COMPUTER SCIENCE

Office: 5057 Woodward, Suite 3010; 313-577-2477
Chairperson: Nathan Fisher
https://engineering.wayne.edu/computer-science (https://engineering.wayne.edu/computer-science/)

The mission of the Department of Computer Science at Wayne State University is to provide excellence in teaching, research, public service, and leadership in the computer science profession and the community. The Department provides a high-quality, innovative, baccalaureate and graduate education that emphasizes the fundamentals of computer science as well as the most recent technological innovations, preparing students for employment and advanced studies. Students are encouraged to become involved in research programs in order to enhance their education and their employment opportunities. Through the use of our state-of-the-art laboratory facilities, students can conduct basic and applied research of high quality, influence, visibility, and potential community impact. The Department continues to develop cooperative research relationships within and outside the computer science discipline, as well as with industry, government and alumni, and local community organizations. This worldwide interaction with professional organizations provides our students with the highest standards, goals, and professional practices.

The Department of Computer Science operates eight instructional and multiple research laboratories comprising about 300 state-of-the-art workstations and servers.

ARSLANTURK, SUZAN: Ph.D., Oakland University; M.S., Oakland University; B.S., Baskent University; Associate Professor

BOSU, AMIANGSHU S.: Ph.D., M.S., University of Alabama; B.S., Bangladesh University of Engineering and Technology; Assistant Professor

BROCKMEYER, MONICA: Ph.D., M.S., B.S., University of Michigan; Associate Professor

DONG, MING: Ph.D., University of Cincinnati; B.S., Shanghai Jiao Tong University; Professor

DONG, ZHENG: Ph.D., University of Texas at Dallas; M.S., University of Science and Technology of China; B.S., Wuhan University; Assistant Professor

DRAGHICI, SORIN: Ph.D., St. Andrews University; M.S., B.S., Politechnica University; Professor

FAHMIDA, SEZANA: Ph.D., Wayne State University; B.S., Bangladesh University of Engineering and Technology; Assistant Professor (Teaching)

FISHER, NATHAN: Ph.D., University of North Carolina; M.S., Columbia University; B.S., University of Minnesota; Professor and Chair

FOTOUHI, FARSHAD: Ph.D., Michigan State University; M.S., B.S., Western Michigan University; Professor

GOEL, NARENDRA S.: Ph.D., University of Maryland; M.S., Poona University; M.S., Delhi University; B.S., Agra University; Professor

GROSU, DANIEL: Ph.D., M.S., University of Texas at San Antonio; B.S., Technical University of Iasi; Professor

HAN, ZHIZHONG: Ph.D., M.E., B.E., Northwestern Polytechnical University; Assistant Professor

HUA, JING: Ph.D., M.S., State University of New York at Stony Brook; M.S., Institute of Automation, Chinese Academy of Sciences; B.S., Huazhong University of Science and Technology; Professor

JANG, RHONGHO: Ph.D., University of Central Florida; Assistant Professor

JAYYOUSI, THAER: Ph.D., M.S., B.S., Wayne State University; Associate Professor (Teaching)

KHANDURI, PRASHANT: Ph.D., Syracuse University; Assistant Professor

KOTOV, ALEXANDER: Ph.D., M.S., University of Illinois at Urbana-Champaign; B.S., Tver State Technical University; Associate Professor

LIU, LIHUI: Ph.D., University of Illinois at Urbana-Champaign; M.S., Chinese Academy of Sciences; B.S., Huazhong University of Science and Technology; Assistant Professor

LU, SHIYONG: Ph.D., State University of New York at Stony Brook; M.E., Institute of Computing Technology, Chinese Academy of Sciences; B.E., University of Science and Technology of China; Professor

MOUSAVI MOJAB, SEYED ZIAE: Ph.D., M.S., Wayne State University; B.S., University of Michigan; B.A., University of Tehran; Assistant Professor (Teaching)

NASSER, HADI: M.S., B.S., University of Michigan-Dearborn; Assistant Professor (Teaching)

PALAZZOLO, THOMAS J: M.A., University of Detroit Mercy; Assistant Professor (Teaching)

REYNOLDS, ROBERT G.: Ph.D., M.S., M.A., B.S., University of Michigan; Professor

SAIFULLAH, ABUSAYEED: Ph.D., Washington University in St Louis; M.S., University of Windsor; B.S., Bangladesh University of Engineering and Technology; Associate Professor

SCHWIEBERT, LOREN J.: Ph.D., M.S., Ohio State University; B.S., Heidelberg University; Professor

WITTEN, DOUG: M.S., University of Michigan-Flint; Assistant Professor (Teaching)

XU, LIHAO: Ph.D., California Institute of Technology; M.Sc., B.Sc., Shanghai Jiao Tong University; Associate Professor

YI, ZHU: Ph.D., State University of New York at Buffalo; B.S. Beihang University; Assistant Professor

ZHONG, ZICHUN: Ph.D., M.S., University of Texas at Dallas; M.S., B.S., The University of Electronic Science and Technology of China; Associate Professor

ZHU, DONGXIAO: Ph.D., M.A., University of Michigan; M.A., Eastern Michigan University; M.S., Peking University; B.S., Shandong University; Associate Professor

- Computer Science (M.S.) (http://bulletins.wayne.edu/graduate/college-engineering/computer-science/computer-science-ms/)
- Computer Science (Ph.D.) (http://bulletins.wayne.edu/graduate/college-engineering/computer-science/computer-science-phd/)
- Artificial Intelligence (M.S.) (http://bulletins.wayne.edu/graduate/college-engineering/computer-science/artificial-intelligence-ms/)
- Data Science and Business Analytics (M.S.) (http://bulletins.wayne.edu/graduate/college-engineering/computer-science/data-science-business-analytics-ms/)

- Robotics (M.S.) (http://bulletins.wayne.edu/graduate/college-engineering/computer-science/robotics-ms/)

CSC 5050 Algorithms and Data Structures Cr. 3
Introduction to problem solving methods and algorithm development; data abstraction for structures such as stacks, queues, linked lists, trees, and graphs; searching and sorting algorithms and their analysis. Not for CSC major credit. Offered for graduate credit only. Offered Yearly.
Restriction(s): Enrollment is limited to Graduate level students.

CSC 5100 Introduction to Mobility Cr. 3
Introduces mobility through giving students a comprehensive understanding of state-of-the-art engineering practices used in the autonomous vehicle industry. Students will get to interact with real data sets from an autonomous vehicle, all through hands-on projects using the open source autonomous driving simulator. Students will hear from industry experts, who work at companies like Ford and GM as they share insights about autonomous technology and how that is powering job growth within the field. Students will also be introduced to the general terminology, design considerations and smart infrastructures on mobility. Offered Winter.
Prerequisites: CSC 3100 with a minimum grade of C- and CSC 3110 with a minimum grade of C-

CSC 5250 Network, Distributed, and Concurrent Programming Cr. 3
Fundamental concepts and skills of developing networked, distributed, and concurrent applications. Topics include: inter-process communication, TCP/IP sockets programming, remote method invocation, multithreading, concurrency and synchronization. Offered Yearly.
Prerequisites: CSC 4420 with a minimum grade of C-

CSC 5270 Computer Systems Security Cr. 3
Fundamental technologies for enabling an e-society which is more predictable, more accountable, and less vulnerable to attacks. Covers three components: security requirements and protocols, cryptography algorithms, and case studies. Offered Fall.
Prerequisites: CSC 5250

CSC 5272 Principles of Cyber Security Cr. 3
Addresses the broad range of industry best practices, knowledge, and skills expected of an IT security manager or officer. Students will learn both the theory and the requirements for practical implementation of core security concepts, practices, monitoring, and compliance. Students will also learn to identify and maintain cost-effective security controls that are closely aligned with business requirements and industry standards. Offered Every Term.
Prerequisites: CSC 2200 with a minimum grade of C or CSC 3020 with a minimum grade of C-

CSC 5276 Unix Security and Shell Programming Cr. 3
This course will feature advanced Linux shell scripting which will show students how to automate specific tasks within the system while also safeguarding against bad actors from compromising the environment. This class will focus on the BASH and Bourne shells with an emphasis on learning SED, AWK and other powerful tools. The class will analyze system threats utilizing the latest in log management. Offered Yearly.
Prerequisites: CSC 5272 with a minimum grade of C-

CSC 5278 Web Security: Hacking and Defense Cr. 3
This course introduces students to web application threats both internally and externally. Malicious code can enter a system from many avenues and attackers. The students will learn both offensive and defensive strategies to thwart a verity of attacks like an SQL Injection, Cross-site Scripting (XSS), Cross Site (CSRF) and Server Side Request Forgery(SSRF). The student's will be using industry best practices tools like BurpSuite, Wireshark, wpscan, sqlmap, RainbowCrack and Zap. The goal of the course is to learn how to make the target surface as small as possible while not impeding the throughput of the data while keeping critical infrastructure operational. Offered Yearly.
Prerequisites: CSC 5272 with a minimum grade of C-

CSC 5280 Introduction to Cyber-Physical Systems Cr. 3
Topics include: modeling, design, analysis, and implementation of cyber-physical systems; dynamic behavior modeling, state machine composition, and concurrent computation; sensors and actuators; embedded systems and networks; feedback control systems; temporal logic and model checking. Offered Yearly.
Prerequisites: CSC 3100 with a minimum grade of C- and CSC 3110 with a minimum grade of C-
Restriction(s): Enrollment limited to students in the College of Engineering.
Equivalent: ECE 5280

CSC 5290 Cyber Security Practice Cr. 3
This course will explore board security topics in the areas of network and operating systems. In particular, this course focus on providing hands-on experience leveraging various security tools, aiming to help students understand real-world security threats. It will cover both offensive and defensive methods in a laboratory environment. Students are expected to finish lab assignments using real-world exploits and defense tools. Offered Every Term.
Prerequisites: CSC 4190 with a minimum grade of C- or CSC 4420 with a minimum grade of C-

CSC 5430 Game Programming and Design I Cr. 3
Fundamentals of game programming and game design using C++, DirectX, Windows, and C#. Offered Fall.
Prerequisites: CSC 2200 with a minimum grade of C or CSC 5250 with a minimum grade of C-
Corequisite: CSC 5431

CSC 5431 Game Programming and Design I: Lab Cr. 1
Laboratory for CSC 5430. Focus on modding, or making changes to existing programs to achieve specific results. Offered Fall.
Corequisite: CSC 5430
Fees: $25

CSC 5750 Principles of Web Technology Cr. 3
History and development of the world-wide web. Techniques for authoring static and dynamic content for the world-wide web. Web security techniques. Electronic commerce on the web. Lab exercises required. Offered Fall, Winter.
Prerequisites: MAT 2010 with a minimum grade of C- and CSC 3750 with a minimum grade of C-

CSC 5800 Intelligent Systems: Algorithms and Tools Cr. 3
Introduction to basic algorithms and software tools for intelligent data representation and analysis, including: data pre-processing, data exploration and visualization, model evaluation, predictive modeling, classification methods, association analysis, clustering, anomaly detection, representing extracted patterns as expertise, tools for data mining and intelligent systems such as WEKA, CLIPS, and MATLAB. Offered Intermittently.
Prerequisites: (CSC 2200 with a minimum grade of C and MAT 2010 with a minimum grade of C-) or (CSC 5050 with a minimum grade of C and MAT 2010 with a minimum grade of C-)

CSC 5825 Introduction to Machine Learning and Applications Cr. 3
Through algorithmic investigation, brainstorming, and case analysis, students develop the skills and strategies that are necessary for effective leaning from data, including Big Data emerging from science and engineering. Offered Winter.
Prerequisites: CSC 3110 with a minimum grade of C-

CSC 5830 Computational Modeling of Complex Systems Cr. 3
Introduction to computer methods useful for modeling complex systems which are refractory to traditional methods of analysis. Emphasis on problem formulation and concrete examples drawn from computer science, engineering, chemistry, and biology. Offered Yearly.
Prerequisites: CSC 2200 with a minimum grade of C or CSC 5050 with a minimum grade of C-

CSC 5870 Computer Graphics I Cr. 3
Graphics devices, graphics primitives, 2-D transformations, windowing and clipping, modeling 3-D objects, 3-D viewing transformations, hidden surface removal, shading and color. Offered Yearly.
Prerequisites: (CSC 5050 with a minimum grade of C and MAT 2250 with a minimum grade of C-) or (CSC 2200 with a minimum grade of C and MAT 2250 with a minimum grade of C-)

CSC 5991 Special Topics in Computer Science Cr. 1-4
Topics to be announced in the Schedule of Classes. Offered Intermittently.
Prerequisites: CSC 2200 with a minimum grade of C
Repeatable for 9 Credits

CSC 6110 Software Engineering Cr. 3
Software process models; advanced software system design; software project management; software analysis; testing and performance analysis; software maintenance; reverse engineering; software reuse; software metrics; object-oriented development. Offered Yearly.
Prerequisites: (CSC 2200 with a minimum grade of C and MAT 2010 with a minimum grade of C-) or (MAT 2010 with a minimum grade of C- and CSC 5050 with a minimum grade of C-)

CSC 6220 Parallel Computing I: Programming Cr. 3
Parallel computing concepts, examples of parallel computers, parallelism in algorithms / data / programs, experiences with state of the art parallel computers. Offered Yearly.
Prerequisites: (CSC 2200 with a minimum grade of C and CSC 5050 with a minimum grade of C) or CSC 3100 with a minimum grade of C-

CSC 6272 Malware and Reverse Engineering Cr. 3
This course will equip students with the necessary background knowledge to become effective Malware Analysis and Reverse Engineering practitioners. The students will learn techniques on how to detect and dissect code with the goal of finding out exactly what the program is doing down to the byte level. The students will gain knowledge on how to handle Command and Control type of Ransomware along with viruses that are intended to take down critical infrastructure. The students will learn how to combat malware and viruses by using tools like Olydbg, Ghidra, Radare2 and NASM Shell. These programs will allow the students to view the payloads of the latest real-world malware. The students will also and gain an understanding of how industry best practices on how an attacker has spread the code and most of all, eradicate them. Offered Yearly.
Prerequisites: CSC 5272 with a minimum grade of C-

CSC 6274 Certified Penetration Testing Cr. 3
The ethical behavior expected of a cyber penetration tester is emphasized. Several applicable codes of ethics will be reviewed. Students are expected to abide by these codes of ethics, both during this course, and after the course is completed. The student will learn the business skills needed to identify protection opportunities, to justify testing activities, and to help the client organization better combat cyber threats. The student will gain deeper insight into industry best practices. Offered Yearly.
Prerequisites: CSC 5272 with a minimum grade of C-

CSC 6280 Real-Time and Embedded Operating Systems Cr. 3
Operating system design for real-time and embedded systems. Focus on scheduling, synchronization, communication, and process and memory management for time-critical and resource-constrained applications. Offered Every Other Year.
Prerequisites: CSC 4420 with a minimum grade of C-

CSC 6290 Data Communication and Computer Networks Cr. 3
Data communication fundamentals and principles governing computer communication networks. Components of networks, how they are connected; basics of design and implementation of network protocols. Offered Yearly.
Prerequisites: CSC 5250

CSC 6430 Game Programming and Design II Cr. 3
Game design methods, team development, languages for game design, debugging and testing, game platforms, memory management and I/O, game physics, character animation, AI agents, AI path programming, networking, online and multiplayer gaming. Offered Yearly.
Prerequisites: CSC 5430 with a minimum grade of C- and CSC 5431 with a minimum grade of C-
Corequisite: CSC 6431

CSC 6431 Game Programming and Design II: Lab Cr. 1
Architecture and tools for modern game platforms. Game development environment; basic aspects of game engine design, graphics engine design, use of shaders. Offered Yearly.
Corequisite: CSC 6430
Fees: $25

CSC 6500 Theory of Languages and Automata Cr. 3
Recursive and recursively enumerable languages; decidability and computability; Rice's theorem; time complexity; space complexity. Offered Fall, Winter.
Prerequisites: CSC 4500 with a minimum grade of C-

CSC 6580 Design and Analysis of Algorithms Cr. 3
Best case, worst case, and expected case complexity analysis; asymptotic approximations; solutions of recurrence equations; probabilistic techniques; divide-and-conquer; the greedy approach; dynamic programming; branch and bound; NP-completeness; parallel algorithms. Offered Fall, Winter.
Prerequisites: CSC 3110 with a minimum grade of C-

CSC 6620 Matrix Computation I Cr. 4
Background matrix algebra; linear system sensitivity; basic transformations; Gaussian elimination; symmetric systems; positive definite systems; Householder method for least squares problems; unsymmetric eigenvalue problems; the QR algorithm. Offered Yearly.
Prerequisites: (CSC 2200 with a minimum grade of C and MAT 2250 with a minimum grade of C-), ECE 3440 with a minimum grade of C-, or BE 2550 with a minimum grade of C-

CSC 6710 Database Management Systems I Cr. 3
Data models, normal forms, relational systems and SQL, query optimization, object-oriented systems, object-relational systems, student Oracle project. Offered Yearly.
Prerequisites: CSC 4710 with a minimum grade of C-

CSC 6720 Data Science Applications Development Cr. 3
Background of SQL and NoSQL databases is necessary. This course focuses on the system development life cycle of a comprehensive data science application. Students will first choose a particular domain and problem to address one of the big data challenges: volume, velocity, or variety. Students will then choose a scalable distributed computing environment to design analytical models to solve business problems. Students will finally develop their data science application using agile methodologies to plan, analyze, design, implement, and operationalize their application. Offered Yearly.
Restriction(s): Enrollment is limited to Graduate level students.

CSC 6800 Artificial Intelligence I Cr. 3
Basic concepts; topics include: recursive problem solving, knowledge representation using semantic networks and frames, state space search methods, planning and problem solving, game playing and adversarial search methods, rules and production systems (RETE networks), constraint satisfaction techniques and applications, optimization algorithms including genetic algorithms, logic programming. Implementation in Lisp and Prolog. Offered Yearly.
Prerequisites: CSC 3110 with a minimum grade of C-

CSC 6860 Digital Image Processing and Analysis Cr. 3
Review of image formation and acquisition; image transformation; image enhancement and restoration; image compression; morphological image processing; edge detection and segmentation; architecture for image processing. Offered Intermittently.
Prerequisites: CSC 3110 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate or Undergraduate level students.

CSC 6870 Computer Graphics II Cr. 3
Representing curves and surfaces; solid modeling; fractal geometry; camera models; illumination models; ray tracing; radiosity methods; transparency; texture; graphics packages. Offered Yearly.
Prerequisites: CSC 5870 with a minimum grade of C-
Fees: $20

CSC 6991 Topics in Computer Science Cr. 1-4
Current topics to be announced in the Schedule of Classes. Offered Intermittently.
Prerequisites: CSC 2200 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate or Undergraduate level students.
Repeatable for 9 Credits

CSC 6995 Internship in Computer Science Cr. 1-3
Experience in industry using tools from the computer science curriculum. Students provide a written report based on the internship experience. Offered Every Term.
Repeatable for 6 Credits

CSC 7220 Parallel Computing II: Algorithms and Applications Cr. 3
Problems in parallel algorithms: design, analysis, complexity. Cluster and grid computing: tools, programming, and applications. Offered Yearly.
Prerequisite: CSC 6220 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

CSC 7260 Distributed Systems Cr. 3
Models of distributed systems, distributed synchronization, algorithms, consistency and replication models and algorithms, fault-tolerance in distributed systems. Offered Every Other Year.
Prerequisite: CSC 5250 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

CSC 7270 Advanced Computer Security Cr. 3
Advanced topics in protecting information computer systems and data. Topics include, but are not limited to, crypto-algorithms and protocols (e.g., IDEA, Elliptic Curve Cryptosystems, and the Byzantine Generals Problem), and secure system design principles. Hands-on design project will reinforce the material. Offered Winter.
Prerequisite: CSC 5270 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students; enrollment limited to students in the College of Engineering.

CSC 7290 Advanced Computer Networking Cr. 3
Foundations of computer networking (e.g., performance evaluation and analysis, protocol specification and verification), latest development in network architecture and technology (e.g., wireless networks, sensor networks, peer-to-peer networks, vehicular networks). Offered Yearly.
Prerequisite: CSC 6290 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.
Fees: $25

CSC 7300 Bioinformatics I: Biological Databases and Data Analysis Cr. 3
Concepts of bioinformatics; tools for storing and analysis of bioinformatics data. Offered Winter.
Restriction(s): Enrollment is limited to Graduate level students.

CSC 7301 Bioinformatics I: Programming Lab Cr. 1
Hands-on experience and exercises for CSC 7300/MBG 7300 lectures. Offered Fall.
Restriction(s): Enrollment is limited to Graduate level students.
Fees: $25

CSC 7410 Bioinformatics II Cr. 4
Biology of bioinformatics, DNA and protein sequencing, introduction of systems biology, mRNA expressions analysis, pathway and molecular machines analysis. Offered Winter.
Prerequisite: CSC 7300 with a minimum grade of C and CSC 7301 with a minimum grade of C and MGG 7010 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

CSC 7710 Database Management Systems II Cr. 3
Concurrency control, transaction processing, crash recovery, security, distributed and heterogeneous databases, data warehousing, data mining, multimedia systems, student Oracle project. Offered Yearly.
Prerequisite: CSC 6710 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

CSC 7760 Deep Learning Cr. 3
Covers the basics of deep neural networks and their applications in various AI tasks. Students will gain a considerable understanding regarding the subject and be able to apply Deep Learning to a range of problems. They will also be positioned to understand the current literature on the topic and extend their knowledge through further study. The following topics will be covered: Feed-forward Deep Neural Networks, Regularizations, Optimization methods, Convolutional Neural Networks, Sequence Modeling: Recurrent and Recursive Networks, Autoencoders and Generative Adversarial Networks and Applications in Object Detection, Natural Language Processing, Relational Reasoning, and Spatial-temporal and Graph Modelling. Programming tutorials on Python, Jupyter, TensorFlow, and Keras will also be provided. Offered Winter.
Restriction(s): Enrollment is limited to Graduate level students.

CSC 7800 Artificial Intelligence II Cr. 3
Advanced topics from these areas: machine learning techniques (inductive and deductive), neural networks and perceptrons, genetic algorithms, advanced concepts in knowledge-based system design, inexact inference, constraint satisfaction techniques and applications, object-oriented programming. Implementation in Lisp and Prolog. Offered Yearly.
Prerequisite: CSC 6800 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

CSC 7810 Data Mining: Algorithms and Applications Cr. 3
Application of various basic/advanced data mining techniques to real-world problems. Offered Winter.
Prerequisite: CSC 5800 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.
Equivalent: IE 7811

CSC 7825 Machine Learning Cr. 3
Supervised learning including regression, kernel-based, tree-based, probability model based and ensemble learning; unsupervised learning including distance based and model based; Markov Chain Monte Carlo (MCMC) methods; graphical models; current topics from literature. Offered Fall.
Prerequisite: CSC 5825 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

CSC 7990 Directed Study Cr. 1-5
Provides students with an opportunity to explore topics or areas of interest not covered in the standard curriculum. Provides more flexible and personalized instruction, allowing students to work closely with a faculty member. Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 12 Credits

CSC 7991 Advanced Topics in Computer Science Cr. 1-4
Topics to be announced in the Schedule of Classes. Offered Every Other Year.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 9 Credits

CSC 8260 Seminar in Networking, Distributed Systems and Parallel Systems Cr. 3
Discussion of current research papers in the fields. Offered Every Other Year.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 9 Credits

CSC 8710 Seminar in Database Management Systems Cr. 3
Discussion of current papers in the field. Offered Every Other Year.
Prerequisite: CSC 6710
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 9 Credits

CSC 8800 Seminar in Machine Learning and Artificial Intelligence Cr. 3
Discussion of current papers in the field. Prospective students should have a solid understanding of machine learning models, optimization algorithms and the underlying mathematics/programming background. Offered Yearly.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 9 Credits

CSC 8860 Seminar Topics in Computer Vision and Pattern Recognition Cr. 3
Discussion of current papers in the field. Offered Every Other Year.
Prerequisite: CSC 7860 with a minimum grade of C
Restriction(s): Enrollment is limited to Graduate level students.

CSC 8990 Graduate Seminar Cr. 1
Discussion of current research by faculty and visitors. Offered Fall, Winter.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 8 Credits

CSC 8999 Master's Thesis Research and Direction Cr. 1-8
Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 8 Credits

CSC 9990 Pre-Doctoral Candidacy Research Cr. 1-8
Research in preparation for doctoral dissertation. Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 12 Credits

CSC 9991 Doctoral Candidate Status I: Dissertation Research and Direction Cr. 3-9
Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 9 Credits

CSC 9992 Doctoral Candidate Status II: Dissertation Research and Direction Cr. 1-18
Offered Every Term.
Prerequisite: CSC 9991 with a minimum grade of S
Restriction(s): Enrollment is limited to Graduate level students.
Repeatable for 18 Credits

CSC 9993 Doctoral Candidate Status III: Dissertation Research and Direction Cr. 7.5
Offered Every Term.
Prerequisite: CSC 9992 with a minimum grade of S
Restriction(s): Enrollment is limited to Graduate level students.

CSC 9994 Doctoral Candidate Status IV: Dissertation Research and Direction Cr. 7.5
Offered Every Term.
Prerequisite: CSC 9993 with a minimum grade of S
Restriction(s): Enrollment is limited to Graduate level students.

CSC 9995 Candidate Maintenance Status: Doctoral Dissertation Research and Direction Cr. 0
Offered Every Term.
Restriction(s): Enrollment is limited to Graduate level students.
Fees: $434.8
Repeatable for 0 Credits