Introduction to Data-Driven Healthcare

Fall 2018

Instructors:	Michoel Snow, MD PhD	**Time:**	F 8am - 10am
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Course Description: This course is an exploration of the modern healthcare informatics pipeline, highlighting core components within the context of real-world applications. Through a mix of discussion and case based learning, each class will examine steps along the pipeline, how they fit into the larger informatics framework, as well as an analysis of their implementation based on real-world projects. Some steps we will analyze include: clinical decision support, cohort selection, ethics of model building, artificial intelligence and machine learning within healthcare. After completing this course students will be able to design complete informatics pipelines to use within their own research. As the course progresses, students will be expected to present on components of informatics pipeline within their specific domains and opportunities for future informatics applications. For the final project, teams of students will be expected to propose new domain-specific informatics pipelines.

Prerequisites: None

Objectives: Students who complete the course in full, will be able to:

- Outline the components which form model bioinformatics pipelines
- Investigate possible hypotheses for clinical significance and system compliance
- Characterize hypotheses within the context of healthcare infrastructure
- Identify stakeholders based on the scope of the project
- Identify sources of patient data and differentiate the various collection mechanisms/tools
- Develop a informatics driven research question
- Assess the quality of the generated data
- Describe modeling frameworks to analyze the data
- Contrast methods to evaluate the results of modeling
- Discuss methods of model implementation and care provider communication
- Design new data-driver pipelines for application within the healthcare system

Presentation and Grades: At the end of the course each group of students will present a novel tenable bioinformatics pipeline for use within the hospital or clinics. The class is graded pass/fail based on in class participation and the final presentation.

Tentative Course Schedule:

1. Overview of course and introduction to buidling data driven bioinformatic pipelines

2. Building clinical decision support systems (Implementation)

3. Evaluating study results and model predictions (Modeling and Analysis)

4. Overview of machine learning models - part 1 (Modeling and Analysis)

5. Overview of machine learning models - part 2 (Modeling and Analysis)

6. Assessing data quality and preparing data for modeling and analysis (Data Preparation)

7. Identifying data sources and implementing collection protocols (Data Collection)

8. Calculating economic feasability and impact (Stakeholder concerns)

9. Bioinformatics ethics and stakeholder engagement (Stakeholder Concerns)

10. Healthcare administrative databases (Infrastructure)

11. Exploratory data analysis (Hypothesis Generation)

12. Small group presentations