

## COMPUTER SCIENCE

USAO offers an outstanding bachelor's degree program in computer science. USAO's unique Interdisciplinary Studies (IDS) program combined with technical courses in computer science, mathematics, and business produces graduates with a competitive advantage. IDS courses provide computer scientists with an integrated understanding of other disciplines which have been recognized as important in the transfer of technology to other fields.

Students may select from one of two program tracks. The scientific track combines coursework in computer science with advanced mathematics, such as calculus, linear algebra, statistics, and numerical analysis for students interested in careers in scientific applications or in pursuing graduate work in computer science. The Management and Information Systems track combines courses in computer science with courses in accounting, economics, business administration, management, and marketing for students interested in seeking immediate business careers.

Regardless of which track is selected, students must complete a minimum of 40 hours of computer science coursework. Common to both tracks is a programming language core based upon two trimesters of C. The remainder of the computer science coursework is taken from computer organization, data base design, programming languages, operating systems, graphical user interface, object-oriented programming, and other special topics.

Most of USAO's computer science coursework is taught in a dedicated computer lab which has the latest, state-of-the-art facilities. These high-speed Windows-based microcomputers are networked together using Windows NT and Windows 2000 servers, each with a 100 megabit connection to the internet. These facilities provide an environment in which students will earn computing on systems that they will encounter when they leave USAO.

The computer science program recommends that computer science majors have their own Windows-based Pentium IV personal computer when they begin the program.

### **Bachelor of Science in Computer Science/ Scientific Track**

Required Course Core (43 hours):

<i>Course</i>	<i>Title</i>	<i>Hours Required</i>
CSCI 2143	Programming in "C/C++" I	3
CSCI 2243	Programming in "C/C++" II	3
CSCI 2343	Programming in COBOL	3
CSCI 3043	Discrete Mathematics	3
CSCI 3143	Data Structure	3
CSCI 3443	Graphical User Interface/OOP	3
CSCI 3453	Computer Organization	3
CSCI 4153	Algorithm Analysis	3
CSCI 4163	Software Engineering	3
CSCI 4713	Operating Systems	3
CSCI 4911	Senior Colloquium	1

*plus* Required CSCI Electives\* (choose 12 hours):

CSCI 4053	Data Base Design	3
CSCI 4143	Programming Languages	3
CSCI 4753	Computer Networks	3
CSCI 4880	Special Topics	1-4

*\*These electives are subject to change.*

Required Supporting Courses (22 hours):

MATH 1745	Calculus I/Analytical Geometry	5
MATH 2225	Calculus II/Analytical Geometry	5
MATH 3233	Linear Algebra	3
MATH 3243	Calculus III	3
MATH 4303	Probability/Statistics	3
MATH 4413	Numerical Analysis	3

**Bachelor of Science in Computer Science/  
Management and Information Systems Track**  
Required Course Core (40 hours):

<i>Course</i>	<i>Title</i>	<i>Hours Required</i>
CSCI 2143	Programming in "C/C++" I	3
CSCI 2243	Programming in "C/C++" II	3
CSCI 2343	Programming in COBOL	3
CSCI 2353	File Organization	3
CSCI 3143	Data Structure	3
CSCI 3443	Graphical User Interface/OOP	3
CSCI 3453	Computer Organization	3
CSCI 4053	Data Base Design	3
CSCI 4143	Programming Languages*	3
CSCI 4163	Software Engineering	3
CSCI 4243	Algorithm Analysis*	3
CSCI 4713	Operating Systems	3
CSCI 4753	Computer Networks*	3
CSCI 4880	Special Topics*	1-4
CSCI 4911	Senior Colloquium	1

*\* Choose three of these for 9 hours*

Supporting Courses (27 hours):

MATH 1513	College Algebra	3
MATH 2203	Elementary Statistics	3
<i>and</i>		
ACCT 2103	Principles of Accounting I	3
ACCT 2203	Principles of Accounting II	3
BADM 3223	Business Communication	3
BADM 3243	Principles of Marketing**	3
ECON 2113	Principles of Macroeconomics	3
ECON 2123	Principles of Microeconomics	3
MGMT 3253	Business Organization/Management	3
MGMT 3373	Human Resource Management**	3

*\*\* Choose one of these for 3 hours*

**COURSE LISTINGS in COMPUTER SCIENCE**

- 1143 INTRODUCTION TO COMPUTER SCIENCE  
General computer concepts including computer capabilities, data representation and programming techniques (BASIC language). 3 hours.
- 2143 PROGRAMMING IN "C/C++" I  
"C" I is an introduction to programming techniques and covers basic programming with functions. Character processing, data types, arrays and storage classes are included with an introduction to pointers. This is a foundation course for computer science majors and an introduction for general programming techniques. 3 hours.
- 2243 PROGRAMMING IN "C/C++" II  
"C" II is a continuation of "C" I and covers pointers in greater detail. Both linear and multidimensional arrays are introduced and then correlated to pointer access. Strings will be presented and pointer association with

- these and recursive techniques. File access will be complemented with software tools and an introduction to C++ and Object Oriented Programming. 3 hours. Prerequisite: CSCI 2143
- 2343 PROGRAMMING IN COBOL  
General problem solving techniques and design of the COBOL language. Formulation and solution of representative business problems (such as payroll and inventory) using business-oriented language (COBOL). 3 hours. Prerequisites: IDS 2003 *or* CSCI 1143, *and* Math 0123.
- 2353 FILE ORGANIZATION  
File processing concepts, alternative file organization including sequential, indexed, and relative. Programming solution of practical business applications using alternate file organization methods. 3 hours. Prerequisite: CSCI 2343.
- 2443 SYSTEM ANALYSIS & DESIGN  
Principles, techniques, and procedures for analyzing, designing, and implementing systems for information management and application of business programs and database systems for implementation of representative systems. 3 hours. Prerequisite: CSCI 2353.
- 2880 SPECIAL TOPICS  
Special topics in computer science. 1-4 hours (may be repeated for total of 6 hours).
- 2900 WORKSHOP  
Guided study in computer science under faculty supervision; various topics and methods of instruction. 1-4 hours (may be repeated for total of 6 hours with change in title and topic).
- 2990 TUTORIAL  
Independent study in computer science under faculty supervision. 1-4 hours (may be repeated for total of 9 hours with change in title and content).
- 3043 DISCRETE MATHEMATICS  
Mathematics for foundations of computer science. Topics include sets, functions, relations, symbolic logic, algebraic structures, graphs, and counting techniques. 3 hours. Prerequisite: MATH 1745 *or* permission of instructor.
- 3143 DATA STRUCTURES  
Study of data structures, including arrays, stacks, queues, linked lists, trees, sorting and files. Various algorithms studied and implemented on existing systems. 3 hours. Prerequisite: CSCI 2243.
- 3443 GRAPHICAL USER INTERFACE/OBJECT ORIENTED PROGRAMMING  
Graphical User Interface is an introduction to human-computer interaction and graphical user interfaces with object oriented programming. Topics include drawing in 2-D primitives, the 2-D graphic pipeline, human-computer interaction, window systems, and some extensions of 3-D graphics. Current graphics programming tools will be used with Objective-Oriented programming techniques. Prerequisite: CSCI 2243
- 3453 COMPUTER ORGANIZATION  
Introduction to organizing and structuring hardware components of computers and the mechanics of information transfer and control. 3 hours. Prerequisite: CSCI 2543 *or* CSCI 2643.
- 3880 SPECIAL TOPICS  
Special topics in computer science. 1-4 hours (may be repeated for a total of 6 hours).
- 4053 DATA BASE DESIGN  
Fundamental concepts of database design and management, including relational, network, and hierarchical database systems. 3 hours. Prerequisites: CSCI 2353 *and* CSCI 3143.
- 4143 PROGRAMMING LANGUAGES

- Introduction to structure and facilities of procedure-oriented programming languages. Several languages will be presented to demonstrate capabilities. 3 hours. Prerequisites: CSCI 2143, CSCI 2343, *and* CSCI 3143.
- 4153 ALGORITHM ANALYSIS  
Fundamental algorithms, including sorting, searching, string processing, graph algorithms, mathematical algorithms, and NP-complete problems. 3 hours. Prerequisite: CSCI 3143.
- 4163 SOFTWARE ENGINEERING  
Development of software as an engineering product which requires planning, analysis, design, implementation, and testing. 3 hours. Prerequisite: CSCI 2243 and junior- or senior-level standing.
- 4453 COMPUTER ARCHITECTURE  
Basic concepts of computer systems design and communication between components along with examples of architectures of different generations of computer systems. 3 hours. Prerequisite: CSCI 3453.
- 4713 OPERATING SYSTEMS  
Investigation of fundamental concepts of operating systems, including program management, input/output control systems, systems deadlock, and file management. Different operating systems compared. 3 hours. Prerequisite: CSCI 3143.
- 4880 SPECIAL TOPICS  
Special advanced topics in computer science in areas of formal language and JAVA, compiler theory, artificial intelligence, parallel processing, and network theory. 1-4 hours. Prerequisite: permission of instructor.
- 4900 WORKSHOP  
Related topics and problems in computer science. 1-4 hours (may be repeated for total of 9 hours with change in title and content). Prerequisite: permission of instructor.
- 4990 TUTORIAL  
Independent study in computer science under faculty supervision. 1-4 hours (may be repeated for total of 9 hours with change in title and content).
- 4911 SENIOR COLLOQUIUM  
A forum where faculty and students present new developments in computer science. Also, review of fundamental computer science concepts. 1 hour. Prerequisite: senior-level standing.