CSC 502 Essentials of Computer Science (3 credit hours)

For students conditionally admitted to the MS in Computer Science program, this course reviews fundamental knowledge and skills in the discipline. Computer programming, basics of computing infrastructure, theoretical foundations, and basic database design are emphasized. Prerequisite: admission to the MS in Computer Science program.

The student will learn to:

1. Program proficiently.
2. Explain the fundamentals of computer hardware, networks, and operating systems.
3. Identify theoretical foundations of various components of computing systems.
4. Design and query a database of simple to moderate complexity

CSC 518: Software Design and Development

Advanced programming techniques, dynamic data structures, object-oriented design, requirements analysis, correctness and efficiency of algorithms, deployment on multiple modern platforms, risk mitigation, long-term maintenance of software systems. Prerequisite: unconditional admission to the MS in Computer Science program.

The student will learn to:

1. Program at an advanced level.
2. Employ complex data structures.
3. Design object-oriented system architectures.
4. Present designs in modern object-oriented notations.
5. Determine user requirements.
6. Assess correctness and efficiency of algorithms.
7. Deliver software systems on multiple modern platforms.
8. Assess and minimize risks.
9. Manage long-term maintenance of computing system.

CSC 548: Computing Infrastructure

Theory and design of computer hardware, data representations, operating systems, computer networks, runtime environments, and peripheral devices. Students will configure and interface software with all of these entities. Prerequisite: unconditional admission to the MS in Computer Science program.

The student will learn to explain, choose, install, improve, interact with, and integrate software with:

1. Hardware.
2. Various data representations.
3. Operating systems.
4. Networks.
5. Systems software.
6. Runtime environments.
7. Peripheral devices.

CSC 538: Data Management and Security

Relational database theory, practical database design, interfacing with a database programmatically via a query language, securing, encrypting, and decrypting data, delivery of data on a variety of modern platforms. Prerequisite: unconditional admission to the MS in Computer Science program.

The student will learn to:

1. Design and use relational databases.
2. Manipulate databases programmatically via a query language.
3. Interface databases to applications delivered via modern platforms.
4. Secure data.
5. Encrypt and decrypt data.
6. Manage large databases.

CSC 508: Theoretical Foundations of Computer Science

Formal logic, directed graphs and their properties, finite state models of computing systems, basic parsing techniques for languages specified by formal grammars, proofs of program correctness based on operational semantics of programming languages. Prerequisite: unconditional admission to the MS in Computer Science program.

In the design and implementation of computing systems, the student will learn to explain and use the following formalisms:

1. Logic
2. Directed graphs
3. Finite state models
4. Grammars
5. Parsing techniques
6. Operational semantics
7. Proofs of program correctness.

CSC 528: Human Aspects of Computing Systems

Observation and interviews of clients and users in order to determine system requirements, iterative prototyping of user interfaces, assessment of usability, the use of social networking in computing systems, legal and ethical principles related to computing systems. Prerequisite: unconditional admission to the MS in Computer Science program.

Students will learn to:

1. Observe and interview potential users of a computing system.
2. Develop usability objectives.
3. Iteratively prototype a user interface (UI).
4. Assess whether a UI meets its objectives.
5. Employ knowledge of social computing systems to improve software.
6. Explain legal principles that protect users and intellectual property.
7. Assess courses of action in light of ethical principles.

CSC 568: Research in Computer Science

Searching professional computing literature, writing integrative summaries, design of a research project in computer science, executing the project, analyzing results, drawing conclusions, writing and presenting the project. Prerequisite: completion of at least three of the six-credit-hour modules required for the MS in Computer Science.

Students will learn to:

1. Review professional literature in computer science.
2. Write and present integrative summaries.
3. Develop a focused computer science research topic.
4. Plan a research project.
5. Execute the project.
6. Evaluate results.
7. Draw conclusions.
8. Write a research paper.
9. Present the research project.