ECE 30

Elijah Hantman

Engineering Principles of Electronics

Introduction

Taught by Paul Vroomen
Office Hours in E2-280
Office Hours: Wed. 10am - 12pm
Email: pvroomen@ucsc.edu

TA Office Hours:

- Baskin, Thursdays 12am-2pm
- BE-230, Mondays 10am-12am
- idk, Fridays 10:45am-12:45pm

- Class Website -¿ Canvas
- Important Announcements
- Everything basically

Overview of Course

- Four Applications of Engineering Principles in mobile phone and computers.
  1. Accelerometers
  2. Touchscreens
  3. LTE, 5G communications
  4. Data Processing Chips
- For each we will review physics + how to apply principles.

- Textbook required
- Older text for comp sci
- e-Text is avalible on most book websites
- Syllabus lists which sections are assigned per lecture

- Recommended textbook
- Basic engineering principles
- Handouts from sections of the book will be used

Grading
Quizzes

- 4 quizzes
- Most material covered via quizzes
- 10 multiple choise questions + bonus question
- Open book
- Avalible from 2pm to midnight
- 15 mins once started

Exams

- Midterm 1 hour
- Solve problems from lectures 1-14

- Final 3 hours
- Questions from full course

Homework

- 8 sets total
- Solve questions using principles discussed in class
- Must be submitted by midnight on following Sunday
- May work in teams of up to 3
- Must list names of other students in team

Late Submissions

- HW submissions are due by midnight
- 50% late penalty (2% of final)
- >24 hours late will not be graded
- Some exceptions
    - Serious illness or emergency
    - Personal, family, or other crisis
    - Problems should be reported immediately

Breakdown

- Quizzes 20%
- Homework 30%
- Midterm Exam 20%
- Final 30%

What does "Engineering Principles of Electronics" Means?

- About leverage and Application
- About Practices

  > ex: For integrated circuites through trial and error we have learned we need an ISO1 clean room to ensure acceptable quality.
  >
  > ISO1 designates a maximum number of particles per m^3.
  >
  > - $10 > 0.1$ um
  > - $2 > 0.2$ um
  > - $0 > 0.3$ um

- Physics is why a device works, Engineering Principles are how we leverage physical laws to create a device

Princples

- Principles $\rightarrow$ Concepts $\rightarrow$ Symbols $\rightarrow$ Quantities $\rightarrow$ Units
- Measuring Acceleration $\rightarrow$ Velocity $\rightarrow$ v $\rightarrow$ 28 $\rightarrow$ m/s
- Concepts are codified in equations

$$v = \frac{\Delta x}{\Delta t}$$

  Where v is they symbol for velocity, x for distance, and t for time. The captial Delta means "Change of". This can be represented via

$$\Delta x = x_f - x_0$$

  Where x_f is the final distance and x_0 is the initial distance.
- The laws of physics are concepts which are made clear through equations, using symbols which we have tied to the real world via consensus and agreement.

  Each law represents repeated observations which have been summarized into a single relationship.

Units

- Units are arbitrary and created by Humans
- Units gain value through consensus

  > Units are tools for communication and organization!

- Units provided detail about concepts and can often solve problems by simply matching units.
- Converting Units is a key skill

Example

- 2.4 miles 1min 45s per 100 yds
- 112 miles at 18.5 mph
- transition times 10mins, 5min

- 112 miles at 18.5 mph = 6.05