COMPUTER SCIENCE

PROFESSORS LAMBERT, WHALEY
ASSISTANT PROFESSOR NECAISE

MAJOR

A major in **computer science** leading to a Bachelor of Arts degree requires completion of at least 41 credits, including the following:

1. Computer Science 111, 112, 201, 210, 211, 312, 313; Mathematics 121
2. either Computer Science 423 or 493 (3-3)
3. either Mathematics 102 or 122
4. one course chosen from Computer Science 315, 317, 320, 330, 332, 340, 397
5. completion of one of the following two groups:
   a. six additional credits in computer science
   b. three additional credits in computer science and, with approval of a student's computer science adviser, nine credits from a cognate area such as accounting, economics, engineering, management, mathematics or physics. Examples of appropriate cognate work are available from the department head

Students should consult with an adviser in the department when choosing courses to fulfill requirement 5b. above.

A major in **computer science** leading to a Bachelor of Science degree requires completion of at least 50 credits, including the following:

1. Computer Science 111, 112, 201, 210, 211, 312, 313; Mathematics 121, 222
2. either Computer Science 423 or 493 (3-3)
3. one course chosen from Computer Science 315, 317, 320, 330, 332, 340
4. six additional credits in computer science
5. six additional credits in mathematics at the 200-level or above

Additional courses required as prerequisites for completion of the above include Mathematics 101 and 102.

In order that the discrete mathematics requirement for Computer Science 211, 312, and 313 be completed in a timely fashion, freshmen expecting to major in computer science are encouraged to take Mathematics 121 in their freshman year.

HONORS: An Honors Program in computer science is offered for qualified students; see the department head for details.

★COMPUTER SCIENCE 111 (4)—Fundamentals of Computer Science I

An examination of some of the major areas of computer science such as computer organization, algorithms and data structures, programming, and the theory of computation. Weekly meetings will include lectures and a laboratory session. *Staff.*

Fall, Winter

★COMPUTER SCIENCE 112 (4)—Fundamentals of Computer Science II

Prerequisite: Computer Science 111. This course includes a disciplined approach to programming in a high level, object-oriented programming language building on the introduction in Computer Science 111. Emphasis is on problem solving methods and algorithm development. Additional topics will be chosen from linear data structures, machine organization, computer graphics, numerical methods and applications of computer science. *Staff.*

Winter

COMPUTER SCIENCE 120 (4)—Procedural Programming

Prerequisite: Permission of instructor. This course includes the fundamentals of traditional procedural programming with a popular language such as C++. Topics include the common control structures, arrays, and classes. *Staff.*

Fall

COMPUTER SCIENCE 201 (3)—Fundamentals of Computer Science III

Prerequisite: Computer Science 112. This course is a continuation of Computer Science 112. Emphasis is on the use and implementation of common data structures, introductory algorithm analysis and object oriented design. Additional topics will be chosen from networking, artificial intelligence and parallel processing. *Staff.*

Spring

COMPUTER SCIENCE 210 (3)—Computer Organization

Prerequisite: Computer Science 111. Multilevel machine organization studied at the levels of digital logic, microprogramming, conventional machine, operating system, and assembly language. *Staff.*

Fall

COMPUTER SCIENCE 211 (3)—Data Structures and Algorithms

Prerequisites: Computer Science 201 and Mathematics 121. Computer representations of data structures as derived from mathematical models: stacks, queues, linked lists. Access methods into data structures, such as hashing and tree searching. Storage allocation and deallocation procedures. Algorithms for manipulating such structures are introduced, analyzed, and implemented by the student. *Staff.*

Winter

COMPUTER SCIENCE 251 (Engineering 251) (3)—Laboratory Computer Applications

Techniques and application of digital data acquisition and automated experimental control. The course is intended for any science major interested in the use of computers in experimental work. Laboratory course. *Akins.*

Fall

COMPUTER SCIENCE 295 (1-3)—Language Laboratory

Prerequisite: Permission of instructor. Introduction to a computer language, which will be chosen according to needs of students and of other Computer Science courses. Typical languages include Small talk, LISP, PROLOG. May be repeated once for degree credit with permission and if the languages are different. May only be used once toward the major requirements. *Staff.*

Offered when interest is expressed and departmental resources permit.

COMPUTER SCIENCE 310 (Management 310) (3)—Management Information Systems

Prerequisite: Junior standing. The objective is to build an understanding of the value and uses of information systems for business operations, management decision making, and strategic advantage. Topics include basic systems concepts and major roles of information systems; computer, telecommunications, and database management concepts; management issues in the implementation of information systems including international, security, and ethical considerations. *Cass, Cline.*

Fall, Winter

COMPUTER SCIENCE 312 (3)—Programming Language Design

Prerequisites: Computer Science 201, 210; Mathematics 121. Formal language description tools; Semantic concepts and syntactic constructs appropriate to diverse applications. Comparison of several high-level languages, such as FORTRAN, LISP, PASCAL, PROLOG, and their implementations of these semantic and syntactic elements. *Staff.*

Fall

COMPUTER SCIENCE 313 (3)—Theory of Computation

Prerequisites: Computer Science 201, Mathematics 121, and either Mathematics 102 or 122. A study of the principles of computer science embodied in formal languages, automata, computability, and computational complexity. Topics include context-free grammars, Turing machines, and the halting problem. *Staff.*

Winter

COMPUTER SCIENCE 315 (3)—Artificial Intelligence

Prerequisite: Computer Science 211. Basic concepts of robotics, theorem proving, natural language processing and intelligent systems. *Lambert.*

Offered when interest is expressed and departmental resources permit.

COMPUTER SCIENCE 317 (3)—Database Management

Prerequisites: Computer Science 210 and 211. Entity-relationship, network, hierarchical, and relational database models. Theory of functional dependencies and normal forms for relational database design. A major project to design and implement a database using a commercial package. *Whaley.*

Offered when interest is expressed and departmental resources permit.

COMPUTER SCIENCE 320 (3)—Parallel Computing

Prerequisites: Computer Science 120, 210, and 211. A survey of parallel computing including hardware, parallel algorithms, and parallel programming. The programming projects emphasize the message-passing paradigm. *Staff.*

Offered when interest is expressed and departmental resources permit.

COMPUTER SCIENCE 330 (3)—Operating Systems

Prerequisites: Computer Science 210 and 211. Procedure initiation, environment construction, re-entrancy, kernel functions, resource management, input/output, file structures, security, process control, semaphores and deadlock, and recovery procedures. The laboratory includes the opportunity to examine and modify the internals of an operating system. *Staff.*

Offered when interest is expressed and departmental resources permit.

COMPUTER SCIENCE 332 (3)—Compiler Construction

Prerequisites: Computer Science 210, 211, 312, and 313. Lexical analysis, parsing, context dependence, translation techniques, optimization. Students are expected to produce a compiler for a suitably restricted language. *Staff.*

Offered when interest is expressed and departmental resources permit.

COMPUTER SCIENCE 340 (3)—Interactive Computer Graphics

Prerequisite: Computer Science 211. A study of the underlying techniques and algorithms used in the display and manipulation of graphics images in an interactive environment. Topics include programming with Motif and the X-window system, two- and three-dimensional viewing and transformations, color models, and realistic rendering of images. A major component of the course is the development and programming of a variety of projects which demonstrate the topics discussed in class. *Staff.*

Offered when interest is expressed and departmental resources permit.

COMPUTER SCIENCE 395 (1), 396 (2), 397 (3)—Seminar

Prerequisite: Permission of the instructor. Readings and conferences for a student or students on topics agreed upon with the directing staff. May be repeated for degree credit with permission and if the topics are different. A maximum of six credits may be used toward the major requirements.

Offered when interest is expressed and departmental resources permit.

COMPUTER SCIENCE 401 (1), 402 (2), 403 (3)—Directed Individual Study

Prerequisite: Permission of the department. Individual conferences. May be repeated for degree credit with permission and if the topics are different.

Offered when interest is expressed and departmental resources permit.

COMPUTER SCIENCE 423 (3)—Senior Project

The senior project is required of all majors in computer science. Under exceptional circumstances it may be completed during the junior year. The student must obtain approval of a project proposal, from a department member, before registering for this course. The project requires planning, design and implementation of a computer application, in such a way as to integrate the material from other computer science courses and courses outside computer science. Students who have a second major are encouraged to design a project which makes use of material from the other major.

COMPUTER SCIENCE 493 (3-3)—Honors Thesis

Prerequisites: Senior standing and honors candidacy. Staff.

Fall-Winter