Washington University in St. Louis

Biomedical Informatics

Website: https://i2db.wustl.edu/

Courses

Visit online course listings to view offerings for M18 BMI.

M18 BMI 5000 Independent Study in Biomedical Informatics
Investigation of a topic in biomedical informatics of mutual interest to the student and mentor. Students and mentor must fill out an agreement and return to the I2DB education office to gain MS credit approval.
Credit variable, maximum 3 units.

M18 BMI 5200 Biomedical Informatics Journal Club
Trainees will attend weekly one-hour seminars and student-led journal club discussions in which current peer-reviewed publications relevant to biomedical informatics will be reviewed and discussed.
Credit 1 unit.

M18 BMI 5201 Biomedical Informatics Rotation
Students will be responsible for arranging two rotations to identify a thesis lab or capstone project site. Each rotation will last approximately one month, with the goal being to expose students to research and practical biomedical informatics opportunities in both academic and industry settings.
Credit 1 unit.

M18 BMI 5204 Mixed Methods in Biomedical Informatics
Building on the fundamentals of biomedical informatics in BMI I & II, this course will introduce students to the various research methods and underlying theories used to conduct biomedical informatics research studies. This course will cover research methods, including the systematic review of published research as well as qualitative, quantitative, and mixed methods. Under each topic, we will focus on the formulation of research questions/hypotheses, the selection of appropriate study design, data collection and analysis methods, and methods to ensure rigor and reproducibility of research. The course will encompass several hands-on components for students to practice and apply their learned skills.
Credit 3 units.

M18 BMI 5205 The Electronic Health Record
The electronic health record (EHR) has become a central technology for the provision of clinical care. This course will use the EHR as a reference point to explore key areas in clinical informatics, including history, applications and policy.
Credit 3 units.

M18 BMI 5302 Introduction to Biomedical Informatics I
This survey and methods course provides an overview of the theories and methods that comprise the field of biomedical informatics. Topics to be covered include the following: (1) information architecture as applied to the biomedical computing domain; (2) data and interoperability standards; (3) biological, clinical, and population health relevant data analytics; (4) healthcare information systems; (5) human factors and cognitive science; (6) evaluation of biomedical computing applications; and (7) ethical, legal, and social implications of technology solutions as applied to the field of biomedicine. The course will consist of both didactic lectures and experiential learning opportunities, including hands-on laboratory sessions and journal club-style discussions. The course will culminate with a capstone project requiring the in-depth examination, critique and presentation of a student-selected topic related to the broad field of biomedical informatics. Biomedical Informatics I is designed primarily for individuals with a background in the health and/or life sciences who have completed a course in introductory statistics (e.g., Math 1011). No assumptions are made about computer science or clinical background; however, some experience with computers and a high-level familiarity with health care will be useful. This course does not require any programming knowledge, and it will not teach students how to program.
Credit 3 units.

M18 BMI 5303 Introduction to Biomedical Informatics II
This course builds upon the principles taught in Biomedical Informatics I by focusing on theories and informatics methods used in the study of populations. Topics include study design, statistical inference, bias, confounding factors, causality, and multi-level populations scale data. This course is intended to enable individuals to critically select relevant methods and evaluate their results as part of both the design of new projects as well as the review of results available in the public domain (e.g., literature, public data sets). Core concepts to be reviewed during this course include computational skills, data modeling and intergration, fomal knowledge representation, in silico hypothesis generation, quantitative data analysis principles, and critical thinking skills surrounding the ability to ask and answer questions about complex and heterogeneous biomedical data. Prerequisite: M18 5302 or instructor permission.
Credit 3 units.

M18 BMI 5304 Introduction to Biomedical Data Science I
Biomedical Data Science I will provide students with an introduction to tools, theories and methods related to data modeling, management and query, data manipulation and analysis, and visualization that serve as the foundations for advanced topics in Biomedical Informatics and Data Science. The course consists of didactic lectures and experiential learning opportunities including hands-on laboratory sessions and a culminating project. No assumptions are made about computer science or clinical background; however, prior experience with health and life sciences data, and data structures and algorithms are strongly encouraged. Lectures will be held asynchronous. Labs are in person.
Credit 3 units.

M18 BMI 5305 Introduction to Biomedical Data Science II
Building upon the fundamental principles of informatics tools and data analysis taught in Biomedical Data Science I (M18-5304), this course provides students with more advanced methods in the areas of biomedical computing, including data analysis, machine learning, deep learning models, natural language processing, deployment of data analysis models on supercomputers, and development of web apps. Both theory and coding applications and practices will be introduced for usage in the space of genomics, imaging, and medical records data analysis to help students apply learned computational tools and models. Prerequisite: M18-5304 or instructor permission.
Credit 3 units.

M18 BMI 5401 Biomedical Informatics Capstone
Students will demonstrate how to synthesize and apply the full spectrum of biomedical informatics theories and methods used in the program curriculum. The capstone project focuses on an applied informatics problem with relevance to health care research or delivery at the individual or population level, resulting in a report that outlines the student's problem selection and the design, conduct, and results

of the student's research. Each trainee will also be expected to present their project and its outcomes or findings in a public seminar, where questions will be posed by both the audience and a committee of faculty members. The specific selection of the capstone or thesis project track as part of a trainee's degree program is to be discussed with and approved by the individual's faculty and academic adviser. Students who do not enroll in the captone course will enroll in the thesis course. Prerequisites: Introduction to Biomedical Informatics I and II (M18 5302 and M18 5303), Introduction ot Biomedical Data Science I and II (M18 5304 and M18 5305), and a minimum of one Advanced Topics course. Permission of the faculty and adviser is also required.
Credit variable, maximum 3 units.

M18 BMI 5402 Biomedical Informatics Thesis
Students will demonstrate how to synthesize and apply the full specturm of biomedical informatics theories and methods included in the program curriculum. The thesis project requires students to formulate research questions that focus on the development or extension of a theoretical framework or a novel method with relevance to the field of informatics, resulting in a report that outlines the student's topic selection and the design, conduct, and results of the student's research. Each trainee will also be expected to present their project and its outcomes or findings in a public seminar, where questions will be posed by both the audience and a committee of faculty members. The specific selection of the capstone or thesis project track as part of a trainee's degree program is to be discussed with and approved by the individual's faculty and academic adviser. Students who do not enroll in the thesis course will enroll in the capstone course. Prerequisites: Introduction to Biomedical Informatics I and II (M18 5302 and M18 5303), Introduction to Biomedical Data Science I and II (M18 5304 and M18 5305), and a mimimum of one Advanced Topics course. Permission of the faculty and academic adviser is also required.
Credit variable, maximum 3 units.