# Health Informatics

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| Degree Offered: | M.S.H.I. |
| Program Director: | Bunyamin Ozaydin, PhD |
| Phone: | (205) 975-0809 |
| E-mail: | mshi@uab.edu |
| Website: | www.uab.edu/hi |

## Master of Science in Health Informatics Program Admission

Admission to the program is in the fall semester only. Application to the program may be submitted August 1 through May 31, preceding the expected date of enrollment for the next fall term. Applications received after May 31 are considered on a space-available basis. Applications are evaluated against the Graduate School's criteria and those criteria developed specifically for the HI program. The ideal size of each entering class is 30 to 35 students.

## Admission Requirements

Admission to the program requires acceptance to the Graduate School of The University of Alabama at Birmingham. Applicants must have completed or anticipate completion of at least a baccalaureate degree from a regionally accredited college or university or from a recognized university abroad before entering the program. As a criterion for unconditional admission, applicants must have no less than a B GPA (3.0 on a 4.0 scale) for the last 60 semester hours of earned undergraduate credit or overall undergraduate credit hours. Official transcripts of all previous academic work beyond the secondary level should be submitted. Before matriculation, entering students must have received a final transcript for each degree received.

The applicant should include a carefully drafted statement about his or her personal interests, career goals, and relevant background experience and a professional resume. Two **confidential** letters of recommendation from individuals qualified to write concerning the applicant's potential for success in both a graduate program and in the Health Informatics field must be submitted.

Prior to entering the program, applicants should have completed three credit hours of undergraduate or graduate course work in statistics (taken within the last five years with a grade of B or better) and an SQL programming or a relevant continuing education course.

Admission to the MSHI program is determined by an interview process and the consensus of the Admissions Committee. The decision is based on previous academic record, professional recommendations as evidence of ability to perform graduate-level work, and an interview with two faculty members and program director. The program director reserves the prerogative for final recommendation on admission status to the Graduate School.

Applicants accepted to the program may be asked to complete a criminal background check and drug screen at program admission and again prior to clinical placement as required by school policy.

To be considered for early admission, all application materials must be in the Graduate School office by March 1.

## Additional Information

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| Deadline for Entry Term(s): | Fall |
| Deadline for All Application Materials to be in the Graduate School Office: | May 31 |
| Number of Evaluation Forms Required: | Two Professional Letters of Recommendation |
| International Applicants: | https://www.uab.edu/gradadmissions/apply/international-applicants |
| Length of Study: | 45 Credit Hours |

## Program Overview

Health Informatics is about optimizing technology to effectively capture and manage health information. Health Informatics is a rapidly evolving discipline that connects people, technology, and data to better improve healthcare outcomes. Health Informatics professionals work with the processes and tools used to implement, maintain, and evaluate health informatics systems and applications. The Health Informatics professional is a cross-cutting leader who drives analytics and usability.

Our students graduate with a solid understanding of how clinicians and administrators use data, information, and technology in making decisions. With courses in the effective design and use of information systems, databases and software, students also learn how to successfully manage the flow of information throughout a healthcare organization and the value of building a solid business case for the purchase, implementation, and use of technology in a healthcare setting. Graduates are prepared to become senior and executive level leaders in the healthcare IT industry. Students are exposed to a variety of academic disciplines and gain a broad education that serves as a foundation for them throughout their careers as information and health informatics executives.

The program includes a core curriculum plus one track of the student's choosing. The first year of the MSHI core curriculum includes HI 611 Introduction to Health Informatics and Healthcare Delivery, HI 613 Analysis and Design of Health Information Systems, HI 614 Clinical and Administrative Systems, HI 617 Principles in Health Informatics, HI 618 Research Methods in Health Informatics, HI 619 Databases and Data Modeling, HI 620 Security and Privacy in Health Care, and HI 621 Strategic Planning Project Management and Contracting. During the second year, students complete the MSHI core by taking HI 624 Leadership Theory and Development and completing a capstone project.

## Data Analytics Track

The proliferation of information technology to support workers in the healthcare industry has resulted in a massive amount of healthcare data being generated. While the data are seen as an organizational asset that can both help determine trends and patterns in patient care delivery and increase organizational efficiency, there are very few individuals trained to extract, combine, organize, interpret, and display these data in meaningful ways. This track produces graduates who help healthcare organizations institute data-driven decision-making processes through data science approaches. Beyond that, graduates of this track in the MSHI program are trained to assist organizations with developing data governance strategies, which help them define the way they think about quality, security, access to data, and policies surrounding data.

Courses in the Data Analytics Track include HI 599 Professional Development, HI 641 Healthcare Data Analytics Challenges, Methods,

and Tools, HI 642 Advanced Data Management and Analytics for Healthcare, HI 643 Business Intelligence for Healthcare, HI 646 Advanced Quantitative Methods for Health Informatics, HI 671 Data Analytics Capstone Project I, HI 673 Data Analytics Capstone Project II, and HI 675 Data Analytics Capstone Project III.

Entry into this track requires admission to the MSHI program and completion of the first year MSHI core curriculum. Declaration for this track occurs in the summer semester of the student's first year in the program.

## User Experience Track

Information technology has facilitated many significant improvements to the way we deliver patient care. However, most IT solutions currently in use by healthcare organizations were not designed to enable new models of healthcare delivery and will require development of more intuitive interfaces that model the behaviors and needs of patients and clinical end users. New products and software cannot be perceived as too difficult to use, nor can they compromise clinicians' ability to interact meaningfully with their patients. Graduates of the Healthcare User Experience Track bring an in-depth understanding of human factors engineering to a complex healthcare delivery system, the technologies that are required to support patient care delivery, and the understanding of best practices in designing safe, effective, and user-friendly products and software in a healthcare setting.

Courses in the User Experience Track include HI 599 Professional Development, HI 656 Human Factors in Healthcare IT Systems, HI 657 Human-centered Research Design Methods for Healthcare, HI 658 Development of User Centered Health Information Systems, HI 659 Qualitative Synthesis for Healthcare Insights, HI 672 User Experience Capstone Project I, HI 674 User Experience Capstone Project II, and HI 676 User Experience Capstone Project III.

Entry into this track requires admission to the MSHI program and completion of the first year MSHI Core. Declaration for this track occurs in the summer semester of the student's first year in the program.

## Artificial Intelligence Track

Artificial Intelligence (AI) technology is critical to future-proofing the healthcare system such that approaches are used for anticipating the future and developing methods of minimizing the negative effects while taking advantage of the positive effects. AI is currently being used to improve patient care, provide accurate diagnoses, optimize treatment plans, inform the decisions of health policymakers, and allocate resources within health systems. As AI permeates the spectrum of healthcare, clinicians and healthcare professionals must be equipped to handle the advancements and challenges brought on by AI and machine learning solutions. The AI track produces graduates who have a working knowledge of Artificial Intelligence as applied to a clinical environment and will serve as translators and accelerators of using healthcare AI technologies.

Courses in the Artificial Intelligence Track include HI 599 Professional Development, HCI 611 Foundations of Artificial Intelligence in Medicine, HCI 612 Applications of Artificial Intelligence in Medicine, HCI 614 Integration of Artificial Intelligence into Clinical Workflow, one elective, HI 680 Artificial Intelligence Capstone Project I, HI 681 Artificial Intelligence Capstone Project II, and HI 682 Artificial Intelligence Capstone Project III.

Entry into the track requires admission to the MSHI program and completion of the first year MSHI core curriculum. Declaration for this track occurs in the summer semester of the student's first year in the program.

## Research Track

Health informaticians are being called on to participate in and contribute to scientific studies and translate bioinformatics into practice. Additionally, for those who are post-docs, we offer the Research Track in collaboration with the Informatics Institute in the Heersink School of Medicine. This track includes two elective courses.

Courses in the Research Track include: HI 599 Professional Development, INFO 696 Introduction to Biomedical Informatics Research, INFO 697 Biomedical Informatics Methods, two Electives, HI 677 Research Capstone Project I, HI 678 Research Capstone Project II, and HI 679 Research Capstone Project III.

Entry into the track requires admission to the MSHI program and completion of the first year MSHI Core. Declaration for this track occurs in the summer semester of the student's first year in the program. Students must discuss electives with the program director prior to course registration.

## Contact Information

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## Master of Science in Health Informatics

The MSHI Program follows a Core/Track model which consists of a total of 45 semester hours. 28 semester hours are taken in the core Informatics courses. The remaining 17 semester hours are taken in one of three specialty tracks (Healthcare Data Analytics, Healthcare User Experience, or Research).

The MSHI Program allows students to earn only two grades of "C" during their time in the program. Upon earning a third grade of "C," the student may be dismissed from the program, depending on the final GPA. In all cases, if the program GPA is lower than 3.0, the student is placed on academic probation or dismissed from the program. Any final grade of "F" or below in any course will result in dismissal from the program.

| Requirements | | Hours |
|---|---|---|
| HI 599 | Professional Development | 0 |
| HI 611 | Introduction to Health Informatics and Healthcare Delivery | 4 |
| HI 613 | Analysis and Design of Health Information Systems | 4 |
| HI 614 | Clinical and Administrative Systems | 3 |
| HI 617 | Principles in Health Informatics | 3 |
| HI 618 | Research Methods in Health Informatics | 3 |
| HI 619 | Databases and Data Modeling | 3 |
| HI 620 | Security and Privacy in Health Care | 3 |
| HI 621 | Strategic Planning Project Management and Contracting | 3 |
| HI 624 | Leadership Theory and Development | 2 |
| **Total Hours** | | **28** |

## Healthcare Data Analytics Track

| Requirements | | Hours |
|---|---|---|
| HI 599 | Professional Development | 0 |
| HI 641 | Healthcare Data Analytics Challenges, Methods, and Tools | 3 |
| HI 642 | Advanced Data Management and Analytics for Healthcare | 3 |
| HI 643 | Business Intelligence for Healthcare | 3 |
| HI 646 | Advanced Quantitative Methods for Health Informatics | 3 |
| HI 671 | Data Analytics Capstone Project I | 1 |
| HI 673 | Data Analytics Capstone Project II | 1 |
| HI 675 | Data Analytics Capstone Project III | 3 |
| **Total Hours** | | **17** |

## Healthcare User Experience Track

| Requirements | | Hours |
|---|---|---|
| HI 599 | Professional Development | 0 |
| HI 656 | Human Factors in Healthcare IT Systems | 3 |
| HI 657 | Human-centered Research Design Methods for Healthcare | 3 |
| HI 658 | Development of User Centered Health Information Systems | 3 |
| HI 659 | Qualitative Synthesis for Healthcare Insights | 3 |
| HI 672 | User Experience Capstone Project I | 1 |
| HI 674 | User Experience Capstone Project II | 1 |
| HI 676 | User Experience Capstone Project III | 3 |
| **Total Hours** | | **17** |

## Healthcare Artificial Intelligence Track

| Requirements | | Hours |
|---|---|---|
| HI 599 | Professional Development | 0 |
| HCI 611 | Foundations of Artificial Intelligence in Medicine | 3 |
| HCI 612 | Applications of Artificial Intelligence in Medicine | 3 |
| HCI 614 | Integration of Artificial Intelligence into Clinical Workflow | 3 |
| HI 680 | Artificial Intelligence Capstone Project I | 1 |
| HI 681 | Artificial Intelligence Capstone Project II | 1 |
| HI 682 | Artificial Intelligence Capstone Project III | 3 |
| Elective - Informatics or research focused | | 3 |
| **Total Hours** | | **17** |

## Research Track

| Requirements | | Hours |
|---|---|---|
| HI 599 | Professional Development | 0 |
| INFO 696 | Introduction to Biomedical Informatics Research | 3 |
| INFO 697 | Biomedical Informatics Methods | 3 |
| HI 677 | Research Capstone Project I | 1 |
| HI 678 | Research Capstone Project II | 1 |
| HI 679 | Research Capstone Project III | 3 |
| Elective 1 | | 3 |
| Elective 2 | | 3 |
| **Total Hours** | | **17** |

## Biomedical and Health Informatics PhD Program

| Requirements | | Hours |
|---|---|---|
| **Core Courses** | | **18** |
| INFO 705/605 | Foundations in Informatics | |
| BST 621 | Statistical Methods I | |
| HCI 611 | Foundations of Artificial Intelligence in Medicine | |
| AH 707 | Research Methods | |
| HI 620 | Security and Privacy in Health Care | |
| **Bioinformatics Track Courses** [1] | | **20** |
| INFO 701/601 | Introduction to Bioinformatics | |
| INFO 703/603 | Biological Data Management | |
| INFO 704/604 | Next-generation Sequencing Data Analysis | |
| INFO 702/602 | Algorithms in Bioinformatics | |
| INFO 791/691 | Biomedical and Health Informatics Seminar | |
| INFO 793/693 | Bioinformatics Journal Club | |
| GRD 717/617 | Principles of Scientific Integrity | |
| **Clinical and Health Informatics Track Courses** [1] | | **20** |
| HI 726 | Health Information Systems | |
| HI 727 | Clinical Operations and Decision Making | |
| HI 728 | Learning and Knowledge Health Systems | |
| HI 729 | Technology and Society | |
| INFO 773/673 | Clinical and Health Informatics Journal Club | |
| GRD 717/617 | Principles of Scientific Integrity | |
| INFO 791/691 | Biomedical and Health Informatics Seminar | |
| **Artificial Intelligence In Medicine Courses** [1] | | **20** |
| AIM 642 | Artificial Intelligence for Medical Imaging | |
| AIM 643 | Artificial Intelligence for Biomedical Signals and Critical Care Systems | |
| AIM 647 | Explainable AI in Medicine | |
| HCI 614 | Integration of Artificial Intelligence into Clinical Workflow | |
| INFO 774/674 | Artificial Intelligence in Medicine Journal Club | |
| GRD 717/617 | Principles of Scientific Integrity | |
| INFO 791/691 | Biomedical and Health Informatics Seminar | |
| **Dissertation Research** | | **24** |
| INFO 799 | Dissertation Research | |
| **Program Electives** | | **12** |
| AIM 647 | Explainable AI in Medicine | |
| INFO 712 | Visual Analytics for Bioinformatics | |
| INFO 751 | Systems Biomedicine of Human Microbiota | |
| INFO 762 | Biomedical Applications of Natural Language Processing in the Large Language Model Era | |
| or CS 762 | Natural Language Processing | |
| CS 716 | Big Data Programming | |
| CS 760 | Artificial Intelligence | |
| CS 763 | Data Mining | |
| CS 765 | Deep Learning | |
| CS 767 | Machine Learning | |
| CS 773 | Computer Vision | |
| BY 633 | Advanced Molecular Genetics and Medicine | |
| GBS 707 | Basic Biochemistry and Metabolism | |
| GBS 708 | Basic Genetics and Molecular Biology | |
| GBS 709 | Basic Biological Organization | |
| GBS 701 | Core Concepts in Research: Critical Thinking & Error Analysis | |

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|---|---|---|
| | BME 617 | Engineering Analysis |
| | BST 622 | Statistical Methods II |
| | BST 621 | Statistical Methods I |
| | INFO 710 | Programming with Biological Data |
| | GBS 716 | Grantsmanship and Scientific Writing |
| | or GBS 725 | Grant Writing- Crafting a Research Proposal |
| | or GBSC 726 | Science Communication & Review |
| | or GRD 709 | Writing Fellowships |
| **Total Credit Hours** | | **74** |

[1] At least one course track is required for completion of this program. Total credit hours required for completion of this program is 74.

## Clinical Informatics Graduate Certificate

The Clinical Informatics Graduate Certificate is designed as a high-quality, rigorous educational forum for practicing clinicians interested in advancing their informatics skills. Students will develop a broad understanding of the strategic application of clinical and administrative information systems, the data contained in these systems, and the people and processes required for effective information systems deployment. Expanding the number of clinical professionals who can act as health informatics champions in healthcare organizations is needed to enable high quality health care, improved population health, and efficient use of healthcare resources.

The curriculum is delivered completely online and consists of 15 credit hours (4 courses) that may be completed in two academic terms. Applicants must be admitted to the UAB Graduate School and to the Clinical Informatics Graduate Certificate program. Upon application and admission to the MSHI program, these 15 credits can be applied toward degree requirements for the MSHI degree.

### Additional Information

| Requirement | Fulfilled By: |
|---|---|
| Deadline for Entry Term(s): | Fall |
| Deadline for All Application Materials to be in the Graduate School Office: | May 31 |
| Length of Study: | 15 Credit Hours |

## Graduate Certificate in Clinical Informatics

| Requirements | | Hours |
|---|---|---|
| HI 611 | Introduction to Health Informatics and Healthcare Delivery | 4 |
| HI 613 | Analysis and Design of Health Information Systems | 4 |
| HI 614 | Clinical and Administrative Systems | 3 |
| HI 617 | Principles in Health Informatics | 4 |
| **Total Hours** | | **15** |

## Artificial Intelligence in Health Services Graduate Certificate

This graduate certificate is a strong complement to your existing training and prepares you to use and translate AI to support critical functions across the healthcare ecosystem, including providing care (clinical decision-making and workflows), administrative functions (operations, supply chain, claims, and fraud protections), data analytics (acquisition, security, and compliance), and patient care (monitoring, assessments, care and benefits). Combine this graduate certificate with other graduate certificates to earn a master's through UAB's Interdisciplinary Graduate Studies program.

This certificate program can be taken completely online.

### Additional Information

| Requirement | Fulfilled By: |
|---|---|
| Deadline for Entry Term(s): | Fall |
| Deadline for All Application Materials to be in the Graduate School Office: | May 31 |
| Length of Study: | 15 Credit Hours |

## Graduate Certificate in Artificial Intelligence in Health Services

| Requirements | | Hours |
|---|---|---|
| HI 634 | Foundations - Artificial Intelligence in Health Services | 3 |
| HI 633 | Artificial Intelligence Methods in Health Services | 3 |
| HI 635 | Data Mining, Management, and Modeling for Artificial Intelligence in Health Services | 3 |
| HI 636 | Human Factors Considerations for Artificial Intelligence in Health Services | 3 |
| HI 620 | Security and Privacy in Health Care | 3 |
| **Total Hours** | | **15** |

## Contact Information

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## Courses

**HI 598. Professional Activity. 0 Hours.**
Professional Development experiences associated with the MSHI degree program.

**HI 599. Professional Development. 0 Hours.**
Professional development experiences associated with the MSHI degree program.

**HI 611. Introduction to Health Informatics and Healthcare Delivery. 3-4 Hours.**
Overview of history and current status of health information technology (health IT) and health informatics within the US health care system, including approaches for planning, implementing and evaluating health IT and the legal and ethical issues involved in the use of health IT.

**HI 613. Analysis and Design of Health Information Systems. 4 Hours.**
Concepts, methods, approaches, standards, and tools in analyzing, modeling, designing, and implementing user centered health information systems.

**HI 614. Clinical and Administrative Systems. 3 Hours.**
Clinical and administrative systems with an emphasis on clinical decision support methods, tools, and systems. Types of methods, tools, and systems used in inpatient and outpatient settings, information flow across systems within healthcare settings, strategies for user-centered design, implementation and evaluation of systems.

**HI 617. Principles in Health Informatics. 3-4 Hours.**
Underpinnings in Health Informatics policies, practices, and principles; Inter-and intra-organizational application of socio-technical information systems and data to enhance research and practice in healthcare.

**HI 618. Research Methods in Health Informatics. 3 Hours.**
Fundamental concepts, methods, and approaches of qualitative and quantitative data analysis, including statistical analysis and measurement techniques, for clinical and health informatics.

**HI 619. Databases and Data Modeling. 3 Hours.**
Concepts of data modeling, database design and administration, data architectures, and data querying for transactional and analytical data systems. Study of various data models with application to health information projects using SQL in current database management systems.

**HI 620. Security and Privacy in Health Care. 3 Hours.**
Security and privacy issues, legislation, regulations, and accreditation standards unique to the health care domain and relative to various group layers (individual, social, and society). Concepts, theories, methods, models, and tools related to technical security of data across networks, systems, databases and storage, audit mechanisms and controls.

**HI 621. Strategic Planning Project Management and Contracting. 3 Hours.**
Theory, practice, and processes needed for strategic planning of integrated health information systems. Assessing benefits of enterprise-wide information integration and tactics needed to realize these benefits. Steps needed for developing strategic plans and understanding drivers of information systems - corporate business alignment. Understanding key concepts of project management. Exposure to skills needed to negotiate contracts with vendors.

**HI 624. Leadership Theory and Development. 2 Hours.**
Exploration of leadership theory and development, and the role of leadership in internal and external advocacy. The emphasis is on the application of leadership theories to individuals and groups in healthcare settings.

**HI 633. Artificial Intelligence Methods in Health Services. 3 Hours.**
This course focuses on the methods and techniques of artificial intelligence (AI) as applied to health services. Students will delve into supervised and unsupervised learning, deep learning, and reinforcement learning through hands-on applications involving real-world healthcare data. Key technical competencies include data preprocessing, visualization, dimensionality reduction, regression and classification modeling, model evaluation, and optimization.

**HI 634. Foundations - Artificial Intelligence in Health Services. 3 Hours.**
This course introduces students to the foundational concepts, methods, and applications of artificial intelligence (AI) in health services. Students will gain an overview of machine learning, natural language processing, and data mining as applied to healthcare, while examining data sources, project implementation strategies, and emerging tools. Emphasis will be placed on the ethical, legal, and practical considerations surrounding AI integration in clinical and administrative settings. The course equips students with a broad understanding of AI's capabilities, limitations, and transformative potential in improving health outcomes and operational efficiency.

**HI 635. Data Mining, Management, and Modeling for Artificial Intelligence in Health Services. 3 Hours.**
This course covers data mining, management, and modeling techniques essential for developing AI solutions in health services. Students will explore data preprocessing, feature selection, database design, and predictive modeling with a strong emphasis on healthcare applications. Topics include relational databases, SQL programming, big data platforms, interoperability standards (such as HL7 and FHIR), and healthcare business intelligence. The course blends theoretical understanding with practical data management and modeling skills to prepare students for data-driven AI development in health systems.

**HI 636. Human Factors Considerations for Artificial Intelligence in Health Services. 3 Hours.**
This course examines human factors, usability principles, and cognitive ergonomics in the design and implementation of artificial intelligence (AI) systems in healthcare. Students will explore how user-centered design and evaluation strategies can improve the safety, trustworthiness, and effectiveness of AI systems. Special focus will be placed on the unique challenges and opportunities posed by AI interfaces, decision support, automation, and emerging technologies such as large language models.

**HI 641. Healthcare Data Analytics Challenges, Methods, and Tools. 3 Hours.**
Current factors, methods, and tools affecting data collection, management, analytics, integration, and reporting in healthcare, including use of various ontologies and standards, and healthcare challenges affecting data analytics.

**HI 642. Advanced Data Management and Analytics for Healthcare. 3 Hours.**
Automation of database management and basic Extract-Transform-Load (ETL) and data analytics tasks using advanced SQL. Creation and optimization of relational databases. Current data modeling and database architecture approaches and their uses in healthcare. Integration of data mining and analytics into database management platforms.
**Prerequisites:** HI 619 [Min Grade: C]

**HI 643. Business Intelligence for Healthcare. 3 Hours.**
Current concepts, methods and tools in Business Intelligence for healthcare. Approaches for data modeling for data warehouses, Extract-Transform-Load (ETL) processes, data marts, data integration, and data visualization.
**Prerequisites:** HI 619 [Min Grade: C] and HI 642 [Min Grade: C]

**HI 646. Advanced Quantitative Methods for Health Informatics. 3 Hours.**
Concepts, methods, and tools used in advanced quantitative data analytics to address a range of problems in health informatics, including prediction, classification, and pattern recognition across a variety of levels (individual, social group, and society).
**Prerequisites:** HI 618 [Min Grade: C]

**HI 656. Human Factors in Healthcare IT Systems. 3 Hours.**
Overview of the importance of human factors engineering in the function of healthcare IT systems and specialized challenges to user experience (UX) research in the context of the healthcare system. Application of user-centered theory, principles, data, and methods to the design of healthcare IT systems. Implementation of UX research methods to evaluate and understand the interactions between healthcare IT systems and their users.

**HI 657. Human-centered Research Design Methods for Healthcare. 3 Hours.**
Design Thinking methodology intensive. Discussion of the importance of qualitative user research. Understanding of discovery to enable Identification of proper user research approaches and establishing research goals. Overview tools and processes for deep research discovery. Students will select a healthcare context for the application of research methods.

**HI 658. Development of User Centered Health Information Systems. 3 Hours.**
Development approaches involving principles of human-centered design, leading to high fidelity health information system prototypes.

**HI 659. Qualitative Synthesis for Healthcare Insights. 3 Hours.**
Overview and execution of qualitative research methods and data gathering within the healthcare context to enable the delivery of solutions. Focus on the application of research theories, methods, and tools to deliver insights and qualitative and quantitative outputs. Understanding socio-technical factors relative to fundamental interface design elements and interface layouts across modalities. Journey mapping, concepting, user flows, and wireframing will be generated.

**HI 671. Data Analytics Capstone Project I. 1 Hour.**
Initiation of first steps in identifying and developing the HI Capstone Project; the Capstone project is a focused investigation of a health informatics problem in a real-world setting and application of problem-solving methodologies for development and execution of solutions.

**HI 672. User Experience Capstone Project I. 1 Hour.**
Initiation of first steps in identifying and developing the HI Capstone Project; the Capstone project is a focused investigation of a health informatics problem in a real-world setting and application of problem-solving methodologies for development and execution of solutions.

**HI 673. Data Analytics Capstone Project II. 1 Hour.**
Continuation course of the HI Capstone Project involving project execution, management, and dissemination; the Capstone project is a focused investigation of a health informatics problem in a real-world setting and application of problems solving methodologies for development and execution of solutions.

**HI 674. User Experience Capstone Project II. 1 Hour.**
Continuation course for the HI Capstone Project involving project proposal development; the Capstone project is a focused investigation of a health informatics problem in a real-world setting and application of problems solving methodologies for development and execution of solutions.

**HI 675. Data Analytics Capstone Project III. 3 Hours.**
Final course for the HI Capstone Project involving project execution, management, and dissemination; the Capstone project is a focused investigation of a health informatics problem in a real-world setting and application of problems solving methodologies for development and execution of solutions.

**HI 676. User Experience Capstone Project III. 3 Hours.**
Final course for the HI Capstone Project involving project execution, management, and dissemination; the Capstone project is a focused investigation of a health informatics problem in a real-world setting and application of problems solving methodologies for development and execution of solutions.

**HI 677. Research Capstone Project I. 1 Hour.**
Initiation of first steps in identifying and developing the HI Capstone Project: the capstone project is a focused investigation of a health informatics problem in a real-world setting and application of problem-solving methodologies for development and execution of solutions.

**HI 678. Research Capstone Project II. 1 Hour.**
Continuation course of the HI Capstone Project involving project execution, management, and dissemination; the Capstone project is a focused investigation of a health informatics problem in a real-world setting and application of problems solving methodologies for development and execution of solutions.

**HI 679. Research Capstone Project III. 3 Hours.**
Final course for the HI Capstone Project involving project execution, management, and dissemination; the Capstone project is a focused investigation of a health informatics problem in a real-world setting and application of problems solving methodologies for development and execution of solutions.

**HI 680. Artificial Intelligence Capstone Project I. 1 Hour.**
Initiation of first steps in identifying and developing the HI Capstone Project; the Capstone project is a focused investigation of a health informatics problem in a real-world setting and application of problem-solving methodologies for development and execution.

**HI 681. Artificial Intelligence Capstone Project II. 1 Hour.**
Rigorous project that provides opportunity for focused investigation of a Health Informatics issue in a real-world setting and for application of problem-solving methodologies for development and execution of solutions. Investigation and application of theory through a practical implementation project.

**HI 682. Artificial Intelligence Capstone Project III. 3 Hours.**
Final course for the HI Capstone Project involving project execution, management, and dissemination; the Capstone project is a focused investigation of a health informatics problem in a real-world setting and application of problems solving methodologies for development and execution of solutions.

**HI 685. Principles in Health Informatics. 3-4 Hours.**
Underpinnings in health informatics policies, practices, and principles. Inter-and intra-organizational application of information systems and data to enhance research and practice in healthcare.

**HI 690. Administrative Internship. 4-8 Hours.**
Structured field experiences in health care or other enterprises associated with health care industry. Includes a mentoring relationship with a preceptor and an opportunity for application of information resource management theory and strategies. Foundation for professional development and assists in refining skills and behaviors necessary for successful practice in a complex professional, social, political, and technological environment.

**HI 694. Special Topics in Health Informatics. 1-4 Hour.**
Study of selected topics in health informatics. May be repeated for credit.

**HI 695. Independent Study in Health Informatics. 1-4 Hour.**
Opportunity to investigate, perform activities and/or conduct a project related to a narrow topic in Health Informatics that corresponds with the current research of HI faculty, including medical informatics, nursing informatics, computer and communication sciences, library science, etc. May be repeated for credit.

**HI 698. Simulation Capstone/Non-thesis Research. 1-8 Hour.**
Rigorous culminating project that provides the opportunity for focused investigation of simulation applications in a real-world setting. Investigation and application of theory through a practical project.

**HI 699. Master's Level Thesis Research. 4-8 Hours.**
Original research in health informatics and interpretation of results. Demonstrates student's acquaintance with literature of field and competency in proper selection and execution of research methodology. Recommended for students planning to pursue a doctoral degree. May be repeated for credit (8 hours maximum credit allowed).
**Prerequisites:** GAC M

**HI 725. Information Systems Theory and Practice. 3 Hours.**
Investigation of appropriate research methods to assess theoretical models involving interdependencies and relationships between Information technology, human behavior, and organizational and socio-technical contexts; review of qualitative and quantitative research methods using IS journal article exemplars.

**HI 726. Health Information Systems. 3 Hours.**
This course introduces the design, implementation, and evaluation of health information systems (HIS). Emphasis is placed on electronic health records (EHRs), interoperability, data governance, and the role of HIS in improving care delivery and patient outcomes.

**HI 727. Clinical Operations and Decision Making. 3 Hours.**
This course focuses on optimizing healthcare delivery through effective management of clinical operations and data-driven decision-making. Topics include process improvement, resource utilization, quality management, and clinical decision support systems. Students will explore real-world challenges and develop practical skills to enhance patient care, streamline workflows, and implement evidence-based solutions in healthcare settings.

**HI 728. Learning and Knowledge Health Systems. 3 Hours.**
This course examines the principles and implementation of learning health systems (LHS) and knowledge health systems (KHS), focusing on their role in advancing healthcare quality and outcomes. Students will explore how continuous data-driven learning cycles, evidence generation, and knowledge dissemination improve patient care, inform clinical decisions, and support system-wide innovation.

**HI 729. Technology and Society. 3 Hours.**
This course explores the complex interactions between technology and society, examining how social norms shape technological advancements, ethics, and policies. Students will analyze the societal impacts of technology, including equity, privacy, and sustainability, while considering strategies for fostering responsible innovation.

**HI 777. Mixed Methods Research I. 3 Hours.**
Provide introduction to the field of mixed methods research: essence of mixed methods research, rationale for using it, its fundamental principles and key characteristics, major design applications, and means of assessing the quality of mixed methods inferences. Learn how the mixed methods research process is shaped by personal, interpersonal, and social contexts and how mixed methods intersects with other quantitative and qualitative research approaches and designs.