Master of Science in Health Informatics Courses

HI5000 Clinical Thinking
Fall Orientation - Designed for students without a clinical background
0 credits
Course Director: Christoph U. Lehmann, M.D.

This course is designed for students who do not have a clinical background and will provide an insight into the clinical care process. This course will teach basic medical terminology and an introduction into diagnostic thinking, its complexities and uncertainties, and its iterative nature. Topics include eliciting an anamnesis, synthesizing history and physical examination, clinical decision making and thresholds for ordering tests, diagnostic biases, utilization of medical evidence in the design of treatment plans, and challenges secondary to health information technology in a complex environment.

After completion, students will be able to successfully navigate the health care system and will be able to converse with clinicians, communicate effectively, and will understand the needs and requirements to deliver care.

HI5301 The U.S. Health Care System
Fall
3 credit hours
Course Director: Mark Frisse, M.D.

This course provides an important introduction and overview to the American health care system, including familiarization with most actors & organizations comprising our broader health care systems. The course begins with a comparison to other nations' health care systems and utilize an internal critique to understand and address issues within the American health system including, but not limited to public health issues, quality and cost of care, ongoing innovation in medicine and medical education, payment mechanisms, consumer behavior, the legal and regulatory framework, and emergency preparedness. It then articulates the demographic challenges ahead as well as their impact on both household and federal finances. It then provides students with an overview of the various methods and parties used to pay for health care as well as the massive and at times unnecessary complexity that imposes unparalleled burdens on physicians, other providers, and on health care delivery organizations. The course will also explore the impact of new technologies across the entire continuum of care – focusing on transitions and care in the home. It concludes with some coverage of both the opportunities and threats posed by rapid technology advancement.

Students will acquire fundamental knowledge and skills regarding the US health system and will be exposed to the broader societal and cross-disciplinary context in which clinical informatics must be applied. This broader environment requires multiple groups to operate with greater degrees of coordination. It will argue the need for a new and more comprehensive approach to health informatics organization, governance, and policies.

HI5302 Health Information Technology
Fall
3 credit hours
Course Director: DuWayne Willet, M.D.

Students will learn about the current state of health information technology in a variety of clinical settings through a review of systems and tools in practice, the interactions and relationship of various information systems, and the overall architecture of health information systems, data networks, and data flow. Learners will understand the types and structure of health data, as well as principles of data exchange, interoperability, and data integration. HIS accreditation and quality assessment will be taught.

An important aspect of the course will be institutional and local data governance. Key concepts of data security and privacy will be taught. This course will further address the use of information technology in health and its impact on care delivery and the healthcare marketplace.

Specific topics include the history of Health Informatics, electronic health records, consumer portals, health information exchange, effect of health information tools on quality and safety, clinical decision support, provider order entry, knowledge management, clinical documentation, dash boards, the role of registries (such as immunization registries), and the development and successful execution of new care delivery models using health information technology (e.g., IT- enabled communication, collaborative workspaces, population health tools).

After the course, students will be able to describe health information technology and its application, data generated, and functionalities, and discuss how to protect health data.

HI5303 Evidence based Medicine and Clinical Decision Support
Fall
3 credit hours
Course Director: Joseph Schneider, M.D.

The development and strength of evidence and its application in health care delivery will be the prelude to the design, implementation, operation, and evaluation of clinical decision support (CDS) in the context of electronic health records and other clinical information systems. Topics to be addressed include making clinical decisions, five rights of clinical decision support (information, person, intervention formats, channel, and point/time in workflow), methods of clinical decision support, proper CDS design, Implementation and operation of CDS, assessment of CDS, knowledge management in healthcare, legal aspects of CDS including unexpected consequences, and business decision support.

Students will be expected to analyze and predict the impact of novel CDS on workflow and provider satisfaction and patient experience, and will be required to develop examples of decision support and complete a CDS project as part of the course.

After completion, students will understand and measure strength of evidence, appreciate the principles of evidence based guideline generation, describe tools to make guidelines implementable, and will have evaluated and designed their own CDS solution to a healthcare problem they identified.

HI5304 Data Analytics
Spring
3 credit hours
Course Director: Joe Beauchamp M.S., CPM, CGCIO

In this course, students will be exposed to scientific methods and processes to extract knowledge and insights from structured and unstructured data. This course will leverage advanced statistics, data analysis, machine learning and related data methodologies to analyze, understand, model, and gain novel knowledge from data. Students will be introduced to clinical epidemiology, predictive analytics, comparative effectiveness and health services research, clinical predication rules, and patient centered outcomes research. Students will learn to apply healthcare analytics including learning how to apply data in quality and performance improvement and innovation projects. Introduction to research informatics tools such as REDCap, i2b2, and TriNetX will be taught. OMAP will be introduced.

Students will learn database design and modeling using a hands on experience. Conceptual model: the logical structure of the entire database. The course will address conceptual schemas, database logical design, entity relationship diagram (ERD), external and internal models, normalization, and data independence (logical and physical).

This course will have a heavily applied aspect with students being exposed to tools such as Python, JavaScript, HTML5/CSS, API Interactions, SQL, Tableau, R, and Git/GitHub.
Students will be able to describe and utilize basic tools fused data analysis, epidemiology, and statistics.

HI5305 Biomedical and Basic Science Informatics
Spring
3 credit hours
Course Director: Andrew R. Jamieson, Ph.D.

Students will be introduced to a number of computational domains that are gaining an increasing importance in Health Informatics. Specific topics include Deep Learning for Healthcare, Introduction to Python I, Python II, and Introduction to R for Beginners, Level 1 & 2. Machine Learning I will provide foundational understanding of machine learning models such as logistic regression, multilayer perceptrons, convolutional neural networks, natural language processing, artificial neural networks, and machine learning (ML) algorithms and will demonstrate how these models can solve complex problems diagnosis, image recognition, and understanding of text.

HI5306 Workflow Process Analysis System Development, Human Factors, and Usability
Spring
3 credit hours
Course Director: Mujeeb Basit, M.D., MMSc.

This course teaches the students necessary terminology and how to apply workflow process mapping, analysis, and process (re)design in clinical environments in the scope of electronic health records and other clinical systems. The course will leverage structured system analysis and design and object-oriented analysis & design with associated modeling frameworks. Students will be able to define workflow and system requirements using process modeling notation. The stages of health information system development are taught. Students are introduced to human factors engineering and human-computer interaction, usability evaluation with the goal to enhance quality, patient care experience, efficiency, safety and satisfaction and to reduce costs. This course will teach qualitative, quantitative, and computational methods used for the design, implementation, and evaluation of health information technology in ambulatory, hospital, home health, and other locations where care is delivered.

Students will demonstrate their ability to review work flows, understand requirements, and synthesize to implement and evaluate systems.

HI5307 Health Information Management
Fall
3 credit hours
Course Director: Katherine Lusk, MHSM, RHIA, FAHIMA

This course provides an overview of Health Information Management (HIM) a discipline dedicated to the practice of acquiring, analyzing, and protecting digital and traditional medical information vital to delivering quality patient care in addition to providing trusted data for public health analysis, quality initiatives, performance improvement efforts and strategic planning. Changes in the healthcare market with clinical care expanding beyond physical walls, increased consumer engagement in healthcare, payers serving as case managers and a mobile society have high- lighted the need for trusted data exchange. Nationally we are striving to improve outcomes while decreasing costs thus financial model changes are underway. The HIM profession supports these initiatives with data normalization across platforms by leveraging standards, classification systems, clinical vocabularies, and nomenclatures. The HIM discipline can be described as the "translator" of healthcare data regardless of where generated by creating trusted information. The creation and normalization of data is important element within an informatics program.

Students will acquire skills in coding and reimbursement systems, quality management and health information systems, management and use of information and information systems for healthcare planning and provision, resource allocation, and executive decision making.

HI5308 Project Management & Clinical System Life Cycle
Fall
3 credit hours
Course Director: Vikas Chowdhry, M.S., M.B.A

Students will acquire best practices in project management, user-centered design, and performance improvement for designing, implementing, and supporting systems, covering the full project life cycle. Students will be exposed to agile methodology (scrum), Lean healthcare (A3 thinking, value stream mapping, PDSA cycle), design thinking (ideation, prototyping), and its intersection with the System Development Life Cycle (SDLC) framework. The course focuses on project managers' key knowledge and frameworks including integration, portfolio and stakeholder management, chartering, scope definition, estimating, project conceptualization, requirement gathering, professional communication and negotiation, Delphi method, team building, project integration management, project risk management and mitigation, disaster recovery, business continuity, project time & quality management. Students will learn precedence diagramming and critical path method, scheduling, resource loading and leveling, and Gantt charts and will be exposed to project management software.

After completing this course, learners should be able to successfully manage health information projects from conceptualization to sun-setting.

HI5309 Application Development
Spring
3 credit hours
Course Director: Jonathan Reeder, M.D.

This course will provide students with knowledge and skills for the development of web and mobile computer applications. Learners will acquire an understanding of wireframes and prototypes, the languages and frameworks most commonly used and fundamental skills in programming and design through immersive project-based courses.

Students will acquire knowledge of the design of user interfaces and software systems and as networking, hosting infrastructure, and security.

HI5200 Practicum
Summer
2 credit hours
Course Director: Christoph U. Lehmann, M.D.

Students will be required to create an experience/rotation in health IT operational teams, health information technology companies, start-ups, or health information consulting companies based on expressed interests and team availability. The course director and preceptor have to approve the activity in advance. Rotations must support the application of material learned in the process of the program and must be congruent with the program objectives. Preceptors and course director will emphasize the need for meaningful, achievable objectives and deliverables.

HI5100 Capstone Project Plan
Summer
1 credit hour
Course Director: Christoph U. Lehmann, M.D.

The goal of the Capstone project is for students to combine their work experience with their academic coursework to produce a feasible, implementable Health Informatics project and provide an evaluation and academic, critical reflection on the project including its benefits, weaknesses, improvement opportunities, and overall assessment. This project will teach students to support their organization's strategy and operations and to become leaders in the field of Health Informatics.

After selecting a suitable faculty mentor approved by the program director, students will plan a project to be designed, implemented, and evaluated in the course of the second year. Students must prepare a needs assessment and will design a proposal. The proposal will be reviewed and critique by the students and faculty. Students may advance to implementation only after formal approval by the course director.

HI5500 Capstone Project Implementation and Evaluations
Final Semester
5 credit hours
Course Director: Christoph U. Lehmann, M.D.

Leveraging the project plans, students will partner with an operational team at UTSW or their home institution to implement and evaluate the project. The experience is designed to allow the Students to acquire real life experience, translate newly acquired academic knowledge into projects, and leverage evaluation, data analytic, and other scientific methodologies in the evaluation of the project. The Capstone project has the option to be completed in small groups but is generally intended to be completed by one student. Students will be supervised and supported by a mentor on the project team and a faculty member. Project feasibility will be important as students are expected at a minimum to develop and implementation plan.

Students will be required to present the results of their Capstone project to the other learners and the faculty of the Master's program for evaluation and grading.

HI5101 Ethics in Clinical Informatics
Summer
1 credit hour
Course Director: Carolyn Petersen, M.S.

This course is a systematic review of ethical concepts and standards of responsible conduct for a Clinical Informatics professional including the code of ethics developed by the American Medical Informatics Association. The course will review changes in power and influence introduced by clinical systems and a redistribution of work. Review of the governance process for data and clinical decision support will be paired with practical exercises in evaluating the effect of health information technology on health care workers and patients. Principles of respect for autonomy, nonmaleficence, beneficence, and justice will be addressed. Copy & Paste as well as the effect of computers in the exam rooms will be addressed. Other topics include ethics around patient portals and social media in health.