College:
Business, Economics, and Computing

Degrees and Programs Offered:
Bachelor of Science, Master of Science (see graduate section)

Major - Computer Science

Minors - Computer Science, Web Development


Student Organizations/Clubs:
Computer Science Club

Career Possibilities:
Software engineer, systems programmer, applications programmer, network administrator, systems developer, systems analyst, web developer, security analyst, information systems auditor, quality assurance analyst.

Department Overview
The Computer Science Department offers strong academic programs that prepare students for work and continuing advancement in information technologies. The pervasive influence of computers in our everyday lives and the strategic importance of computing systems in our economy and government require an increasingly educated and technologically literate citizenry as well as highly skilled and knowledgeable computing professionals who understand, design, implement and manage complex information systems. Since the inception of the computer science major at UW-Parkside in 1979, graduates have found highly successful careers in computing and information technology throughout the region and the country.

Computing professionals must have a solid grounding of fundamentals as a basis for adapting to rapid changes in computing theory and practice. They must also have knowledge and experience with current methodologies which they can apply reliably to solve existing problems and to design new strategies and systems as the demand arises. They must be able to work cooperatively and to communicate effectively. Combining theory, practice, and collaboration, the computer science major at UW-Parkside prepares students for successful careers in computing and information systems and contributes to their growth as professionals.

Laboratory experiences are integral components of many of the department’s computer science courses. Computer science students use the laboratory’s high-performance workstations, servers, and printing facilities – available only to computer science majors – to carry out their programming and laboratory work.

The computer science major includes 62-63 credits in computer science, mathematics, and the sciences. In addition, computer science students must complete a 9-credit computer science breadth package that includes courses in significant application domains such as science, mathematics, business or economics.

In collaboration with faculty in management information systems, the Computer Science Department offers a master of science in computer and information systems (MSCIS). See the Graduate Programs section of this catalog for detailed MSCIS degree requirements, admissions information, and courses.

The Computer Science Department and the Mathematics Department jointly offer a double major in computer science and mathematics. The degree requirements for this double major are listed below.

The Computer Science Department also offers a computer science minor, a web development minor, and certificates in World Wide Web publishing, UNIX system administration, mobile development and cyber security.

Preparation for Graduate School
The computer science major is excellent preparation for students seeking to do graduate work in computer science. Such students may wish to supplement the minimum requirements for a computer science major with additional courses in mathematics and the sciences. Students considering graduate study in computer science are strongly encouraged to complete CSCI 331 as one of their electives.

Dual Degree BS and MSCIS Track
Computer science students who have finished the prerequisite courses for the MSCIS program and at least 40 credits within the CS major may apply for early admission to the MSCIS program. All admissions requirements, except having completed a bachelor’s degree, still apply. By concurrently enrolling in both undergraduate and graduate courses students may complete their MSCIS degree in a considerably shorter time than the 2 years generally required after completing their bachelor’s degree.

Internships
Many major employers and smaller businesses in the area hire UW-Parkside computer science students as interns in computing-related jobs. In addition to facilitating these informal non-credit bearing internships, the Computer Science Department sponsors a credit-bearing internship program. In a credit-bearing internship, the student, the computer science...
faculty, and the student’s supervisor collectively agree on the internship’s objectives; progress toward meeting these objectives is evaluated periodically throughout the term. Students should contact the department chair for more information.

Program Level Outcomes

The learning goals of the computer science major are aligned with ABET (Accreditation Board for Engineering and Technology) and the university’s Shared Learning Goals. ABET student outcomes are defined preceded by a letter: e.g., a). ABET goals are grouped according to the university’s Shared Learning Goals.

The computer science program enables students to attain, by the time of graduation:

**Reasoned Judgment**
1. An ability to apply knowledge of computing and mathematics appropriate to the discipline
2. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
3. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs

**Social and Personal Responsibility**
1. An ability to function effectively on teams to accomplish a common goal
2. An understanding of professional, ethical, legal, security and social issues and responsibilities
3. An ability to analyze the local and global impact of computing on individuals, organizations, and society
4. Recognition of the need for and an ability to engage in continuing professional development

**Communication**
1. An ability to communicate effectively with a range of audiences
2. An ability to use current techniques, skills, and tools necessary for computing practice

Requirements for the Computer Science Major (72-73 credits)

In addition to meeting the general university requirements of a UW-Parkside degree, students seeking to graduate with a major in computer science must satisfy the following:

- Completion of computer science major requirements.
- Attainment of a minimum UW-Parkside cumulative GPA of 2.50 in all courses eligible to meet the student’s computer science major requirements, including courses that meet the computer science major breadth requirement.

A. Required Mathematics Course (5 credits)
   MATH 221  Calculus and Analytic Geometry I ..............5 cr

B. Required Science Course (5 credits)
   Choose one:
   - PHYS 201  General Physics I.................................5 cr
   - CHEM 101  General Chemistry I...............................5 cr
   - CHEM 102  General Chemistry II..............................5 cr

C. Required Major Courses (62-63 credits)

1. Computer Science Courses (41 credits)
   CSCI/ MATH 231  Discrete Math.................................3 cr
   CSCI 241  Computer Science I...............................5 cr
   CSCI 242  Computer Science II..............................4 cr
   CSCI 245  Assembly Language Programming..............3 cr
   CSCI 309  Probability and Statistics.....................3 cr
   CSCI 333  Programming Languages........................3 cr
   CSCI 340  Data Structures and Algorithm Design........3 cr
   CSCI 355  Computer Architecture..........................3 cr
   CSCI 370  Operating Systems.................................3 cr
   CSCI 380  Database Management Systems................3 cr
   CSCI 475  Software Engineering Principles and Practice I........3 cr
   CSCI 476  Software Engineering Principles and Practice II................3 cr
   CSCI 495  Computer Science Seminar.....................2 cr

2. Elective Major Courses (12 credits)
   Choose four courses:
   - CSCI 331  Computational Models..........................3 cr
   - CSCI 405  Artificial Intelligence..........................3 cr
   - CSCI 420  Computer Graphics...............................3 cr
   - CSCI 421  Computer Vision..................................3 cr
   - CSCI 422  Multimedia Systems..............................3 cr
   - CSCI 423  Mobile Development II..........................3 cr
   - CSCI 424  Networked Applications.........................3 cr
   - CSCI 440  Compiler Design and Implementation........3 cr
   - CSCI 444  Event-Driven Programming......................3 cr
   - CSCI 445  Web Security....................................3 cr
   - CSCI 467  Computability and Automata....................3 cr
   - CSCI 477  Computer Communications and Networks.........3 cr
   - CSCI 478  Network Security.................................3 cr
   - CSCI 479  Information Systems Security..................3 cr
   - CSCI 480  Advanced Databases..............................3 cr

3. Required Computer Science Breadth Requirement
   (9-10 credits)
   Students must complete a package of 9 or more credits outside of computer science in a coherent collection of courses that are relevant to computer science and that meet the approval of the computer science faculty. Several such packages have been pre-approved, in areas such as mathematics, the sciences, art, business and economics. Pre-approved packages include:

   - MATH 222 and 301
   - MATH 222 and PHYS 202
   - CHEM 102 and 215
   - Select any 3 courses from: ACCT 201, BUS 272, FIN 330, MGT 349, and MKT 350
   - ECON 320 or 321, and two additional 300-level ECON courses
   - GEOG 350, 460 and 465
   - CRMJ 316, 380 and BUS 272
   - ART 104, 377 and 477

   Optionally, a student may submit an individually designed computer science breadth package of 9 or more credits for approval by the computer science faculty. See the department chair for details.
Requirements for the Computer Science/Mathematics Double Major
(89-90 credits)

Students may satisfy graduation requirements for both computer science and mathematics by completing all required courses for computer science with 9 elective credits and PHYS 201, together with the following mathematics courses (which automatically satisfy the computer science breadth requirement):

Required Math Courses (29 credits)

- MATH 222 Calculus and Analytic Geometry II ..........5 cr
- MATH 223 Calculus and Analytic Geometry III ...........5 cr
- MATH 301 Linear Algebra ..................................4 cr
- MATH 303 Set Theory, Logic and Proof ...................3 cr
- MATH 317 Differential Equations and Their
  Applications .........................................4 cr
- MATH 350 Advanced Calculus ..............................4 cr
OR
- MATH 367 Elementary Number Theory ...................4 cr
- MATH 441 Abstract Algebra .................................4 cr

Students completing the computer science/mathematics double major are strongly encouraged to take CSCI 331 as one of their electives.

Course Audit Restrictions

Computer science courses are generally not available for audit.

Disruption of Studies

Normally, students must meet the major requirements in effect at the time they declare a major; however, students majoring in computer science who do not attend continuously may be subject to the major requirements in effect upon their return. In particular, students who do not complete (with a passing grade) a computer science course numbered above 241 for four consecutive semesters will be subject to the major requirements in effect upon their next registration for a computer science course.

Substitutions

Requests for course substitutions to meet the requirements of the computer science major need the approval of the computer science faculty. In the case of the computer science/mathematics double major, substitutions require the approval of both the computer science faculty and the mathematics faculty.

Transfer Credits

In addition to the minimum UW-Parkside cumulative GPA requirement of 2.50 for courses in the major, students with transfer credits applying to the computer science major must also attain a minimum cumulative GPA of 2.50 in all course work required, including transfer credits.

Part-Time Study

The computer science major is available to both full-time and part-time students. Classes meet throughout the day, including evenings. Evening classes are offered on a restricted rotation basis to permit persons working full time during the day to complete major requirements during off-the-job hours. Contact the Computer Science Department chair for details.

Requirements for the Computer Science Minor (26 credits)

The Computer Science Department offers a minor in computer science. It is designed to meet the needs of students who are majoring in another field, but who desire a deeper understanding of computers and software. Students seeking to minor in computer science must attain a minimum UW-Parkside cumulative GPA of 2.50 in all courses eligible to meet the student’s computer science minor requirements.

A. Required Mathematics Course (5 credits)

- MATH 221 Calculus and Analytic Geometry I ..........5 cr

B. Required Computer Science Courses (15 credits)

- CSCI/MATH 231 Discrete Mathematics ....................3 cr
- CSCI 241 Computer Science I .............................5 cr
- CSCI 242 Computer Science II ............................4 cr
OR
- CSCI 340 Data Structures and Algorithm Design ........3 cr
- CSCI 380 Database Management Systems ...............3 cr

C. Elective Courses (6 credits)

At least 6 credits of CSCI courses numbered 331 or above, excluding CSCI 375.

Requirements for the Web Development Minor (27-29 credits)

The Computer Science Department, in collaboration with the Art and Business departments, offers a minor in web development. The minor is designed for students who are seeking an in-depth technical understanding of website development and administration. Students completing the minor will be well situated to take on jobs as web programmers, web developers and web server administrators.

A. Required Courses (24-26 credits)

- ART 104 Introduction to Digital Art ....................3 cr
- ART 377 Web Design I ....................................3 cr
- ART 477 Web Design II ...................................3 cr
- CSCI 241 Computer Science I .............................5 cr
OR
- MIS 221 Business Programming I - Visual Basic ....3 cr
- CSCI 220 Web Concepts I ..................................3 cr
- CSCI 322 Web Concepts II ................................3 cr
- CSCI 433 Web Development Project ....................3 cr

Choose one:

- ENGL 202 Technical Writing .............................3 cr
- ENGL 204 Writing for Business and Industry ..........3 cr
- COMM 255 Writing for Multimedia .......................3 cr
The Computer Science Department offers a certificate in mobile development for students interested in careers involving developing mobile applications for tablet computers and mobile phones. With the rise in popularity and functionality of mobile devices, the need for skilled mobile developers has increased. Our certificate provides students a background in writing software for multiple mobile device platforms, designing user interfaces for mobile devices, and designing networking and the World Wide Web, cyber security has become of increasing importance to all computer users. Our certificate gives students a background in securing applications and systems software, desktop computers, servers, and the networks that connect them. The certificate is supported by a dedicated laboratory that is isolated from the rest of the campus network, allowing students to gain practical hands-on knowledge of the tools used to both attack and defend computers.

Requirements for the Mobile Development Certificate (16 credits)

The Computer Science Department offers a certificate in UNIX system administration that provides background and experience for students interested in careers in system administration. This certificate consists of the following courses:

A. Required Course Options (5-6 credits)
- CSCI 241 Computer Science I .........................5 cr
- OR
- MIS 221 Business Programming I - Visual Basic ....3 cr
- MIS 322 Business Programming II - C# ..............3 cr

B. Required Courses (5 credits)
- CSCI 274 UNIX Concepts and Tools ..............1 cr
- CSCI 275 UNIX Scripting .............................1 cr
- CSCI 375 UNIX System Administration ..........3 cr

Courses in Computer Science (CSCI)

101 Computer Software Tools .............................3 cr
  Prereq: None. Freq: Occasionally.
  Each section introduces a particular software tool. Commonly offered tools include: word processors, spreadsheets, presentation software and databases. Meets two hours per week for eight weeks. May be repeated for credit with different content. Students are expected to have basic computer proficiency skills before taking this course. Students seeking basic computer proficiency skills are encouraged to take ACSK 095.

105 Introduction to Computers ..........................3 cr
  Prereq: None. Freq: Fall, Spring, Summer.
  Computer components and the principles of operation; networking, the Internet and the World Wide Web; problem solving techniques, introduction to algorithms, elementary programming concepts.
130 Introduction to Programming........................................3 cr
Prereq: MATH 111 or equivalent. Freq: Fall.
Fundamentals of high-level programming language: object-orientation, 
methods, functions, variables, program control.

145 Introduction to Computer Science..............................5 cr
Prereq: C or better in MATH 112 and 113 or 114. Freq: Fall.
An introduction to the fundamentals of software development; 
including software classes, objects, logic, selection control, repetition 
control, subprograms, parameter passage, and rudimentary software 
engineering techniques. Students complete numerous programming 
projects using a modern programming language. Three-hour lecture; 
one-hour discussion; two-hour lab. Not open to those with credit in 
CSCI 241.

210 Mobile Device Interfaces...........................................3 cr
Prereq: MATH 111. Freq: Fall.
Focuses on the fundamentals of interface design for mobile devices. Topics 
include input, output, organization, and human-computer interaction. 
Various tools are used to design and implement interfaces appropriate for 
various screen sizes and resolutions found on mobile devices.

220 Web Concepts I ......................................................3 cr
Prereq: C or better in CSCI 130, 145 or 241; or MIS 221; or consent 
of instructor. Freq: Fall.
Explains web client programming concepts, website authoring, dynamic 
web pages, object usage, events and event-driven programming, 
markup languages, document object model.

231 Discrete Mathematics ..............................................3 cr
Prereq: C of better in MATH 231.
Sets; the number system; Boolean algebra; formal logic and proofs; 
relations and functions; combinatorics and recurrence relations; graphs 
and trees. Cross-listed with MATH 231.

241 Computer Science I ..................................................5 cr
Prereq: C or better in MATH 112 and 113, or 114. Freq: Fall, Spring.
Introduces the fundamentals of software development; including 
software classes, objects, logic, selection control, repetition control, 
subprograms, parameter passage, and rudimentary software 
engineering techniques. Three-hour lecture; one-hour discussion; two- 
hour lab. Not open to those with credit in CSCI 145.

242 Computer Science II .................................................4 cr
Prereq: C or better in CSCI 145 or 241. Freq: Fall, Spring.
Object-oriented programming concepts including inheritance and 
polymorphism; recursion; introduction to data structures including: 
lists, stacks, queues, trees and maps; advanced sorting and searching 
algorithms. Three-hour lecture, two-hour lab.

245 Assembly Language Programming.............................3 cr
Prereq: C or better in either CSCI 145 or 241; C or better in CSCI 
231, 242 or concurrent registration. Freq: Fall, Spring.
Organization of computers, digital representation of data, symbolic 
coding and assembler systems, instructions, addressing modes, 
program segmentation and linkage, and applications.

274 UNIX Concepts and Tools........................................1 cr
Prereq: C or better in CSCI 130, 145 or 241, or MIS 221, or 
concurrent registration. Freq: Fall.
Examines concepts and tools for UNIX including file system organization, 
directory and file manipulation, text processing, UNIX processes, 
editors, interacting with other users, interacting with Internet hosts 
systems. One hour lecture, one and one half hour lab.

275 UNIX Scripting.......................................................1 cr
Prereq: C or better in CSCI 274. Freq: Fall.
Investigates Unix shells, shell variables and the environment, scripting 
languages, input and output, control structures, argument handling, 
functions, parameter passing and start-up scripts. One hour lecture, 
one and one half hour lab.

279 Business Information Security...................................3 cr
Prereq: None. Freq: Occasionally.
Provides an overview of information security planning. Evaluates 
security threats, regulations and controls affecting various business 
types. Students select an industry that is specific to their career goals and 
consider the threats and controls appropriate for that industry.

290 Special Topics in Computer Science..........................1-4 cr
Prereq: Consent of instructor. Freq: Occasionally.
Elementary topics in computer science.

295 Makerspace Seminar...............................................1 cr
Prereq: None. Freq: Occasionally.
Requires independent work in a community-operated workspace where 
students with common interests develop technology related projects.

296 Professional Certification........................................1-6 cr
Prereq: Consent of instructor. Freq: Occasionally.
Instruction and laboratory work preparing students to take professional 
certification examinations. Credits will vary depending on certification 
program. Special laboratory fees, add/drop deadlines, and fee refund 
policies may apply.

309 Probability and Statistics.........................................3 cr
Prereq: C or better in MATH 221. Freq: Spring.
Elementary probability; random variables, properties of distributions, 
sampling, queuing theory, central limit theorem and law of large 
numbers.

322 Web Concepts II ....................................................3 cr
Prereq: CSCI 220 or consent of instructor. Freq: Spring.
Explains server-side programming concepts; server architectures; 
relational databases and database connectivity; dynamic web pages; 
form processing and web services.

323 Mobile Development I.............................................3 cr
Prereq: C or better in CSCI 242, or consent of instructor.
Freq: Occasionally.
Examines existing tools, environments and programming languages for 
developing applications for mobile devices on the Android platform. 
Examines current research on mobile applications and future trends. 
Cross-listed with CIS 523.

331 Computational Models.............................................3 cr
Prereq: C or better in CSCI 231. Freq: Occasionally.
Regular languages, finite automata, context-free languages and 
grammars, push-down automata, Turing machines, algorithms and the 
Church-Turing thesis, and decidability.

333 Programming Languages.........................................3 cr
Prereq: C or better in CSCI 231; 242. Freq: Spring.
Introduction to the syntax and semantic issues in programming 
languages and their effect on language implementation. This includes 
methods to specify languages, data storage, and the sequence of 
control in programs. Non-procedural languages, including functional 
and logic languages, will be examined.

340 Data Structures and Algorithm Design.........................3 cr
Prereq: C or better in CSCI 231, 242. Freq: Spring.
Study of the design, implementation and analysis of computer 
algorithms; time and space requirements for sorting, searching, graph 
thory, mathematics and string processing algorithms.

355 Computer Architecture............................................3 cr
Prereq: C or better in CSCI 245. Freq: Spring.
The design of computer systems and components. Processor design, 
control structures and microprogramming; caches, memory hierarchies, 
mass memory, and memory management; buses, interrupts and I/O 
structures; multiprocessors and advanced processors.

368 Mathematical Modeling..........................................3 cr
Prereq: MATH 222; MATH 250 or CSCI 242. Freq: Occasionally.
Survey of mathematical models, models involving differential equations, 
probabilistic models, Markovian models, simulation, and Monte-Carlo 
methods. Cross-listed with MATH 368.

370 Operating Systems..................................................3 cr
Prereq: C or better in CSCI 242 and 355. Freq: Fall.
Operating system concepts, process definition and implementation, 
deallock, memory management and protection, distributed system 
architecture, and case studies.
375 UNIX System Administration .................................................. 3 cr
Prereq: C or better in CSCI 275. Freq: Spring.
UNIX system administration concepts and techniques including system
organization, kernel configuration, device management, system files
and runtime maintenance, software configuration and installation,
and network configuration; comparison of UNIX with other operating
systems. Two hour lecture, two hour lab.

380 Database Management Systems ........................................... 3 cr
Prereq: C or better in CSCI 242. Freq: Fall.
The relational model, database design, relational database query
languages such as Relational Algebra and SQL, database normalization
techniques, physical database design.

405 Artificial Intelligence (AI) ...................................................... 3 cr
Prereq: C or better in CSCI 333. Freq: Occasionally.
Introduction to Artificial Intelligence (AI) techniques that include search,
game playing, and knowledge representation. Specific subdisciplines
of AI including natural language processing and neural networks.
Programming assignments in both Prolog and LISP. Not open to those
with credit in CIS 605.

420 Computer Graphics ............................................................ 3 cr
Prereq: C or better in CSCI 340. Freq: Occasionally.
Graphics hardware and software, techniques for representation and
visualization, two- and three-dimensional transformations, concepts
and techniques of visual realism.

421 Computer Vision ............................................................... 3 cr
Prereq: C or better in CSCI 333 or 340. Freq: Occasionally.
Review of algebra of matrices and partial differentiation. Introduction
to Machine Vision and Image Processing including image formation,
thresholding, image filtering, edge detection, image segmentation,
image data compression, image similarity and some dynamic vision.

422 Multimedia Systems .......................................................... 3 cr
Prereq: C or better in CSCI 333 or 340. Freq: Occasionally.
Principles and design of multimedia systems; implementation of
multimedia algorithms; and discussion of current multimedia
technologies. Not open to students with credit in CIS 622.

423 Mobile Development II ....................................................... 3 cr
Prereq: C or better in CSCI 323, or consent of instructor.
Freq: Occasionally.
Examines existing tools, environments and programming languages
for developing applications for mobile devices on the iOS platform.
Explores current research on mobile applications and future trends.
Cross-listed with CIS 623.

424 Networked Applications ...................................................... 3 cr
Prereq: C or better in CSCI 423 or consent of instructor. Freq: Fall.
Explores server-side application programming concepts. Topics
include server architectures, communication protocols, relational
databases and database connectivity, dynamic content delivery and
communication security. Cross-listed with CIS 674.

433 Web Development Project ................................................... 3 cr
Prereq: CSCI 322 or consent of instructor. Freq: Occasionally.
Focuses on project-based development of a significant web site or a
specific web-based problem or project under the supervision of the
instructor. Includes project management techniques, client-server
communication and content management systems.

440 Compiler Design and Implementation ................................. 3 cr
Prereq: C or better in CSCI 333 or concurrent registration.
Freq: Occasionally.
Theory, design and implementation of compilers and other syntax-
directed systems. Applies techniques of finite state machines, lexical
analysis, symbol tables, parsing, storage allocation and code generation
to the development of a compiler. Laboratory work included.

444 Event-Driven Programming ................................................. 3 cr
Prereq: C or better in CSCI 370. Freq: Occasionally.
Origins of events; the event-driven programming model; interrupt
processing as event handling; client-server architectures; windowing
environments and GUI programming; development support software;
case studies; and student project.

445 Web Security ................................................................. 3 cr
Prereq: C or better in CSCI 242 or 322. Freq: Occasionally.
Vulnerabilities of web languages, interfaces, servers and databases.
Identifying and avoiding vulnerabilities with shopping carts, HTTP/
HTTPS and the URL. Detecting and preventing hacking techniques
such as cyber graffiti, e-shoplifting, impersonation, buffer overflows and
cross-site scripting.

467 Computability and Automata .............................................. 3 cr
Prereq: C or better in CSCI 331 or consent of instructor.
Freq: Occasionally.
Turing machines, recursive functions, Kleene’s T Predicate, Ackermann’s
function, finite automata, grammars and languages. Cross-listed with
MATH 467.

475 Software Engineering Principles and Practice I ..................... 3 cr
Prereq: C or better in CSCI 333, 340, 370 or 380. Freq: Fall.
An introduction to UML design and teamwork in the development of
a larger software system. The use of UML use case, activity, class/
object, interaction, and state diagrams in the creation of efficient
designs and systems.

476 Software Engineering Principles and Practice II ................... 3 cr
Prereq: C or better in CSCI 475. Freq: Spring.
Software development from an engineering perspective including
software development models, team organization and management,
implementation strategies, software testing and verification, and project
cost estimation. Students will demonstrate their mastery of software
erginning design and development strategies through implementation
of a significant team-based project.

477 Computer Communications and Networks ............................ 3 cr
Prereq: C or better in CSCI 242, 245. Freq: Occasionally.
Transmission protocols, layered network protocols, network topology,
message routing, performance analysis, security, and case studies.

478 Network Security .......................................................... 3 cr
Prereq: C or better in CSCI 370, 375, 477 or MIS 327. Freq: Occasionally.
Computer and network security related to operating systems, networks
and system administration issues, including hacking, incident response,
firewalls, VPNs, intrusion detection, and auditing. A background in
computer networking is helpful.

479 Information Systems Security ............................................ 3 cr
Prereq: C or better in CSCI 242 or MIS 328. Freq: Occasionally.
Introduction to information systems security. Considers technical,
administrative, and physical aspects of IT security. Topics include fraud,
risk, information protection, business continuity, network security,
auditing, and security planning and governance.

480 Advanced Databases ....................................................... 3 cr
Prereq: C or better in CSCI 380. Freq: Occasionally.
Review of relational database languages such as SQL and Relational
Algebra, and query optimization techniques. Non-relational database
models including object-oriented databases, XML databases,
and deductive databases. Data mining, transaction management,
concurrency control, text retrieval, and web data management.

490 Special Topics in Computer Science .................................. 1-4 cr
Prereq: Consent of Instructor. Freq: Occasionally.
Advanced topics in computer science with applications.

493 Internship in Computer Science ........................................ 1-2 cr
Prereq: Consent of instructor and department chair. Freq: Fall, Spring.
Participation in the technical activities of an ongoing organization under
the joint guidance and supervision of a member of the organization and
member of the faculty. Grading will be on a credit/no-credit basis. A student
may register and receive credit in this course for a maximum of 6 credits.

495 Computer Science Seminar .............................................. 2 cr
Prereq: Any 300-level CSCI course or consent of instructor. Freq: Spring.
Examines computer ethics, the computing profession, current trends in
information technology, and career opportunities. Includes oral presentations.

499 Independent Study ....................................................... 1-3 cr
Prereq: Consent of instructor and department chair. Freq: Fall, Spring.
Independent work on a specific problem in computer science under the
supervision of faculty.