

Health Informatics & Data Science (HIDS)

HIDS 6001 Massv Health Data Fundamentals 3 Credits

This basic course is a broad overview of how data analytics is used in healthcare and medical research settings. Here, we primarily focus on the use of a data analytic framework to advance the goals of healthcare, research and product development organizations. We attempt to cover the people, process, infrastructure needs, tools, skills, organization and governance to effectively perform this work in a healthcare organization or an organization that is in the ecosystem of a healthcare system. We do not focus on any particular quantitative methodologies. Here we provide a broad overview of the field with exposure to several common tools, software packages, usecases with a focus on hands-on problem solving. There is a parallel lab portion of this course that covers the various types of healthcare related big data (EHR, Claims, population health, patient registries, social media etc) and health IT tools to manage and analyze them. This is a hands-on, practical portion of the course about using informatics methodologies and tools and cloud computing resources to do analysis and manipulation of datasets that are too large to fit on a single machine and/or analyzed with traditional tools. The lab portion of the course will focus on Pandas, Matplotlib, autoML, NLP libraries, Spark, MapReduce, the Hadoop Ecosystem and other tools. You will understand how to acquire and/or ingest the data, and then massage, clean, transform, analyze, and model it within the context of Big data analytics. You will be able to think more programmatically and logically about your Big data needs, tools and issues.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment limited to students in the MS-HIDS or MS-HIDS-SM programs.

Enrollment is limited to Graduate level students.

HIDS 6002 Utilizing Data in EMRs 3 Credits

The scientific utility of EHR derived "routine" clinical data generated as a byproduct of care delivery has been previously demonstrated, and there are no insurmountable technical challenges or barriers to achieving the effective use of this type of data for a national cohort of millions of individuals. This course is designed to introduce students to one of the major components of data collection, analysis and clinical decision support systems at the point of care: The electronic health record systems (EHR) and their use in care management, research, and analytics. The course is intended to familiarize students with data access across multiple data sources. This is a practical, hands on experience course that will introduce students to the variety of systems used in the clinic and the complex interactions and features that make up a modern clinical information system. Students will learn different aspects of EHR systems in both inpatient and outpatient clinical environments, and will focus on data extraction, exploring analytics and visualization capabilities and generating insights from the perspective of EHR. This is an introduction level course, designed to offer the most benefit to Health Data Scientists and offers a deep learning experience of EHR functionality.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

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Enrollment is limited to Graduate level students.

HIDS 6004 EvdncBasdData Anlyns in PopHlth 3 Credits

The class will focus on key concepts about evidence-based approaches in data science, including the analysis of population health datasets and the discussion of important case studies. Students will learn important principles for organizing and analyzing data, along with concepts and tools for reproducible research, for which they will gain hands-on experience with the R programming language. Students will then expand their understanding of study design and evidence-based medicine, discussing important literature in this area and where the field is going regarding innovative designs. Finally, there will be an emphasis on the understanding of "meta-research" or "research on research," focusing on the understanding of reproducibility and replicability.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

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HIDS 7003 Precision Health Informatics 4 Credits

This course is designed to provide fundamentals of current computational approaches to support and enable Precision Medicine through data management, analysis and visualization. The successful implementation of precision medicine initiatives requires professionals who are well-versed in informatics. According to recent publications a closer look at strategic plans focused on research and clinical implementation of precision medicine efforts revealed significant gaps in expertise that impacts the ability of a health system to relate genomic data to better health outcomes. Clinical and biomedical informatics, with their focus on how information is collected, stored, analyzed and disseminated, are two important areas for the advancement of precision medicine. Providing data that has clinical relevance on a patient specific level as well as presenting that data in a way that makes it easier for physicians to interpret and use it in their decision-making process, informatics is essentially the engine that will power precision medicine into widespread adoption. This course covers the two broad focus areas: Precision Medicine in the context of Molecular Medicine and genomic technologies, and Precision Medicine in the context of data analytics integrating clinical data with genotype or other biomarker type data. Course details: this course will consist of 4 modules, quizzes and final exam. Modules include: Precision Medicine fundamentals: concepts and approaches; Molecular Diagnostics: major technologies, platforms, resources and providers; Data Commons: on-line resources and tools for large scale Big Biomedical data; Data Analytics solutions for Precision Medicine.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

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HIDS 7005 Advanced Health Informatics 3 Credits

This course provides a broad overview of Health Informatics and is designed for the health data science program. Given the generally high level of Health Informatics field and its important role in the healthcare delivery, it is likely that each of you will have (or may already have had) some notion about informatics, information technologies in healthcare at some point in your careers. This course will provide you with a framework to help you understand the informatics environment in healthcare, to assess different components of the ecosystem, to develop understanding about each of the major building blocks, and to be able to think about the specific technologies enabling health information access, sharing and analysis to improve performance, efficiency and enable a better patient outcome. This course also provides an understanding of the leadership role of the health data scientist, implementation and management of technologies including computer based decision models to structure information and analyze complex organizational problems. Current and future IT applications such as the electronic health record (EHR), mobile health, and telemedicine will be analyzed for their influence on cost, quality and access to care; the legal, ethical and regulatory ramifications of these technological advances will also be explored.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

HIDS 7006 AI for Health Applications 3 Credits

This course will provide a hands-on opportunity to explore the current applications of artificial intelligence and machine learning in biomedicine and healthcare. Focused around case studies representing the successful examples of these algorithms, students will learn the mathematical formulations underlying the methods, understand the computational requirements and limitations of their application, and explore their use in healthcare research applications. In general, a single ML/AI method will be addressed each week, and consist of lecture on the underlying algorithm, discussion of applications from the literature, and an interactive workshop illustrating its application to a test example dataset. Homework will test the implementation of the given algorithms on a curated dataset and explore the unique attributes.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

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HIDS 7007 Digital Health Applications 2 or 4 Credits

You have a special talent. That is why you are in this Master's program. You also have a burning idea ... the next big digital health app that is going to change medicine. "But I don't have the time or money or know where to start," you might tell yourself. This elective is designed to give you a roadmap to go from idea to concept validation to prototype. Along the way exposing you to technical aspects of development and interoperability such as FHIR and insight into how to formulate a digital health app business plan and pitch to investors. Kevin Maloy, MD is the unicorn doctor-coder who straddles the line between in the trenches clinical medicine and writing code. He is famous for taking ideas from back of the napkin drawings to enterprise deployment at a large hospital system while seeing patients there. He is one of the most approachable, down to earth, honest doctors with an IT background. He is much more interested in building apps as opposed to attending meetings. He is board certified in Emergency Medicine and a certified Physician Builder in Epic. He has extensive full stack developer skills including Oracle, MS SQL, php, and nodejs.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

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HIDS 7009 Imaging Informatics 3 Credits

COURSE TITLE: HIDS 509: Imaging Informatics. INSTRUCTORS: Dr. Yuriy Gusev. DESCRIPTION: To develop understanding of Biomedical Imaging Informatics, its goals, standards, methods and applications. This course will enable students to identify various imaging modalities and associated data types, understand imaging data standards, navigate through on-line resources for medical imaging, and become familiar with tools for imaging information processing and analysis for major practical applications of biomedical imaging. This course is about understanding major types of imaging data, methods for processing imaging information and analysis tools; and integration with other types of health data

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

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HIDS 7950 Mandatory Capstone 4 Credits

The Capstone Course is the culmination of the student's course work and experiences at Georgetown. It is an integral part of the core curriculum taken during the Summer I and II sessions. The Capstone course consists of a student-proposed and executed project. The Project is designed to provide students with the opportunity to bring together the knowledge and skills they have acquired throughout the program and apply them to a real-world challenge in healthcare. Students will be required to identify a problem and propose a practical solution that leverages the learning acquired during the 2 semesters in the program. Students will be supervised by the academic advisor and a host preceptor/mentor from industry or government. The project will typically cover the conceptualization, analysis, design, and production of a working, functional prototype that serves as a proof of concept.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

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