

De Anza College
Introduction to Engineering
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Engineering is such an exciting discipline. It is one of those things that never bores you. I began my first hands-on project at the age of ten, and even today, I can still work on some of the projects I did at the age of ten with a different level of appreciation and depth. Each time you learn something in engineering, you learn it more deeply. For those of you who are new to engineering, think of it as me showing you Disneyland for the first time.



Above is the map of Disneyland. Even though I have only been there a few times as a kid, you see the different sections, such as Fantasyland, Tomorrowland, New Orleans Square, just to name a few. Engineering in many ways is the same. Just as you cannot explore the complete Disneyland in one day, you cannot explore the complete field of engineering in one quarter. In this class, I will choose important topics that illustrate the state of the art techniques in engineering.

What will we learn

One important aspect of engineering is **abstract** thinking. We want to abstract away from the underlying details of the implementation so we can work on, for instance, a satellite image as well as a Facebook image. In this case, we do not want to hire two separate image processing engineers. Similarly, if you are working on feedback control, the system you build for a helicopter can be adapted to one for the aircraft,

with modifications, of course. The point is abstraction allows us to work on multiple systems. Abstraction is also what makes an engineer's job fun, because when we get tired of working on one project, we can switch to the next, without the need to train ourselves from scratch, because the fundamentals will carry over from one project to the next.

This class will challenge you to think **conceptually**. Many of you perhaps had a course in mathematics already where you can write down some equations, solve, and obtain the right answer without understanding at a deep level why your solution works. Unfortunately, in engineering, the mathematics and equations don't mean much if you cannot explain the **meaning** behind your answer in an **intuitive** way. Intuition is gut feeling and takes time to train. Before you write anything down, what is your gut feeling? This class will give you an introduction to intuitive thinking so you can start building your intuition as an engineer.

These are the major units of the course.

- I. Software Engineering
- II. Machine Learning
- III. Signals and Systems
 - a. Reverberation, delay – example from guitar
 - b. Fourier Transform
 - c. Feedback systems – example from everyday life
 - d. Image processing
- IV. Probability
 - a. Markov Chain
 - b. Kalman filter
- V. Electronics
 - a. Circuits fundamentals
 - b. Applications of circuits
 - c. Camera system

Prerequisite

I take it for as a fact that we are all here to learn. Having that said, if you are not here to learn, then you probably shouldn't be here. We are here based on the mutual rapport of learning, of expanding our current knowledge. Actions that prohibit learning will be forbidden in this class.

Pursuing something intensely

As an example, if you are here in class and checking your phone like there is no tomorrow then you are disrupting others from learning. A tip I can give you is to pursue something intensely. Example – rather than watching a soccer game on your phone, you should go and watch a live soccer game in San Jose. If you enjoy eating, you want to go for a buffet. If you enjoy movies, rather than watching a movie on your laptop between classes, you should go to the cinemax for two days straight

from 9 am to midnight back to back. When you pursue something intensely the urge usually resides.

I also assume that you have an appropriate amount of study skills under your belt. I assume you know to a certain extent how to be a good note taker and how to appropriately allocate your time. If not, please utilize the De Anza College academic skills center. They offer a variety of workshops on note taking, test taking, memorization techniques, time management, and other study techniques that may potentially benefit you. If you are lacking in any of these areas it is your responsibility to spend extra time to catch up. This class will be intense at times, so I am giving you a heads up.

Logistics

The quality of the assignment you turn in is also very important for this class. If you throw something together the last second it will undoubtedly show and this will waste both my time and your time. The assignments need to be treated seriously, as they are important in preparing you for the necessary skills that need to be acquired. Hand calculations need to be written neatly. Essay response must be typed and printed out.

You have a **total of five absences** for this class. If you are planning to miss more than five classes, you should not take my class this quarter. Note this number includes both excused or unexcused absences. In the case of excused absence that exceed five absences, you will receive an incomplete rather than fail. Any consecutive miss of classes will be counted with an additional penalty. Meaning, if you miss two classes on two consecutive days, you will be counted with a plus one, for a total of three misses. Any additional absences will reduce your total course grade automatically by 2.5 out of 100. For example, if you miss 9 classes, then the highest grade you can receive will be a 90. Then you will pretty much be in the B range, because unless you get everything else perfectly, which is pretty hard, you have short changed yourself.

You have a **total of four late days** for your assignments which you can use throughout the entire quarter. Anything beyond will give you a zero on the assignment. Assignments are due at the beginning of the class. If you are absent that day, it is still your responsibility to turn in your assignment, otherwise you will be deducted from your total number of late days. For example, if the assignment is due on the last day of the week and you miss that class, it does not mean you can turn it in on Monday without penalty. Weekend days will be counted toward the total number of late days.

Your assignment will be assigned once every 1-1.5 week. You should pace yourself during the week to finish the different components rather than the night before. Usually, your assignment requires more than one sitting.

Resources

There are no official textbook for this class.

If you ever feel like you are falling behind, please seek out resources for yourself. Sometimes it is simply a matter of finding the right resources to get yourself back on track.

Resources will be uploaded to course studio as we proceed through the quarter.

Grading

Homework	30%
Midterm	20%
Pop Quizzes	20%
Final Exam	20%
Participation, Attitude, and Effort	10%

The grade and cutoff are as follows:

A 93 A- 90 B+ 87 B 83 B- 80 C+ 77 C+ 73 C- 70 D+ 67 D 63 D- 60

Final words

This class should be really fun. The technical topics are supposed to be challenging. Never feel ashamed to ask questions if you don't understand something. We are all here to learn together. I look forward to interacting with you and having a great quarter with you.

Student Learning Outcome(s):

*The student will be able to analyze, graph and develop a formula for a given data set.

*The student will be able to prepare and write technical specifications and documentation, and be able to orally present them.

*The student will work collaboratively on an engineering team.