Computer science is the study of the theory and practice of computation. A computer scientist creates new hardware and software that is more efficient, effective, and reliable. Computer information systems, on the other hand, is the study of the use of computers for systematic organization of data that supports efficient and accurate collection, processing, analysis and retrieval of information. An information system specialist applies existing technology to solve real world problems. Both incorporate aspects of several other fields: mathematics, to analyze the properties of algorithms and data structures; engineering, to design and construct practical programs and machines; the experimental sciences, both to investigate the behavior of programs running on real machines and to use programs for modeling scientific phenomena; the cognitive sciences, to develop “intelligent” programs and to study computation in relation to human intelligence; and business administration, to identify information needs of organizations.

Computer science and information systems are young and rapidly developing fields. Presently their chief areas, reflected in regular course offerings at The College at Brockport, are: design and analysis of algorithms, programming languages, systems analysis, software engineering, project management, database systems, e-commerce, computer architecture, operating systems, computer security, artificial intelligence, decision support and expert systems, networking, multimedia, etc. Other areas are covered in independent study and topics courses. In addition, students can gain valuable job experience through internship programs and Brockport Career Exploration Courses (BCEC).

The programs offered by the department provide students with an excellent basis for a variety of careers and for graduate study. Possible careers include programming, system analysis and design, maintenance, management, and user support of software in areas such as business, sci-
ence, engineering, and computer systems. Fields of graduate study include computer science, mathematics, information systems, information management, and various areas of science and engineering.

The student interested in the programs offered by the department has several options to choose from: a major in computer science (CSC) in the advanced computing (AC) track, which is accredited by Computing Accreditation Commission [CAC] of ABET, or the software development (SD) track; a major in computer information systems (CIS); a double major in computer science or computer information systems and another discipline such as mathematics or business administration; a minor in computer science; and a minor in computer information systems. Both majors have several entry-level courses in common. Hence, the selection of a specific major and the track, if any, may be postponed until the sophomore year.

### Major in Computer Science

#### 1. Advanced Computing Track of the Computer Science Major (68 credits)

(Accredited by Computing Accreditation Commission [CAC] of ABET)

For a major in computer science in the AC track, a student must complete the following 68 credits of computer science, mathematics and science courses with an average grade of “C” or better in core and elective courses. In addition, the grade for each of CSC 203, 205 and 311 must be “C” or better. Other restrictions apply. See Notes below.

<table>
<thead>
<tr>
<th>A. Core Courses (37 credits)</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 203</td>
<td>Fundamentals of Computer Science I</td>
</tr>
<tr>
<td>CSC 205</td>
<td>Fundamentals of Computer Science II</td>
</tr>
<tr>
<td>CSC 209</td>
<td>UNIX Tools</td>
</tr>
<tr>
<td>CSC 303</td>
<td>Digital Logic and Computer Design</td>
</tr>
<tr>
<td>CSC 311</td>
<td>Computer Organization and Software Interface</td>
</tr>
<tr>
<td>CSC 401</td>
<td>Programming Languages</td>
</tr>
<tr>
<td>CSC 406</td>
<td>Algorithms and Data Structures</td>
</tr>
<tr>
<td>CSC 411</td>
<td>Computer Architecture</td>
</tr>
<tr>
<td>CSC 412</td>
<td>Operating Systems</td>
</tr>
<tr>
<td>CSC 427</td>
<td>Software Systems Engineering</td>
</tr>
<tr>
<td>CSC 483</td>
<td>Theory of Computation</td>
</tr>
<tr>
<td>CSC 486</td>
<td>Junior/Senior Seminar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Elective Courses (9 credits)</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three CSC courses numbered 400-489, selected under advisement. Restrictions apply. See notes below.</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Mathematics Corequisites (10 credits)</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 202</td>
<td>Calculus II</td>
</tr>
<tr>
<td>MTH 346</td>
<td>Probability and Statistics I</td>
</tr>
<tr>
<td>MTH 481</td>
<td>Discrete Mathematics II</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D. Science Corequisites (12 credits)</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) A two-semester sequence in a lab science for science/engineering majors. For example, PHS 235-240, CHM 205-206, BIO 201-202, ENV 202-303, ESC 211-311, GEL 201-302.</td>
<td>12</td>
</tr>
<tr>
<td>(ii) Each remaining course must be a course in science or a course that enhances the student’s abilities in the application of the scientific method. Each course must be a course for science/engineering majors or a course with a strong emphasis on quantitative methods.</td>
<td></td>
</tr>
</tbody>
</table>

Total: 68
Notes:
1. The prerequisite for CSC 203 is CSC 120. The prerequisite for MTH 202 is MTH 201. The prerequisites for MTH 481 are MTH 201 and MTH 281.
2. A student must take at least 30 credits in non-mathematics, non-science courses.
3. A student must take at least 15 credits in mathematics courses.
4. A student must take at least 30 credits in mathematics and science courses combined.
5. At least 18 of the credits used to satisfy the core or elective requirements in the major must be earned at Brockport.
6. A maximum of six credits can be earned by “credit by portfolio assessment,” and a maximum of six credits can be earned by “departmental credit by examination.”

2. Software Development Track of the Computer Science Major (43 credits)
For a major in computer science in the SD track, a student must complete the following 43 credits of computer science and mathematics courses with an average grade of “C” or better in core and elective courses. In addition, the grade for each of CSC 203, 205 and 311 must be “C” or better. Other restrictions apply. See Notes below.

A. Core Courses (28 credits)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 203</td>
<td>4</td>
</tr>
<tr>
<td>CSC 205</td>
<td>4</td>
</tr>
<tr>
<td>CSC 209</td>
<td>1</td>
</tr>
<tr>
<td>CSC 303</td>
<td>3</td>
</tr>
<tr>
<td>CSC 311</td>
<td>4</td>
</tr>
<tr>
<td>CSC 401</td>
<td>3</td>
</tr>
<tr>
<td>CSC 406</td>
<td>3</td>
</tr>
<tr>
<td>CSC 411</td>
<td>3</td>
</tr>
<tr>
<td>CSC 486</td>
<td>3</td>
</tr>
</tbody>
</table>

B. Elective Courses (12 credits)
Four CSC courses numbered 400-489, selected under advisement. Restrictions apply. See notes below.

C. Mathematics Corequisite (3 credits)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 481</td>
<td>3</td>
</tr>
</tbody>
</table>

Total: 43

Notes:
1. The prerequisite for CSC 203 is CSC 120. The prerequisites for MTH 481 are MTH 201 and MTH 281.
2. At least 18 of the credits used to satisfy the core or elective requirements in the major must be earned at Brockport.
3. A maximum of six credits can be earned by “credit by portfolio assessment,” and a maximum of six credits can be earned by “departmental credit by examination.”

Major in Computer Information Systems (65 credits)
For a major in computer information systems, a student must complete the following 65 credits of computer science, computer information systems, mathematics, and information systems environment courses with an average grade of “C” or better in core and elective courses. In addition, the grade for each of CSC 203, CSC 205, CIS 202 and CIS 303 must be “C” or better. Other restrictions apply. See Notes below.

A. Core Courses (35 credits)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSC 203</td>
<td>4</td>
</tr>
<tr>
<td>CSC 205</td>
<td>4</td>
</tr>
<tr>
<td>CSC 209</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes:
1. The prerequisite for CSC 203 is CSC 120. The prerequisites for MTH 481 are MTH 201 and MTH 281.
2. At least 18 of the credits used to satisfy the core or elective requirements in the major must be earned at Brockport.
3. A maximum of six credits can be earned by “credit by portfolio assessment,” and a maximum of six credits can be earned by “departmental credit by examination.”
B. Elective Courses (6 credits)
   Two CSC or CIS courses numbered 400-489, selected under advisement. 6
   Restrictions apply. See notes below.

C. Math Corequisites (9 credits)
   MTH 243 Elementary Statistics 3
   MTH 281 Discrete Mathematics I 3
   One MTH course selected from MTH 201, 221, 343, 441, 461, 463, 481 3

D. IS-Environment Corequisites (15 credits)
   15 credits in a cohesive body of knowledge to prepare the student to function effectively as an IS professional. Select, under advisement, from (but not limited to) the following disciplines: business administration, healthcare administration, recreation and leisure studies, and sports management.

Total: 65

Notes:
1. The prerequisite for CSC 203 is CSC 120. The prerequisite for CIS 202 and CIS 206 is CSC 104 or CIS 106.
2. A student must take at least 30 credits in General Education courses.
3. The following CSC courses are NOT allowed as CIS electives: CSC 411, 419, 422, 427 and 434.
4. At least 18 of the credits used to satisfy the core or elective requirements in the major must be earned at Brockport.
5. A maximum of six credits can be earned by “credit by portfolio assessment,” and a maximum of six credits can be earned by “departmental credit by examination.”

Minor in Computer Information Systems
For a minor in computer information systems, a student must complete the following 18 credits of CSC and CIS courses, of which at least half of the credits must be taken at Brockport. Note that the prerequisite courses are CSC 104 (or CIS 106), CSC 120 and MTH 122.

A. Core Courses (9 credits) Credits
   CSC  203   Fundamentals of Computer Science I 4
   CSC  209   UNIX Tools 1
   CIS  202   Fundamentals of Information Systems 3
   CIS  206   IT Tools 1

B. Elective Courses (9 credits)
   Three courses, selected under advisement, from the following list: CIS 300-489, CSC 205, CSC 212, CSC 300-489 (except CSC 303, 311, 411, 419, 422, 427, 434)

Total: 18
CIS 106 End-User Computing (A). Develops students’ acumen in key end-user computing technologies, to a level that will allow students to utilize technology successfully in the workplace and to meet the contemporary expectations of employers. Includes topics such as word processing, operating systems, spreadsheets, office presentation, network applications, and databases. Requires extensive lab work. 3 Cr. Every Semester.

CIS 202 Fundamentals of Information Systems (A). Prerequisite: CSC 104 or CIS 106. Introduces the use of information systems and information technology in organizations. Considers concepts of information management, systems theory, quality, enhanced decision making, and added value in products and services. Stresses information technology, including computing and telecommunications systems. Teaches students to analyze requirements, define an information system, and develop custom solutions to enhance productivity. 3 Cr. Every Semester.

CIS 206 Information Technology Tools (A). Prerequisite: CSC 104 or CIS 106. Develops intermediate level proficiency in key office productivity and information technology tools. Includes these topics: operating systems, graphical user interfaces, word processing, desktop publishing, grammar and style checkers, office presentations, multimedia documents, spreadsheets and advanced applications, business charts, Internet and intranet, e-mail, World Wide Web, search engines, and Web publishing. Requires extensive hands-on laboratory exercises. 1 Cr. Every Semester.

CIS 295 Topics in Computer Information Systems (A). Prerequisite: Published prior to registration each semester. Addresses current topics in the field at an introductory level. Each offering of the course is motivated by the expertise of the instructor and by students’ interests. Descriptions and prerequisites are published prior to the registration period for the course. Example topic: information technology hardware and software laboratory. 1-3 Cr.

CIS 303 Information Technology Hardware and Software (A). Prerequisites: CIS 202, CSC 209 and MTH 281. Covers both hardware and software components of computer systems. Includes these topics: basic elements of a computer system, data representation, digital logic, CPU architecture, memory, buses, instruction sets, assembly language, magnetic and optical disks, backup storage, video displays, I/O devices, networks, multi-user and multi-tasking operating systems, process, file, and memory management. 3 Cr. Every Semester.

CIS 317 Analysis and Logical Design of Information Systems (A). Prerequisites: CIS 202, CIS 206, and CSC 203. Studies requirement analysis, system development and modification process. Includes topics such as lifecycle phases and the role of systems analyst; organizational style, feasibility and impact of information systems; requirements analysis, sampling and investigating data, interviewing; data flow diagrams, data dictionaries, preparing and writing proposals; prototyping, designing for effective input and output, user interface; software metrics, quality assurance and software package evaluation and acquisition. Requires supervised laboratory sessions. 4 Cr. Fall.

CIS 404 Multimedia Applications (A). Prerequisites: CIS 206 and CIS 303. Studies multimedia systems and applications in the business world. Includes these topics: multimedia applications, hypertext and hypermedia, audio, graphics, images, and full motion video; multimedia-ready personal computers and workstations, storage devices, operating systems and graphical user interfaces; communication and networking requirements, multimedia applications on the Internet; file formats, data compression and streaming audio/video; and multimedia authoring tools. 3 Cr. Fall.

CIS 419 Computer Networks and Internet Applications (A). Prerequisites: CIS 206 and CIS 303. Studies data communication, computer networks, and Internet applications. Includes topics such as data communication, LAN and WAN applications, Internet and intranet, e-mail, FTP and Web applications, distributed systems, standards; communication concepts, media, coding of data, error control, LAN topologies and protocols, bridges, routers and gateways; TCP/IP, client server paradigm; network configuration, performance monitoring, management, security, and reliability. 3 Cr. Fall.
CIS 422 Physical Design and Implementation With DBMS (A). Prerequisite: CIS 317. Covers information systems design and implementation within a database management system environment. Requires students to design and construct a physical system using database software to implement the logical design. Stresses basic knowledge of normalization of data modeling, database methods, database design, and the use of databases in business. 3 Cr. Spring.

CIS 427 Project Management and Practice (A). Prerequisites: CIS 317 and CSC 205. Introduces software development and management of the development process. Includes these topics: managing the software life cycle (requirements definition, logical design, physical design, implementation, testing, system integration, maintenance); design techniques (structured, event-driven, object-oriented); implementation; testing and software quality assurance; delivery and user training; metrics for project management and system performance evaluation; management expectations; personnel management, cost analysis and change management; management of behavioral and technical project aspects. 3 Cr. Spring.

CIS 434 Decision Support and Expert Systems (A). Prerequisites: CIS 202, CIS 206 and CSC 203. Covers Decision Support Systems (DSS) and its subsystems. Includes the following topics: DSS overview, modeling and analysis using linear programming, decision tables, trees, AHP, etc., group decision support systems, fundamentals of AI, expert systems, expert system building tools, and validation, knowledge representation. Involves hands-on experience with Excel LP Solver, Scenarios, Goal Seeking, etc., and DSS and ES software tools such as Expert Choice, Prolog or Essays, etc. 3 Cr. Spring.

CIS 436 Data Mining (A). Prerequisite: CIS 422. Studies data mining process with the goal of discovering nontrivial, interesting and actionable knowledge from large data sources. Includes the following topics: concepts, models and techniques of data mining; data preparation; concept description; decision tree and Bayesian classifications; cluster analysis and distance measures, hierarchical and probability based clustering; association rule mining. 3 Cr. Fall.

CIS 492 Computer Information Systems Internship (A). Prerequisites: Junior status, 3.0 or better average in computer science courses, appropriate course work, at least 18 credits toward the major completed prior to starting the internship, and instructor's permission. Provides an opportunity to apply knowledge from the classroom by working in a professional setting. Also provides a valuable and challenging experience for students who have never worked in such a situation, as well as for professionals furthering their education. Teaches the successful intern how effective professional performance requires integrating substantive knowledge with behavioral skills and proficiency in oral and written communication. Each student is supervised on campus by a computer science faculty member, and at the work site by qualified management personnel. Past projects have involved business programming, requirement analysis, web applications, database design, data communications, and project management. 1-3 Cr. By Arrangement.

CIS 493 Senior Thesis (A). Prerequisites: Junior status, 3.0 or better average in computer science courses, appropriate course work, at least 18 credits toward the major completed prior to starting the thesis, and instructor's permission. Provides students with an opportunity to apply knowledge from the classroom by working in an independent research or development project in an academic setting, which is a valuable and challenging experience for students who are contemplating graduate studies in computer science, to test out their potential for independent study and advanced research. May involve substantial software development, structuring available commercial software/hardware for specific applications, or an empirical case study of the use of technology. By developing a successful thesis, permits students to enrich their knowledge of computer applications, theory, hardware or software, to develop skills in analyzing problems involving current computing technologies, and to make effective oral and written presentations of their accomplishments. Each student is supervised by a Department of Computer Science faculty member. For details, see “The Computer Science Thesis Option” in the Handbook. 3 Cr. By Arrangement.

CIS 495 Topics in CIS (A). Prerequisite: Published prior to registration each semester. As an advanced course, addresses current topics in the field. Each offering of the course is motivated by the expertise of the instructor and by students’ interests. Expects students to complete a major research, design, or development project. Descriptions and prerequisites are published prior to the registration period for the course. 3 Cr.

CIS 499 Independent Study in Information Systems (A). Prerequisite: Instructor's permission. Arranged in consultation with the professor-sponsor and in accordance with the procedures of the Office of Academic Advisement prior to registration. 1-3 Cr. By Arrangement.

CSC 104 Computers in the Business World (A). Provides a general introduction to the different uses of computers in business. Includes these topics:
computer system concepts, data representation and storage, processor and peripheral hardware, data processing and word processing systems, spreadsheets, report generation, database queries, and management packages. 3 Cr.

CSC 105 Internet and Web Publishing (A). Prequisite: CSC 104 or CIS 106 or GEP 150 or equivalent. Provides a general introduction to cyberspace. Includes these topics: Internet, e-mail, lists, news groups, Gopher, Telnet, FTP, World Wide Web, net browsers, and creating Web home pages using HTML. 3 Cr. Every Semester.

CSC 120 Introduction to Computer Science (A). Prequisite: MTH 111 or higher. Provides a breadth-first introduction to computer science. Includes these topics: algorithms and their properties; binary, octal and hexadecimal: arithmetic and conversion; representation of integer and real numbers; elementary computer organization, architecture and programming of a simple machine; digital logic; Java programming: declarations, assignments, expressions, I/O and loops; operating systems and networks; database, spreadsheet, etc.; ethical, legal and social issues of computing. Preparation for CSC 203. 3 Cr. Every Semester.

CSC 203 Fundamentals of Computer Science I (A). Prerequisites: CSC 120 and MTH 122. Covers fundamental computer science concepts and object-oriented program development in Java. Includes these topics: problem solving, algorithm design and implementation; program testing and documentation; primitive data types, data manipulation, selection, loops; classes, methods, parameters, inheritance; arrays, strings, files, introduction to sorting and searching techniques and other basic algorithms. Requires extensive programming and supervised laboratory sessions. 4 Cr. Every Semester.

CSC 205 Fundamentals of Computer Science II (A). Prerequisites: CSC 203 and MTH 281. Covers an introduction to abstract data structures and their implementation. Includes these topics: program development (interpreting specifications, object-oriented and top-down development, information hiding, structured testing), stacks, queues, linked lists, recursion, trees, searching and sorting algorithms, introduction to analysis of algorithms, program verification, event-driven programming with graphical user interfaces. Requires extensive programming and supervised laboratory sessions 4 Cr. Every Semester.

CSC 209 UNIX Tools (A). Prerequisite: CSC 203. Provides a comprehensive introduction to the UNIX operating system from the programmer’s point of view. Includes these topics: basic commands, file system structure, concept of shells, shell features (pipes, redirection, etc.), access control, process control, scripting, UNIX tools (sed, grep, make, etc.). Requires extensive hands-on laboratory exercises and shell-script programming. 1 Cr. Every Semester.

CSC 212 Programming in Visual Basic (A). Prequisite: MTH 111. Provides a general introduction to computer programming and applications for non majors using the VISUAL BASIC language. Includes these topics: computer terminology, programming concepts, language features, and algorithm design. Introduces a survey of computer applications using the following programming techniques: structured design concepts, decisions, loops, functions, subroutines, arrays, and files. Requires extensive programming. 3 Cr.

CSC 219 Programming in C (A). Prerequisites: CSC 205 and CSC 209. Provides an advanced coverage of the C language. Includes these topics: syntax, semantics, control structures; arrays, pointers, and pointer arithmetic; string manipulation; structs and unions; functions and parameter passing, command line arguments; bit level operations. Requires extensive programming. 1 Cr. Every Semester.

CSC 295 Topics in Computer Science (A). Prerequisite: Published prior to registration each semester. Addresses current topics in the field at an introductory level. Each offering of the course is motivated by the expertise of the instructor and by students’ interests. Descriptions and prerequisites are published prior to the registration period for the course. Example topic: Windows NT. 1-3 Cr.

CSC 303 Digital Logic and Computer Design (A). Prerequisite: MTH 281. Provides an introduction to digital logic and design of computers. Includes these topics: number systems, Boolean algebra and logic gates, simplification of Boolean functions, combinational and sequential logic design, registers, counters, memory units, and ALU. Includes hands-on experience with hardware circuit components. 3 Cr. Every Semester.

CSC 311 Computer Organization and Software Interface (A). Prerequisites: CSC 205 and CSC 209. Covers basic hardware organization of digital computers and software interface at the assembly and C programming levels. Includes the following topics: processor and memory organization, fetch-execute-decode cycle, data representation of integer and floating point numbers, computer arithmetic, assembly language programming (instruction encoding, addressing modes, control flow logic, subroutines, linking and loading), C programming (program development, modularization, I/O concepts, library function calls, programming environment). Requires extensive programming and supervised laboratory sessions. 4 Cr. Every Semester.
CSC 356 Life in the Digital Age (A,I,W,Y). Studies the impact of new technologies on a global society. Includes the changing nature of privacy and growing use of government surveillance, ie. national ID cards and RFID tracking. Also considers the Internet’s effect on societal communication and differences in gender communication patterns, issues of freedom of expression and censorship, the influence of technology in the workplace and at home, and other relevant topics. 3 Cr. Every Semester.

CSC 401 Programming Languages (A). Prerequisite: CSC 311. Studies the concepts of various programming languages. Includes these topics: history of languages, design principles, formal syntax and semantics, implementation: compilation and interpretation, comparative study of features in various languages considering criteria such as binding, scope, type conversion, data abstraction, parameter passing techniques, exceptions and I/O. Covers various programming paradigms such as procedural, object-oriented, functional, logic and scripting. Requires extensive programming. 3 Cr. Every Semester.

CSC 406 Algorithms and Data Structures (A). Prerequisites: CSC 205 and MTH 481. Covers design and analysis of data structures and associated algorithms using object-oriented methods. Includes these topics: complexity measures, pre-and post-conditions, programming to interfaces, union-find sets, hashing, trees (AVL, splay, B-Trees), graphs, recursion, algorithm design strategies and NP-completeness. Extensive programming. 3 Cr. Every Semester.

CSC 411 Computer Architecture (A). Prerequisites: CSC 303 and CSC 311. Covers design and organization of digital computers. Includes these topics: digital logic and circuit design, data representation, computer history, performance evaluation, CISC/RISC architectures, registers, memories and memory management, CPU and ALU architectures, instruction sets, buses and I/O systems, interrupt structure, microprogramming and control unit design. Covers additional topics such as virtual machines, parallelism and pipelining. 3 Cr. Every Semester.

CSC 412 Operating Systems (A). Prerequisites: CSC 219 and CSC 411. Covers basic principles of operating systems. Includes these topics: OS structures and design principles, concurrent processes and programming, threads, CPU scheduling, memory management and virtual memory, process synchronization and deadlock, file systems, mass storage structure, I/O systems, and case study of UNIX/Linux operating system. Requires extensive programming. 3 Cr. Spring.

CSC 419 Computer Networks (A). Prerequisites: CSC 303 and CSC 311. Provides a comprehensive study of the field of computer communications, local area networks, and internetworking. Includes these topics: the OSI and TCP/IP models, protocols, topologies, data communication issues, error detection and correction, local area networks, network hardware, Ethernet and wireless technologies, WAN, packet-switching, routing, datagrams, Internet addressing, home networking and security. Includes hands-on experience with network hardware and software. 3 Cr. Fall.

CSC 421 Computer and Network Security (A). Prerequisite: CSC 419 or CIS 419. Studies concepts, techniques, and tools in computer and network security. Includes these topics: security, privacy, information assurance, threats, user authentication and access control; UNIX and Windows examples; logs and intrusion detection; cryptography, public-key and private-key systems, Kerberos, IP security, firewalls, Web and database access control and security issues; ethical issues. Includes hands-on experience with security hardware and software. 3 Cr. Spring.

CSC 422 Relational Data Base Design (A). Prerequisite: CSC 205. Provides a study of the theory and practice of the relational approach to database design. Includes these topics: DBMS vs. a traditional file processing, relational algebra, normalization, lossless and/or dependency preserving decomposition, query languages such as SQL and a language that is available on the system, query optimization, integrity and security, and database project design. Requires extensive programming. 3 Cr. Fall.

CSC 427 Software Systems Engineering (A). Prerequisite: CSC 311. Provides an introduction to software engineering methodologies and programming-in-the-large. Includes these topics: life-cycle models, development standards, project organization, estimation techniques, requirements modeling, specification techniques, object-oriented and structured approaches to software design, implementation issues, testing, verification and validation, maintenance and documentation. Requires students to work in teams developing a large-scale software product. Develops technical communication and writing skills. Requires extensive programming. 3 Cr. Fall.

CSC 429 Object-Oriented Software Development (A). Prerequisite: CSC 427. Provides an introduction to OOP concepts and their applications using Java. Includes these topics: review of OOP fundamentals, UML modeling; advanced Java features: interfaces, abstract classes, GUI programming, layout managers, event and exception handlers, etc.; software design principles,
cohesion and coupling; detailed coverage of design patterns: model-view-controller, observer, adapter, factory, strategy, singleton, etc.; software quality assurance: testing strategies. Requires extensive programming. 3 Cr. Spring.

CSC 434 Artificial Intelligence (A). Prerequisite: CSC 401. Provides an introduction to artificial intelligence, its applications, and languages. Includes these topics: problem solving using state space search, heuristics, A* algorithm, game playing, mini-max, alpha-beta, knowledge-based expert systems, forward and backward chaining, natural language understanding, evolutionary computing, cellular automata, genetic algorithms, neural networks; programming AI applications using Prolog, LISP, and/or using frameworks in Java. Requires extensive programming. 3 Cr. Fall.

CSC 442 Electronic Commerce Technology (A). Prerequisites: CSC 209 and (CIS 422 or CSC 422). Surveys electronic commerce technologies and realities. Studies defining tools of e-business to understand the manner in which users, tools, needs and opportunities interact. Includes these topics: the infrastructure of e-commerce and the design and implementation of e-business portals using network and database technologies, data/Web mining and security/encryption techniques for finding and negotiating with trading partners to execute electronic transactions. 3 Cr. Fall.

CSC 444 Introduction to Parallel Computing (A). Prerequisites: CSC 406 and MTH 481. Deals with design and analysis of parallel algorithms. Includes these topics: parallel models of computation, measures of complexity, parallel algorithms for selection, searching, sorting, merging, matrix algorithms, transitive closure, connected components, shortest path, minimum spanning tree and routing algorithms. Provides hands-on experience in a parallel programming environment. 3 Cr.

CSC 483 Theory of Computation (A). Prerequisites: CSC 203 and MTH 481. Provides a study of formal languages and theory of automata with an emphasis on Church's thesis and the "algorithm = machine" point of view. Includes these topics: regular expressions and context-free languages, finite and pushdown automata, Turing machines, computability, undecidability, and complexity of problems. 3 Cr. Spring.

CSC 486 Junior/Senior Seminar (A). Prerequisite: CSC 205; junior or senior status and computer science majors only. Provides an overall view of the professional field of computing, emphasizing development of communication skills for the profession. Includes these topics: detailed history of computing technology, social effects of computing, ethics in the field, professional literature, organizations and related activities, current industrial, social, legal governmental and technical developments, and career opportunities. Requires extensive reading and writing, both technical and non-technical, as well as library research, and prepared group discussions and oral presentations. 3 Cr. Every Semester.

CSC 492 Computer Science Internship (A). Prerequisites: Junior status, 3.0 or better average in computer science courses, appropriate course work, at least 18 credits towards the major completed prior to starting the internship, and instructor's permission. Provides an opportunity to apply knowledge from the classroom by working in a professional setting. Also provides a valuable and challenging experience for students who have never worked in such a situation, as well as for professionals furthering their education. Teaches the successful intern how effective professional performance requires integrating substantive knowledge with behavioral skills and proficiency in oral and written communication. Each student is supervised on campus by a computer science faculty member, and at the work site by qualified management personnel. Past projects have involved software engineering, graphics, database design, data communications, and process control. 1-3 Cr. By Arrangement.

CSC 493 Senior Thesis (A). Prerequisites: Junior status, 3.0 or better average in computer science courses, appropriate course work, at least 18 credits towards the major completed prior to starting the thesis, and instructor's permission. Provides students with an opportunity to apply knowledge from the classroom by working in an independent research or development project in an academic setting, which is a valuable and challenging experience for students who are contemplating graduate studies in computer science, to test out their potential for independent study and advanced research. May involve substantial software or hardware development, structuring available commercial software/hardware for specific applications, or theoretical analysis of computational schemes. By developing a successful thesis, permits students to enrich their knowledge of computer applications, theory, hardware or software, to develop skills in analyzing problems involving current computing technologies, and to make effective oral and written presentations of their accomplishments. Each student is supervised by a Department of Computer Science faculty member. For details, see “The Computer Science Thesis Option” in the Handbook. 3 Cr. By Arrangement.

CSC 495 Topics in Computer Science (A). Prerequisite: Published prior to registration each semester. As an advanced course, addresses current topics in the field. Each offering is motivated by the expertise of the instructor and students’ interests. Requires students to complete a major research, design, or
development project. Descriptions and prerequisites are published prior to the registration period for the course. Past topics include: networking, human factors, computational linguistics, advanced architecture, software engineering, logic programming, and program validation, object-oriented programming and parallel algorithms. 3 Cr.

CSC 499 Independent Study in Computer Science (A). Prerequisite: Instructor’s permission. Arranged in consultation with the instructor-sponsor and in accordance with the procedures of the Office of Academic Advisement prior to registration. 1-3 Cr. By Arrangement.

DEPARTMENT OF COUNSELOR EDUCATION

184 Albert W. Brown Building
(585) 395-2258

Chairperson and Professor: Susan Rachael Seem, PhD, LMHC, NCC, ACS, Pennsylvania State University; Associate Professors: Patricia Goodspeed Grant, EdD, LMHC, NCC, University of Rochester; Thomas J. Hernandez, EdD, LMHC, University of Rochester; Assistant Professors. Robert Dobmeier, PhD, LMHC, CRC, University of Buffalo; Kathleen “Kitty” Fallon, PhD, NCC, IMH, University of Florida; Summer Reiner, PhD, LMHC, NCC, University of Connecticut.

The department does not offer an undergraduate academic major. A few courses, however, are offered for the undergraduate student. For information on graduate degrees in counselor education, refer to the 2009-2011 Graduate Studies Catalog.

Department of Counselor Education

Courses

EDC 201 Life/Career Planning for Adults (B).
For adults desiring to determine future goals. Allows students to assess their ideal goals, interests, abilities and skills through class discussion, assigned readings and papers. Allows students to decide on future directions. 1 Cr.

EDC 202 Career Management (A).
Helps students develop an understanding that career planning and the development process is not a one-time event, but an ongoing process that requires personal attention and involvement. Prepares students for transition from college to professional workplace, focusing on career goals and developing skills to produce job-search correspondence. 1 Cr.

EDC 301 Introduction to Counseling (B).
Provides an overview and general understanding of the professional practice of counseling, including historical perspectives, basic concepts, major theoretical approaches, basic techniques and skills used by counselors, the process of counseling, and the various roles played by professional counselors in diverse settings. Course concepts are presented in both lecture and experiential formats. 3 Cr.

EDC 302 Achieving Helping Relations in College Residence Halls (B).
Explores the role and responsibilities of the college resident assistant. Allows students to develop and practice the skills of assertiveness, conflict management, empathic listening, helping, self-awareness and self-disclosure. Allows these skills to be applied to the college environment and to current issues facing college resident assistants. 3 Cr. Every Semester.