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# Computer Science

## Faculty

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**Professor:**.....Thurber

**Assistant Professor:**.....Lin

## Objectives

Computer science studies the representation, storage and transformation of information utilizing computer systems. The Department of Computer Science at Biola University provides two primary areas of concentration in addition to a basic core curriculum. These two areas are computer science and information systems. The department also offers a selection of courses for those majoring in other fields who wish a minor emphasis in computer science. Our student labs are equipped with numerous Pentium and Macintosh workstations. We also have a Computer Science Alcove equipped with the latest Pentium IV platforms running either Windows or Linux.

The department endeavors to provide each student with an understanding of the organization and operation of modern computer systems. Fundamental values and knowledge are emphasized so that students will be able to stay abreast of their field. At the same time students are exposed to practical applications and current computer systems so that they will have significant opportunities in the market place upon graduation. The pervasive use of computers today allows the student to pursue a career in many different areas including aerospace, insurance, teaching, the computer industry, and banking, to name a few. Also, the student is prepared to pursue further studies in graduate school, typically in computer science or business. There is a concerted attempt by the department to integrate faith and learning in the study of computer science and its impact upon our society.

## Degree Program

A Bachelor of Science degree in Computer Science is offered upon completion of the university baccalaureate and the computer science major in one of the emphases.

## Majors

### COMPUTER SCIENCE (53 UNITS)

This emphasis must complete: 105, 106, 202, 230, 301, 302, 311, 400, 430, 440 twice with two different topics and one course (3 units) at the 300 or 400 level in Computer Science or Math. Math 105, 106, 112, 291 and 321 or 333.

### INFORMATION SYSTEMS (57 UNITS)

This emphasis must complete: 105, 106, 202, 230, 301, 302, 311, 402, 430, 440, and one course (3 units) at the 300 or 400 level in Business or Computer Science. Business 202, 211, 212, 328, 370. Math 103, 112 and 210.

**Note:** All concentrations must include 24 upper division units.  
The general education requirement for a foreign language

for those following a computer science major may be met by two years of high school language or the first four units of a college language. The science / mathematics requirement may be met by three units of science.

## Minor

A Computer Science Minor is offered with the completion of 21 units. Students pursuing a minor are required to take a core curriculum of 105, 106 and 202. The remaining requirements are fulfilled according to interest in consultation with department adviser. At least two courses must be at the 300 or 400 level.

## Courses (CSCI)

- CSCI 103 Computer Applications.....1**  
Introduction to computer applications using programs such as Word, Excel, or PowerPoint. Cannot be used toward the major. Does not count toward General Education. May be repeated with a different topic. Fall, spring.
- CSCI 104 The Nature of Computing .....2**  
The history of computing machines. Computer logic and binary arithmetic. Elementary concepts of computers. Elementary BASIC programming. Societal impact of computers. Cannot be counted toward the major. Fall, spring.
- CSCI 105 Introduction to Computer Science.....3**  
Introduction to computer hardware and software. Problem solving methods. Elementary concepts of algorithm development. C programming. Three hours lecture, one hour lab. Fall.
- CSCI 106 Data Structures .....3**  
Linear lists, strings, arrays and orthogonal lists; graphs, trees, binary trees, multi-linked structures, searching and sorting techniques, dynamic storage allocation; applications. Prerequisite: 105. Spring.
- CSCI 202 Assembly Language Programming .....3**  
Basic concepts of computer systems and computer architecture. Assembly language programming. Micros, program segmentation and linkages. Prerequisite: 106. Spring.
- CSCI 230 Programming Languages .....3**  
Organization and structure of programming languages. Runtime behavior and requirements of programs. Introduction to programming language specifications and analysis. Study of various alternative languages such as Ada, C++ and Lisp. Prerequisite: 106. Fall.
- CSCI 301 Software Engineering.....3**  
Concepts, principles, techniques, and documents of software engineering. Emphasis on systematic approaches to software engineering and the software life cycle. Team project required. Prerequisite: 230. Alternate years.

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**CSCI 302 Computer Organization.....3**

Organization and structuring of the major hardware components of computers. Mechanics of information transfer and control within a digital computer system. Fundamentals of logic design. Communications systems. Prerequisite: 202 or consent. Alternate years.

**CSCI 311 Operating Systems .....3**

Computer operating systems; topics include time sharing, process communication, memory management, storage allocation, interrelationships between the operating system and the architecture of computer systems. Prerequisites: 106. Alternate years.

**CSCI 400 Theory of Algorithms.....3**

Various types of algorithms, analytic techniques for the determination of algorithmic efficiency, NP-complete problems, complexity hierarchies, intractable problems. Prerequisite: 106, Math 112. Alternate years.

**CSCI 402 Database Management .....3**

Integrated database systems, logical organization, data description language (DDL), data manipulation language (DML), of hierarchical networks and relational databases, overview of selected database management systems (DBMS). Prerequisite: 230. Alternate years.

**CSCI 430 Computer Communications .....3**

Concepts of computer communications, local area networks, seven layers of communication protocols, global networks. Prerequisite: 106. Alternate years.

**CSCI 440 Topics in Computer Science.....3**

Course may be repeated for credit with different content (section title). Prerequisite: 106. Topics are selected from the following:

**Compiler Theory.** The theory of languages and their implementation.

**Systems Programming.** Design and implementation of language translators and system utilities.

**Theory of Computation.** Concepts from theoretical computer science, finite state concepts, decidability, computability, and Turing machines.

**Computer Graphics.** Computer interactive graphics, software structures, screen display, graphical techniques.

**Artificial Intelligence.** Concepts and techniques of artificial intelligence, representation, search strategies, control, communication and perception, and applications.

**CSCI 480 Research Seminar..... 1-3**

Special studies in computer science. Prerequisite: senior standing or consent.