B M I/POP HLTH 451 — INTRODUCTION TO SAS PROGRAMMING FOR POPULATION HEALTH
2 credits.
Use of the SAS programming language for the management and analysis of biomedical data. Enroll Info: None
Requisites: Declared in the Population Health, Epidemiology or Clinical Investigation graduate program.
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2020

B M I/STAT 541 — INTRODUCTION TO BIOSTATISTICS
3 credits.
Course designed for the biomedical researcher. Topics include: descriptive statistics, hypothesis testing, estimation, confidence intervals, t-tests, chi-squared tests, analysis of variance, linear regression, correlation, nonparametric tests, survival analysis and odds ratio. Biomedical applications used for each topic. Enroll Info: None
Requisites: Graduate/professional standing. Not open to students with credit for STAT 542 or BMI 541 or equiv BMI 542 cons inst
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2020

B M I/STAT 542 — INTRODUCTION TO CLINICAL TRIALS I
3 credits.
Intended for biomedical researchers interested in the design and analysis of clinical trials. Topics include definition of hypotheses, measures of effectiveness, sample size, randomization, data collection and monitoring, and issues in statistical analysis. Statistics graduate students should take B M I/STAT 64. Enroll Info: None
Requisites: B M I/STAT 541
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2020

B M I/POP HLTH 551 — INTRODUCTION TO BIOSTATISTICS FOR POPULATION HEALTH
3 credits.
Designed for population health researcher. Topics include descriptive statistics, elementary probability, probability distributions, one- and two-sample normal inference (point estimation, hypothesis testing, confidence intervals), power and sample size calculations, one- and two-sample binomial inference, underlying assumptions and diagnostic work. Enroll Info: None
Requisites: Declared in the Population Health, Epidemiology or Clinical Investigation graduate program. Not open to students with credit for STAT/B M I 541
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2020

B M I/POP HLTH 552 — REGRESSION METHODS FOR POPULATION HEALTH
3 credits.
Introduction to the primary statistical tools used in epidemiology and health services research; multiple linear regression, logistic regression and survival analysis. Enroll Info: None
Requisites: STAT/B M I 541 or POP HLTH/B M I 551
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2021
B M I/COMP SCI 567 — MEDICAL IMAGE ANALYSIS
3 credits.

Present introductory medical image processing and analysis techniques. Topics include medical imaging formats, segmentation, registration, image quantification, classification. Strongly encourage Matlab experience, such as COMP SCI 310 or 368-Matlab. Enroll Info: None
Requisites: (MATH 320 or 340) and (STAT 511, 541, POP HLTH/B M I 551, STAT 324, 371, or STAT/F&W ECOL/HORT 571) or graduate/professional standing
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2020

B M I 573 — FOUNDATIONS OF DATA-DRIVEN HEALTHCARE
3 credits.

Familiarize students with basic informatics principles and techniques to support clinical research and quality improvement studies from a perspective of data-driven approaches. Content includes information systems for study design; regulatory compliance; use of electronic health records data for research; data collection and acquisition; data security, storage, transfer, processing and analysis. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2016

B M I/COMP SCI 576 — INTRODUCTION TO BIOINFORMATICS
3 credits.

Algorithms for computational problems in molecular biology. The course will study algorithms for problems such as: genome sequencing and mapping, pairwise and multiple sequence alignment, modeling sequence classes and features, phylogenetic tree construction, and gene-expression data analysis. Enroll Info: None
Requisites: (COMP SCI 300 or 367) and MATH 222 or graduate/professional standing or declared in the Capstone Certificate in Computer Sciences for Professionals
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2020

B M I/BIOCHEM/BMOLCHEM/MATH 606 — MATHEMATICAL METHODS FOR STRUCTURAL BIOLOGY
3 credits.

A rigorous foundation for mathematical modeling of biological structures. Mathematical techniques include ordinary and partial differential equations, 3D Fourier analysis and optimization. Biological applications include protein folding, molecular dynamics, implicit solvent electrostatics, and molecular interactions. Enroll Info: None
Requisites: (MATH 234, 320, 340, or 375) and (COMP SCI 200, 300, 301, 302, or 310) or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2016

B M I/BIOCHEM/BMOLCHEM/MATH 609 — MATHEMATICAL METHODS FOR SYSTEMS BIOLOGY
3 credits.

Provides a rigorous foundation for mathematical modeling of biological systems. Mathematical techniques include dynamical systems and differential equations. Applications to biological pathways, including understanding of bistability within chemical reaction systems, are emphasized. Enroll Info: None
Requisites: MATH 415 and (MATH 320, 340, 341, or 375) or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2020

B M I/I SY E 617 — HEALTH INFORMATION SYSTEMS
3 credits.

Provides grounding in core concepts of health information systems. Major applications include clinical information systems, language and standards, decision support, image technology and digital libraries. Evaluation of IE tools and perspectives designed to improve the quality, efficiency and effectiveness of health information. Enroll Info: None
Requisites: I SY E 417, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2016
B M I/STAT 641 — STATISTICAL METHODS FOR CLINICAL TRIALS
3 credits.

Statistical issues in the design of clinical trials, basic survival analysis, data collection and sequential monitoring. Intended for statistics graduate students; those with medical backgrounds should take STAT/B M I 542. Enroll Info: None

Requisites: STAT/MATH 310 or graduate/professional standing
Course Designation: Breadth - Natural Science

L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2021

B M I/STAT 642 — STATISTICAL METHODS FOR EPIDEMIOLOGY
3 credits.

Methods for analysis of case-control, cross sectional, and cohort studies. Covers epidemiologic study design, measures of association, rates, classical contingency table methods, and logistic and Poisson regression. Enroll Info: None

Requisites: STAT/MATH 310 or graduate/professional standing
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2020

B M I/POP HLTH 651 — ADVANCED REGRESSION METHODS FOR POPULATION HEALTH
3 credits.

Extension of regression analysis to observational data with unequal variance, unequal sampling and propensity weights, clusters and longitudinal measurements, using different variance structures, mixed linear models, generalized linear models and GEE. Matrix notation will be introduced and underlying mathematical and statistical principles will be explained. Examples use data sets from ongoing population health research. Enroll Info: None

Requisites: POP HLTH/B M I 552
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2020

B M I/POP HLTH 652 — TOPICS IN BIOSTATISTICS FOR EPIDEMIOLOGY
1-3 credits.

Each module will adopt an in-depth focus on a biostatistical method of particular relevance to epidemiology such as measurement error, missing data, intermediate variables, complex study designs, meta-analysis, splines, propensity scores, causal inference, spatial statistics and resampling. One or more modules will be offered every spring semester. Enroll Info: None

Requisites: Declared in the Population Health, Epidemiology or Clinical Investigation graduate program.
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2015

B M I 699 — INDEPENDENT STUDY
1-3 credits.

Directed study to pursue knowledge beyond curriculum. Enroll Info: Jr st or cons inst

Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2021

B M I/STAT 741 — SURVIVAL ANALYSIS THEORY AND METHODS
3 credits.

Theory and practice of analytic methods for censored survival data, including nonparametric and parametric methods, the proportional hazards regression model, and a review of current topics in survival analysis. Enroll Info: None

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2021

B M I 750 — CUMULATIVE CAPSTONE IN CLINICAL AND HEALTH INFORMATICS
3 credits.

Application of core coursework to a real world project where students assess all 10 American Medical Association informatics (AMIA) competencies for healthcare informatics. These competencies are integrated into a large cumulative project to ascertain the knowledge, skills and attributes to successfully work in an informatics field. Enroll Info: None

Requisites: Declared in Clinical and Health Informatics MS program
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No

B M I/COMP SCI 767 — COMPUTATIONAL METHODS FOR MEDICAL IMAGE ANALYSIS
3 credits.

Study of computational techniques that facilitate automated analysis, manipulation, denoising, and improvement of large-scale and high resolution medical images. Design and implementation of methods from computer Vision and Machine Learning to efficiently process such image data to answer biologically and clinically meaningful scientific questions. Students are strongly encouraged to have programming skills and basic proficiency in calculus and linear algebra, such as MATH 340. Enroll Info: None

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2016
BM I/STAT 768 — STATISTICAL METHODS FOR MEDICAL IMAGE ANALYSIS
3 credits.

Introduce key statistical methods and concepts for analyzing various medical images. Analyze publicly available and student/instructor supplied imaging data using the most up-to-date methods and tools. Aimed at graduate student and researchers with strong quantitative background. Enroll Info: None

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2021

BM I 773 — CLINICAL RESEARCH INFORMATICS
3 credits.

Course will familiarize students with basic informatics principles and techniques to support clinical research. Content includes information systems for protocol design; regulatory compliance; approaches for patient recruitment; efficient protocol management; data collection and acquisition; data security, storage, transfer, processing and analysis. Enroll Info: None

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2020

BM I/COMP SCI 776 — ADVANCED BIOINFORMATICS
3 credits.

Advanced course covering computational problems in molecular biology. The course will study algorithms for problems such as: modeling sequence classes and features, phylogenetic tree construction, gene-expression data analysis, protein and RNA structure prediction, and whole-genome analysis and comparisons. Enroll Info: None

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2021

BM I 826 — SPECIAL TOPICS IN BIOSTATISTICS AND BIOMEDICAL INFORMATICS
1-3 credits.

Covers advanced topics in the areas of biostatistics and biomedical informatics. Includes reading and discussion of original literature and individual student projects. Enroll Info: None

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2021

BM I/COMP SCI/PSYCH 841 — COMPUTATIONAL COGNITIVE SCIENCE
3 credits.

Studies the biological and computational basis of intelligence, by combining methods from cognitive science, artificial intelligence, machine learning, computational biology, and cognitive neuroscience. Requires ability to program. Enroll Info: None

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2020

BM I/STAT 877 — STATISTICAL METHODS FOR MOLECULAR BIOLOGY
3 credits.

Develop statistical problems in gene mapping, high throughputomic data analysis, phylogenetics and sequence analysis. Introduce ideas of key methods using published data. Statisticians learn statistical basis for research methodology. Collaboration among students and with biologists is encouraged through projects. Enroll Info: None

Requisites: STAT 610 or MATH/STAT 710
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2020

BM I 881 — BIOMEDICAL DATA SCIENCE SCHOLARLY LITERATURE 1
2 credits.

Critical evaluation of the scholarly literature is a crucial skill for researchers. Through this course, students will develop this valuable skill by focused reading and discussion of a variety of journal articles of present or historical importance from the biomedical sciences literature, including biostatistics, biomedical informatics, and relevant topics in statistics and computer science. Enroll Info: None

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2020

BM I 882 — BIOMEDICAL DATA SCIENCE SCHOLARLY LITERATURE 2
2 credits.

Critical evaluation of the scholarly literature is a crucial skill for researchers. Through this course, students will develop this valuable skill by focused reading and discussion of a variety of journal articles of present or historical importance from the biomedical sciences literature, including biostatistics, biomedical informatics, and relevant topics in statistics and computer science. Enroll Info: None

Requisites: BM I 881
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2021
B M I 883 — BIOMEDICAL DATA SCIENCE PROFESSIONAL SKILLS 1
1 credit.

A variety of skills that are important for a successful research career are
often left to students to develop on their own. This course attempts to
fill many of those gaps, including writing and reviewing papers, securing
research funding, giving talks, presenting posters, making a personal
website, job opportunities in universities and industry, and teaching.
Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: No
Last Taught: Fall 2020

B M I 884 — BIOMEDICAL DATA SCIENCE PROFESSIONAL SKILLS 2
1 credit.

A variety of skills that are important for a successful research career are
often left to students to develop on their own. This course attempts to
fill many of those gaps, including writing and reviewing papers, securing
research funding, giving talks, presenting posters, making a personal
website, job opportunities in universities and industry, and teaching.
Enroll Info: None
Requisites: B M I 883
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: No
Last Taught: Spring 2021

B M I 899 — PRE-DISSERTATOR RESEARCH
1-12 credits.

Pre-dissertator Research. Enroll Info: Course is open to pre-dissertator
students only.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Summer 2021

B M I 901 — FUNDAMENTALS OF INFORMATICS IN CLINICAL RESEARCH
2 credits.

Become familiar with basic informatics principles and techniques
to support clinical research. Content includes information systems
for protocol design; regulatory compliance; approaches for patient
recruitment; efficient protocol management; data collection and
acquisition; data security, storage, transfer, processing and analysis.
Enroll Info: None
Requisites: MED SC-M 810, 811, 812, and 813
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: No

B M I/B M E/BIOCHEM/CBE/COMP SCI/GENETICS  915 — COMPUTATION
AND INFORMATICS IN BIOLOGY AND MEDICINE
1 credit.

Participants and outside speakers will discuss current research in
computation and informatics in biology and medicine. This seminar is
required of all CIBM program trainees. Enroll Info: None
Requisites: Consent of instructor
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2021

B M I/MEDICINE  918 — HEALTH INFORMATICS FOR MEDICAL
STUDENTS ELECTIVE
2 credits.

Biomedical Informatics is an interdisciplinary field that combines
knowledge of information sciences and medical sciences to optimize
the use and application of biomedical data across the spectrum from
molecules to individuals to populations. Offers an overview of the field of
health informatics by providing students with the fundamental knowledge
of the concepts of health informatics and how technology can be used in
the delivery of health care. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2020

B M I 990 — DISSERTATOR RESEARCH
1-3 credits.

Dissertator Research. Course is open to dissertators only. Enroll Info: None
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework
requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2021