Basic Engineering Questions

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1. What does an engineer learn and do?

Engineers learn the fundamentals in a field of engineering and use them to solve societies problems.

2. What is the place of engineering in society?

Engineers create new technologies, to understand the technological changes, and to manage these changes responsibly.

3. What is the difference between engineering and science?

Scientists "explore what is", engineers "create what never has been". Engineers are usually concerned with the design and production of goods and services to meet the needs of society.

3.1. A Task-centered Computer Engineering Curricula

A task-centered curricula lists some of the tasks that we expect computer engineers to be able to engage in. This relates to computer engineers in general.

- Computer Systems (design and implementation, architecture, performance analysis)
- Software Development (life cycle, simulation, responding to needs of industry)
- Data Management (data structures, data processing data mining)
- Network (network programming, distributed computing, networking hardware)
- Embedded systems (microprocessor systems, smart systems, telemanagement of devices, control).
- IC Design (VLSI design, programmable logic design)
- Computational theory and applications
- AI (machine learning, vision, data mining, neural networking inferencing)
- Signal Processing (image processing, video processing voice processing, compression, etc.)
- Integrated computer and communications systems (modem design, digital communications design)

3.2. Subject-centered computer engineering curricula

A subject-centered computer engineering curricula is typically centered on subjects of:
Discrete Math

* Boolean algebra
* Logic
* Set theory
* Z transform

Continuous Math

* Differential Equations
* Linear Algebra.
* Fourier analysis
* Probability/Queueing theory
* Convolution integrals.

Physical Science

* Dynamics
* Electricity
* Chemical structure and equilibrium
* Physics of matter
* Thermodynamics

Hardware

* Digital electronic circuits
* Analog electronic circuits
* Computer systems and architecture
* Integrated Circuit design

And Computer Science

* architecture
* software
* theory

3.3. Electrical Engineering Vs Computer Engineering

Electrical engineering is concerned with the practical applications of electricity and with devices in which the motion of electrons and other charged particles is controlled.

The Electrical Engineering discipline covers many of the same subject areas as Computer Engineering except that it places more emphasis on Hardware and less emphasis on Computer Science.

Computer Engineering, on the other hand, places more emphasis on Computer Science than hardware.

3.4. Computer Science Vs Computer Engineering

Computer science programs typically study a mixture of software and hardware subjects as they relate to the study of computers. The software tends toward the theoretical and mathematical activities that include the design and analysis of algorithms, as well as the performance analysis of systems.

The major sub disciplines of computer science have traditionally been (1) architecture (including all levels of hardware design, as well as the integration of hardware and software components to form computer systems), (2) software (the programs, or sets of instructions, that tell a computer how to carry out tasks), here subdivided into software engineering, programming languages, operating systems, information systems and databases, artificial intelligence, neural networks, and computer graphics, and (3) theory, which includes computational methods and numerical analysis on the one hand and data structures and algorithms on the other.

Computer science is generally considered a discipline separate from computer engineering, although the two disciplines overlap extensively in the area of computer architecture, which is the design and study of computer systems.

3.5. Computer Engineering vs. Software Engineering

Software engineering is held as a discipline separate from computer engineering and computer science, although there is overlap in the area of software development and computer science theory.

Software engineering, as a discipline, arises from large scale software development that requires teams of programmers. The team treats the development as an engineering task that has constraints on cost, reliability, and maintainability. The software-engineering process is usually described as consisting of several phases, generally consisting of: (1) identification and analysis of requirements, (2) development of specifications (3) software design (perhaps at several successively

more detailed levels), (4) implementation (actual coding), (5) testing, and (6) maintenance.

Computer engineering solutions go beyond the standard set of software engineering solutions. They often incorporate applications of mathematics and engineering disciplines often reserved for computer scientists or electrical engineers.

At the end of the program students will have an ability to communicate effectively. This program helps a student think independently about areas of knowledge so that they can organize the area of knowledge, identify, formulate and develop computer-based solutions to problems in the field. Emphasis is placed on an ability to make use of modern programming tools in the solution of the problems. Our graduates are able to make decisions about computer technologies.

The Computer Engineering program at Fairfield University has three broad domains, object-oriented programming principles, visualization and computer systems.

Software design principles are integrated throughout the program and are applied to custom engineering designs. Extensive experimental and computational facilities are available and close interactions are maintained with industry.

The proposed program is comprised of the following components:

1. General Knowledge in the field of Computer Engineering
2. Object-oriented principles
3. Computational applications of Mathematics