

Engineering 100 (section 700)
**Microprocessors and Music: An Introduction
to Computing Systems**

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Introduction to engineering

What's an engineer? Definition, characteristics, job description, etc.

How does an engineer differ from a tradesperson? Electrical engineer vs. electrician? Mechanical engineer vs. car mechanic?

How does an engineer differ from a scientist?

One definition

Scientific and mathematical principles

Applies...to practical ends

Design, manufacture (i.e. build/implement), test, operate

- different phases in the lifetime of a system

Efficient, economical

- engineers tend to value function over form

Structures, machines, processes, systems

- engineers design/build/test/operate “stuff”
- different types of engineers work on different types of systems

Aerospace Engineering

Atmospheric, Oceanic and Space Sciences

Biomedical Engineering

Chemical Engineering

Civil and Environmental Engineering

Computer Engineering

Computer Science

Electrical Engineering

Industrial and Operations Engineering

Materials Science and Engineering

Mechanical Engineering

Naval Architecture and Marine Engineering

Nuclear Engineering and Radiological Sciences

Characteristics of engineers

- good at math and science
- likes to understand how things work
- likes to solve problems
- likes to improve existing systems
- likes to invent new solutions (or even new problems)

What are engineers good for?

- good at theory and practice
- good at solving real problems effectively and efficiently

Etymology

- ingeniosus (skilled)

Introduction to computer engineering

Computer engineers design/build/test/operate systems that involve computers.

What are some devices you own that have a computer processor?

Overview of course

Goal: experience the life cycle of a substantial computer engineering project

Microprocessor-based music synthesizer

- microprocessor: general-purpose, programmable computer
- device drivers for keyboard, mouse, speaker, microphone, VGA monitor, LCD display, secure digital card, SDRAM, serial port
- music synthesizer (runs as application on your microprocessor). Takes input from user via I/O devices, computes audio signals, generates sound via audio controller.

Project done on development board: Altera DE2

- FPGA (field-programmable gate array)
- SRAM, SDRAM
- LEDs
- switches and buttons
- PS/2 interface
- USB interface
- audio interface (speaker, microphone)
- VGA interface
- LCD display
- secure digital card
- serial port

- also infrared, Ethernet, TV out, Flash RAM

Course will introduce you to basics of many parts of computer engineering

- digital logic
- implementing algorithms in hardware
- implementing a computer in hardware
- programming a computer in assembly language
- interfacing to I/O devices
- digital audio
- operating systems

Workload

- 4 credits ==> 12 hours/week
- lecture (3 hours)
- lab (2 hours)
- discussion (1 hour)
- group meeting (1 hour)
- CE work outside lab (2-3 hours)
- TC work (2-3 hours)