

## Undergraduate Degree Programs in Computing at SJSU

### *What is the Difference?*

#### **Computer Engineering, Computer Science, Electrical Engineering, Management Information Systems, and Software & Information Engineering**

#### **Which (if any) is for you?**

Once you graduate from San Jose State You will probably work for 20 to 40 years. You may change jobs and even career paths several times. You will probably spend at least one third of your life working at your chosen career. It is a fundamental truth that whatever you do it should be something you enjoy as well as provide you with an adequate standard of living. It may sound critical that you make the right choice of discipline or you will be off on the “wrong” path. It’s not quite that way because knowledge and technology are changing very rapidly and some of the details you learn at San Jose State will be useful only for a few years. The two principal benefits you should strive to gain from your education at SJSU are:

- A love of learning and a commitment to continued learning throughout your lifetime
- The ability to learn things on your own, i.e., learn how to learn

Living in the Silicon Valley, we are constantly bombarded by information about computers. Clearly, information technology, including the use of computers is becoming more widespread and more important. Many students enter SJSU with the desire to make a career in computers. But what does this mean? The five academic programs considered here are all heavily involved with computers. You may plan to pursue a program in one of these disciplines, but which one? And how do you make your decision? The following abbreviated information is aimed at giving you a sense of how these disciplines relate to computers and to one another.

#### **Computer Science**

Computer Science, housed in the College of Science, is concerned with the fundamental knowledge that enables the design of computers and the software that runs on them.

#### *What You Will Study in Computer Science?*

Calculus and other mathematics topics, physics, programming, computer organization and architecture, data structures and algorithms, operating systems, formal languages and computability, software engineering, and courses from two tracks in the following areas: graphics, artificial intelligence, computation theory, scientific computing, software engineering, distributed computing, programming languages, networking and laboratory computing.

#### *What Core Skills Will You Have Upon Graduation?*

You will have the ability to program computers and to understand the theory that underlies programming. You will be knowledgeable in the software systems that are required for the operation of computers and the theory of programming languages. Through your choice of specialization areas you will be proficient in two of the areas listed.

#### *What Jobs Will You Be Prepared For?*

Programmer, systems analyst and software developer, customer support.

#### **Computer Engineering**

Computer Engineering, in the College of Engineering, is concerned with the design of computers, both hardware and software, and with the design of systems in which computers are an element (embedded systems).

*What You Will Study in Computer Engineering?*

Calculus, data structures and algorithms, differential equations, physics, chemistry, programming, computer organization and architecture, digital hardware design, microprocessor design, file processing, operating systems design, software engineering, circuits and electronics and a two-semester senior design project.

*What Core Skills Will You Have Upon Graduation?*

You will have the ability to design computers and embedded systems with consideration given to hardware, software, and firmware and the tradeoffs among these elements. You will also be able to program computers.

*What Jobs Will You Be Prepared For?*

Computer and embedded system designer, programmer, field service engineer, applications engineer, sales engineer.

**Electrical Engineering**

Electrical Engineering, in the College of Engineering, is concerned with the design of electronic systems including both analog and digital elements. Electrical Engineers are also knowledgeable in the electronics of transistors, the role of electromagnetics in electronic components and systems, and the design of systems with embedded computers.

*What You Will Study in Electrical Engineering?*

Calculus, differential equations, physics including solid state devices, chemistry, programming, electronic materials, circuits and electronics, linear systems, communications/controls, digital hardware design, microprocessor design, and a two-semester senior design project.

*What Core Skills Will You Have Upon Graduation?*

You will have the ability to design: electronic devices and systems with embedded computers, computer networks, antennas and communication and control systems.

*What Jobs Will You Be Prepared For?*

Systems and device designer, applications programmer, field service engineer, applications engineer, sales engineer.

**Management Information Systems**

Found in the College of Business, Management Information Systems addresses the application of computers and other information technologies for the management of business information.

*What You Will Study in Management Information Systems?*

Economics, finite mathematics, financial and managerial accounting, legal environment of business, business statistics, marketing, operations management, quantitative business analysis, global business, business systems and policy, business programming, systems analysis and design, telecommunications, database management systems, business strategy and information systems. There is also a practicum in management information systems.

*What Core Skills Will You Have Upon Graduation?*

You will have the ability to develop software applications for business information systems used in managerial decision making and implementation of managerial strategies.

*What Jobs Will You Be Prepared For?*

Computer networking administrator, database administrator, systems analyst.

## **Software and Information Engineering**

Software and Information Engineering, in the College of Engineering, is concerned with the design, development, implementation, maintenance and updating of large scale software systems. Software Engineers are

### *What You Will Study in Software Engineering?*

Calculus, discrete mathematics, linear algebra, physics, chemistry, programming, electronic materials, circuits, data structures and algorithms, digital hardware design, computer networks, operating systems, computer organization and architecture, database management systems, object-oriented analysis and design, computer and human interaction, and a two-semester senior design project.

### *What Core Skills Will You Have Upon Graduation?*

You will have the ability to design, develop and maintain software systems through: the use of Computer-Aided Software Engineering (CASE) tools; prototyping; making tradeoffs among hardware, software and languages; configuration management, planning and control of software development; testing disciplines; and software maintenance and termination techniques.

### *What Jobs Will You Be Prepared For?*

Software applications engineer, project development manager; software developer, software test engineer, software maintenance engineer.