

Course Descriptions

HSCI 5130. Introduction to Real World Evidence. (2 Hours)

Introduces students to real world data (RWD) and how different forms of observational health data are collected and organized. Examines how RWD are used to inform regulators and other stakeholder groups in life sciences and healthcare. Emphasizes the role of team science in executing a RWD analysis.

HSCI 5140. Foundations of Data Models. (2 Hours)

Introduces students to design principles behind data modeling in life sciences and healthcare. Examines and compares approaches to common data models across different research communities. Explores the use cases behind popular data models through industry case studies.

HSCI 5150. Methods for Observational Research 1. (3 Hours)

Surveys approaches to observational research across pharmacoepidemiology, emphasizing approaches used by the Observational Health Data Sciences and Informatics community.

HSCI 5160. Standardization of Real World Data. (2 Hours)

Introduces students to the principles of interoperability protocols in healthcare and life sciences to support clinical data standardization. Explores the process of extract-transform-load (ETL) in the harmonization of healthcare data. Accentuates real world case studies driving standardization approaches.

HSCI 5170. Data Model Transformation. (2 Hours)

Examines the process for transforming data into a common representation that can be used across research environments. Covers the technical and business processes for data model adoption. Establishes the framework for evaluating data quality and the implementation of agile principles in data model release management.

HSCI 5151. Methods for Observational Research 2. (3 Hours)

Examines advanced methods in conducting observational research across pharmacoepidemiology, emphasizing approaches used by the Observational Health Data Sciences and Informatics community.

PHSC 5212. Research Skills and Ethics. (2 Hours)

Teaches students the basics of laboratory safety, safekeeping laboratory data, and the process of writing a grant proposal. Also, case studies explore the concepts of data distortion or fabrication, conflicts of interest, confidentiality, ethical aspects of peer review, and the attribution of credit in science.

HSCI 6980. Capstone. (3 Hours)

Offers students an opportunity to complete a specialized research or applied project in real world data strategy and evidence generation as part of the master's degree. Designed to meet the specific

learning and research interests of the student to prepare for a career in healthcare and life sciences. Learning experience is based on independently led activities that meet agreed-upon benchmarks with the faculty-mentor. Activities can include working with healthcare, life sciences, regulatory and/or technology organizations.

HSCI 5180. Phenotyping. (2 Hours)

Surveys the process for constructing heuristics to define a population of interest in observational research. Emphasizes the principles of phenotype curation across real world data feeds and strategies to ensure robust, reproducible research.

HSCI 5190. Cohort Building. (2 Hours)

Examines approaches to defining cohorts in pharmacoepidemiology, emphasizing common analytical tools, knowledge objects and assessing the appropriateness of clinical heuristics to answer a clinical study question.

HSCI 6110. Advanced Population Characterization. (2 Hours)

Introduces students to the design principles of population-level characterization studies at scale, emphasizing the use of common data models and shared analytical approaches to implement reproducible, repeatable research.

HSCI 6120. Advanced Population Estimation. (3 Hours)

Introduces students to the design principles of causal inference studies (population-level effect estimation) at scale, emphasizing the use of common data models and shared analytical approaches to implement reproducible, repeatable research. Covers a framework for study diagnostics including empirical equipoise, covariate balance, negative control calibration, empirical null distribution and power.

HSCI 6130. Advanced Patient Prediction. (3 Hours)

Introduces students to the design principles of patient-level prediction studies at scale, emphasizing the use of common data models and shared analytical approaches to implement reproducible, repeatable research. Covers frameworks for evaluating internal and external validity of machine learning models constructed using real world data.

HINF 6355. Interoperability Key Standards in Health Informatics. (3 Hours)

Reviews the different healthcare informatics standards for storing and exchanging data in healthcare technology systems. Covers where and how they are used, where and why they are not used, and an overview of some of the types of products available to facilitate their use. Seeks to demystify the details behind the standards. Offers students an opportunity to work through examples in small groups in class and discuss issues involving the standards' adoption and use. Non-health informatics students may be able to take the course with permission of the program director.

HINF 5300. Personal Health Interface Design and Development. (4 Hours)

Explores the design of innovative personal health human-computer interface technologies. Examples include assistive technologies that aid persons with disabilities, consumer wellness promotion applications, patient education and counseling systems, interfaces for reviewing personal health records, and elder care and social network systems that monitor health and support independent

living. Offers students an opportunity to work in teams to build a prototype personal health interface system to solve a real problem. Topics include needs assessment and participatory research, iterative user interface design methods for health interface development, computational sensing of health states and behavior, software architectures for iteratively testing prototype personal health interface technologies, human-computer interaction issues related to personal health technology, and technology transfer requirements to support future validation studies of technology.

HINF 6205. Creation and Application of Medical Knowledge. (3 Hours)

Explores the relationship between clinical data and clinical knowledge and how both are developed and deployed in organizations to support improvements in patient care and research. Topics covered include what medical data is available and how it should be accessed, analyzed, and organized to support evidence-based medicine and research. Analyzes current and future approaches to clinical decision support and expert system development and how they can be deployed via new or existing knowledge-management infrastructures.

HINF 6220. Database Design, Access, Modeling, and Security. (3 Hours)

Designed to provide an introduction to the theory and application of database management systems. Topics covered include the relational model, basic and intermediate query formulation using structured query language, database design using the entity relational model, and database normalization and optimization. In addition to these traditional topics, this course covers a sample of emerging topics relevant to the healthcare professional, including personal health information, privacy and security considerations, XML as a data model, and clinical data warehousing and mining.