COMPUTER SCIENCE

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DEGREE OFFERED:
Bachelor of Science in Computer Science
Minor in Computer Science

THE MAJOR: The Computer Science degree at Channel Islands offers latest, cutting edge education for various industrial and applied fields. The program will prepare students for careers in high-tech, computer and Internet driven industries, where interdisciplinary, dynamic and innovative professionals trained in latest technologies are increasingly sought. Students will be given a strong background in computer hardware and software, as well as a substantial amount of “hands-on” experience. The program will stress interdisciplinary applications in other sciences and business.

PROPOSED COURSE OF STUDY:

FRESHMAN YEAR (30 Units)
ENGL 100  Composition and Rhetoric  (3, G.E. A1)
MATH 150 Calculus 1  (4, G.E B3)
COMP 150 Object Oriented Programming  (4)
G.E. Section  A, C, D, or E  (3)

MATH 151 Calculus 2  (4)
MATH/PHIL 230  Logic  (3, G.E. A3 or C3)
COMP 151 Data Structures and Program Design  (3)
COMP 162 Comp. Architecture and Assembly Language(3)
G.E. Section  A, C, D, or E  (3)

SOPHOMORE YEAR (28-31 Units)
MATH 240 Linear Algebra  (3)
COMP 232 Programming Languages  (3)
COMP 262 Computer Organization and Architecture  (3)
MATH 300 Discrete Mathematics  (3)
MGT  346 Scientific and Professional Ethics  (3, G.E. D)
Select one 2 semester science sequence and an additional science course (one lab section required) in Physics, Biology, or Chemistry  ( 13-16, G.E. B1 and B2]

JUNIOR YEAR (18 Units + G.E)
MATH 342 Analysis of Algorithms  (3)
COMP 344 Automata, Languages and Computation  (3)
COMP 362 Operating Systems and System Architecture  (3)
COMP 380 Program Design Techniques  (3)
MATH 342 Probability and Statistics  (3, G.E. A3)
COMP 350 Software Engineering  (3)

SENIOR YEAR (20-21 Units+ G.E.)
COMP 440 Databases (3)
COMP 450 Societal Issues in Computing (3, G.E. D)
MATH 451 Numerical Analysis (3)
COMP 464 Computer Graphics I (3)
COMP 499 Senior Colloquium (1)
Choose 3 or more Computer Science Electives (9) from the following list:

COMP 430 Design of Compilers (3)
COMP 431 Bioinformatics (3)
COMP 466 Computer Graphics II (3)
COMP 469 AI/Neural Nets (3)
MATH 440 Operation Research (3)
ENGL 434 Technical Writing (3)
COMP 485 Human Comp. Interaction (3)
COMP 424 Security (3)
COMP 429 Networks (3)
COMP 432 Advanced Object Oriented Programming (3)
COMP 492 Internship (3)
COMP 494 Independent Research (3)
COMP 497 Directed Study (3)
COMP 499 Senior Colloquium (1)

The choice of electives should reflect student specialization and require approval by the student's advisor. Students are cautioned against assuming that courses taken before such approval will be acceptable.

General Education Included in Major Requirements
MATH 150 Calculus I (4, G.E. B3)
MATH/PHIL 230 Logic (3, G.E. A3)
MGT 346 Scientific and Professional Ethics (3, G.E. D)
COMP 344 Automata, Languages and Computation (3, C3)
COMP 450 Societal Issues in Computing (3, G.E. D)
Sciences - (8, G.E. B1, B2)
TOTAL .................................................................24

REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN COMPUTER SCIENCE DEGREE:

Lower Division Required Major Courses ............... 43
Upper Division Required Major Courses ............... 37
Upper Division Elective Major Courses ............... 9
Elective Courses ..................................................6
General Education Included in Major Requirements (24)
General Education & Title V .................................30

Total 125

LOWER DIVISION REQUIRED MAJOR COURSES (43-46 units):
MATH 150 Calculus 1 (4)
MATH 151 Calculus 2 (4)
PHIL 230 Logic (3, G.E. A3 or C3)
COMP 150 Object Oriented Programming (4)
COMP 151 Data Structures and Program Design (4)
COMP 162 Comp. Architecture and Assembly Language (3)
MATH 240 Linear Algebra (3)  
COMP 232 Programming Languages (3)  
COMP 262 Computer Organization and Architecture (3)

Select one 2 semester science sequence and an additional science course (one lab section required) in Physics, Biology, or Chemistry (12-15, G.E. B1 and B2)

UPPER DIVISION REQUIRED MAJOR COURSES (37 units):
MATH 300 Discrete Mathematics (3)  
MGT 346 Scientific and Professional Ethics (3)  
MATH 342 Analysis of Algorithms (3)  
COMP 310 Automata, Languages and Computation (3)  
COMP 362 Operating Systems and System Architecture (3)  
COMP 380 Program Design Techniques (3)  
MATH 342 Probability and Statistics (3)  
COMP 350 Software Engineering (3)  
COMP 440 Databases (3)  
COMP 450 Societal Issues in Computing (3, G.E. D)  
MATH 451 Numerical Analysis (3)  
COMP 464 Computer Graphics I (3)  
COMP 499 Senior Colloquium(1)

ELECTIVES in MAJOR (9-10 units) from the following list:
COMP 430 Design of Compilers (3)  
COMP 431 Bioinformatics (4)  
COMP 466 Computer Graphics II (3)  
COMP 469 AI/Neural Nets (3)  
MATH 440 Operation Research (3)  
ENGL 484 Technical Writing (3)  
COMP 449 Human Comp. Interaction (3)  
COMP 424 Security (3)  
COMP 429 Networks (3)  
COMP 462 Advanced Object Oriented Programming (3)  
COMP 490 Internship (3)  
COMP 492 Internship (3)  
COMP 494 Independent Research (3)  
COMP 497 Directed Study (3)  
COMP 499 Senior Colloquium (1)

ELECTIVES (6 units)
TOTAL UNITS IN THE MAJOR: 88 units

MINOR IN COMPUTER SCIENCE (25)

MATH 150 Calculus 1 (4)  
MATH 151 Calculus 2 (4)  
COMP 150 Object Oriented Programming (4)  
COMP 151 Data Structures and Program Design (4)  
MATH 300 Discrete Math (3)

Select two upper upper-division courses from the CS program approved by the advisor (6).

TOTAL UNITS IN THE MINOR: 24 units
COURSE DESCRIPTIONS – MOST OF THE COURSES REQUIRE A LAB FEE

COMP 100. Computers: Their Impact and Use (3)

An introduction to the uses, concepts, techniques, and terminology of computing. Places the possibilities and problems of computer use in historical, economic, and social contexts. Shows how computers can assist in a wide range of personal, commercial, and organizational activities. Typical computer applications, including word processing, spreadsheets, and databases. Not open to Computer Science majors.

COMP 101. Computer Literacy (3)

An introduction to computer applications, including web applications, word processing, spreadsheets, databases and programming. Includes service learning component. Not open to Computer Science majors.

COMP 103. Computer Programming Introduction (3)

An introduction to the design, development and expression of algorithms. Algorithms and their stepwise refinement. Expression of algorithms in a formal language. This course is intended to be a first course in programming language (for example VISUAL BASIC or C/C++). Not open to students who have completed Comp. 150.

COMP 150. Object Oriented Programming (3+1)

Prerequisite: Students with no programming experience should take COMP 103 first. Introduction to algorithms, their representation, design, structuring, analysis and optimization. The course introduces the concept of object paradigm and teaches how to design and implement algorithms as structured programs in a high level language. Course includes programming lab.

COMP 151. Data Structures and Program Design (3+1)

Prerequisite: Comp. 150. Introduction to data structures and the algorithms that use them. Review of composite data types such as arrays, records, strings, and sets. The role of the abstract data type in program design. Definition, implementation, and application of data structures such as stacks, queues, linked lists, trees, and graphs. Recursion. Use of time complexity expressions in evaluating algorithms. Comparative study of sorting and searching algorithms. Course includes programming lab.

COMP 162. Computer Architecture and Assembly Language (3)


COMP 232. Programming Languages (3)

Prerequisites: COMP 162 and 151. Discussion of issues in the design, implementation, and use of high-level programming languages. Historical background. How languages reflect different design philosophies and user requirements. Technical issues in the design of major imperative (procedural) programming languages. Other approaches to programming: functional programming, logic programming, and object-oriented programming.
COMP 262. Computer Organization and Architecture (3)

Prerequisites: COMP 151 and 162.
Extension of basic addressing concepts to more advanced addressability such as base register and self-relative addressing. Comparative computer architecture focusing on such organizations as multiple register processors and stack machines. Basics of virtual memory input-output. Introduction to the concept of microprogrammable systems. Low-level language translation process associated with assemblers. System functions such as relocatable loading and memory management. Application of data structure and hashing techniques to the above. Other related topics.

COMP 350. Software Engineering (3)

Prerequisites: COMP 232, 262.
Concepts and techniques for systems engineering, requirements analysis, design, implementation and testing of large scale computer systems. Principles of software engineering for production of reliable, maintainable and portable software products. Emphasis on functional analysis and structured design techniques. Topics include unit, integration and systems testing, configuration management, and software quality assurance practices. Participation in group activities involving analysis, design and implementation of a software intensive system. Introduction to Computer Aided Software Engineering (CASE)

COMP 362. Operating Systems (3)

Prerequisites: COMP 262.
Examination of the principal types of systems including batch, multi-programming, and time-sharing. Networked systems are also discussed. The salient problems associated with implementing systems are considered including interrupt or event driven systems, multi-tasking, storage and data base management, and input-output. Emphasis will be placed on some of the simple algorithms used to solve common problems encountered such as deadlocks, queue service, and multiple accesses to data. Projects will be implemented to reinforce the lectures.

COMP 410. Computer Application in Biomedical Fields (3)

Prerequisite: BIOL 201 with C or better grades.
Current applications of computers and data processing technology to the understanding and solving of specific problems in biomedical fields.
Same as BIOL 410

COMP 420. Database Theory and Design (3)

Prerequisite: COMP 350.
Database structure including: structure definition, data models, semantics of relations, and operation on data models. Database schemas: element definition, use and manipulation of the schema. Elements of implementation. Algebra of relations on a database. Hierarchical data bases. Discussion of information retrieval, reliability, protection and integrity of databases.

COMP 422. Design of Compilers (3)

Prerequisites: COMP 310 and MATH 362.
Organization of compiler including lexical and syntax analysis, symbol tables, object code generation, code optimization techniques, and overall design. Compilation techniques and run-time structures.

COMP 424. Computer System Security (3)
Prerequisite: COMP 350.

COMP 429. Computer Networks (3)
Prerequisites: COMP 310, COMP 362 and MATH 344.
Basic software design and analysis considerations in networking computers into coherent, cooperating systems capable of processing computational tasks in a distributed manner. Network topology, routing procedures, message multiplexing and process scheduling techniques.

COMP 431. Bioinformatics (4)
Prerequisite: COMP 150, MATH 151, Statistics.
Basic computational models used in molecular biology and chemistry will be introduced. Topics include algorithms for string alignments, dynamic programming, structural superposition algorithms, computing with differential information, 3D motifs, Hidden Markov Models, phylogenetic trees, statistical/information techniques for pattern recognition, genetic algorithms.
GenEd A3, B1

COMP 444. Automata, Languages, and Computation (3)
Prerequisites: MATH. 300.
Study of the relation of languages (i.e. sets of strings) and machines for processing these languages, with emphasis on classes of languages and corresponding classes of machines. Phrase structure languages and grammar. Types of grammars and classes of languages. Regular languages and finite state automata. Context-free languages and pushdown automata. Unrestricted languages and Turing Machines. Computability models of Turing, Church, Markov, and McCarthy. Applications to programming languages, compiler design, and program design and testing.
GenEd C3

COMP 447. Societal Issues in Computing (3)
Prerequisites: COMP 350 and COMP 362 and senior standing.
A survey course on the role of the digital computer in modern society. The dangers of the misuse of computers (as in the invasion of privacy), as well as the proper and intelligent use of the machines, are discussed.
GenEd D

COMP 449. Human-computer Interaction (3)
Prerequisite: COMP 350.
The information exchange between humans and computer systems will be examined. Aspects of input/output devices, software engineering, and human factors will be discussed with respect to human-computer interactions. Topics include: text and graphic display; user modeling; program design, debugging, complexity and comprehension; and current research studies and methodologies.
GenEd E

COMP 462. Advanced Object-Oriented Programming (3)
Prerequisite: COMP 350.
Principles of object-oriented design and programming based on languages such as JAVA, C++ and Smalltalk will be presented. Understanding of the role of objects, methods, message passing, encapsulation, and inheritance for effective programming will be stressed. Language structure versus particular engineering objectives will be analyzed. Design Patterns techniques will be a unifying theme.

COMP 464. Computer Graphic Systems and Design I (3)
Prerequisite: COMP 350 and MATH 240.
Fundamental concepts of computer graphics. Graphics devices; graphics languages; interactive systems. Applications to art, science, engineering and business. Trade-offs between hardware devices and software support.

COMP 466. Computer Graphic Systems and Design II (3)

Prerequisite: COMP 464.
Advanced concepts of computer graphics. Topics include computer graphics software and hardware, mathematical basis of geometric modeling, data base management in manufacturing environments, imagining and visualization.

COMP 469. Artificial Intelligence/ Neural nets (3)

Prerequisites: COMP 310, 362, and 350.
An exploration of the use of computers to perform computations normally associated with intelligence, pattern formation and recognition using various backpro iterations. Stacks, decision trees and other modern mining tools and computational models for knowledge representation will be covered. Other topics may include natural language and imagining.

COMP 490. Topics in Computer Science (3)

Prerequisites: Junior standing.
Current issues in computer science.

COMP 492. Internship (3)

Prerequisites: Junior standing and Program approval of written proposal of internship studies.
Supervised work and study in industrial setting involving development of degree related skills. All students are required to present their projects at the Senior Seminar. Credit/no credit.

COMP 494. Independent Research (3)

Prerequisites: Senior standing and Program approval of written proposal of independent research studies.
Supervised project involving theoretical research in the field of computer science or its applications. All students are required to present their projects at the Senior Seminar. Credit/no credit.

COMP 497. Directed Study (3)

Prerequisites: Senior standing and Program approval of written proposal of directed studies.
Supervised project involving library research. All students are required to present their projects at the Senior Seminar.

COMP 499. Senior Colloquium (1)

Prerequisites: Senior standing.
Oral presentation of current advancements in the field, reports on students’ projects, and invited lectures. Repeatable.