Master of Science in Computer Science with a Health Information Technology Concentration	**University of Minnesota Twin Cities** **Department of Computer Science and Engineering**	**Role: Programmers and Software Engineers (S/W)** **Type 2 Masters**

Purpose

This program prepares students to be the architects and developers of advanced health IT solutions. The students will be capable of designing information systems in health care and public health fields with strong skills for professional software development and interface design.

Scholarship

Admitted students will be supported by tuition reimbursement and a stipend offered through the University Partnership for Health Informatics.

Requirements

This master's degree requires the completion of 31 credits of graduate course work (see list of courses) including a 3-credit master's thesis. Students must complete the course requirements within 24 months and meet the degree requirements set forth by the department (http://www.cs.umn.edu/academics/graduate/degrees/ms.php).

Eligibility

Individuals with a bachelor's degree from an accredited institution, a minimal GPA of 2.8 (3.2 and above preferred), and those who meet foundational course requirements are eligible.

For further information, contact: Rui Kuang, kuang@cs.umn.edu

Required Courses:

Course Title: Advanced Algorithms and Data Structures, CSCI 5421
Credits: 3.0; fall, spring, every year
Method of Delivery: Online and In-person

Fundamental paradigms of algorithm and data structure design. Divide-and-conquer, dynamic programming, greedy method, graph algorithms, amortization, priority queues and variants, search structures, disjoint-set structures. Theoretical underpinnings. Examples from various problem domains.

Course Title: Functional Genomics, Systems Biology, and Bioinformatics, CSCI 5461
Credits 3.0; spring, every year
Method of Delivery: Online and In-person

Computational methods for analyzing, integrating, and deriving predictions from genomic/proteomic data. Analyzing gene expression, proteomic data, and protein-protein interaction networks. Protein/gene function prediction, Integrating diverse data, visualizing genomic datasets.

Course Title: Introduction to Data Mining, CSCI 5523
Credits 3.0; fall, spring, offered periodically
Method of Delivery: Online and In-person

Data pre-processing techniques, data types, similarity measures, data visualization/exploration. Predictive models (e.g., decision trees, SVM, Bayes, K-nearest neighbors, bagging, boosting). Model evaluation techniques, clustering (hierarchical, partitional, density-based), association analysis, anomaly detection. Case studies from areas such as earth science, the Web, network intrusion, and genomics. Hands-on projects.

Course Title: Architecture and Implementation of Database Management Systems, CSCI 5708
Credits: 3.0; spring, every year
Method of Delivery: Online and In-person

Techniques in commercial/research-oriented database systems. Catalogs. Physical storage techniques. Query processing/optimization. Transaction management. Mechanisms for concurrency control, disaster recovery, distribution, security, integrity, extended data types, triggers, and rules.

Course Title: Software Engineering I, CSCI 5801
Credits: 3.0; fall, every year
Method of Delivery: Online and In-person

Advanced introduction to software engineering. Software life cycle, development models, software requirements analysis, software design, coding, maintenance.

Course Title: Clinical Informatics and Patient Safety, HINF 5520
Credits: 2.0; spring
Method of Delivery: online and In-person

Electronic and personal health records include decisions support applications. Description of legacy applications and their management, legal and regulatory issues of clinical systems. Health policy issues and HIT policy concerns. Understanding of health care system organization and effect on health IT system development and application.

Course Title: Health Informatics I, HINF 5430
Credits: 4.0; fall
Method of Delivery: online and In-person

History/challenges of health informatics. Structure of the healthcare delivery system. Electronic medical records fundamentals. Clinical information systems. Basics of information, computation, communication. Data management in health settings. Added value of information systems in health care, Ethical and legal considerations of health information systems. Clinical decision support fundamentals and technology applications.

Course Title: Introduction to the US Health Care System, HINF 5501
Credits: 1.0; fall
Method of Delivery: online and In-person

The student will gain an appreciation for the health care system & its unique interaction between key health system stakeholders. An understanding of the relationship between patients, providers, payors and regulatory bodies will be explored with a focus on the role of information management & challenges of information standardization and exchange.

Course Title: Thesis Credits: Master's, CSCI 8777
Credits: 3.0; fall, spring, summer, every year
Method of Delivery: Online and In-person

Design and implementation of a software system for a health informatics application. Typically, the project requires substantial work in software system design and programming.