

MASTER'S DEGREE
IN
COMPUTER SCIENCE



**Northeastern
Illinois
University**

GRADUATE STUDENT HANDBOOK

MASTER'S DEGREE IN COMPUTER SCIENCE

The Master's Degree in Computer Science has three concentrations: one for individuals who want to enter careers in industry, one for individuals who want to pursue a Ph.D., and one for high school teachers who want to obtain an endorsement to teach computer science.

Requirements for Admission to the Program

Application

All applicants who wish to be admitted to the Graduate College at Northeastern Illinois University must prepare applications following the "Instructions for Completing Applications." Applications for admission are accepted according to the deadlines established by the Graduate College. File the appropriate application materials and supporting documents with the Graduate College Office (B-167). Call the Graduate College at (773)442-6000 for further information.

Applicants to NEIU's Graduate College must have an undergraduate degree from an accredited institution, and demonstrate a high level of scholastic ability as indicated by total grade point average. Applicants must have a minimum overall GPA of 2.75 on a 4.0 scale for all college level work completed.

Admission to the Master's Degree Program in Computer Science

Students must satisfy all requirements for admission to the Graduate College. Departmental approval is required for full admission to the Computer Science Master's program, and is based upon an evaluation of the candidate's ability to study computer science at the graduate level. No previous course work in computer science is necessary to enter the program; however, the student must have knowledge of discrete structures and programming in order to take courses which count towards the degree. If the student does not have this background, it is necessary for the student to take background courses in these areas before beginning course work towards the degree.

Requirements for the Degree

Course Requirements

The Master's Degree in Computer Science requires 36 credit hours of course work, 27 of which must be earned at Northeastern Illinois University. The remaining 9 credit hours may represent courses taken at accredited institutions with graduate programs in computer science and in conformance with the rules of the Graduate College (See "Transfer of Credit" section on page 2). The 36 hours will be made up of 9 credit hours of core course work, 18 credit hours of required course work from one of three concentrations, and 9 credit hours of elective course work (or 6 credit hours, if the student completes a Master's thesis). The three concentrations are Management Information Systems, Computer Science, and Teacher Endorsement. The purpose of the Management Information Systems Concentration is to prepare students for the application of computer science and related technologies to solving business problems. The primary purpose of the Computer Science Concentration is to prepare students to enter a Ph.D. program in computer science. The purpose of the Teacher Endorsement Concentration is to provide teachers with 1) the course work necessary to obtain an endorsement for teaching computer science and 2) the skills necessary to teach computer science at the pre-college level. A teaching certificate is required to enter this concentration.

No more than 9 hours of specifically approved 300 level courses may be selected to satisfy course requirements for the Master's Degree. Courses taken to remove deficiencies (i.e., CS 200, CS 201, CS 207, CS 304, CS 324, CS 405, CS 406) will not be counted toward the 36 hours of course work required for the Master's Degree. Courses taken to satisfy undergraduate degree requirements can not be used toward the Master's Degree. All elective course work is to be selected in consultation with and approved by the graduate advisor.

Project Requirement

As stated in the course requirements above, each student is required to complete a Master's Project or Master's Thesis. The student will make this decision in consultation with his or her advisor. Enrollment in either CS-490 Master's Project (3 credit hours) or CS-495 Master's Thesis (6 credit hours) is allowed only after a student has completed 30 credit hours in the program. Both the Master's Project and the Master's Thesis are chosen and worked on with a project advisor.

A Master's Project (CS-490, 3 credit hours) must be a paper or a large-scale software project that extends a student's scope of study beyond that covered in any course. A presentation of the Master's Project must be given to and approved of by a committee of three faculty members, including the project advisor.

A Master's Thesis will allow a student to undertake a more ambitious project than the Master's Project. A Master's Thesis must contain some component of original research and be significantly more work than a Master's Project. The Master's Thesis must, in addition, be submitted to a thesis committee at least one week before the required defense of the thesis. The grade for the Master's Thesis will be given after the thesis committee has reviewed the project and the defense has been made. A Master's Thesis must follow strict University-wide guidelines—see the "Thesis Manual" for more details.

Transfer of Credit

Courses taken at Northeastern Illinois University

A maximum of six credit hours taken at NEIU prior to the granting of the bachelor's degree may be considered for acceptance to the Master's program if these credits, a) are applicable; b) have not been applied to the baccalaureate degree; and c) were completed no more than 12 months prior to the date of graduation. The Enrollment Services (Admissions and Records) Office must be advised, in writing, of a student's intention to petition to apply those courses to a Master's program. The above applies only to Northeastern Illinois University graduates. Courses taken as a graduate student-at-large at NEIU are not automatically accepted in the Master's degree program. A maximum of nine credit hours taken under this classification may be applied toward the Master's degree if such work corresponds directly to specific program requirements and satisfies scholastic requirements of the Graduate College.

Courses taken at other accredited institutions

Students may apply to the Graduate College for the transfer of up to nine credit hours from other accredited graduate institutions. Students must first be admitted to a degree program and write a letter of petition to the dean. The course(s) in question should be identified by title, number, school, and course description. An official transcript of the work must be on file in the graduate office. The course(s) must have been completed relatively recently at an accredited institution, with a grade of "B" or better, and be applicable to the Master's degree program. However, the following courses cannot receive transfer credit and must be taken at NEIU in order to receive credit for NEIU Master's degree in Computer Science: CS-401 (Software Engineering), CS-404 (Analysis of Algorithms), and CS-420 (Object Oriented Design). Furthermore, for the MIS track, ECON-401 must be taken at NEIU to count as an elective.

Academic Standing

Students seeking an advanced degree in Computer Science should demonstrate an advanced ability in the area. No more than six hours of "C" credit is acceptable. Grades below "C" bear no credit toward the degree. The cumulative GPA of all courses within the scope of the specific Master's program, not only those actually applied towards the degree, must be at least a "B" (3.0) at all times, starting with the end of the student's second semester. If the cumulative GPA is below 3.0 after the second semester, the student will have one semester in which to bring the cumulative GPA to 3.0 or above. The student will become ineligible for the degree and will be dropped from the program if the cumulative GPA is still 3.0 after that next semester. The student will also become ineligible for the degree and will be dropped from the program if he or she receives three grades below "B" or two grades below "C".

Graduation

All graduate students are responsible for filing the following documents:

Application for acceptance to candidacy for the master's degree. This form should be submitted to the Graduate College Office upon completion of 12 credit hours of course work in the degree program with a minimum GPA of 3.0 ("B" average). A maximum of 6 credit hours accepted on transfer may be counted in this 12 hour total.

Application for graduation. This form should be filed in the Graduate College Office, accompanied by the non-refundable and non-transferable graduation fee:

- a. after the student has been notified of acceptance for degree candidacy,
- b. when there is reasonable expectation of completion of all requirements by the appropriate deadline date, and
- c. in accordance with the published schedule (contact the Graduate College for deadlines for graduation).

For further information please contact:

**The Department of Computer Science
Northeastern Illinois University
5500 N. St. Louis Avenue
Chicago, Illinois 60625**

**Peter G. Kimmel
Graduate Program Coordinator
Classroom Building, Room 3058
Telephone (773) 442-4717
e-mail: pgkimmel@neiu.edu**

**Department Office
Classroom Building, Room 3053
Telephone: (773) 442-4720**

Background Courses:

The following courses are required if the student does not have sufficient background in computer science. They do not count toward the M.S. Degree.

CS-201 Discrete Structures

OR

CS-405 Applied Discrete Structures

CS-200 Programming I and CS-207 Programming II

OR

CS-406 Object Oriented Development

Master's Degree in Computer Science Course Requirements

Required Core Courses:

CS-400 Discrete Modeling and Analysis.....	3 cr.
CS-404 Analysis of Algorithms.....	3 cr.
CS-490 Master's Project.....	3 cr.
OR	
CS-495 Master's Thesis.....	6 cr.
	Total: 9-12 cr.

Management Information Systems Concentration:

This concentration prepares students for the application of computer science and related technologies to solving business problems.

CS-401 Software Engineering.....	3 cr.
CS-412 Web Application Development.....	3 cr.
CS-413 IT Project Management.....	3 cr.
CS-415 Design of Database Systems.....	3 cr.
CS-419 Informatics.....	3 cr.
CS-420 Object Oriented Design.....	3 cr.
Three course electives, approved by the CS Department.....	9 cr.
CS Core Courses.....	9 cr.
	Total: 36 cr.

Recommended electives: CS-331, CS-440, CS-460, ECON-401 (MIS concentration only).

Computer Science Concentration:

The primary purpose of the Computer Science Concentration is to prepare students to enter a Ph.D. program in computer science. However, students interested in obtaining in-depth knowledge of systems programming should also consider this concentration.

CS-325 Automata, Languages, and Theory of Computation.....	3 cr.
CS-331 Computer Networks.....	3 cr.
CS-401 Software Engineering.....	3 cr.
CS-402* Advanced Systems Programming.....	3 cr.
CS-408 Advanced Operating Systems.....	3 cr.
CS-409* Compiler Theory and Design.....	3 cr.
Three course electives, approved by the CS Department.....	9 cr.
CS Core Courses.....	9 cr.
	Total: 36 cr.

Recommended electives: CS-311, CS-415, CS-426, CS-460.

*NOTE: CS 412 and/or CS 420 may be used in place of CS 402 and/or CS 409

Teacher Endorsement Concentration:

The purpose of this concentration is to provide teachers with 1) the course work necessary to obtain an endorsement for teaching computer science and 2) the skills necessary to teach computer science at the pre-college level.

CS-331 Computer Networks.....	3 cr.
CS-407 Elements of Data Structures.....	3 cr.
CS-411 Professional Computing.....	3 cr.
CS-412 Web Applications Development.....	3 cr.
CS-416 Artificial Intelligence and Robotics.....	3 cr.
CS-417 Video Game Programming.....	3 cr.
Three course electives, approved by the CS Department.....	9 cr.
CS Core Courses.....	9 cr.
	Total: 36 cr.

Recommended electives: CS-403, CS-420, CS-426, CS-460.

Obtaining an M.S. in this concentration does not automatically result in an endorsement to teach computer science. Rather, after completing 32 Computer Science semester hours, persons who want to add an endorsement to teach computer science to their existing certificate can apply to their regional superintendent of schools or they can apply on line on the OTIS system at www.isbe.net/otis. The form to use is 73-52, Application for Endorsement of Issued Certificate.

CS GRADUATE COURSE ROTATION PLAN

CS 307	Programming Languages	FALL
CS 311	Computer Architecture	FALL
CS 325	Theory of Computation	FALL
CS 331	Computer Networks	FALL, SPRING, SUMMER
CS 335	Artificial Intelligence	SPRING
CS 345	Network Security	FALL
CS 355	Cryptography	SPRING
CS 400	Discr Modeling & Analysis	FALL even# yrs; SUMR odd# yrs; SPR even# yrs.
CS 401	Software Engineering	FALL odd# yrs; SUMR even# yrs; SPR odd# yrs
CS 402	Adv Systems Programming	SPRING odd# yrs
CS 403	Authoring Techniques in CAI	FALL odd# yrs
CS 404	Analysis of Algorithms	FALL odd# yrs; SUMR even# yrs; SPR odd# yrs
CS 408	Adv Operating Systems	SPRING even# yrs
CS 409	Tpcs in Compiler Theory	SPRING even# yrs
CS 411	Professional Computing	SPRING even# yrs
CS 412	Web Application Development	FALL even# yrs; SUMR odd# yrs; SPR even# yrs.
CS 413	IT Project Management	FALL odd# yrs; SUMR even# yrs; SPR odd# yrs
CS 415	Design of Database Systems	FALL odd# yrs; SUMR even# yrs; SPR odd# yrs
CS 416	AI & Robotics	FALL even # s
CS 417	Video Game Programming	SPRING
CS 419	Informatics	FALL odd# yrs; SUMR even# yrs; SPR odd# yrs
CS 420	Object Oriented Design	FALL even# yrs; SUMR odd# yrs; SPR even# yrs.
CS 435	Expert Systems	SUMR odd# yrs
CS 440	Computer Graphics	FALL even# yrs; SUMR odd#yrs

CS COURSE OFFERINGS BY SEMESTER:

FALL EVEN # YEARS	SPRING ODD # YEARS	SUMMER ODD # YEARS	FALL ODD # YEARS	SPRING EVEN # YEARS	SUMMER EVEN # YEARS
(2008, 2010...)	(2009, 2011...)	(2009, 2011...)	(2009, 2011...)	(2010, 2012...)	(2010, 2012...)
CS 307	CS 331	CS 331	CS 307	CS 331	CS 331
CS 311	CS 335	CS 400	CS 311	CS 335	CS 401
CS 325	CS 355	CS 412	CS 325	CS 355	CS 404
CS 331	CS 401	CS 420	CS 331	CS 400	CS 413
CS 345	CS 402	CS 435	CS 345	CS 408	CS 415
CS 400	CS 404	CS 440	CS 401	CS 409	CS 419
CS 412	CS 413*		CS 403	CS 411	
CS 416	CS 415		CS 404	CS 412	
CS 420	CS 417		CS 413	CS 417	
CS 440	CS 419		CS 415	CS 420	
CS 460			CS 419		

*Note: CS 413 will not be offered in spring 09. Students graduating before it is offered again (fall 09 at the earliest) will be able to substitute an elective with their advisor's approval.

(Rotation Schedule revised 3/08)

Course Descriptions

CS-307 Programming Languages, 3 cr. This course provides an introduction to the fundamental concepts of programming languages, their structural definition and run time implementation. It equips the students with the tools necessary for the critical evaluation of existing programming languages, and the learning of new ones. In addition, it prepares students for the study of compiler design. Prereq.: CS-304 or CS-407.

CS-311 Modern Computer Architecture, 3 cr. This course is intended for those students who wish to understand the architecture and operation of computer systems. Methods for interconnecting processors, memories and I/O devices are discussed. The addressing modes and instruction techniques for manipulation of more complex data structures such as queues, lists and trees are covered. Prereq.: CS-207 or CS-406; CS-301.

CS-325 Automata, Languages, and Theory of Computation, 3 cr. This course discusses several models of computation, including finite automata, pushdown automata, and deterministic and nondeterministic Turing machines. The notions of undecidability, computational complexity, intractability, and NP completeness are also discussed. The course is mainly theoretical in nature, but some applications, such as finite state systems and parsing, will be discussed. Prereq.: CS-201 or CS-405; CS-304 or CS-407.

CS-330 Telecommunications, 3 cr. This course describes the basic principles of modern data communications and presents the techniques and algorithms that deal with data compression, error detection and data encryption. Also, the different kinds of modems are presented and their operation is analyzed. The course finishes with a reference to cellular telephony. Prereq.: CS-207 or CS-406.

CS-331 Computer Networks, 3 cr. This course covers concepts in data communications, emphasizing protocols. An overview of all protocol layers will be covered, with emphasis on OSI and TCP/IP. Prereq.: CS-207 or CS-406.

CS-335 Artificial Intelligence, 3 cr. This course describes the kinds of problems which fall into the area of artificial intelligence such as Natural Language Understanding, Vision and Expert Systems, and what makes these problems difficult. Methods are given which show how these problems can be given structure so that conclusions can be drawn from the knowledge each system has available to it, thus enabling such a system to appear to “think” like an intelligent human being. Prereq.: CS-304 or CS-407.

CS-345 Network Security, 3 cr. This course discusses the principles and practice of network security applications and standards that are widely used on the internet and on corporate networks. Topics covered include cryptographic algorithms and protocols that underlie network security applications, network security tools, system-level security issues including the threat of intruders, virus countermeasures, the use of firewalls and trusted systems, IP security, electronic mail, and web security. Prereq.: CS-308 or CS 408.

CS-355 Cryptography, 3 cr. This course covers cryptography and a wide range of cryptographic applications. Theory discussed includes the design and analysis of cryptographic algorithms such as private key and public key cryptosystems used to secure data transmission and electronic system communications. Cryptographic applications such as digital signatures, entity identification, key exchange, and e-commerce transactions are discussed. Prereq.: CS-324 or CS-404.

CS-400 Discrete Modeling and Analysis, 3 cr. This course provides necessary tools to develop mathematical maturity through the study of important topics such as combinatorial analysis, discrete structures, algorithmic thinking and mathematical reasoning. Topics include Advanced Enumeration Methods, Recurrence Relations (Equations), Graph Theory, Automata and Formal Languages, Proof Techniques, and Probability and Statistics. Prereq.: CS-201 or CS-405.

CS-401 Software Engineering, 3 cr. The complete software development process: requirement specification, design, coding, testing and maintenance. Various software engineering methods for the development of large-scale quality software are presented. Prereq.: CS-304 or CS-407.

CS-402 Advanced Systems Programming, 3 cr. The study of systems programming tools, their use and their construction. Includes the development of an integrated systems programming environment consisting of a processor simulator, an assembler and a loader. Prereq.: CS-301; CS-304 or CS-407.

CS-403 Authoring Techniques in CAI, 3 cr. The study of various concepts associated with computer-aided instruction and authoring. Students will develop software for instructional purposes in their own areas of interest. Languages such as Podium, Visual Basic, HTML, JAVA and LogoWriter can be used. Prereq.: Graduate Standing.

CS-404 Analysis of Algorithms, 3 cr. This course provides various methodologies to design and analyze algorithms. Topics include incremental, divide-and-conquer, dynamic programming, greedy, backtracking, and branch-and-bound methodologies. Additional topics include sorting and searching algorithms, and computational complexity and Intractability. Prereq.: CS-324*; Co-req: CS-400.

CS-405 Applied Discrete Structures, 3 cr. Applied Discrete Structures provides necessary elements of discrete structures to study computer science at our graduate level. Topics include Logic and Proofs, Set Theory, Number Theory, Combinatorics, Probability, Relations and Functions, Boolean Algebra and Matrices. (Background course; not for credit toward M.S. degree.) Prereq.: MATH-106 or equivalent.

CS-406 Object Oriented Development, 3 cr. This course covers the principles of computer programming using an object oriented programming language. Students will get extensive programming experience in designing algorithms and implementing programs that use the fundamental constructs of an OOP language in many application areas. (Background course; not for credit toward M.S. degree.) Prereq.: MATH-106 or equivalent.

CS-407 Elements of Data Structures, 3 cr. This course covers the elements of data structures and algorithms that form the basis of all major computer science applications. Topics include stacks, linked lists, queues, trees, graphs, heaps, recursion and various sort and search algorithms. Students will become experienced in the design and coding of programs that use these structures and algorithms in a variety of applications. (Credit in Teacher Endorsement Concentration only.) Prereq.: CS-207 or CS-406.

CS-408 Advanced Operating Systems, 3 cr. Advanced operating system design and construction concepts such as memory, processor, process, and secondary device management, synchronization and communication, security and protection, system performance and evaluation, network distributed, and fault-tolerant systems are covered. Study of operating systems highlighting these concepts. Prereq.: CS-304 or CS-407.

CS-409 Compiler Theory and Design, 3 cr. This course describes the procedures used to develop a compiler for a high level language. First a simple high level language is defined and a simple program is written using this language. Then the concepts of a scanner and a parser are presented and students write the software for a scanner and a parser. Gradually, software for all phases of a compiler is developed and by the end of the semester, every student has developed a compiler that can produce assembly code for a microprocessor for a program written in a predefined simple high level language. Prereq.: CS-304 or CS-407.

CS-410 Special Topics in Computer Science, 3 cr. This course will treat a specific topic in computer science varying from semester to semester. Topics offered will depend on faculty and student interests. Prereq.: Graduate Standing and Consent of Instructor.

*For students admitted to M.S. program prior to summer 07, CS 304 is the prerequisite for CS 404. Beginning fall 2008, CS 324 is prerequisite of CS 404 for ALL students, regardless of admission date.

CS-411 Professional Computing, 3 cr. This course provides an in-depth study of the history of computing and how computers have affected society. Furthermore, it covers the computer skills, basic to advanced, needed to teach others to be truly computer literate in modern society. Topics include history of computing, the social context of computing, ethical issues in computing, computer security and privacy, the impact of the internet and the World Wide Web, an introduction to networks, an introduction to computer architecture and operating systems, word processing, spreadsheets, and database systems. Prereq: Graduate Standing.

CS-412 Web Application Development, 3 cr. This course serves as an introduction to different techniques and tools for the design of web applications. Topics covered include web applications flow, object oriented programming, design of classes, dynamic content, scripting languages, implicit objects, and database accessing. Students will be expected to understand and apply these concepts into the generation of sample websites. Prereq.: CS-207 or CS-406.

CS-413 IT Project Management, 3 cr. IT Project Management is the discipline that applies management principles to the development of information system projects. It uses techniques developed by Industrial Engineers and used by other engineers and business managers to bring in projects within time and budget. This course supplements Software Engineering by focusing on the management aspects of investing in the development of information systems. Prereq.: CS-207 or CS-406; Coreq.: CS-401.

CS-414 Independent Study, 3 cr. An opportunity for advanced study under the direction of an advisor knowledgeable in the field. The area of study will be selected by the student and his/her advisor, and must be approved by the department chair. Prereq. Graduate Standing and Consent of Instructor.

CS-415 Design of Data Base Systems, 3 cr. This course covers various concepts associated with design and construction of data base systems. Topics include data base architecture, relational model, relational languages (SQL), normalization theory, Entity-Relationship theory and physical data base design. Students will develop a simple data base system. Prereq.: CS-207 or CS-406.

CS-416 Artificial Intelligence and Robotics, 3 cr. This course serves as an introduction to aspects of Artificial Intelligence applied to the robotics field. Students will learn different techniques to approach problems using simple robotics. Students will be expected to understand the main concepts, research for available resources, and participate in projects where these concepts will be applied. Prereq.: CS-304 or CS-407.

CS-417 Video Game Programming, 3 cr. The aim of this course is to explore the basics behind game programming and the gaming industry, including elements of computer graphics and computer vision as well as advanced stereoscopic computer applications. Following the nature of computer/video games development as a team effort, for this course, we shall design and implement one large class project for a game prototype as a team. Prereq.: CS-304 or CS-407.

CS-419 Informatics, 3 cr. Informatics is the discipline that applies the methodologies of science and engineering to information. It concerns organizing data into information, learning knowledge from information, learning new information from knowledge, and making decisions based on the knowledge and information learned. This course concerns computational methods for analyzing data and processing information in applications to business decisions. Prereq.: CS-400; CS-304 or CS-407; ECON-220 or MATH-275 or their equivalent.

CS-420 Object Oriented Design, 3 cr. This course provides students with a solid foundation in object oriented design (OOD) and programming (OOP), a contemporary and highly used programming paradigm. OOD involves the presentation of three main concepts: encapsulation, polymorphism, and inheritance. These concepts and implementation techniques are presented in an object oriented programming language and students become experience in OOD projects. Prereq.: CS-304 or CS-407.

- CS-426 Exploring Numerical Methods, 3 cr.** This course covers the elements of the design and analysis of numerical methods. Topics include errors in numerical methods, floating-point and interval arithmetic, measuring the efficiency of numerical methods, interpolation and curve fitting, numerical differentiation, numerical integration, and numerical optimization. Prereq.: CS-200 or CS 406; MATH-203.
- CS-430 Queueing Theory in Communications Networks, 3 cr.** Queueing Systems, birth and death models, Markovian queues, the M/G/1 model, Erlang's equations, models of computer and telecommunication systems. Prereq.: CS-304 or CS-407.
- CS-431 Digital Telephony, 3 cr.** Advantages over analog telephony, voice digitalization, digital transmission and multiplexing, switching, networks (synchronization, control, and management), traffic analysis, terrestrial vs. satellite. Prereq.: CS-304 or CS-407; CS-330.
- CS-435 Expert Systems, 3 cr.** An expert system is a program that is capable of making the judgments and decisions of an expert. An example of an expert system is a program that does medical diagnosis. This course covers methods for designing expert systems and for reasoning using expert systems. Prereq.: CS-304 or CS-407; CS-400.
- CS-440 Computer Graphics, 3 cr.** Graphics hardware. Scaling and data charting. Representation of two-dimensional objects. Translation and rotation of objects. Two-dimensional line clipping. Three-dimensional object representation. Perspective in three-dimensional object representation. Line-clipping and hidden line and face removal in three dimensions. Efficiency considerations in hidden line and face removal. Lighting and shading. Reflections and shadow. Transparent and translucent surfaces. Interactive graphics and associated hardware and software. Software for event handling and device sampling. Light pen with locator/pick problems and echoing. Prereq.: CS-304 or CS-407; CS-400.
- CS-442 Topics in Network Design, 3 cr.** Protocols for computer networks. Performance requirements, evaluation and analysis. Case studies of actual networks. Prereq.: Graduate Standing.
- CS-450 Advanced Computer Architecture, 3 cr.** Computer system structure and design issues such as ALU design, arithmetic algorithms, memory hierarchy, control, microprogramming, instruction sets, addressing, input-output. Comparison of specific examples of computer models and selected topics on parallel processors. Prereq.: CS-301; CS-308 or CS-408; CS-311.
- CS-455 Cyber Risk Management, 3 cr.** This course teaches students the principles of managing risk as it relates to information security in an organization engaged in computing and internet operations. Students will be able to use their knowledge of security and privacy issues to develop tools for analyzing and managing cyber risk and creating a policy framework for information security. Prereq.: CS-201 or CS-405; CS-207 or CS-406.
- CS-460 Computer Security, 3 cr.** Study of existing hardware and software techniques for implanting security. Passwords, encryption and authorization schemes. Special security problems presented by distributed and network environments. Prereq.: CS-304 or CS-407; CS-400.
- CS-470 Pattern Recognition, 3 cr.** Statistical and semantical methods of pattern recognition. Image processing with industrial and commercial applications. Application to sound and visual identification problems. Prereq.: CS-409 or Consent of Instructor.
- CS-490 Master's Project, 3 cr.** The completion of a large scale software project and associated documentation or a thesis. Topic for the project is chosen in conjunction with a project advisor. Prereq.: 30 hours of graduate credit.
- CS-495 Master's Thesis, 6 cr.** Student conducts research and writes a thesis in Computer Science. This is an alternative to CS-490 for those who want to pursue a more ambitious project. Prereq.: 30 hours of graduate credit.

Computer Science Faculty

Netiva Caftori, Professor, D.A., University of Illinois (Chicago). Web development; Education software; Security; Ethics.

Miroslava Carlson, Assistant Professor, M.S., Northwestern University. Relational Database Theory and Practice.

Christine Georgakis, Professor, Ph.D., Illinois Institute of Technology. Artificial intelligence; Expert systems; Computer security.

Mohammed Haque, Associate Professor, Ph.D., Illinois Institute of Technology. Artificial intelligence; Intelligent tutoring systems.

Heung Kim, Professor, Ph.D., Northwestern University. Artificial intelligence; Deductive database systems; Expert systems; Programming languages.

Peter G. Kimmel, Associate Professor and Graduate Program Coordinator, Ph.D., University of Chicago. Theoretical computer science, complexity theory, algorithms, communication complexity, randomized algorithms.

Kumarss Naimipour, Associate Professor, Ph.D., University of Illinois. Algorithms; Data structures; Combinatorics; Graph theory.

Richard Neapolitan, Professor and Chair of the Computer Science Department, Ph.D., Illinois Institute of Technology. Probabilistic reasoning in expert systems; Foundations of probability theory; Cognitive science.

Pericles Prezas, Assistant Professor, Ph.D., Illinois Institute of Technology. Telecommunications; Digital design; Networks; Computer architecture.

Marcelo Sztainberg, Assistant Professor, Ph.D., State University of New York at Stonybrook. Robotics; Nanorobotics; Algorithms; Complexity; Computational geometry; Artificial intelligence.

Adjunct Faculty

James Albright, M.S., Northern Illinois University. Object oriented programming; Web development, Java; Websphere; Operating systems.

John Hade, M.S., Northeastern Illinois University. Databases; Data structures; Assembly language; Programming language theory.

David Kamper, M.S., Northeastern Illinois University. Application systems development; Databases; Programming languages.

Michael Kazarinov, Ph.D., Kharkov State University, USSR. Computer graphics.

Norman Noerper, Assistant Professor, M.B.A., University of Missouri (Kansas City). Application systems development; Databases, ASP.net, VB.net, Microsoft Servers; IBM mainframe; Project management.

Freddy Ann Porps, M.S. Northeastern Illinois University.

Kenneth Sotak, M.S. Northeastern Illinois University

Kim Tracy, M.S., Stanford University. Executive Director of University Computing for NEIU, Artificial Intelligence, Security, Networking, Operating Systems, Databases, Ebusiness, And History Of Computing.

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1st Revision 09/1989
M.S. 09/1987