Fall 2017

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| Instructor: | Raji Lukkoor |
| Class Days/Time: | Tuesdays and Thursdays: 6:30 PM – 7:45 PM Lecture; 7:50 PM - 10:05 PM Lab |
| Location: | S42 |
| Office Hours: | TTh 6:00 PM – 6:30 PM, 10:00 PM – 10:30 PM |
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Course Description

Introduction to Engineering is designed to allow students to explore engineering through hands-on design projects. Students will learn about the various aspects of the engineering profession and acquire *both* technical and non-technical skills, in areas such as project proposal, project management, technical communication, teamwork, and engineering ethics. Students will learn about human factors and engineering design factors impacting design as well as understand how sustainability principles influence design. Students will also gain a deep understanding of the challenges surrounding the world's energy needs.

The format of the course will be strongly interactive. Emphasis will be placed on group problem solving and experiential learning.

Course Objectives

Specific objectives of the course include:

1. Introduce the student to the fundamentals of engineering;
2. Introduce the student to the various disciplines of engineering;
3. Introduce the student to the concepts of teamwork, project management, engineering ethics and technical communication;
4. Introduce the student to the principles of sustainability and how they affect design;
5. Introduce the student to communication tools such as Microsoft Word, PowerPoint and Excel, to help support engineering design and analysis.

During this course, as teams of two to three students, you will work on a design project that excites you and is of interest to you. The goal is to assess the need for the project, describe your solution, and explain why/how it is different from other solutions available. Each student team will write and submit a project proposal, during the third week of the quarter, which outlines the project need, background, objectives, implementation plan, deliverables and resources. Concurrently, each student team will create and submit a PERT chart and a Gantt chart that highlight an estimated timeline of deliverables and important dates for the project. At the end of this course, each student team will deliver a PowerPoint presentation and submit a project report. Students will conduct peer evaluations by providing constructive feedback on the project presentations. The design project, presentation and report writing constitute 55% of your course grade; participation is mandatory and a requirement to pass this course.

Student Learning Outcome

At the end of this course, students will be able to:

1. Summarize the steps of the engineering design process;
2. Apply basic physics concepts to the design and analysis of built systems;
3. Apply teamwork skills and resolve team conflict;
4. Write a simple engineering report and present the report orally;
5. Use tools such as spreadsheets to support engineering design and analysis;
6. Use ethical reasoning to address to evaluate ethical dilemmas;
7. Explain principles of sustainability and how they affect engineering design;
8. Appreciate the challenges surrounding the world's energy needs;
9. Appreciate and align with the various engineering disciplines.

Text

(Recommended but not required).

Engineering Your Future: A Comprehensive Introduction to Engineering by William C. Oakes, PhD, 2009-2010 Edition.

A Whole New Engineering: The Coming Revolution in Engineering Education by David R. Goldberg and Mark Somerville, 2014 Edition.

Attendance

Attendance is mandatory. Ensure that vacations, doctor's appointments, social engagements, etc. do not interfere with attendance. Active class participation, including the completion of all class exercises, is key to achieving educational success. Class activities cannot be made up if the class is missed. If you are absent from class, the onus of checking on announcements made while you were absent is on YOU.

Classroom Protocol

Please arrive to class on time. If you do happen to arrive to class late, please enter and take your seat quietly. Expected classroom courtesies include: no text messaging, no emailing, no checking emails, or no gaming. Likewise, no recording of lecture, no in-class picture taking of lecture slides, no making/receiving phone calls. No copying or sharing of instructional material, including videos, PowerPoint slides, notes, handouts, problems, solutions, quizzes, tests, simulations, etc.

Note that any inappropriate or disruptive behaviors, including offensive/vulgar expressions, disrespecting others' viewpoints or disrespecting the instructor could lead to removal from the classroom and/or disciplinary action, as warranted.

Communication

Email communication is most appropriate for administrative matters (notification of illness, scheduling appointments, clarification of homework problems, etc.). With all communication, please maintain a high degree of respect and professionalism. Homework problems or other course materials are best discussed in person during scheduled office hours and not by email.

Coursework Expectation

Lecture presentations will be posted to *Canvas* at the start of each week. The *Introduction to Engineering Course Schedule & Calendar* is attached. Each student is responsible to check the calendar on a regular basis to see if there is a change in the schedule.

Note: All work submitted past the due date will be docked 50%.

Technical Papers:

Relevant technical papers will be assigned throughout the quarter. Note that papers might be added or deleted from the list as the quarter progresses. Where applicable, paper guidelines will be posted on *Canvas*.

Note: This is an individual effort.

Speaker Forum Participation:

Speaker Forum participation consists of attending the event, participating in class discussions, asking content-related questions, and submitting a summary paper.

Note: This is an individual effort.

Engineer Interview & Write-up:

This exercise consists of securing an engineer (any engineering major), writing a list of interview questions, scheduling & interviewing the engineer, and submitting the interview write-up.

Note: This is an individual effort.

Note: You must conduct the engineer interview and submit the write-up in order to complete the class and pass this course.

PROJECT:

Project Proposal, PERT & Gantt Charts

A project proposal, a PERT chart and a Gantt chart per team is required for your project.

Note: You must submit the above proposal and charts in order to complete the class and pass this course.

Project Demo, PowerPoint Presentation & Peer Evaluation:

A final PowerPoint presentation per team is due for your project. All team members must be present and participate in the final demo, presentation and peer evaluation of other team projects; else, you will receive a zero.

Note: You must demonstrate your project and deliver the Final Presentation in order to complete the class and pass this course.

Project Final Written Report:

A final written report per team is due for your project.

Note: You must submit the Final Report in order to complete the class and pass this course.

Evaluation & Grading:

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| Project | | |
| Proposal | Team | 10% |
| PERT & Gantt Charts | Team | 10% |
| Final Demo & PowerPoint Presentation | Team | 25% |
| Final Written Report | Team | 10% |
| Engineer Interview & Write-up | Individual | 15% |
| 3 Technical Papers – Teamwork (8 pts), Ethics (9 pts), Energy (8 pts) | Individual | 25% |
| Speaker Event Participation and Paper | Individual | 5% |

Note: The above weighting is subject to change, with fair notice given in class.

The final course grades will be assigned according to the following grading scale, with standard decimal rounding (i.e. 0.5 and greater rounded up):

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| A+ = 100-98% | A = 97-93% | A- = 92-90% |
| B+ = 89-87% | B = 86-83% | B- = 82-80% |
| C+ = 79-76% | C = 75-70% | |
| D+ = 69-68% | D = 67-63% | |
| F = 59-0% | | |

Note: The above grading rubric is subject to change, with fair notice given in class.

Introduction to Engineering Course Schedule & Calendar

* Note that the schedule below is subject to change with fair notice given in class.*

| Week | Date | Lecture/Lab Topic | Assignment | Due Date |
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| 1 | Sep 26 | Lec: First Day of Class Lab: Examples of previous projects | | |
| | Sep 28 | Lec: History of Engineering Lab: Form team, select project | | |
| 2 | Oct 03 | Lec: Engineering Design Lab: Project Proposal writing | Project Proposal | |
| | Oct 05 | Lec: Engineering Disciplines Lab: Start writing project proposal | | |
| 3 | Oct 10 | Lec: Human Design Factors Lab: Continue writing project proposal Proposal review | | |
| | Oct 12 | Lec: Engineer Interview Guidelines Lab: Excel Basics; PDCA, PERT & Gantt charts | Interview Paper PERT/Gantt Charts | Project Proposal due |
| 4 | Oct 17 | Lec: Teamwork Lab: Work on project during lab time | Teamwork Paper | |
| | Oct 19 | Lec: Technical Communication I Lab: Purchase all the parts | | PERT/Gantt Charts due |
| 5 | Oct 24 | Lec: Sustainability Lab: Work during lab time | | |
| | Oct 26 | Lec: Sustainability Lab: Interview Questions Review Bring in the parts and work during lab time | | |
| 6 | Oct 31 | Lec & Lab: Speaker Event | Speaker Paper | Teamwork Paper due |
| | Nov 02 | Lec: Energy Lab: Work during lab time | Energy Paper | Speaker Paper due |
| 7 | Nov 07 | Lec: Engineering Ethics Lab: Work during lab time | Ethics Paper | |
| | Nov 09 | Lec: Technical Communication II Lab: Work during lab time | Final Written Report | |
| 8 | Nov 14 | Lec: Technical Communication III Lab: Work during lab time | PowerPoint Presentation | |
| | Nov 16 | Lec: Interview Paper Review Lab: Work during lab time | | Energy Paper due |
| 9 | Nov 21 | Lec: Interview Paper Review Lab: Work during lab time | | Ethics Paper due |
| | Nov 23 | <i>Thanksgiving Holiday</i> | | |
| 10 | Nov 28 | Lec: Presentation/Report Review Lab: Work on Presentation and Report | | |
| | Nov 30 | Lec: Presentation/Report Review Lab: Work on Presentation and Report | | Interview Paper due |

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| 11 | Dec 05 | Lec: TBA Lab: Work on Presentation and Report | | |
| | Dec 07 | | | Project Presentation & Demo due |
| 12 | Sunday, Dec 10 | | | Project Written Report due |