**MU Doctor of Philosophy in Computer Science (Ph.D)**

The Doctor of Philosophy (Ph.D.) in Computer Science at Morrison University is an advanced, intensive program offered by the Computer Science Department and designed to take students to the frontiers of knowledge in one of several key areas of Computer Science.

The Ph.D. in Computer Science combines theory and practice in complementary, yet flexible, ways. The program has been designed to prepare students for careers in research (at universities, or government or industrial research laboratories), teaching at institutions of higher education, or advanced development (at hardware and software companies).

**COURSE MODULES**

**CSCI 4470/6470 Algorithms**

Algorithms, covering basic analysis techniques, basic design techniques (divide-and-conquer, dynamic programming, greedy), basic and advanced graph algorithms, and NP -completeness theory.

**Credit Hours:** 4

**Prerequisites:** (CSCI 2720 or CSCI 2725) and CSCI 2670

**CSCI 6480 Approximation Algorithms**

This is a graduate-level course on algorithms for finding approximate solutions to NP-complete problems. It introduces the class NP and explores the importance of the NP-complete problems. Approaches for finding approximate.

**Credit Hours:** 4

**Prerequisites:** CSCi 2670 or Permission of Department

**CSCI 6610 Automata and Formal Languages**

The fundamental limitations on mechanized computation. In the first part of the course, the emphasis is on possible versus impossible computations. Three classes of languages are considered: regular, context-free, and recursively enumerable. In the second part of the course the emphasis shifts to possible versus feasible computations.

**Credit Hours:** 4

**Prerequisites:** CSCI 2670

**CSCI 4050/6050 Software Engineering**

Full cycle of a software system development effort, including requirements definition, system analysis, design, implementation, and testing. Special emphasis is placed on system analysis and design. The design phase includes development of a user interface. A large term project incorporates the full software life cycle.

**Prerequisites:** CSCI 2720 or CSCI 2725

**CSCI 4370/6370 Database Management**

The theory and practice of database management. Topics to be covered include efficient file access techniques, the relational data model as well as other data models, query languages, database design using entity-relationship diagrams and normalization theory, query optimization, and transaction processing.

**Credit Hours:** 4

**Prerequisites:** CSCI 2720 or CSCI 2725

**CSCI 4570/6570 Compilers**

Design and implementation of compilers for high-level programming languages. Topics include all phases of a typical compiler, including scanning, parsing, semantic analysis, intermediate code generation, code optimization, and code generation. Students design and develop a compiler for a small programming language. Emphasis is placed on using compiler development tools.

**Credit Hours:** 4

**Prerequisites:** Undergraduate Students: CSCI 4720

Graduate Students: CSCI 6720

**CSCI 6720 Computer Systems Architecture**

Design and analysis of the structure and function of modern computing systems. Topics studied include combinational and sequential logic, number systems and computer arithmetic, hardware design and organization of CPU, I/O systems and memory systems, instruction set and assembly language design, performance characterization and measurement, and current trends and developments in computer architecture and organization.

**Credit Hours:** 4

**Prerequisites:** CSCI 4720

**CSCI 4730/6730 Operating Systems**

Coverage of the key concepts in modern operating systems. Specific topics include process management, synchronization mechanisms, scheduling strategies, deadlock detection/avoidance, memory management, file systems, protection and security, and distributed systems. Concepts will be reinforced through programming projects using a realistic operating system.

**Credit Hours:** 4

**Prerequisites:** Undergraduate Students: (CSCI 4720 or CSEE 4280) and CSCI 2720

Graduate Students: CSCI 6720

**CSCI 4760/6760 Computer Networks**

In-depth coverage of computer networks, including: digital data transmission and encoding, layered protocol models, Internet protocol, Internet client-server software, and network design methodology.

**Credit Hours:** 4

**Prerequisites:** CSCI 2720 and (CSCI 2670 or CSCI 2670E or CSEE 2220 or CSEE 2220E)

**CSCI 4780/6780 Distributed Computing Systems**

The fundamental concepts in distributed computing and the practical techniques for building distributed systems. Topics include distributed computing models, naming, synchronization, replication and consistency, fault tolerance, and security. Widely deployed distributed systems are used as case studies. Students design, implement, and analyze prototype systems.

**Credit Hours:** 4

**Prerequisites:** CSCI 2720 and CSCI 1730

**CSCI 8240 Software Security and Cyber Forensics**

Exploration of both the foundation and recent advances in software security and cyber forensics. Topics will include software vulnerability analysis, advanced attack and defense techniques, cybercrime investigation and forensics, and security and forensics in different platforms (e.g., mobile, cloud computing, web application).

**Credit Hours:** 4

**CSCI 8260 Computer Network Attacks and Defenses**

This is an advanced course on computer and network security. The course will mainly focus on reading and analyzing recent top- tier research publications in the field of computer security and privacy and on the research and development of systems that can enforce security and privacy in the real world.

**Credit Hours:** 4

**CSCI 8350 Enterprise Integration**

Technical information management aspects of enterprise integration using recent advances in workflow management, database management, distributed systems, and information systems areas of computer science. Topics include federated/multidatabase architectures and systems for integration of distributed, heterogeneous, and autonomous databases, business process modeling and workflow automation. Large group project.

Not offered on a regular basis.

**Credit Hours:** 4

**CSCI 9300 Doctoral Dissertation**

Dissertation writing under the direction of the major professor.

Required Forms: Independent Study/Internship Form

Credit Hours: 12

Prerequisites: Permission of Department