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BIO

BIO 6000 Capstone I MS Biostatistics

Course Director(s): Bagiella, Emilia

The Capstone is a required three-semester course for students in the MS in Biostatistics Program. It provides experience in the art of consulting and in the proper application of statistical techniques to clinical and translational research. Students will bring together the skills they have acquired in previous coursework and apply them to the consulting experience. Learning will take place by doing.

In the Fall term, the capstone-related lectures and project will engage students in important discourse regarding data management and research ethics.

Prerequisites: Must be enrolled in the MS in Biostatistics program

Credits: 1 | Offered: Fall

BIO 6100 Fundamentals of Epidemiology

Course Director(s): Liu, Bian

This course provides a rigorous introduction to epidemiology for students in the first trimester of the MS in Biostatistics program.

Topics covered include: an introductory overview of epidemiology, common measures of health outcome frequencies and associations, appropriate construction of an epidemiologic

hypothesis, causal inferences, common epidemiologic study designs, error and bias in epidemiologic studies, confounding and effect modification, critique review and evaluation of published studies, ethics and reproducibility in epidemiologic research.

Credits: 3 | Offered: Fall

BIO 6300 Introduction to R Programming

Course Director(s): Benn, Emma

In this course, students will gain a comprehensive, hands-on, introduction to statistical computing for data management and statistical analysis in R, a free, open source, statistical software. This course is geared towards students interested in becoming skilled and efficient data analysts in the biomedical, public health, or clinical and translational sectors. This course presumes prior or concurrent enrollment in a graduate-level introductory biostatistics course. Topics covered in this course include: basic commands, functions, and operations for vectors, matrices, and data frames, debugging, loops, data management, data visualization, and univariate and bivariate analyses.

Pre-requisites

Students must have significant, minimum scripting-level, programming experience with demonstrated productivity in one or more programming languages (python preferred, but R and Matlab acceptable). Students with only toy-model programming experience will find the course immediately overwhelming. Specific mathematical or statistical expertise is not required, but college-level mastery of basic mathematical and statistical knowledge of fundamental concepts should be obtained prior to starting class. Such concepts include basic calculus, linear algebra and probability distributions. If none of these pre-requisites are available, attending one or more of the following courses is required:

Course: BMI1005-1007 (all modules) Computer Systems

Course: BSR1803 Systems Biology: Biomedical Modeling

Course: BMI2005 Introduction to Algorithms

Course: BIO6300 Introduction to R programming

Credits: 1 | Offered: Fall

BIO 6400 Biostatistics for Biomedical Research

Course Director(s): Bagiella, Emilia; Benn, Emma

This course covers the basic tools for the collection, analysis, and presentation of data in all areas of basics, clinical and translational research. Central to these skills is assessing the impact of chance and variability on the interpretation of research findings and subsequent implications on the understanding of disease mechanisms, drug discovery and development, and applications to clinical practice. Topics covered include: general principles of study design including internal and external validity; probability and sampling distributions, theory of confidence intervals and hypothesis testing; review of methods for comparison of discrete and continuous data including one-sample and two-sample tests, correlation analysis, linear

regression, sample size and power. Additionally, students will learn to apply their statistical knowledge to complex real-world challenges, while gaining introductory statistical computing proficiency in R and SAS.

Prerequisites: Algebra

Required for MS in Biostatistics, students. All other students must take a placement test.
Credits: 3 | Offered: Fall

BIO 6500 Probability and Inference I

Course Director(s): TBD

This course covers basic material in Probability Theory, which is necessary for all work in Biostatistics, especially as a foundation for Statistical Inference.

We will introduce the basic terminology and concepts of probability theory, including sample and outcome spaces, random variables, discrete distributions and probability density functions. Students will also learn fundamental properties of the most important discrete and continuous probability distributions, expectations, moment generating functions, conditional probability and conditional expectations, multivariate distributions, laws of large numbers, and the central limit theorem. This course is a prerequisite for the Probability and Inference II course. Strong analytical and quantitative skills are required to successfully master the material covered in this course. Credits: 3 | Offered: Fall

BIO 8000 Capstone II MS Biostatistics

Course Director(s): Bagiella, Emilia

The Capstone is a required three-semester course for students in the MS in Biostatistics Program. It provides experience in the art of consulting and in the proper application of statistical techniques to clinical and translational research. Students will bring together the skills they have acquired in previous coursework and apply them to the consulting experience. Learning will take place by doing.

In the Spring I term, students will start participating in real-life consultations and reporting in class about their progress.

Prerequisites: Must be enrolled in the MS in Biostatistics program Credits: 1 | Offered: Spring

BIO 8200 Analysis of Categorical Data

Course Director(s): Liu, Shelley

This course provides a comprehensive overview of methods of analysis for binary and other discrete response data, with applications to epidemiological and clinical studies. It is a second level course that presumes some knowledge of applied statistics and epidemiology. Topics discussed include 2 x 2 tables, m x 2 tables, tests of independence, measures of association,

power and sample size determination, stratification and matching in design and analysis, inter-rater agreement, logistic regression analysis.

Prerequisites:

BIO6400 or MPH0300 and

BIO6100 or MPH0400

Credits: 3 | Offered: Spring

BIO 8500 Probability and Inference II

Course Director(s): TBD

This course is the second part of a two course sequence in Probability and Inference which follows Probability and Inference I.

Statistical inference is the theoretical foundation for statistical methods used in the biological sciences. Essential topics covered in this course include: point estimation, confidence sets, the likelihood function, and statistical hypothesis testing. Optimality criteria for estimation and testing are developed. Other topics to be discussed include basic notions from Bayesian inference and Decision Theory as well as the theory of linear models. Nonparametric inference and other areas may be included as time permits.

Prerequisites: BIO6400 and BIO6500

Credits: 3 | Offered: Spring

BIO 8700 Theory of Linear & Generalized Linear Models

Course Director(s): Lin, Hung Mo

This course provides a comprehensive overview of regression methods for analysis of continuous (normally distributed) and categorical (binary and count) data. The aim of this course is to provide a systematic training in both the theoretical foundations and the model building strategies of generalized linear models for MS/MPH and PhD students who have already had some data analysis experience. The course covers the theoretical background underlying regression techniques. Topics discussed include simple regression and multiple regression for normally distributed data, logistic regression, log linear model, Poisson regression, and negative binomial regression for categorical data, and regression diagnostics.

Prerequisites: BIO6400 and BIO6500 Credits: 3 | Offered: Spring

BIO 9000 Capstone III MS Biostatistics

Course Director(s): Bagiella, Emilia

The Capstone is a required three-semester course for students in the MS in Biostatistics Program. It provides experience in the art of consulting and in the proper application of statistical techniques to clinical and translational research. Students will bring together the skills

they have acquired in previous coursework and apply them to the consulting experience. Learning will take place by doing.

In the Spring II term, students will meet the capstone requirements by shadowing Biostatistics faculty in the Center for Biostatistics consultation service. By shadowing the Biostatistics faculty, students will learn how to: 1) successfully collaborate with non-statisticians (primarily clinical faculty) at the Icahn School of Medicine at Mount Sinai, 2) provide appropriate study design-related and methodologic approaches to cutting edge research questions, 3) successfully conduct advanced preliminary analyses, and 4) communicate their findings to an institution-wide audience at an MS in Biostatistics capstone symposium at the end of the Spring II term.

Prerequisites: Must be enrolled in the MS in Biostatistics program Credits: 1 | Offered: Spring 2

BIO 9001 Applied Analysis of Healthcare Databases

Course Director(s): Egorova, Natalia

Applied Analysis of Healthcare Databases provides a comprehensive overview of healthcare databases that are commonly used for research. The overall course objective is to provide students with working knowledge of available healthcare databases, research questions that can be addressed using these databases and methods used for analysis of large scale databases. This course will prepare students to identify and use national and local healthcare databases in their own research. Students will evaluate published database studies, complete programming exercises with SAS statistical software and hands-on access to a large database, and prepare a proposal for analyzing a specific research question using a large healthcare database.

Pre-Requisites: (BIO6400 or MPH0300) AND (BIO6100 or MPH0400) Credits: 3 | Offered: Spring 2

BIO 9002 Race and Causal Inference Seminar

Course Director(s): Benn, Emma

In this course, we will question the operationalization of race as a ‘cause’ when examining racial disparities in health from a statistical framework grounded in the underlying theories of causal inference. By the end of this course, students will have gained a unique set of knowledge that they can use to: 1) more critically scrutinize the traditional approaches to investigating disparities in health (not just specific to race), and 2) apply a more nuanced inferential, rather than descriptive, approach to future work in the disparities arena that will move us closer to finding efficacious interventions.

Prerequisites:

BIO6400 or MPH0300 AND
BIO6100 or MPH0400

BIO6300 is highly recommended.

All others require permission from professor.
Credits: 1 | Offered: Spring 2

BIO 9100 Survival Analysis

Course Director(s): Ozbet, Umut

This course describes the analysis of time-to-event data. Several concepts of censoring are introduced, as are functions used to describe survival distributions. Both parametric and nonparametric methods to describe and compare survival distributions are given. Cox regression is studied including the assumptions required, examining the validity of these assumptions, and dealing with time dependent covariates. Interval censored data are explored, as well as the analysis of multiple failures. Analyzing data sets will be required. Emphasis is on concepts and applications, but some appreciation of very basic statistical concepts is required to appreciate the topics to be covered

Prerequisites: BIO6400, BIO6500, BIO8500 and BIO8700
BIO6300 is highly recommended
Credits: 3 | Offered: Spring

BIO 9200 Analysis of Longitudinal Data

Course Director(s): Suarez-Farinas, Mayte

The aim of this course is to provide a systematic training in both the theoretical foundations and the model building strategies of linear regression models for students who have already had some data analysis experience. The course presents modern approaches to the analysis of longitudinal data. Topics include linear mixed effects models, generalized linear models for correlated data (including generalized estimating equations), computational issues and methods for fitting models, and dropout or other missing data.

The course is organized as a two-hour lecture in which the statistical methodology for longitudinal data is discussed and a one-hour lab in which R will be used to perform analysis of actual data.

Prerequisites: BIO6400, BIO6500, BIO8500 and BIO8700.
BIO6300 is highly recommended
Credits: 3 | Offered: Spring

BMI

BMI 1001 Intro to Biomedical & Translational Informatics

Course Director(s): Frederick Thum

This course will provide a survey of the field of Biomedical Informatics with an emphasis on the growing and emerging field of Translational Informatics. It will cover some of the basic concepts and ideas behind the application of computational and statistical approaches and

theories in translational medicine, and provide a survey of some possible application areas. A special focus will be on areas of research underway at Mount Sinai for which there are courses available as well as potential supervisors. The course shall consist of 15 1-hour lectures held twice a week over a period of 8 weeks. The goal is to introduce students to and get them acclimated within the MS in Biomedical Informatics at the Icahn School of Medicine at Mount Sinai.

Attendance is mandatory and is 50% of the Final Grade. Credits: 1 | Offered: Fall

BMI 1002 Intro to Clinical Information Systems

Course Director(s): Kannry, Joseph

This course will compare and contrast the ways in which Clinical Information Systems (e.g. Electronic Health Records (EHR), Personal Health Records (PHRs), etc.) support the needs of and are actually used by physicians, patients, accountable care organizations, researchers, informaticians and medical centers. We will examine the workflows for each of these use cases. We will explore the benefits supplied, limitations of and risks brought by the use of Clinical Information Systems EHRs. We will also investigate how these information systems are deployed for maximum benefit. We will briefly discuss clinical data standards. We will also discuss clinical decision support systems. In all of our discussions, we will discuss real-world challenges and homework will be assigned based on these challenges.

Credits: 1 | Offered: Spring

BMI 1003 Introduction to Healthcare Systems

Course Director(s): Pugh, Michael

This is a distance learning course, offered through Adobe Connect. 75 minute live Adobe Connect sessions with the Course Director.

We will explore the roles and structures of medical centers, physicians, patients, insurance companies, pharmaceutical companies, device manufacturers, Medicare/Medicaid and accountable care organizations. We will discuss the history and future directions of the system. We will cover legal and ethical issues and national policies and procedures such as the HIPAA and the IRB. We will explore the advantages and limitations of this system including a comparison of its quality, cost and accessibility with other systems worldwide Credits: 1 | Offered: Fall

BMI 1005 Computer Systems - UNIX/Linux Fundamentals

Course Director(s): Costa, Anthony

This course provides an introduction to computer systems and scientific computing environments to enable effective use of computational and data resources. The course assumes no prior computing experience and is broken into 3 component modules. These are:

1. UNIX/Linux fundamentals with a focus on operating systems (file systems, navigation, communication, multi-user environments, permissions, file sharing, UNIX shells, POSIX architecture), beginning and intermediate shell scripting, and Linux environment applications commonly encountered in scientific computing (e.g., awk, sed).
2. Computer system architectures and applications in scientific computing, topics including the history of scientific computing, HPC architecture and application design (Von Neumann architecture, parallel processing, shared and distributed memory, vector processing, MIMD/SIMD, accelerator computing, parallel numerical libraries), HPC batch processing systems (e.g., scheduling) and finally modern distributed data-parallel approaches (e.g., Hadoop-style and ecosystem, Spark, MapReduce as a paradigm and implementation).
3. Introduction to scientific programming in Python 3, with relevant comparison/contrast to other important languages commonly encountered in scientific computing (e.g., perl, R, C/C++). Variables, operators, data structures, control flow, decisions, file I/O, exception handling, and modern python libraries encountered in HPC, scientific computing, and data science (e.g., scipy, numpy, pandas, scikit-learn).
Emphasis will be placed on real-world practicality by motivating study with examples and tasks relevant to bioinformatics, structural biology, imaging, and data science. The student will develop both a solid conceptual foundation and experience solving real problems by the end of the class.

Credits: 1 | Offered: Fall

BMI 1006 Computer Systems: Architectures & Applications in Scientific Computing

Course Director(s): Costa, Anthony

This course provides an introduction to computer systems and scientific computing environments to enable effective use of computational and data resources. The course assumes no prior computing experience and is broken into 3 component modules. These are:

1. UNIX/Linux fundamentals with a focus on operating systems (file systems, navigation, communication, multi-user environments, permissions, file sharing, UNIX shells, POSIX architecture), beginning and intermediate shell scripting, and Linux environment applications commonly encountered in scientific computing (e.g., awk, sed).
2. Computer system architectures and applications in scientific computing, topics including the history of scientific computing, HPC architecture and application design (Von Neumann architecture, parallel processing, shared and distributed memory, vector processing, MIMD/SIMD, accelerator computing, parallel numerical libraries), HPC batch processing systems (e.g., scheduling) and finally modern distributed data-parallel approaches (e.g., Hadoop-style and ecosystem, Spark, MapReduce as a paradigm and implementation).

3. Introduction to scientific programming in Python 3, with relevant comparison/contrast to other important languages commonly encountered in scientific computing (e.g., perl, R, C/C++). Variables, operators, data structures, control flow, decisions, file I/O, exception handling, and modern python libraries encountered in HPC, scientific computing, and data science (e.g., scipy, numpy, pandas, scikit-learn).

Emphasis will be placed on real-world practicality by motivating study with examples and tasks relevant to bioinformatics, structural biology, imaging, and data science. The student will develop both a solid conceptual foundation and experience solving real problems by the end of the class.

Credits: 1 | Offered: Fall

BMI 1007 Computer Systems: Introduction to Scientific Programming in Python 3

Course Director(s): Costa, Anthony

This course provides an introduction to computer systems and scientific computing environments to enable effective use of computational and data resources. The course assumes no prior computing experience and is broken into 3 component modules. These are:

1. UNIX/Linux fundamentals with a focus on operating systems (file systems, navigation, communication, multi-user environments, permissions, file sharing, UNIX shells, POSIX architecture), beginning and intermediate shell scripting, and Linux environment applications commonly encountered in scientific computing (e.g., awk, sed).

2. Computer system architectures and applications in scientific computing, topics including the history of scientific computing, HPC architecture and application design (Von Neumann architecture, parallel processing, shared and distributed memory, vector processing, MIMD/SIMD, accelerator computing, parallel numerical libraries), HPC batch processing systems (e.g., scheduling) and finally modern distributed data-parallel approaches (e.g., Hadoop-style and ecosystem, Spark, MapReduce as a paradigm and implementation).

3. Introduction to scientific programming in Python 3, with relevant comparison/contrast to other important languages commonly encountered in scientific computing (e.g., perl, R, C/C++). Variables, operators, data structures, control flow, decisions, file I/O, exception handling, and modern python libraries encountered in HPC, scientific computing, and data science (e.g., scipy, numpy, pandas, scikit-learn).

Emphasis will be placed on real-world practicality by motivating study with examples and tasks relevant to bioinformatics, structural biology, imaging, and data science. The student will develop both a solid conceptual foundation and experience solving real problems by the end of the class.

Credits: 1 | Offered: Fall

BMI 2002 Biomedical Software Engineering I

Course Director(s): Goldberg, Arthur

Software plays a vital and increasingly significant role in all aspects of biomedical research, translation of successful research findings, and patient care. How is this software created? What best practices should biomedical software professionals follow to design, create, and deploy such software? Many of these practices are widely used by software engineers. How should biomedical computing adapt them to address our unique challenges?

We teach software engineering best practices that will enable students to efficiently and consistently design and create quality biomedical software. We focus on a comprehensive set of practical, well-regarded methods and tools that students can apply immediately. These include requirements analysis, modular and object-oriented design, complexity hiding, coding standards, software reuse, version control, unit and regression testing, and logging and debugging.

We employ both traditional classroom and experiential pedagogy. In addition to completing simple programming assignments, all students must be working on a biomedical software project. Each student's project provides a context for exploring the ideas and practicing skills taught in the classroom. Students in the MS in Biomedical Informatics Program must take this course concurrently with the program's required Capstone Project course. Other students must identify or create a suitable project in which they participate.

Credits: 2 | Offered: Fall

BMI 2003 Biomedical Software Engineering II

Course Director(s): Goldberg, Arthur

Software plays a vital and increasingly significant role in all aspects of biomedical research, translation of successful research findings, and patient care. How is this software created? What best practices should biomedical software professionals follow to design, create, and deploy such software? Many of these practices are widely used by software engineers. How should biomedical computing adapt them to address our unique challenges?

We teach software engineering best practices that will enable students to efficiently and consistently design and create quality biomedical software. We focus on a comprehensive set of practical, well-regarded methods and tools that students can apply immediately. These include requirements analysis, modular and object-oriented design, complexity hiding, coding standards, software reuse, version control, unit and regression testing, and logging and debugging.

We employ both traditional classroom and experiential pedagogy. In addition to completing simple programming assignments, all students must be working on a biomedical software project. Each student's project provides a context for exploring the ideas and practicing skills taught in the classroom. Students in the MS in Biomedical Informatics Program must take this course concurrently with the program's required Capstone Project course. Other students must identify or create a suitable project in which they participate.

Credits: 2 | Offered: Spring

BMI 2005 Introduction to Algorithms

Course Director(s): Costa, Anthony

This course is a computer-science intensive program intended as a survey of algorithms – that is, computational methods used to solve appropriately defined problems, and their implementation on modern scientific computing hardware. Core to any modern discussion of algorithms is competency in one or more object-oriented programming languages, in addition to a deep dive into data structures, without which the discussion of practical algorithm implementation is not useful. We complete the course with a survey of mathematical optimization techniques typically not encountered in an ordinary course on algorithms, but which form the mathematical basis for many problems in computational biology, biochemistry, genomics, and data science. In this course, we use Python 3 as the core programming tool. The class is structured as 1.5 hours of lecture each week with a 1.5 hour lab component, for 12 total weeks. The course can be logically broken up into 3 modular topics, with the bulk of the time discussing fundamental algorithms and data structures; however, each module builds on the previous and therefore the course should be taken as a whole.

Credits: 3 | Offered: Spring

BMI 3001 Data Analytics and Mining

Course Director(s): Ma'ayan, Avi

Data are becoming all the more important in today's world to discover reliable understanding of complex processes and actionable hypothesis on ways to productively perturb these processes. Biology and medicine have been witnessing a data revolution driven by rapid progress in a variety of biotechnologies and an increased emphasis on personalized medicine. This course is designed to train students, staff and faculty in commonly used methods to organize and mine data sets, especially those that are complex and large (big data). These methods include basic data concepts, database operations, classification, clustering and outlier/anomaly detection. Credits: 1 | Offered: Spring

BMI 3002 Machine Learning for Biomedical Data Science

Course Director(s): Pandey, Gaurav

Data are becoming all the more important in today's world to discover reliable understanding of complex processes and actionable hypothesis on ways to productively perturb these processes. Biology and medicine have been witnessing a data revolution driven by rapid progress in a variety of biotechnologies and an increased emphasis on personalized medicine. This course is designed to train students, staff and faculty in commonly used methods to organize, mine and learn from data sets, especially those that are complex and large (big data). These methods include basic data concepts, classification, clustering, network inference and analysis and outlier/anomaly detection. Note that the teaching of these methods will focus on the abstract and mathematical concepts involved in learning from general data sets. Relatable examples of the application of these methods to biomedical datasets will also be provided. Students in teams will also be expected to conceive a relevant project at the beginning of the course and present their approach and results at the end. The overall goal of this course is to teach the attendees how to apply the methods above to complex biomedical data sets to

extract actionable knowledge that may not be obtainable from other methods. Credits: 3 |
Offered: Spring

BMI 8001 Biomedical Informatics Capstone - Fall

Course Director(s): Kovatch, Patricia; Shapiro, Jason

BMI Capstone Projects is a required course that provides students in the MS Program in Biomedical Informatics (BMI Program) in the Graduate School of Biomedical Sciences at Mount Sinai with an opportunity to participate in a biomedical informatics internship with an ongoing biomedical research or clinical project at Mount Sinai or a BMI Program partner. Credits: 3 |
Offered: Fall

BMI 8002 Biomedical Informatics Capstone - Spring

Course Director(s): Goldberg, Arthur

BMI Capstone Projects is a required course that provides students in the MS Program in Biomedical Informatics (BMI Program) in the Graduate School of Biomedical Sciences at Mount Sinai with an opportunity to participate in a biomedical informatics internship with an ongoing biomedical research or clinical project at Mount Sinai or a BMI Program partner. Credits: 3 |
Offered: Spring

BMI 9001 Biomedical Data Science Capstone Project

Course Director(s): Sobie, Eric

This course represents the culmination of the Master in Biomedical Data Science (MBDS) Curriculum. In a semester-long, active learning project, students will work with a mentor to devise a potential solution to a contemporary problem in biomedical data science. The process of researching current unsolved problems, outlining potential solutions, and writing a final report will require students to integrate and synthesize concepts learned in the program's core coursework, thus providing a demonstration that trainees have mastered and can apply pertinent ideas and approaches.

The course is 9 credits where students will complete intensive, full-time research under the direct guidance of a mentor.

Pre-requisites:

Students will take this course after having completed the full sequence of core courses for the MBDS program. This will require them to have developed significant, minimum scripting-level, programming experience with demonstrated productivity in one or more programming languages. To develop the expertise necessary for a strong capstone project, students in the program will have taken the following courses:

BMI1005=1007(all modules) Computer Systems

BMI2005 Introduction to Algorithms

BMI3002 Machine Learning for Biomedical Data Science

Credits: 9 | Offered: Fall

BSR

BSR 1004 Introduction to Journal Club I

Course Director(s): Pfleger, Cathie

This is a 2-part required course to be taken by all first year students taking core coursework in Biomedical Sciences. This course primarily (1) reinforces fundamental concepts learned in BSR1012 Biomedical Science (Fall) and (2) teaches students how to read primary literature (journal articles). Students will be divided into groups of eight to twelve students. Each group will have an advanced student mentor and a faculty mentor. The papers discussed will parallel the material being taught in BSR1013 BMS (Fall) All students will be required to participate in the presentation and discussion of the paper, getting any necessary preparatory help from the student and faculty mentors. The students will be graded on attendance, presentation and participation in discussions. Credits: 1 | Offered: Fall

BSR 1005 Introduction to Journal Club II

Course Director(s): Sokol, Sergei

The course will involve the discussion of several publications that focus on key discoveries or critical concepts of molecular, cell and developmental biology. This is a 2-part required course to be taken by all first year students taking BSR1013 BMS (spring). The students will be divided into groups of five students. Each group will have an advanced student mentor and a faculty mentor. Each student will be required to present a paper, getting any necessary preparatory help from the student and faculty mentors. Each presentation will be followed by a discussion involving the entire group. Each student presenter will receive feedback about the presentation from the student and faculty mentor. The course will require a final critique paper. Students will be graded based on attendance, presentation and participation in discussions. Credits: 1 | Offered: Spring

BSR 1006 Laboratory Rotation - Fall

Course Director(s): Graduate School Staff

Laboratory rotations are an important part of the first year of the Graduate Program at Mount Sinai. They give students the opportunity to experience different research projects, different laboratory and mentoring styles, and allow the faculty to assess the interests and aptitude of the students. In general, all PhD and MD/PhD students will complete three laboratory rotations (a minimum of two, in two different laboratories, is recommended) before declaring a research preceptor and a Multidisciplinary Training Area. Credits: 4 | Offered: Fall

BSR 1007 Laboratory Rotation - Spring

Course Director(s): Graduate School Staff

Laboratory rotations are an important part of the first year of the Graduate Program at Mount Sinai. They give students the opportunity to experience different research projects, different laboratory and mentoring styles, and allow the faculty to assess the interests and aptitude of

the students. In general, all PhD and MD/PhD students will complete one-three laboratory rotations (a minimum of two, in two different laboratories, is recommended) before declaring a research preceptor and a Multidisciplinary Training Area. The rotation facilitates the choice of preceptor and also offers students an exposure to problems and techniques of interest to them. For each semester, the student should submit the name of the rotation preceptor and start date of the rotation no later than the beginning of the semester. This is done via the submission of the Rotation Agreement Form. Credits: 4 | Offered: Spring

BSR 1012 Biomedical Science - Fall

Course Director(s): O'Connell, Matthew

Biomedical Science - Fall is part 1 of a year long six unit course that surveys a broad and comprehensive study of basic Molecular Cellular and Developmental Biology. The topics covered prepare students for both a career in Biomedical Research and for the Advanced studies within the CAB, DSCB, GGS, IMM, and MIC MTAs. Biomedical Science is a required course for all first year students that intend to be members of these MTAs. The course is structured as a series of lectures; grade assessment is based on a mixture of in-class and take home quizzes as well as one formal examination per unit Credits: 5 | Offered: Fall

BSR 1013 Biomedical Science - Spring

Course Director(s): O'Connell, Matthew

Biomedical Science - Spring, is part 2 of a year long, six unit course that surveys a broad and comprehensive study of basic Molecular, Cellular and Developmental Biology. The topics covered prepare students for both a career in Biomedical Research, and for the Advanced studies within the CAB, DSCB, GGS, IMM, and MIC MTAs. Biomedical Science is a required course for all first year students that intend to be members of these MTAs. The course is structured as a series of lectures; grade assessment is based on a mixture of in-class and take home quizzes as well as one formal examination per unit.

Prerequisite: BSR1012 Biomedical Science - Fall

Credits: 5 | Offered: Spring

BSR 1015 Introduction to Scientific Computing

Course Director(s): Oemke, Holly; Costa, Anthony

This course provides an introduction to Sinai's scientific computing environment to enable effective use of our computational and data resources including the Minerva supercomputer and the Mount Sinai Data Warehouse. Assuming no prior computing experience, the course will introduce modern compute environments including basic computer architecture, Linux/Unix, queuing systems, file system structure, data management and teach basic scripting/programming concepts. The class will include "hands on" exercises in Unix shell scripting, Python and R Credits: 1 | Offered: Fall

BSR 1016 Problem Solving in Biomedical Science

Course Director(s): Baron, Margaret

This summer course is designed for new MD/PhD students, to promote and develop analytic thinking in biomedical science and to explore a selection of current experimental model systems and paradigms. The course will help to hone students' critical reading skills and ability to identify important scientific questions and to design experimental approaches through which the problem can be addressed. Camaraderie among members of the entering class allows the students to interact closely with one another and with outstanding faculty. Credits: 2 | Offered: Fall

BSR 1017 Biomedical Science for MDPHD - Fall

Course Director(s): O'Connell, Matthew, Chen, Benjamin

Biomedical Science - Fall for MDPHD students. 1st year MD/PhD students should register for this course. Credits: 9 | Offered: Fall

BSR 1018 Biomedical Science for MDPHD - Spring

Course Director(s): O'Connell, Matthew, Chen, Benjamin

Biomedical Science - Spring for MDPHD students. 1st year MD/PhD students should register for this course. Credits: 4 | Offered: Spring

BSR 1021 Responsible Conduct of Research

Course Director(s): Gligorov, Nada

This course is required for all first-year graduate students, following NIH mandates.

Specific topics for the eight 1 hour sessions:

- (i) Research Misconduct
- (ii) Experimental design and data management practices
- (iii) Mentor and Trainee Responsibilities; Collaborative Research
- (iv) Conflicts of Interest; Intellectual property
- (v) The Protection of Human Subjects
- (vi) The Welfare of Laboratory Animals
- (vii) Publication, authorship, and peer review
- (viii) Peer Review, the Grant Process, and Fiduciary Responsibility.

Each Session is ~45 minute lecture with 15 minutes of discussion. Credits: 0.5 | Offered: Fall

BSR 1022 Rigor & Reproducibility

Course Director(s): Dominguez-Sola, David

Rigor and reproducibility is front and center in modern biomedical research. This is a new half credit course to address these issues and enhance training in responsible conduct in research. Credits: 0.5 | Offered: All Terms

BSR 1107 Structural Biology & Molecular Biophysics of Disease

Course Director(s): Ubarretxena, Iban

This course introduces the student to core concepts and methodologies in structural biology and molecular biophysics applied to the study of disease mechanisms. From a disease perspective the course will be divided into four major diseases: Cancer, Metabolic Diseases, Neurological Disorders and Cardiovascular Disease. Each disease section will begin with a lecture by an expert who will introduce a particular disease, discuss the most relevant disease mechanisms, and identify key protein targets involved in pathogenesis. This lecture will be followed by a series of lectures focused on the structural biology and molecular biophysics approaches employed to study these pathogenic protein targets, reveal their mechanism of action, and identify their druggability. From a technical perspective the course will cover experimental (wet lab) and computational approaches, emphasizing the complementarity of methods used to characterize biomolecular systems at different levels of temporal and spatial resolution. The course includes coverage of X-ray crystallography, NMR spectroscopy, Cryo Electron Microscopy, SAXS, Atomic Force microscopy, FRET, Nanoparticles, Molecular Dynamics Simulations, Monte Carlo Simulations, Structural Bioinformatics, and more. This course is required for second year SMD students. Credits: 3 | Offered: Spring 2

BSR 1501 Fundamentals of Immunology

Course Director(s): Alexandropoulos, Konstantina

The Immunology Core III was developed to provide the students with an in-depth study of the fundamental concepts in Immunology. This is a 45-hour course that it is intended to introduce students to the organization of the immune system and function of the immune response as it relates to health and disease. The different topics and sections will be presented and discussed by faculty members who have expertise in the subject matter. The grades will be based on in-class quizzes and midterm and final exams as well as on class participation. The aim of the course is that students will develop a solid understanding of immunological concepts, develop the skills to help them appreciate immunological research so that they will be prepared to undertake more advanced studies and be able to carry out original research in this field. Reading assignments will be based on Janeway's Immunobiology textbook (8th edition) and supplementary reading materials suggested by the lecturers. Biomedical Science I and II courses are prerequisites for this course. Credits: 3 | Offered: Fall

BSR 1705 Prin of Neural Sci, Beh & Brain Pathophys: Cell & Molec Neu

Course Director(s): Chess, Andrew; Friedel, Roland

This is a year-long, introductory Core course divided into 4 separate Units. Overall, the course will provide students with a rigorous foundation in the molecules, cells and circuits upon which nervous system function is based, how different brain systems are engaged to drive different behaviors and the nature of brain disorders that affect identified synapses, cells, circuits and systems. Unit 1 covers Cellular and Molecular Neuroscience. Credits: 3 | Offered: Fall

BSR 1706 Prin of Neural Sci, Beh & Brain Pathophys: Systems Neuro

Course Director(s): Cropper, Elizabeth

This is a year-long, introductory Core course divided into 4 separate Units. Overall, the course will provide students with a rigorous foundation in the molecules, cells and circuits upon which nervous system function is based, how different brain systems are engaged to drive different behaviors and the nature of brain disorders that affect identified synapses, cells, circuits and systems. Unit 2 covers Systems Neuroscience. Credits: 4 | Offered: Fall

BSR 1707 Prin of Neural Sci, Beh & Brain Pathophys: Behav & Cognitive Neurosci

Course Director(s): Huntley, George; Salton, Stephen

This course surveys topics in behavioral and cognitive neuroscience including the structure of brain systems for learning and memory, executive function, emotional regulation, and reward processing. A consistent focus is the integration of research findings across levels of analysis and evaluation of the quality of experimental findings. The course format is seminar-style presentation of key research articles. Credits: 3 | Offered: Spring

BSR 1708 Prin of Neural Sci, Beh & Brain Pathophys: Neurological & Psychiatric Disorders

Course Director(s): Casaccia, Patrizia; Schaefer, Anne

This and the concurrent Topics in Clinical Neuroscience are an integrated set of courses covering the most recent highlights in molecular pathogenesis and clinical features of the major neurologic and psychiatric disorders. The goal is to offer Ph.D. candidates an opportunity to learn more about the disorders they study in laboratory animals, which will improve the translational potential of their work and better prepare them for a future as an NIH-funded investigator. A key feature of this novel class is that students will be exposed each week to the molecular pathogenesis of psychiatric and neurological disorders together with a clinical presentation. Credits: 2 | Offered: Spring

BSR 1800 Systems Biomedicine

Course Director(s): Blitzer, Robert

Presents core molecular, cellular, and biochemical material within the context of physiology and pathophysiology of disease. There are five modules that make up the course: Introduction, Diabetes, Cancer, Renal Disease and Drug Abuse Credits: 8.5 | Offered: Fall

BSR 1802 Quantitative Graduate Physiology

Course Director(s): Sobie, Eric

This course will provide students with a deep understanding of cardiovascular and renal physiology. Lectures will both describe both the general functioning of these organ systems and cover selected topics in greater detail. Paper discussion forums and problem sets will complement the material discussed in the lectures. Emphasis will be placed on describing quantitatively the functioning of the heart and kidney, and on illustrating underlying principles that are shared by the two organ systems. Both classical systems-level and contemporary cellular-level issues will be discussed. Topics will include: 1) ionic balance in cardiac cells, 2) multidimensional electrical propagation in heart, 3) systemic control of cardiac output; 4)

cotransport of ions and metabolites in renal epithelial cells, and 5) a mathematical description of nephron function. Credits: 3 | Offered: Spring

BSR 1803 Systems Biology: Biomedical Modeling

Course Director(s): Sobie, Eric

We take a case-based approach to teach contemporary mathematical modeling techniques to graduate students. Lectures provide biological background and describe the development of both classical mathematical models and more recent representations of biological processes. Students are taught how to analyze the models and use computation to generate predictions that may be experimentally tested. Credits: 3 | Offered: Spring

BSR 2001 Electron Microscopy

Course Director(s): Ronald E. Gordon

This 2 credit didactic course covering the structure and function of the electron microscopes, TEM, SEM & STEM; tissue preparation for both types of scopes; freeze fracture; immunocytochemistry at the EM level; image analysis; photographic techniques and some special applications to include energy dispersive spectroscopy (EDS), wavelength spectroscopy and a variety of others. Credits: 2 | Offered: Fall

BSR 2004 Lessons in Scientific Publishing

Course Director(s): Pinotti, Rachel; Halevi, Gali

Being published in high quality, reputable journals and ensuring high impact in both traditional and alternative metrics is essential to a successful career today in science and medicine. The aims of this course are to familiarize students with the processes of writing and publishing scientific papers and to learn how to create a professional online presence that will allow their work to be noticed and cited. The course offers ISMMS students the opportunity to become adept in the processes of research organization, article submission and peer-review as well as creating and maintaining online presence to promote their work and their achievements. This course is an ideal option for students interested in research and publishing. Credits: 1 | Offered: Spring

BSR 2104 Intro to Computer Modeling & Macromolecules

Course Director(s): Mezei, Mihaly

The course relies mainly on academic software (VMD from University of Illinois at Urbana-Champaign, Simulaid and Dockres developed here) as well as on commercial software (Gaussian and Pymol). The course also relies on the use of Web resources (e.g., the Protein Data Bank or the ZINC library of small molecules, as well as various servers and software downloads). Credits: 3 | Offered: Fall

BSR 2108 Structural & Chemical Approaches to Pharmacology and Drug Discovery

Course Director(s): Osman, Roman

This course attempts to recreate in a teaching environment the fundamental approaches of rational small molecule drug discovery research, and teach the fundamental molecular and physico-chemical principles that govern the capacity of small molecules to affect or regulate biological functions of macromolecules. The course consists of three themes, covering topics ranging from lead discovery to drug candidate selection, and to mechanism of action of drugs for both validated and emerging drug target families, as listed below:

Theme #1. Structure-based Drug Discovery

- lead discovery and optimization, and drug candidate selection

Theme #2. New Advances on Validated Drug Target Families

- drugs and mechanism of action on kinases, GPCRs and others

Theme #3. Emerging Drug Targets

- Identification and characterization of drug targets relevant to epigenetics, neurodegenerative diseases and cancer.

Theme #1 teaches the principles of discovery of biological targets and active compounds by hypothesis-driven and high-throughput approaches with both experimental and computational methods. This is followed by characterization of biological target interactions with lead compounds (i.e., structure, energy and dynamics). The inferred molecular mechanisms provide the basis for lead optimization through rational design and medicinal chemistry, and drug candidate selection through evaluation of drug toxicity and efficacy, as well as drug pharmacokinetic/pharmacodynamic properties.

Themes #2 and #3 review the latest advancements in drug discovery for both validated and emerging drug target families consisting of proteins involved in enzymatic catalysis, gene transcription and translation, protein-protein or protein-nucleic acid interactions.

Credits: 3 | Offered: Spring

BSR 2301 Embryos Genes and Development

Course Director(s): Soriano, Philippe

This course will provide a thorough introduction to invertebrate and vertebrate development emphasizing cellular, genetic and molecular mechanisms. The course will focus primarily on development of fruit flies, nematodes, Xenopus, zebrafish, and mice. Emphasis will be on understanding fundamental embryological processes such as induction, determination, and pattern formation. Current technologies such as transgenic animals, genetics, mosaic analysis, homologous recombination, somatic cell genetics, and classical embryonic manipulations will be analyzed. Selected topics include developmental genetics of regulatory hierarchies, lateral inhibition, regeneration and development, cell lineage analysis, X-chromosome inactivation, imprinting, and sex determination. Following introductory lectures, the course will focus on primary literature detailing the current state of the field using journal club presentation (by

students). The final exam will consist of grant proposals by the students to be reviewed by other students in a study section type arrangement Credits: 3 | Offered: Fall

BSR 2400 Translational Genomics

Course Director(s): Scott, Stuart; Sharp, Andrew

The influence of Genomics is vast and affects all areas of biology, thus this course will be useful to all those who plan to do biomedical research. This course is an introduction to the goals, principles, tools, and many applications of genetics/genomics. The focus of this course will be on the human genome and in particular on naturally occurring DNA sequence variations and their impact on molecular physiology, clinical phenotypic expression, the diversity populations, and human evolution. Emphasis is on the latest advances in genetics/genomics, the use of genetic tools in understanding complex biological pathways and disease, and the translation of genomic information on clinical care. By the end of the course, the students will have a working knowledge of the current genomic technologies, approaches and types of databases and computational tools available with an overall understanding of how genomics can be used to probe disease biology. Credits: 3 | Offered: Spring

BSR 2401 Intro to Human Genome Sequencing

Course Director(s): Kenny, Eimar; Suckiel, Sabrina

There are no specific prerequisites and no expectation of previous experience with large-scale computing.

This workshop-style course is a general offering to the entire Mount Sinai community and serves as both the prerequisite (and part of the informed decision-making process) for the fall full-semester course "Practical Analysis of Your Personal Genome", in which students will have the opportunity, if they are interested, to have their genome sequenced. This course will be of interest to anyone, however, who is getting started with next-generation sequencing in a research or clinical setting, regardless of whether they intended to take the follow-on course.

If you want to take the fall course ¿Practical Analysis of Your Personal Genome¿ (Fall, times TBD) you must register for and attend this prerequisite course. Those students wishing to take the fall course please include a brief description of your background and motivation for taking the course. Note that the fall course is capped at 20 students and because of that cap the course is effectively limited to students (who have priority) except by prior arrangement with the course staff. Students must be able to commit to 4-hours of class per week. Given that substantial time commitment, graduate students must have permission from their advisor to take the fall course. Credits: 2 | Offered: Spring 2

BSR 2601 Fundamentals of Microscopy

Course Director(s): Azeloglu, Evren

An introductory microscopy course that covers basic concepts in optical, electron and scanning probe microscopy with special emphasis on state-of-the-art technological developments. Topics

will include theoretical concepts as well as applications, such as rudimentary image processing applications and contemporary imaging platforms. The course is composed of seven modules with lectures; four modules with hands on lab/demo segments; one image processing project. Credits: 3 | Offered: Spring

BSR 2700 Neuropharmacology

Course Director(s): Hurd, Yasmin; Zachariou, Venetia

This course focuses on the major neurotransmitter-receptor systems in the brain and the detailed mechanistic underpinnings by which psychotropic drugs (including antipsychotics, antidepressants, anxiolytics, anticonvulsants, drugs of abuse, and others) affect the nervous system. It is designed for students who already have basic knowledge of neuroscience. Each class will involve a student-led discussion of a recent research paper, which illustrates important advanced principles of neuropharmacology and state-of-the-art methods used in the field. Credits: 1 | Offered: Fall

BSR 2701 Brain Imaging: in vivo methods

Course Director(s): Kaplan, Ehud; Tang, Cheuk

Introduction to basic physics and principles of in-vivo neuroimaging technologies, including MRI, PET and Optical techniques Credits: 1 | Offered: Fall

BSR 2703 Drug Discovery: Successful vs Usual

Course Director(s): Mobbs, Charles

The purpose of this course is to develop skills to enhance discovery of medically useful drugs. The course uses a case-study approach describing the discovery of the most valuable drugs currently in use, with an emphasis on phenotypic screening, combined with exposure to cutting-edge bioinformatics tools. Some of the drugs to be addressed are penicillin, insulin, the small pox vaccine, ether, morphine, aspirin, salvarsan, thiorazine/Haldol, norethindrone, and digoxin. Of particular interest will be assessment of what is, or more generally what is not, known about mechanisms by which drugs exert their therapeutic effects, and how the development of drugs have elucidated mechanisms of disease. Credits: 3 | Offered: Fall

BSR 2704 Current Topics in Translational Neuroscience

Course Director(s): George Huntley

This new course will be an adjunct to the Brain & Behavior course given to MSTP students in their second year. Topics of special interest will be selected for more advanced discussion, which will revolve around student-led presentations of research papers. The topics will thus enrich the standard curriculum of the course. In addition to being a requirement for Neuroscience MD/PhD students, all MD/PhD students will be encouraged to enroll along with any medical student with a particular interest in neuroscience. Credits: 1 | Offered: Fall

BSR 2705 Effective Scientific Communication

Course Director(s): Croxson, Paula

All scientists have to communicate our science, whether it is to our peers, collaborators, potential funders or the general public. This course aims to provide students with the hands-on skills and knowledge they need to communicate their science effectively. Through a series of hands-on workshops focused on spoken and written skills, students will learn from experts in Policy and Advocacy, Media, Outreach and Teaching to develop their skills. Students will develop the ability to craft a clear message, give and receive feedback and edit their work across a range of media and audiences. Credits: 1 | Offered: Spring 2

BSR 2901 Foundations of Biomedical Research

Course Director(s): Mobbs, Charles

The course covers the key discoveries that form the basis of current biomedical research, and most importantly how these discoveries were made, including the cell theory, discovery of the gene, the germ theory, and structural biology. The philosophy of the course is that great discoveries are most likely to be made with an understanding of how the greatest discoveries in the past were made. Credits: 3 | Offered: Spring

BSR 2930 Protecting and Commercializing Your Innovation

Course Director(s): Hanss, Basil; Gruber, Simon

This lecture course, developed jointly between Icahn School of Medicine at Mount Sinai (ISMMS) and Rensselaer Polytechnic Institute (RPI), explores the relationship between academic research, intellectual property, and commercialization. You will learn about the nuances of intellectual property, with a focus on biomedical applications, and how the products of academic research and related innovations can be protected and commercialized. The course will cover experimental design, patent strategy, interaction with regulatory agencies, and the process of starting a company or licensing an invention. Lectures will be given at both RPI and ISMMS by instructors from patent law firms, successful biotech entrepreneurs, and Mount Sinai Innovation Partners. Credits: 2 | Offered: Fall

BSR 2931 Commercialization of Biomedical Innovation: Entrepreneurship & Business Fundamentals

Course Director(s): Preker, Alexander; Nickerson, Brian

This course will allow participants to learn about entrepreneurship and business fundamentals with an aim to understanding the process of commercializing biomedical innovation. This course may be taken in sequence with the course on Intellectual Property (BSR 2930: Protecting Your Innovation) or just as one course experience (no Pre-requisites are required).

In particular, the course will introduce students to the underlying concepts of entrepreneurship – both tangible and intangible. It will help the student better understand some of the –subsectors– of the health industry relevant to entrepreneurship in commercializing scientific discovery of new drugs, medical technology, diagnostics, clinical advancement, and digital health. The course will also aid participants to understand better the importance to commercialization of protecting the intellectual properties of innovation. Students will also

have the opportunity to review some of the key regulatory approval processes of the FDA and reimbursement approval processes under Medicare and private health insurance.

The course will also teach students relevant fundamentals of organizational leadership, governance and management. It will allow the students to understand the range of legal entities that can be used to start a business. It will discuss the market intelligence that is needed for entrepreneurs to understand if a particular innovation has potential for commercialization, the market context in terms of supply, demand, competition and potential profits. Furthermore, the course will examine the different funding modalities, starting at the seed funding stage, progressing through the different phases of private equity and finally public offerings and mergers & acquisitions. This will include understanding a company's macro financial position and valuation.

Credits: 2.5 | Offered: Spring

BSR 3101 Computer-Aided Drug Design

Course Director(s): Filizola, Marta; Provasi, Davide

Please note - Attendance in this course is mandatory.

COMPUTER-AIDED DRUG DESIGN (CADD) is a hands-on course that provides an introduction to computer-aided drug design/discovery technology, including both ligand-based and structure-based rational drug design strategies. Both theoretical and practical aspects of chemoinformatics, virtual screening, and in silico design approaches are presented with the goal of teaching students how to accelerate the discovery of novel molecules with improved therapeutic profiles using modern technologies. To this end, lectures will be integrated with hands-on sessions and at least one "serious game" (a.k.a. simulation of a real-world structure-based drug discovery problem).

This course is not only designed to provide students with a solid foundation in computational structural biology, but also to help them become proficient in the use of modern drug discovery solutions available at Mount Sinai (e.g., the Schrödinger's Small Molecule Drug Discovery Suite). Students will also acquire an understanding of how to protect their own intellectual property on discoveries in preclinical stages and how to eventually move these discoveries to commercialization

Credits: 1.5 | Offered: Fall

BSR 3503 Mechanisms of Action of Immunomodulatory Agents

Course Director(s): Salmon, Helene; Merad, Miriam

The international video conference-based course on immunotherapy entitled "Immunological Biotherapies: Concepts and Development" was introduced in the 2015-2016 academic year. Based on its success and the large turnout by graduate and master students, postdocs and clinical fellows, we are happy to offer this course again this year, with the following modules:

Module 1: Mechanisms of Action of Immunomodulatory Agents
Module 2: Cancer Immunotherapy
Module 3: Immunotherapy of Chronic Inflammation
Module 4: Vaccine Development in Infectious Diseases

The goal of this class is to provide students with the means to understand the relevance of immunology and immunotherapy strategies in the treatment of human disease. We have gathered an exceptional number of immunotherapy experts throughout the world to teach basic immunology principles and discuss the development and success of different immunotherapies in the treatment of inflammatory diseases, autoimmunity, cancer, and infectious diseases.

Lectures will be provided locally either in France (Sorbonne Universités, Paris), in Brazil (University of Sao Paulo) or New York (Mount Sinai) and transmitted live through a videoconference to all three locations. Students and lecturers will have the opportunity to discuss in an open forum.

The course is organized in 4 modules (3hrs/day; 6 to 9 hrs per module), and evaluation is based on attendance and participation (one credit given for two modules).

Credits: 0.5 | Offered: Spring

BSR 3504 Cancer Immunotherapy

Course Director(s): Salmon, Helene; Merad, Miriam

The international video conference-based course on immunotherapy entitled "Immunological Biotherapies: Concepts and Development" was introduced in the 2015-2016 academic year. Based on its success and the large turn out by graduate and master students, postdocs and clinical fellows, we are happy to offer this course again this year, with the following modules:

Module 1: Mechanisms of Action of Immunomodulatory Agents
Module 2: Cancer Immunotherapy
Module 3: Immunotherapy of Chronic Inflammation
Module 4: Vaccine Development in Infectious Diseases

The goal of this class is to provide students with the means to understand the relevance of immunology and immunotherapy strategies in the treatment of human disease. We have gathered an exceptional number of immunotherapy experts throughout the world to teach basic immunology principles and discuss the development and success of different immunotherapies in the treatment of inflammatory diseases, autoimmunity, cancer, and infectious diseases.

Lectures will be provided locally either in France (Sorbonne Universités, Paris), in Brazil (University of Sao Paulo) or New York (Mount Sinai) and transmitted live through a

videoconference to all three locations. Students and lecturers will have the opportunity to discuss in an open forum.

The course is organized in 4 modules (3hrs/day; 6 to 9 hrs per module), and evaluation is based on attendance and participation (one credit given for two modules).

Credits: 0.5 | Offered: Spring

BSR 3505 Immunotherapy of Chronic Inflammation

Course Director(s): Salmon, Helene; Merad, Miriam

The international video conference-based course on immunotherapy entitled "Immunological Biotherapies: Concepts and Development" was introduced in the 2015-2016 academic year. Based on its success and the large turn out by graduate and master students, postdocs and clinical fellows, we are happy to offer this course again this year, with the following modules:

Module 1: Mechanisms of Action of Immunomodulatory Agents

Module 2: Cancer Immunotherapy

Module 3: Immunotherapy of Chronic Inflammation

Module 4: Vaccine Development in Infectious Diseases

The goal of this class is to provide students with the means to understand the relevance of immunology and immunotherapy strategies in the treatment of human disease. We have gathered an exceptional number of immunotherapy experts throughout the world to teach basic immunology principles and discuss the development and success of different immunotherapies in the treatment of inflammatory diseases, autoimmunity, cancer, and infectious diseases.

Lectures will be provided locally either in France (Sorbonne Universités, Paris), in Brazil (University of Sao Paulo) or New York (Mount Sinai) and transmitted live through a videoconference to all three locations. Students and lecturers will have the opportunity to discuss in an open forum.

The course is organized in 4 modules (3hrs/day; 6 to 9 hrs per module), and evaluation is based on attendance and participation (one credit given for two modules).

Credits: 0.5 | Offered: Spring

BSR 3506 Vaccine Development in Infectious Diseases

Course Director(s): Salmon, Helene; Merad, Miriam

The international video conference-based course on immunotherapy entitled "Immunological Biotherapies: Concepts and Development" was introduced in the 2015-2016 academic year. Based on its success and the large turn out by graduate and master students, postdocs and clinical fellows, we are happy to offer this course again this year, with the following modules:

Module 1: Mechanisms of Action of Immunomodulatory Agents

Module 2: Cancer Immunotherapy

Module 3: Immunotherapy of Chronic Inflammation
Module 4: Vaccine Development in Infectious Diseases

The goal of this class is to provide students with the means to understand the relevance of immunology and immunotherapy strategies in the treatment of human disease. We have gathered an exceptional number of immunotherapy experts throughout the world to teach basic immunology principles and discuss the development and success of different immunotherapies in the treatment of inflammatory diseases, autoimmunity, cancer, and infectious diseases.

Lectures will be provided locally either in France (Sorbonne Universités, Paris), in Brazil (University of Sao Paulo) or New York (Mount Sinai) and transmitted live through a videoconference to all three locations. Students and lecturers will have the opportunity to discuss in an open forum.

The course is organized in 4 modules (3hrs/day; 6 to 9 hrs per module), and evaluation is based on attendance and participation (one credit given for two modules).

Credits: 0.5 | Offered: Spring

BSR 3508 Applications of DNA sequencing and synthesis to Immunology

Course Director(s): Laserson, Uri

The last decade's exponential improvements in DNA sequencing and synthesis technologies have created many opportunities for generating massive data sets and conducting highly parallelized experiments in the life sciences. This course will explore these technological developments as applied to immunology, including the antibody/TCR repertoire, single-cell methods, highly-multiplexed functional CRISPR screens, among other topics. By the end of this course, you should have a strong understanding of high-throughput DNA sequencing and synthesis, and how to use them for data-intensive immunology. Credits: 1 | Offered: Spring 2

BSR 3509 Translational Genomics in Primary Immunodeficiencies: How the Bench Shapes the Bedside

Course Director(s): Byun, Minji; Maglione, Paul

In just the last few years, application of next generation genetics research approaches has led to a drastic expansion in the number of primary immunodeficiencies in which a genetic etiology has been delineated. Paired with such genetic elucidation, mechanistic translational research can vastly improve understanding of basic human immunology as well as shape therapeutic approaches for these vulnerable patients. This course will explore how such a translational genomics can be harnessed in a bedside-to-bench manner to identify novel genetic etiologies of human immunological disorders and improve treatment of primary immunodeficiencies.

Credits: 1 | Offered: Spring

BSR 4201 Journal Club in Cancer Biology

Course Director(s): Germain, Doris

The JC in Cancer Biology critically discusses recent literature in the context of each student's research project. Open to PhD, MDPHD and MSBS students. Credits: 1 | Offered: All Terms

BSR 4301 Journal Club in Developmental & Stem Cell Biology

Course Director(s): Dubois, Nicole

This is a Journal Club in Developmental and Stem Cell Biology (DSCB JC). Students will present once a year a paper from the recent literature that is relevant to stem cell biology in developing or adult tissues. Credits: 1 | Offered: All Terms

BSR 4401 Journal Club in Genetics & Genomic Sciences

Course Director(s): Houten, Sander; Sharp, Andrew

This course is mandatory for 2nd year and above GGS students, and open only to Ph.D. and M.D./Ph.D. students in the GGS MTA. Each week one student will present a paper selected as representing an interesting concept or advance in genetics and genomics. The presenter describes the topic of the paper, summarizing the strengths and weaknesses, followed by an open discussion and critique of the research. For the final 20 minutes, a second presenter gives a progress report about their own work.

Credits: 1 | Offered: All Terms

BSR 4501 Journal Club in Immunobiology

Course Director(s): Ting, Adrian

This course follows an intensive small group discussion format that critically evaluates original research articles in the area of immunology. The articles are selected by the student in consultation with the presiding faculty member, and include recent important advances in immunology or investigations that provide conceptual advances relating to long-standing problems. The analysis will include background to the research, the hypothesis tested, the experimental methods used, as well as interpretation and discussion of results. This is a discussion class and participation is required. Students are also expected to discuss the implications of the research, the new questions it raises, and how it relates to the rest of the field. Grading will be based on class participation and extent of preparation. This class is required for students beginning in their second year until they complete their Ph.D. First year students interested in immunology are encouraged to attend. Attendance is required for all classes. Credits: 1 | Offered: All Terms

BSR 4601 Journal Club in Microbiology

Course Director(s): tenOever, Benjamin

This course uses a journal club format to discuss important papers along the interests of the students enrolled. Each student is instructed to carefully select a high impact paper that motivates the work in the lab and lead the discussion of the paper with the group. Active participation from all students is expected. The course meets weekly. All MIC Training Area

Graduate students who have not yet completed their thesis proposal are required to take this course. Credits: 1 | Offered: All Terms

BSR 4603 Journal Club in Virus-Host Interactions

Course Director(s): Ashour, Joseph; Marazzi, Ivan

This one credit journal club course aims to communicate the most exciting ongoing research involving viruses and their molecular interactions with the host, as well as to train students and postdoctoral fellows in the skills of scientific presentation. The course is regularly attended by twenty to thirty research personnel from 10 laboratories, including faculty, postdoctoral fellows, medical students, and graduate students, both from within and outside the MSM Training Area. The course serves as a forum for interdisciplinary communication and discussion of the latest research in the fields of virology, cell biology and immunology. Informed introduction, concise presentation and critical discussion are the themes of the journal club. Credits: 1 | Offered: All Terms

BSR 4702 Selected Topics in Neuroscience

Course Director(s): Huntley, George; Zachariou, Venetia

Students will present work in progress and are strongly encouraged to have their advisory committee present. Alternatively, students can present a paper with relevance to their lab work. This course meets weekly. Credits: 1 | Offered: All Terms

BSR 4801 Journal Club in Pharmacological Sciences

Course Director(s): Ubarretxena, Iban; Jin, Jian

Journal Club in Pharmacological Sciences serves as the main journal club for the Systems Biology of Disease and Therapeutics MTA. The group meets weekly. At each meeting, a student presents a manuscript closely related to his/her dissertation project, and he/she may also present original data, although this is not required. Each paper is chosen by the student presenting that week and is usually related, in a broad sense, to Pharmacology. Topics discussed in the past year have included analysis of data in The Cancer Genome Atlas, identification of targets for treating Marfan Syndrome, and mechanisms underlying the initiation of ventricular arrhythmias. Credits: 1 | Offered: All Terms

BSR 5006 Medical Scientist Grand Rounds - Fall

Course Director(s): Baron, Margaret

Medical Scientist Grand Rounds is a series of joint clinical/scientific presentations that highlight the doctoral work of our senior MD/PhD students. A senior MD/PhD in their clinical training phase presents the clinical case as an introduction to a scientific topic with the guidance of a clinician expert. The doctoral research presentation focuses the discussion on specific research questions from their dissertation. A panel discussion concludes the session allowing students to simultaneously inquire about the science and medicine. Credits: 1 | Offered: Fall

BSR 5007 Medical Scientist Grand Rounds - Spring

Course Director(s): Baron, Margaret; Swartz, Talia

Medical Scientist Grand Rounds is a series of joint clinical/scientific presentations that highlight the doctoral work of our senior MD/PhD students. A senior MD/PhD in their clinical training phase presents the clinical case as an introduction to a scientific topic with the guidance of a clinician expert. The doctoral research presentation focuses the discussion on specific research questions from their dissertation. A panel discussion concludes the session allowing students to simultaneously inquire about the science and medicine. Credits: 1 | Offered: Spring

BSR 5201 Seminar Series in Oncological Sciences

Course Director(s): Germain, Doris

The seminar series in Cancer Biology brings leading researchers to MSSM to discuss their recent research. Open to PhD, MSTP and MSBS students. Credits: 1 | Offered: All Terms

BSR 5202 Seminar in Cancer Biology: Works in Progress

Course Director(s): Manfredi, James

Presentations of research by students provide each the opportunity to present their research at least once during the academic year. Credits: 1 | Offered: All Terms

BSR 5301 Seminar in DSCB: Works in Progress

Course Director(s): Krauss, Robert; Mlodzik, Marek

Presentation of research by students; each student to present at least once per year Credits: 1 | Offered: All Terms

BSR 5302 Seminar Series in Dev & Regen Biology & Black Family Stem Cell Institute

Course Director(s): Krauss, Robert; Wassarman, Paul

All DSCB students who have not yet passed the Thesis Proposal are required to register for this course. Credits: 1 | Offered: All Terms

BSR 5401 Seminar in Genetics & Genomic Sciences

Course Director(s): Holmes, Gregory; Sharp, Andrew

This is a CME accredited Seminar Series offered by the Department of Genetics and Genomic Sciences and the Institute for Genomics and Multiscale Biology at the Mount Sinai Medical Center. It is open to the entire department and institute, including faculty and trainees. The audience is diverse, with medical geneticists, basic scientists and computational biologists. All GGS students who have not yet passed the Thesis Proposal are required to register for this course. Credits: 1 | Offered: All Terms

BSR 5402 Works in Progress: Gen and Genomic Sciences

Course Director(s): Klein, Robert; Schadt, Eric; Savic, Radoslav

This forum provides an opportunity for Graduate Students, Postdocs and junior Faculty in the Department of Genetics and Genomic Sciences to present ongoing work to other members of the Department, and gain experience presenting their work publically. After completing their

first year rotation projects, each Graduate student is required to give at least one presentation per year. This is a required course for Graduate Students in the GGS MTA from second year until graduation. Credits: 1 | Offered: All Terms

BSR 5501 Seminar in Immunobiology

Course Director(s): Ting, Adrian; Xiong, Huabao

This course combines two seminar series hosted by the Immunology Institute at the Icahn School of Medicine at Mount Sinai. The first series features a monthly seminar given by an invited speaker who is a prominent scientist in immunology. Students are expected to familiarize themselves with the speaker's research areas. Students are expected to attend a luncheon with the speaker which provides them with an opportunity to meet with the speaker and ask questions or engage in discussions. The second series is a weekly work-in-progress seminar presented by students and post-docs on their research. Students will be required to present in this seminar series starting in their 3rd year. Credits: 1 | Offered: All Terms

BSR 5601 Seminar in Microbiology

Course Director(s): Evans, Matthew

Because of the diverse interests of our faculty, topics for this seminar series range from immunology, virology, bacteriology, oncogenesis, and signal transduction, to molecular biology. Speakers come from all over the United States, Europe, Australia, and Asia. They are from both academic institutions and from industry. The seminar series is attended by faculty from basic science, as well as from clinical departments. Credits: 1 | Offered: All Terms

BSR 5701 Seminar in Neuroscience

Course Director(s): Hof, Patrick

This is the Friedman Brain Institute Translational Neuroscience seminar series. Students in the Neuroscience MTA are required to attend. The seminar provides weekly lectures by outstanding neuroscientists, encompassing all domains of neurobiology, with an emphasis on discovery and translational neuroscience. The seminars will be advertised by e-mail and will be posted on bulletin boards throughout the institution. The seminars are also posted on the FBI website: consult <http://icahn.mssm.edu/research/institutes/brain-institute/events> Credits: 1 | Offered: All Terms

BSR 5803 Seminar in Biophysics and Systems Pharmacology

Course Director(s): Ubarretxena, Iban; Jin, Jian

A series of seminars broadly related to pathophysiology, drug development, and/or systems-level computational analyses. Credits: 1 | Offered: All Terms

BSR 6201 Advanced Topics in Cancer Biology

Course Director(s): Manfredi, James

Advanced Topics in Cancer Biology will be offered in the Spring semester, 2014. Three modules will be offered. Students may take either one, two, or all three modules for credit. Each module

is 1 credit. This is a journal article-based class in which students take turns leading discussion of assigned journal articles centered on a specific topic and chosen by faculty module leaders. For general information and topics for the coming semester students should contact James Manfredi (8-5495). Credits: 3 | Offered: Spring

BSR 6202 Advanced Topics in Tumor Biology

Course Director(s): O'Connell, Matthew

Advanced topics in tumor biology is a participatory lecture-based course focusing on cancer diagnosis, therapeutics, genetics, behavioral medicine and ethics. Open to PhD, MSTP and MSBS students. Credits: 3 | Offered: Fall

BSR 6203 Practical Cancer Genomics

Course Director(s): Sachidanandam, Ravi

Open to 2nd year PhD students and up Credits: 1 | Offered: Spring 2

BSR 6301 Stem Cells and Regenerative Biology

Course Director(s): Krauss, Robert, Baron, Margaret

Stem Cells and Regenerative Biology is an advanced course covering embryonic, induced pluripotent, and several different types of adult stem cells. The course will combine didactic lectures and student presentations of the primary literature. In doing so, students will gain insight into the roles of various stem cell types in development, regeneration, and diseases; currently used techniques for analysis of stem cells; and both historical perspectives and current concepts in the field. Credits: 3 | Offered: Fall

BSR 6302 Sys & Developmental Biology & Birth Defects

Course Director(s): TBD

The participants will get practical skills in handling genomic data, especially as related to the field of Cancer. The course is self-contained, there are no pre-requisites, everything needed for the work will be taught. Credits: 1 | Offered: Spring

BSR 6402 Practical Analysis of a Personal Genome

Course Director(s): Kenny, Eimear

Students in this course will analyze a human genome sequence starting with raw sequence reads through identifying a list of sequence variants. Using public databases, literature and other resources students will formulate hypotheses about the phenotypic significance of these variants. This is a hands-on, laboratory course in which students will choose to analyze either their own genome or a reference genome after lectures and counseling to make the consequences of personal genome analysis clear. Credits: 3 | Offered: Fall

BSR 6502 Adv Topics in Immunology

Course Director(s): Ting, Adrian

For this course, three areas of immunology will be selected for in depth study, in three different modules. Students are expected to master the selected topics and be able to critically present the literature, identify important questions and formulate an experimental plan to address them. Mastering of critical reading and presentation skills are the main goals of this course.

Each module is graded independently and consists of 7 class meetings of two hours each. The format involves a two-hours lecture/introduction on the first class, followed by student presentations (5 classes) and the final exam during the last two hours of each module. Credits: 3 | Offered: Spring

BSR 6601 Advanced Virology

Course Director(s): Evans, Matthew; Simon, Viviana

Description: The goal of this course is to provide a broad-based systematic approach to the problem of virus-host interactions. The course is designed to be coordinated with the bi-annual New York Academy of Sciences Symposium on Virus-Host Interactions. All first year and second year PhD students as well as MD/PhD students doing their research projects in virology, cell biology, immunology, and/or molecular genetics/gene therapy are encouraged to participate.

This non-modular course will begin with an introduction to host immune defense mechanisms and will explore the strategies that viruses have developed in order to evade them. While all viruses enter cells, replicate their genomes, and exit the infected cell, the specific tactics employed differ dramatically among the virus groups.

Specifically, we will discuss (i) the basic life cycle of relevant viruses and (ii) the ways in which they interact with their host cells and evade immune detection. Credits: 3 | Offered: Fall

BSR 6701 Neuroanatomy

Course Director(s): Holstein, Gay

The goal of the course is to provide students with a basic understanding of the structural organization and connectivity of the human central and peripheral nervous system. In general, a systems approach is used to review the major sensory, motor and integrated neural systems. Student performance is evaluated by four exams; all students attending the course are expected to take the exams, and the course is open to all interested students Credits: 3 | Offered: Spring

BSR 6703 Neurobiology of Aging & Adult Development

Course Director(s): Mobbs, Charles

This course covers essential topics in the Neurobiology of Aging, using as a textbook *Neuroscience of Aging* edited by Hof and Mobbs. Topics include mechanisms in the biology of aging, successful aging, normal age-related impairments in brain function (including normal memory impairments), age-related neurodegenerative diseases, including Alzheimer's disease, and prospects for treatment. Credits: 3 | Offered: Fall

BSR 6704 Advanced Topics in Synapses

Course Director(s): Benson, Deanna

The course will cover development, composition, plasticity, and disease related vulnerability of synapses in the central nervous system. The format will be one of discussion and debate surrounding papers in the current literature.

Prerequisites: Neuroscience Core or strong neuroscience background

Credits: 1 | Offered: Spring

BSR 6705 Topics in Clinical Neuroscience

Course Director(s): Morishita, Hirofumi; Murrrough, James

This course covers clinical features of major neurologic and psychiatric disorders, including diagnostics, clinical pathology (where appropriate), course of illness, and treatment. The goal is to offer Ph.D. candidates an opportunity to learn more about the disorders they study in laboratory animals, which will improve the translational potential of their work and better prepare them for a future as an NIH-funded investigator. Credits: 1 | Offered: Spring

BSR 6708 Molec Pathways & Integrated Phys of Metabolism in Obesity, Diabetes & Aging

Course Director(s): Buettner, Christoph; Mobbs, Charles

The epidemic of obesity and diabetes constitutes one of the gravest threats to public health in the 21st century. This course examines the molecular and physiological mechanisms that regulate energy balance and blood glucose homeostasis, focusing on the integrative function of hypothalamic neurons. Credits: 3 | Offered: Spring

BSR 6709 Consciousness: How the Hard Problem can Inform Exper Studies

Course Director(s): Brown, Steven

The term hard problem articulates the difficulty of explaining the transition between physical (e.g., neurons) and phenomenal entities (e.g., colors). Thus, why is any merely neural dynamic the basis for any phenomenal experience at all? Alternatively, if we induce some neural dynamic, why does the inductee not merely experience neurons firing, rather than, e.g., seeing phosphenes? I will begin with a brief philosophical overview and move to computational and neurally oriented efforts to address this most central issue of the problem of consciousness.

Credits: 2 | Offered: Fall

BSR 6710 The Biology of Aging

Course Director(s): Mobbs, Charles

The course covers the basic biology of aging, including the genetic and environmental contributions to normal age-related impairment as well as age-related diseases. A particular focus is the role of nutrition in aging, and the relationship between aging and metabolic impairments including obesity and diabetes. Credits: 3 | Offered: Spring

BSR 6712 Comparative Neuroscience

Course Director(s): Baxter, Mark

Description: We will discuss brain structure and behavior across many different phyla and take an evolutionary approach to understanding the organization of the nervous system. Credits: 1 | Offered: Spring 2

BSR 6713 Curr Topics in Integrative Approaches to Neuroresilience

Course Director(s): Pasinetti, Giulio Maria

The goal of this interdisciplinary course is to understand the mechanism of action of the role of certain botanical dietary supplements, in particular polyphenols, against stressful events and to clarify the role of gut microbiome at the genomic level in the promotion of cognitive and psychological resilience. Naturally occurring compounds have been recognized for their therapeutic value in medical disorders, and notably, the 2015 Nobel Prize in Medicine specifically recognized developments of bioactive compounds from natural products for disease treatment. Collectively this course is creating a culture of innovation that emphasizes creativity, disruptive thinking, and interdisciplinary collaboration to understand the mechanisms associated with the promotion of neuroresilience. Credits: 1 | Offered: Spring

BSR 6714 Translation Lab

Course Director(s): Rudebeck, Peter

This new course is an Advanced Elective, and will be targeted to Neuroscience graduate students in their second or third year, and MSTP students. Topics in translational neuroscience will be discussed and students will design their own hypothetical experiment and ways experimentally to test it Credits: 1 | Offered: Fall

BSR 6715 Neuroimaging

Course Director(s): Frangou, Spphia

This course is an Advanced Elective, and will be targeted to Neuroscience graduate students in their second or third year, and MSTP students. The course will focus on the application of brain imaging techniques to address basic and clinical neuroscience questions. These will include delineation of neural circuits relevant to cognitive processing, neural abnormalities underlying the pathophysiology of mental disorders, and neural mechanisms of treatment response. Topics will be presented in didactic and interactive methods that will expose students to neuroimaging and will encourage them to design their own hypothetical experiment and identify neuroimaging approaches that will allow them to test it. Credits: 1 | Offered: Spring 2

BSR 6805 Fundamentals of Nanomedicine

Course Director(s): Costa, Kevin

Nanomedicine is the application of nanostructured materials in medicine. Nanomedicine approaches are now being widely explored as diagnostic tools and novel therapeutics. This course will cover the synthesis of multifunctional nanoparticles, their characterization, applications in imaging (optical imaging, computed tomography and magnetic resonance imaging) and applications in therapy (drug delivery, genetic therapies and tissue engineering).

There will be a focus on the underlying concepts that control nanoparticle properties and interactions in vivo. Credits: 3 | Offered: Spring 2

BSR 6806 Programming in Sys Bio & Bioinformatics

Course Director(s): Ma'ayan, Avi

This mini course covers computer programming methodologies applied to processing data and analysis of data in the broad fields of Bioinformatics and Systems Biology. Topics covered would include an overview of data structures and algorithms, Python scripting for processing text files, computational platforms such as R and MATLAB as well as web technologies using JavaScript, PHP, and MySQL. Students will be required to complete small programming assignments throughout the course. Credits: 1 | Offered: Spring

BSR 8000 Independent Research for Basic Science Research

Course Director(s): Graduate School Staff

Research Credit for Independent Research. Only PhD and MD/PhD in Biomedical Science or Neuroscience, who have NOT passed the Thesis Proposal should register for this course Credits: 10 | Offered: All Terms

BSR 8002 Independent Research: MS Biomed Sci: I - Fall

Course Director(s): Hanss, Basil

Research Credit for Independent Research. 1st year Masters in Biomedical Science students should register for this course. Credits: 4 | Offered: Fall

BSR 8003 Independent Research: MS Biomed Sci: II - Spring

Course Director(s): Graduate School Staff

Research Credit for Independent Research. 1st year Masters in Biomedical Science students should register for this course. Credits: 4 | Offered: Spring

BSR 8004 Independent Research: MS Biomed Science Fall

Course Director(s): Hanss, Basil

Research Credit for Independent Research. 2nd year Masters in Biomedical Science students should register for this course for the Fall term Credits: 4 | Offered: Fall

BSR 8005 Independent Research: MS Biomed Science Spring

Course Director(s): Hanss, Basil

Research Credit for Independent Research. 2nd year Masters in Biomedical Science students should register for this course for the Spring term Credits: 4 | Offered: Spring

BSR 8900 Thesis: MS Biomedical Science

Course Director(s): Hanss, Basil

Thesis Credit for MS Biomedical Science.

2nd yr MSBS students should register for this course, only if they are planning to defend and deposit their MS thesis in the upcoming semester. Credits: 3 | Offered: All Terms

BSR 9000 Doctoral Dissertation Research

Course Director(s): Graduate School Staff

Research Credit for Doctoral Dissertation Research. Only PhD and MD/PhD in Biomedical Science or Neuroscience, who have passed the Thesis Proposal should register for this course
Credits: 10 | Offered: All Terms

CLR

CLR 0001 Masters Thesis for Clinical Research

Course Director(s): Gabrilove, Janice

Students should register for their Master's Thesis credits (5 credits) during the Spring 1 or Spring 2 term of their second year while preparing to submit their Thesis. Students may be able to register for additional Master's Thesis credits (1-3), instead of elective credits, with permission of the Program Director.

Please refer to the Guide to Completing the Masters Thesis as a resource for the steps that need to be taken in fulfilling the Masters Thesis requirement.

Credits: 5 | Offered: All Terms

CLR 0002 Independent Study for Clinical Research

Course Director(s): Gabrilove, Janice

An Independent Study is an elective option providing the student with an opportunity to delve more thoroughly into an area of specific interest.

The Independent Study Proposal should be submitted at least three weeks prior to the anticipated start of the proposed project/course of study. The proposal will be reviewed to ensure that the goals of the project meet the overall objectives of the Clinical Research Program. Approval of a form submitted less than three weeks prior to the anticipated start of the project/course of study will not be guaranteed. The student assumes any risk that missing appropriate deadlines may entail. Approval, when granted, is conditional upon the student completing all of the outlined requirements. The student must submit a Postscript Report and request that the faculty sponsoring the Independent Study submit an Evaluation Form.

Three credits are the maximum number of credits that may be awarded to any Independent Study. Please note that while the total hours committed to the pursuit of the Independent Study may be sufficient for more than three credits or more than one elective, students will not receive any more than three credits for one project/course of study. Each student may complete no more than two independent study projects.

An Independent Study must be a unique experience. Material covered during an independent study project should be highly targeted and not simply a review of the regularly offered coursework. It is important to note that generally speaking independent study projects should not be attempts to take courses offered r Credits: 3 | Offered: All Terms

CLR 0006 Spectrum of Methods in Clinical Research I

Course Director(s): Sacks, Henry

This first term covers fundamental concepts of relevance to the formulation of meaningful questions in clinical investigation and provides an overview of non-experimental, quasi-experimental and experimental study designs utilized in the conduct of clinical investigation. The course is divided into 4 sections: 1) The Research Question & Stating the Hypothesis; 2) Finding the evidence & discerning the burden of disease; 3) Measurement Science & Sampling; and 4) Study Design Credits: 3 | Offered: Fall

CLR 0007 Spectrum of Methods in Clinical Research III

Course Director(s): Peter, Inga

Methods in Clinical & Population Based Research: Part III is divided into four sections. The first focuses on the use of specific databases & analytical programs in the conduct of clinical research. The format for this section of the course includes lecture and laboratory sessions. The second section of the course focuses on Omics & clinical research and covers genomics, proteomics, microarray technologies, methylation arrays, and bioinformatics principles. Also covered are the clinical and genomic databases that are essential for conducting omics clinical investigations and the resources and tools for personalized medicine research. Review of the Biobank and access to the de-identified database will be provided to the student to demonstrate the use of this unique resource for conducting novel clinical investigation. The third section of the course will provide an initial introduction to health services research, including topics concerning health care disparities, community engagement & participatory research; and comparative effectiveness research. Finally, the last segment of the course will focus on practical aspects of clinical research including, graphic presentation of data and scientific writing as well as an overview of the nuts and bolts of securing peer review funding as well as opportunities for new clinical investigators, in particular. Credits: 3 | Offered: Spring 2

CLR 0011 Research Grant Writing Course

Course Director(s): Swan, Shanna

This course will familiarize students with the basic elements and approach to writing grants. Students will select a research topic, develop a research plan, and write a grant application in the appropriate format of the PHS 398 form for submission to a funding agency. Each grant section will be presented to the class by the students for critique and discussion. Student evaluation is based on class presentations and the final grant application, which can serve as

the student's thesis proposal. Grant applications for both investigator-initiated research projects (e.g., NIH R01, R03, R21) and mentored career-development awards (e.g., K12, K23) will be covered. Features of successful research grant applications will be presented and a description of the grant review process will be covered. The course also will cover the development of writing skills for publication and competitive grants, and explore principles of research strategy in the context of requirements of funding agencies. Effective scientific communication and writing skills are reviewed, institutional routing, and discussion of the NIH grant review process will be covered. Credits: 1 | Offered: Spring 2

CLR 0012 Integrative Prob Solving in Clin & Trans Research

Course Director(s): Bagiella, Emilia; Peter, Inga

This course is designed to prepare PhD in Clinical Research candidates for the mandatory written comprehensive examination. The course is comprised of problem sets reflective of foundational course work and the integration of methodology and experimental design highlighted throughout the common required course work. Students will be asked to practice their ability to critically analyze and appraise clinical /translational research data in an effort to integrate important concepts and tools learned across during required coursework. Credits: 1 | Offered: Fall

CLR 0014 Integrative Prob Solving in Clin and Trans Research II

Course Director(s): Bagiella, Emilia; Peter, Inga

Part II of CLR0012:

This course is designed to prepare PhD in Clinical Research candidates for the mandatory written comprehensive examination. The course is comprised of problem sets reflective of foundational course work and the integration of methodology and experimental design highlighted throughout the common required course work. Students will be asked to practice their ability to critically analyze and appraise clinical /translational research data in an effort to integrate important concepts and tools learned across during required coursework. Credits: 1 | Offered: Spring

CLR 0016 Spectrum of Methods in Clinical Research II

Course Director(s): Gabrilove, Janice

Methods in Clinical & Population Based Research: Part II is divided into two sections.

The first provides an in depth focus on study design and analysis, including randomized clinical trials, early proof of concept trials, phase II trials, including futility designs; phase III efficacy trials, small population clinical trials and n-of-1 studies.

The second section of the course focuses on study implementation and conduct and will include the following topics: responsible conduct of research, good clinical practice; responsibilities of the principal investigators; working with the IRB; patient selection, allocation and recruitment; protocol adherence, adverse events and adverse event reporting; data and safety monitoring plans and monitoring boards; regulatory bodies and funding.

Pre-requisite: Spectrum of Methods in Clinical Research 1 Credits: 3 | Offered: Spring

CLR 0017 Clin & Translational Research JC & Seminar-Fall

Course Director(s): Sigel, Keith

This class will meet weekly and will consist of a Journal Club alternating with a Seminar Series/Works in Progress.

The Journal Club will provide a forum for the development of critical thinking and fosters real time utilization of recently learned analytical tools and methodology. A structured format focused on dissecting and discerning the specific research question and hypothesis posed; the appropriateness of the experimental design and the nature of the statistical methods employed in a given article, is employed so as to facilitate the emergence of astute and critical readers of the scientific literature & to reinforce relevant issues being discussed in other didactic courses. The Seminar Series/Works in Progress classes, which meet on the alternate week, will include presentations by trainees & faculty, covering ongoing clinical research projects to facilitate constructive debate and discussion of specific research approaches and conceptual models under development. In addition, this forum will be used to cover specific additional topics of importance to clinical research, including: human subjects research compliance; scientific presentation skills; mentor: mentee relationships; team science; & time management. Credits: 1 | Offered: Fall

CLR 0018 Clin & Translational Research JC & Seminar-Spring I

Course Director(s): Sigel, Keith

This class will meet weekly and will consist of a Journal Club alternating with a Seminar Series/Works in Progress.

The Journal Club will provided a forum for the development of critical thinking and fosters real time utilization of recently learned analytical tools and methodology. A structured format focused on dissecting and discerning the specific research question and hypothesis posed; the appropriateness of the experimental design and the nature of the statistical methods employed in a given article, is employed so as to facilitate the emergence of astute and critical readers of the scientific literature & to reinforce relevant issues being discussed in other didactic courses. The Seminar Series/Works in Progress classes, which meet on the alternate week, will include presentations by trainees & faculty, covering ongoing clinical research projects to facilitate constructive debate and discussion of specific research approaches and conceptual models under development. In addition, this forum will be used to cover specific additional topics of importance to clinical research, including: human subjects research compliance; scientific presentation skills; mentor:mentee relationships; team science; & time management. Credits: 1 | Offered: Spring

CLR 0019 Clin & Translational Research JC & Seminar-Spring II

Course Director(s): McBride, Russel; Sigel, Keith

The Journal Club will provide a forum for the development of critical thinking and fosters real time utilization of recently learned analytical tools and methodology. A structured format

focused on dissecting and discerning the specific research question and hypothesis posed; the appropriateness of the experimental design and the nature of the statistical methods employed in a given article, is employed so as to facilitate the emergence of astute and critical readers of the scientific literature & to reinforce relevant issues being discussed in other didactic courses. Credits: 1 | Offered: Spring 2

CLR 0020 Doctoral Thesis for Clinical Research

Course Director(s): Gabrilove, Janice

Student should register for Doctoral Thesis credits during the Fall, Spring 1 and Spring 2 of year 3. Number of credits to register each term will depend on the student's track. Please refer to the curriculum guide or track checklist for details. Credits: 3 | Offered: All Terms

CLR 0207 Culture, Illness & Community Health

Course Director(s): Butts, Gary; Poliandro, Edward

This course considers Franz Boas's definition of culture as culture is everything but natural science.[1] Any interaction or encounter with another individual or group of individuals is in fact a cultural experience which occurs within a cultural context. Broadly, this course aims to demonstrate how culture is conceptualized, considered, and explored in a broad range of issues in the basic, clinical, and community arenas around health and illness and to distinguish the cultural context in each session. The course utilizes class room lecture and small group discussion sessions and a small group project to enable participants to integrate culturally effective approaches into the design and implementation of research across the translational spectrum that improve patient and community health outcomes and reduce health care disparities.

Course Objectives:

At the end of this course the student should be able to:

- 1) Demonstrate an understanding of one's own cultural context and its impact on patients, communities and on health care outcomes
 - 2) Analyze evidence of health care disparities from available resources
 - 3) Integrate culturally effective approaches into the design and implementation of research across the translational spectrum that improve patient and community health and reduce health care disparities
- Credits: 3 | Offered: Spring 2

CLR 0320 Applied Biostatistics in Clinical Trials

Course Director(s): Bagiella, Emilia

This course will present the fundamental methods for the design and implementation of analysis for clinical trials. The course will emphasize randomized comparative studies, including protocol preparation, randomization, intention-to-treat, sample size, interim monitoring, adaptive designs, endpoints and reporting. The relationship between protocol design and analytic plan will be highlighted. The course has two broad aims: (1) to develop the skills

necessary to be a more critical reader of medical literature and (2) to provide the basic statistical tools to aid in the design of clinical trial protocols.

CLR-0320 Elective course for MSCR or PhD in CR; required for those students in MSCR/PhD who are concentrating on Clinical Trials research. Credits: 3 | Offered: Spring

CLR 0420 Molecular Epidemiology

Course Director(s): Teitelbaum, Susan

The course will take the form of a series of in-depth discussions of case studies in analytical, clinical, molecular and genetic epidemiology. Each week, students will receive an assignment for the following session, consisting of a few key papers to read and a series of questions or topics. They will prepare and submit a short essay before the following session. The lecturer will briefly review the case, and will then lead the discussion around the issues and questions addressed in the essay. Emphasis will be made on combining and assessing the overall evidence, integrating different lines of epidemiologic research as well as epidemiologic and experimental data.

Prerequisites: Epidemiology II, Applied Linear Models II Credits: 3 | Offered: Spring

CLR 0501 Computational Tools & Information Sources for Clin. Res.

Course Director(s): Weinberg, Alan

The overall objective of this course is to provide the researcher with a working knowledge of essential tools for the acquisition, management and analysis of data. The data acquisition section of the course reviews the various methods for collecting primary data in the setting of clinical trials and registries. The course will review direct collection of data from electronic health records and primary data entry via electronic data capture systems, both local and web-based. It will cover principles of case report form design, compliance with good clinical practice standards and with 21CFR part 11. It will review specialized software for managing multicenter studies, which address a variety of functions, including trial registration, randomization, tracking, site communication and performance measures. Credits: 3 | Offered: Spring

CLR 0610 Meta-analysis, Decision Analysis and Cost-effectiveness Analysis

Course Director(s): Sacks, Henry

The goals of this course are to provide students with a theoretical understanding and hands on experience in literature synthesis methods. Areas to be covered include meta-analysis, decision analysis, and cost-effectiveness analysis. The course will provide a review of each method within an interactive computing environment. Students will be given opportunities to learn how to develop an appropriate question and to use RevMan and TreeAge software for assignments on each topic.

Credits: 3 | Offered: All Terms

CLR 0700 Professionalism & Ethical Issues in Clinical Research

Course Director(s): Meyer, John; Rhodes, Rosamond; Gligorov, Nada

This seminar will explore the complex issues raised by human subject research. The seminar will begin with a review of some of the landmark cases of unethical use of human subjects in research, the policies that shape our current understanding of the ethical conduct of research, and the mechanisms for research oversight that have been instituted. Then, through reading a broad selection of seminal articles and papers from the recent literature, seminar presentations and discussions, we shall engage in a conceptual analysis of a number of controversial and pressing issues. We shall discuss the moral and public policy aspects of topics such as research design, risk-benefit assessment, informed consent, the use of "vulnerable" subjects, research without consent, confidentiality, inducements, conflicts of interests, disclosure of research findings, tissue use, vaccine development, and international research. In addition to exploring the moral landscape of this rich and provocative domain, the seminar will clarify and inform participants' understanding of basic moral concepts such as autonomy and justice. It will also serve as a model for approaching other issues in applied ethics. Credits: 2 | Offered: Fall

CLR 0801 Fundamentals of Molecular Biology and Genetics

Course Director(s): TBD

This course is designed to provide students with the fundamental understanding of the human genome structure, variation and function. The major goal of the course is to introduce the basic concepts of molecular biology and genetics that are used in current genetics and genomics research and personalized medicine. This course will consist of didactic sessions supplemented with discussions of published studies involving next generation sequencing, cancer genetics, and personalized medicine. This course will prepare students for more advanced courses offered by the Mount Sinai Graduate Programs and help critically review literature that utilizes genetic and genomic approaches for human diseases. Credits: 1 | Offered: Spring

CLR 0810 Genetic Epidemiology

Course Director(s): Peter, Inga

This course is designed to introduce students to the theory and practice of genetic epidemiology. The goal of genetic epidemiology is to identify genetic mechanisms and gene-environment interactions involved in the etiology of complex diseases and related traits. An in-depth discussion of designs and methodologies involved in conducting population-based genetic epidemiologic studies will be offered. An overview and practical of the currently available software for genetic epidemiologic analyses will be given. The lecture material will be supplemented with discussions of published studies and computer labs using real and simulated data. Students will be exposed to tools needed to critically review literature in genetic epidemiology & human genetics.

Prerequisites:

MPH0400 Epidemiology I

MPH0300 Intro to Biostatistics or

MPH0800 Intro to Advanced Biostatistics

MPH0311 Multivariable Methods or

MPH0812 Applied Linear Models I

Suggested course but not required: MPH0802 Introduction to SAS systems Credits: 3 | Offered: Spring

CLR 0901 The Drug Development Process

Course Director(s): Gabrilove, Janice; Zhou, Ming-Ming

This course will cover strategies for drug discovery and the requirements for preclinical evaluations of new drug targets. Target identification & validation; small molecule & biological therapeutics; drug evaluation process and licensure; patent applications, INDs, NDAs and issues related to clinical trials and regulatory requirements also will be addressed. Credits: 1 | Offered: Spring 2

CLR 1010 Clinical Trials Management

Course Director(s): Gabrilove, Janice

In this course students will learn the essentials of coordinating and managing the day-to-day operations of a clinical research study, from the planning site logistics and constructing timelines for study initiation visit to closing out a study. Students will learn how to estimate staff requirements, prepare realistic budgets and timelines and review source documents (Case Report Forms (CRFs), protocols and study budgets). Students will also learn the role and responsibilities of each member of a clinical research group, process of recruitment, informed consent, confidentiality and communication with patients, regulatory authorities and collaborating investigators. Students will also learn the basics of data management and regulatory compliance, including measurement of patient baselines; preparation, logging and tracking CRFs; cross checking documentation for accuracy, source documentation; preparing for an audit and responding to data queries. Credits: 1 | Offered: Fall

CLR 1111 Theoretical Basis of Translational Oncology

Course Director(s): Montgomery, Guy

The purpose of this course is to provide students with scientific, conceptual, methodological and practical knowledge about translational medicine. This course will cover aspects related to study design, development and implementation. Special emphasis will be dedicated to areas related to biomarker discover and validation. Learning objectives include: 1) To define the basic principles of translational research and how to apply them in oncology; 2) To understand the main disease models able to recapitulate human cancer; 3) To describe the regulatory process for conducting research using human samples; 4) To apply translational research principles in clinical trial design utilizing case based studies Credits: 3 | Offered: Fall

CLR 1112 Advanced Technologies and Tools in Translational Research

Course Director(s): Villanueva, Augusto

This course has a significant practical perspective. The objective is to provide the student with an overview of the mainstream genomic technologies currently used in translational research studies, with a particular focus on sequencing-based approaches. Learning objectives include:

1) To describe the experimental and analytical bases of genomic technologies, focusing on next-generation sequencing (NGS); 2) To understand the rationale and workflow of data analysis in NGS experiments; 3) To delineate the pros and cons of single-cell technologies in cancer research; 4) To interpret methods and results from high-throughput genomic analyses, 5) To infer relevant biological insights from a gene list (differential gene expression experiment).

Credits: 2 | Offered: Fall

CLR 1113 Translational Oncology: Application of Translational Research in Oncology

Course Director(s): Malone, Adriana

The course will summarize the main mechanisms involved in cancer development, maintenance and regression, and how they can be exploited therapeutically. Mainstream molecular alterations in solid tumors will be discussed. A specific emphasis will be dedicated to the role of the tumor microenvironment (e.g., immune system) in cancer monitoring and therapeutics.

Learning objectives include: 1) To delineate the hallmarks of cancer and how they provide opportunities for biomarker / therapeutic strategies; 2) To understand the role of the immune system in oncology; 3) To discuss the future trends in translational oncology (e.g., big data and next generation healthcare) Credits: 3 | Offered: Spring

CLR 1114 Translational Oncology: Drug Development - From Discovery to Commercialization

Course Director(s): Cleto, Cythia

This course provides a comprehensive overview of the regulatory, methodological and scientific pathways for drug development within the field of oncology. The cycle of drug development will be discussed and cover stages from drug discovery, screening, regulatory considerations and compliance, manufacturing and drug delivery, to clinical deployment. Woven into these themes are aspects related to intellectual property and commercialization.

Aside from the scientific and practical aspects of the cycle, a wider perspective on drug discovery is also illuminated. Experts in the fields of economics will share their findings on the fiscal impact of new medicines, and specialists in ethics will discuss the compassionate use of investigational new drugs.

Learning objectives:

- 1) To delineate the regulatory steps in drug development.
- 2) To understand how translational research principles can be applied to speed up the implementation of diagnostic and therapeutic interventions
- 3) To discuss the future trends in drug development and novel approaches for anti-cancer target discovery

Credits: 2 | Offered: Spring 2

HCD

HCD 0601 HCDL Gateway Seminar (Pass/Fail)

Course Director(s): Nickerson, Brian

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

This intensive gateway seminar introduces you to key program themes and course materials. It helps frame initial themes of the program content that will follow in the online portion of the experience. The seminar will allow for ample networking and collaborative opportunities among course colleagues, faculty, and prominent guest speakers. Key themes to be explored are: leading in a disrupted health care delivery sector, understanding broad system influencers, quality improvement and evidence-based decisions in health care delivery, reform basis of the Affordable Care Act, and managing critical urban health issues. There will also be a highly interactive session on personal leadership development. Credits: 2 | Offered: Fall

HCD 0602 Seminar in Health Care Delivery Leadership

Course Director(s): Irr, Frank

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

This intensive seminar focuses on the central elements that ensure quality throughout health care delivery systems and organizations. These elements include:

- 1) An examination of patient safety management
- 2) Quality improvement concepts and innovations
- 3) The clinical microsystems approach to value and quality improvement

The seminar will allow course colleagues, faculty, and prominent guest speakers to network and collaborate. There will also be another interactive session on personal leadership development. Credits: 2 | Offered: Fall

HCD 0720 Affordable Care Act

Course Director(s): Nickerson, Brian

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

This course begins with a review of the critical public policy issues facing the US health care system, followed by an examination of the formulation and implementation of the Patient Protection and Affordable Care Act of 2010 (ACA). The study of ACA formulation and implementation will address the intent and design of the law and then what the law demands in practice from the government.

Topics to be explored within ACA formulation and implementation are:

The individual mandate
Medicaid expansion
Subsidized exchanges
Insurance regulations

Cost containment Credits: 1 | Offered: Fall

HCD 0721 Navigating Healthcare Reform

Course Director(s): Brown, Larry; Fox, Ashley

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

For current and aspiring health care managers, this course seeks to illuminate central components of health care policy, a critically important area. The course also examines the political forces that have created the different types of public intervention that constitute current US health care policy. It explores how the government (especially the federal government) has influenced the voluntary and private institutions in the health care system, and how public policy intervention has built up steadily since World War II. You will gain a better understanding of the policy constraints and opportunities you confront in your work. You will gain a greater ability to position yourself and your organization to influence political dynamics and policy outcomes. Credits: 2.5 | Offered: Fall

HCD 0730 Health Care Delivery Economics

Course Director(s): Preker, Alex

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

This course provides an overview of the economics of health care delivery for industry leaders. It begins with an in-depth analysis of the structure and dynamics of the US health care system and trends in health care expenditures. We address economic perspectives and theory related to the production of health care and the supply and demand of health care services, the health insurance market, the structure of health care systems and industries through the continuum of care (medical practices, hospitals, and post-acute care providers), and health care system reform Credits: 2.5 | Offered: Fall

HCD 0740 Strategy Creation for Health Care

Course Director(s): Pugh, Michael

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

Designed for experienced managers in a health care or related organizations, this course is an opportunity to learn how to transform organizational knowledge into a strategic management system. We will examine the uses of external environmental analysis, organizational assessment, practical research, data collection and leadership principles as the basis for the creation of strategic management and leadership tools. We will focus on the analytical dimensions of strategic thinking and planning to ensure you are exposed to the technical and conceptual elements of strategy. Credits: 2.5 | Offered: Fall

HCD 0750 Strategic Communications for Health Care

Course Director(s): Thomas, Richard K.; Simon, Francoise

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

Communications and marketing strategy must keep pace with rapid changes in the new health care landscape. Health care leaders and managers must understand the fundamentals of communications, marketing, and digital strategy to ensure effective delivery of health care services. The new competitive landscape requires focused attention on brand, perception of quality, and the ways to advance core functions in order for businesses to remain viable. Similarly, the use of digital and social media in personal, professional, and institutional marketing and branding are key drivers of leadership success. This course will explore these new realities and focus on critical topics Credits: 2.5 | Offered: Spring

HCD 0760 Leading and Managing Health Care

Course Director(s): Albright, Robert

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

This course is designed to increase the critical leadership competencies that are essential for the leaders of the most complex health care organizations. In order for organizations to flourish in the current environment, leaders must be aware of their own idiosyncrasies, as well as their strengths, weaknesses, values, and ways they resolve conflicts. They also must excel at building and leading teams, interdependent functions, and large scale systems. Successful leaders of tomorrow must be experts in change management, labor-management relations, and strategic organizational leadership. The course will enhance what you have learned from experience through frameworks and models that will prepare you to understand the relationship between senior leadership and the health care organization's attainment of competitive advantage. Credits: 2.5 | Offered: Spring

HCD 0770 Leveraging Data for Evidence Based Dec. I

Course Director(s): Mazumdar, Madhu

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

This course is designed to provide an understanding of the analytical methods health care managers and executives need to critically interpret the findings of comparative effectiveness studies and touse hospital-derived data for assessing and improving quality of care and process performance. The course structure contains four overarching topics:

- 1) Biostatistical and epidemiological methods for comparative effectiveness research
- 2) Statistical process control
- 3) The scope and limits of evidence-based medicine
- 4) Hospital-based and public sources of health care data

Through selected readings, case studies, problem-solving assignments, on-line self-study components, and lecture presentations and discussions, you will develop a conceptual

understanding of the principles and analytical tools necessary to become a critical reader of health services research literature. This will enable you to identify and adopt best practices for your institution. Moreover, it will give you the analytical skills needed for guiding quality improvement projects effectively. Credits: 1.5 | Offered: Spring

HCD 0810 Leveraging Data for Evidence Based Dec. II

Course Director(s): Mazumdar, Madhu

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

This course is designed to provide an understanding of the analytical methods health care managers and executives need to critically interpret the findings of comparative effectiveness studies and use hospital-derived data for assessing and improving quality of care and process performance. The course structure contains four overarching topics:

- 1) Biostatistical and epidemiological methods for comparative effectiveness research
- 2) Statistical process control
- 3) The scope and limits of evidence-based medicine
- 4) Hospital-based and public sources of health care data

Through selected readings, case studies, problem-solving assignments, on-line self-study components, and lecture presentations and discussions, you will develop a conceptual understanding of the principles and analytical tools necessary to become a critical reader of health services research literature. This will enable you to identify and adopt best practices for your institution. Moreover, it will give you the analytical skills needed for guiding quality improvement projects effectively. Credits: 1 | Offered: Fall

HCD 0820 Health Information Systems

Course Director(s): Darrow, Bruce

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

The health care field is one of the most information-intensive sectors in the US economy and avoidance of the rapid advances in information technology is no longer an option. Consequently, the study of health care information technology and systems has become central to health care delivery effectiveness. This course covers the modern application of information technology that is critical to supporting the vision and operational knowledge of health care leaders. Health care decision makers must meet head-on the dynamic challenges of health care delivery, quality, cost, access, and regulatory control. In addition, this course integrates the Healthcare Information System as integral to the Quality Assurance Tracking Programs. This includes measurement of systems inputs, processes, and outputs with special emphasis on systems outcomes research and organizational accountability to its various stakeholders, notably government regulators. Credits: 2.5 | Offered: Fall

HCD 0830 Finance Essentials for Health Care

Course Director(s): Preker, Alexander

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

This course provides an intensive examination of financial decision-making concepts and tools critical to ensuring accountable, effective, and efficient health care delivery. Topics will intersect the domains of resource allocation, managerial accounting, and corporate finance that are most relevant to health care delivery. No previous advanced knowledge of finance is required for the course. Course topics and materials are delivered from the standpoint of equipping you with critical frameworks to support leadership-level decisions involving finance or issues with critical financial dimensions. Credits: 2.5 | Offered: Fall

HCD 0840 Operations Management in Health Care I

Course Director(s): Gianelli, Arthur

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

This course provides a solid foundation in the role of production and operations management in the health care industry. You will review the integration of human, economic and technological factors in accomplishing the operations management mission and executing the related strategies. Among the many important topics are: evidence-based medicine, balanced scorecard, statistics, forecasting, simulation, capacity planning, scheduling, location analysis for clinics, process strategy involving patient flow, supply chain management, project management, and quality control management. We will also examine the role of ethics within the framework of the operations management's sub-functions. Credits: 1.5 | Offered: Fall

HCD 0841 Operations Management in Health Care II

Course Director(s): Gianelli, Arthur

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

This course provides a solid foundation in the role of production and operations management in the health care industry. You will review the integration of human, economic and technological factors in accomplishing the operations management mission and executing the related strategies. Among the many important topics are: evidence-based medicine, balanced scorecard, statistics, forecasting, simulation, capacity planning, scheduling, location analysis for clinics, process strategy involving patient flow, supply chain management, project management, and quality control management. We will also examine the role of ethics within the framework of the operations management's sub-functions. Credits: 1 | Offered: Spring

HCD 0850 Improving Population and Public Health Delivery

Course Director(s): Gandhi, Niyum

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

This course will enable you to probe the Public Health and Community/Population-Based Approach and address the core principles and functions of public health, including how this approach differs from acute care medicine, and how public functions are institutionalized in the US health care system. The course will focus upon arguments and evidence that the health status of populations is shaped not by medical care and health care policy but rather by basic social conditions that often correlate closely with class, race, and ethnicity. Interrelated topics include: status and stress; social isolation and community engagement; complex socio-clinical conditions (mental illness, HIV, substance abuse, homelessness); promotion of healthy behaviors; and the role of the ACA in advancing public health Credits: 2.5 | Offered: Fall

HCD 0860 Clinical Microsystems Innovations

Course Director(s): Irr, Frank; Pugh, Michael; Dupree, Erin

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

This course immerses you in best-in-class microsystems methods that organize front-line health care delivery to maximize quality, value, and flexibility for innovation. The Microsystem approaches provide defined processes and techniques which serve as an effective vehicle for implementing organizational change at the point of care. The course will focus on planning processes, tools and techniques that can be applied immediately in clinical settings. Several Mount Sinai and other hospital-based clinical microsystem innovations will be examined as detailed case studies. Credits: 2.5 | Offered: Spring

HCD 0901 Capstone: Health Care Delivery Leadership

Course Director(s): Nickerson, Brian

ONLY OPEN to students in the MS Health Care Delivery Leadership Program

You will have the opportunity to work on a project that directly addresses a strategic problem in your institution, or carefully examine one of a host institution. This action learning project will enable the application and integration of course material into a coherent response and potential solution(s) to an actual health care delivery issue. These projects will form a repository of knowledge that program cohort peers can use to learn from and share. Credits: 2.5 | Offered: Spring

MGC

MGC 1100 Intro to Interview & Counsel Methodology

Course Director(s): Zinberg, Randi; Saperstein, Melissa

The course will introduce the genetic counseling students to fundamental interviewing skills and the counseling methodologies to provide the foundation for which they will build their clinical skills. Content from this module will be applied throughout their training.

Credits: 1 | Offered: Spring

MGC 1101 Intro to Ethical Responsibility of Genetic Counselors

Course Director(s): Rhodes, Rosamond

This course will introduce the student to the concept of professional responsibility and professional codes of ethics with a focus on the genetic counselor code of ethics. The principles of confidentiality and truth telling and the importance of a duty to treat (care) will be explored. Credits: 1 | Offered: Fall

MGC 1105 Clinical Research Ethics in Genetic Counseling

Course Director(s): Rhodes, Rosamond; Zinberg, Randi

This seminar will explore the complex issues raised by human subject research. The seminar will begin with a review of some of the history of eugenics. In that light, we shall examine the policies that shape our current understanding of the ethical conduct of research and the mechanisms for research oversight that have been instituted. Through reading a broad selection of seminal articles and papers from the recent literature, we shall engage in a conceptual analysis of a number of controversial and pressing issues. We shall be discussing the moral and public policy aspects of topics such as research design, risk-benefit assessment, informed consent, research with "vulnerable" subjects, research without consent, confidentiality, inducements, conflicts of interests, disclosure of research findings, and biobank research. Credits: 1 | Offered: Spring

MGC 1400 Medical Genetics

Course Director(s): Mehta, Lakshmi; Karger, Lisa

This course is designed to provide students an introduction to medical genetics with an emphasis on molecular genetics, pedigree analysis, population genetics, clinical genetics, cytogenetics, and biochemical genetics. Throughout the course selected hereditary disorders will be presented, and the pertinent clinical presentation, diagnostic evaluation, pathophysiology, treatment, and counseling issues for each disorder will be discussed. Credits: 4 | Offered: Spring

MGC 3000 Impact of Illness on Patients and Families

Course Director(s): Saperstein, Melissa

This course is only open to Master of Genetic Counseling students. This course has an action-oriented design that facilitates the attainment of insight into the social and psychological factors that affect families and patients with chronic and acute diseases. There will be direct participation along with social workers in interviews with patients and families who are in states of stress and crisis as they ask for and receive medical and psychiatric care. Credits: 2 | Offered: Fall

MGC 3200 Clinical Rotations

Course Director(s): Zinberg, Randi

Only open to Genetic Counseling students. Credits: 6 | Offered: Spring

MGC 3301 Topics in Genetic Counseling - I

Course Director(s): Zinberg, Randi

During this semester the students will be introduced to the field of genetic counseling and explore issues relating to reproductive genetic counseling. The course takes both a didactic and psychosocial approach to the topics presented. Students are expected to begin to appreciate the complexities of the counselor/client relationship. Credits: 2 | Offered: Fall

MGC 3302 Topics in Genetic Counseling - II

Course Director(s): Zinberg, Randi

This semester will continue to explore practical, didactic and psychosocial issues related to providing genetic counseling throughout the lifecycle with a specific focus on clinical pediatric and adult genetic counseling. Credits: 3 | Offered: Spring

MGC 3303 Topics in Genetic Counseling - III

Course Director(s): Zinberg, Randi

This course will build upon the knowledge and skills obtained during GCI and GCII and focus on continued professional development, including the opportunity to practice skills using standardized patients. Credits: 2 | Offered: Fall

MGC 8300 Thesis in Genetic Counseling

Course Director(s): Zinberg, Randi

Thesis Credit for Genetic Counseling Students. Credits: 4 | Offered: Spring

MPH

MPH 0001 Introduction to Public Health

Course Director(s): Collins, Cappy

This introductory course will provide a broad overview of public health & its history, triumphs and challenges, as well as its prospects for the future. The course will provide a strong foundation for students entering the Master of Public Health Program. A principal goal of the course is to give students an understanding of the structure and function of the public health system in the United States and internationally. Some of the leading figures in public health in this country and abroad will be invited to present lectures, and they will provide students with a sense of the breadth and depth of public health as well as a sense of the extraordinary range of career opportunities that exist in this ever changing field. Credits: 1 | Offered: Fall

MPH 0002 Public Health Surveillance

Course Director(s): Oliver, Kristin; Thanik, Erin

Public health surveillance is the ongoing systematic collection, analysis, and interpretation of data to prevent and control disease. This course will introduce students to local, national and global surveillance systems, including NHANES, BRFSS, NYC Community

Health Survey. Through class lectures, discussions and assignments students will link health data to public health practice. The course is a requirement for students in the Health Promotion Disease Prevention track.

WHEN MONDAY IS A HOLIDAY, CLASS WILL MEET ON FRIDAY OF THAT WEEK Credits: 3 |
Offered: Fall

MPH 0003 Current Topics Clinical Preventive Med

Course Director(s): Garland, Elizabeth; Oliver, Kristin

This course builds on the fundamental aspects of clinical prevention and the United States Preventive Services Task Force Guidelines. Designed for the healthcare professional, the course will include discussions about new evidence-based approaches that guide clinicians regarding the appropriateness and utility of new preventive services, screening tests, guidance for counseling patients, and an examination of current interventions at the community level, in addition to current controversies and research in the prevention field. prosthetics that remarkably link the brain directly to external mechanical devices and further alter the meaning of disability. These are some of the issues that will be addressed in this seminar.

Credits: 2 | Offered: Fall

MPH 0005 Geographic Information Systems (GIS)

Course Director(s): TBD

Geographic Information Systems (GIS) are used by public health professionals to better understand relationships between health and the environment, the geographic and temporal transmission of disease, and access to health care. This rapidly-changing field is seeing an expansion in the application of geography to better understand a number of health outcomes, thanks in part to new web-based tools and desktop technologies that make the use of GIS data and methods more accessible to a broader audience. This hands-on workshop will focus on the fundamentals of geographic information and how the technology can be applied to public health. Topics covered include an introduction to key GIS concepts and how to apply them to public health issues; how to find and prepare demographic and health data for mapping; standard cartographic principles; geocoding and data confidentiality; and an introduction to spatial analysis methods. The course will also include a demonstration of a variety of web mapping and data visualization tools available online. Credits: 1 | Offered: Spring 2

MPH 0006 Public Health Ethics

Course Director(s): Baumrin, Stephen; Moros, Daniel

This course examines "classic" and emerging issues in biomedical ethics paying particular attention to the history of medicine and the nature of scientific thought as it relates to medical ethics. While many of these issues arise in consideration of pandemics, limited health care resources, third world resource need, drug development policy, and health care policies they are driven by, or modified by, considerations both non-medical and non-health care oriented. It is the availability of well confirmed effective treatments that forces us to wrestle with such

questions as the propriety of medical intervention over the objection of the patient, the treatment of children over the objection of their parents, the right of all citizens to health care, the regulation of the sale of body parts for transplantation, and numerous circumstances arising out of assisted reproduction. In the not too distant past it would have seemed bizarre to consider the adjudication of competing rights when one woman contracts to rent the uterus of a surrogate to bear through in vitro fertilization the embryo formed from the egg of a third individual. The current revolution in biotechnology, microelectronics and nanotechnology continuously produces new issues. What is the meaning of confidentiality in a world where an enormous amount of information about each of us can be extracted rapidly from numerous searchable databases? What is the moral status of the embryonic stem cell derived from a discarded embryo, or a non-human animal? How are we to regulate cloning and our ability to shape and alter the human genome? We now implant electrodes into the brains of patients with Parkinson's disease and essential tremor. Soon we may be treating depression, disorders of impulse control, anxiety and phobias electronically. Does such technology present different issues as compared with today's drug and surgical therapies? We will also be challenged by the products of bioengineering. We already have Credits: 3 | Offered: Spring

MPH 0007 Social Justice in Public Health and Medicine

Course Director(s): Rhodes, Rosamond; Cowen, Ethan

Justice is a major concern in theoretical ethics and political philosophy and a huge literature is devoted to trying to explain just what it entails. In this course our aim will be to examine a broad spectrum of issues in medicine, medical research, and public health that raise questions about justice. In light of these critical examples, we shall review and critique an array of philosophical views on justice. Throughout the seminar we shall be engaged in two activities: (1) using clinical dilemmas and health policies as touchstones for developing a clear understanding of justice, and (2) developing an understanding of how theories of justice apply in different public health and medical contexts. By going from practice to theory and from theory back again to practice we shall advance our understanding of the theoretical literature as well as the requirements of justice in public health, medicine and other areas of the social world.

This course will begin with an examination of the allocation of medical resources that raise questions about justice. It will then move on to examine contemporary work on justice and review of some theoretical work by authors who focus their attention on justice in medicine (e.g., Norman Daniels and Paul Menzel). As the seminar progresses, we shall develop an understanding of how the U.S. happens to have developed the mechanisms that we now have for the delivery of health care. We shall examine how medical resources are actually distributed here, elsewhere, and globally, and in various contexts. We shall consider ways in which those allocations do and do not express justice. We shall also explore some of the problems that become apparent when you attend to the special needs of social groups (e.g., the poor, children, women, the elderly, African-Americans) and examine dilemmas and conflicts that are raised by issues such as the treatment of premature and compromised neonates.

Credits: 3 | Offered: Spring

MPH 0008 Introduction to Public Health Nutrition

Course Director(s): Tansman, Laurie

Public Health Nutrition continues to be an exciting and expanding field with a multitude of new strategies to improve public health! Because of all the excitement that each new initiative generates, there are always controversies coupled with confusion. This course is designed to provide an introductory overview of Public Health Nutrition concepts and issues while educating the student about the most current Public Health Nutrition Issues. While certain basics are always covered, each semester is unique as the most current public health initiatives are addressed. The course director is passionate about public health and has given public testimony on many issues at the local, state and national level. In response to student request, this course has been redesigned to include a more in depth review of nutrition-related illnesses and their treatment. A popular component of this course is the assignments that enhance the students insight on public health nutrition. This isn't just a course about reading and listening but doing! Credits: 3 | Offered: Fall

MPH 0010 Zoonoses: An Emerging Public Health Issue

Course Director(s): Factor, Stephanie

Zoonoses, diseases transmitted from animals to humans, are increasingly being recognized as emerging or re-emerging disease threats to public health. This course will explore the interactions between physicians, veterinarians, and public health professionals; provide an understanding of the public health consequences of these diseases; and explore preventive measures. Finally, we will set the framework for discussions of agents of bioterrorism and the public health response to these threats. The course attracts top speakers from across the country in the fields of public health, infectious diseases, veterinary medicine, and the biomedical sciences.

Pre-requisite: MPH0400 Introduction to Epidemiology

Credits: 3 | Offered: Spring 2

MPH 0012 Advocacy in Action: How to Solve Problems in Public Health

Course Director(s): Collins, Cappy

This course will cover fundamental concepts in health advocacy. These concepts can guide program and policy developments in the service of helping populations, and they accommodate variables including the scope of the efforts, the level of involvement of the population, the utilization of other stakeholders and the sustainability of the efforts. Students in this course should expect to develop their own advocacy project proposals, or assess and/or contribute to existing projects, as individuals or in teams. Empowering other people starts with empowering oneself. This course is intended for students who have completed 1-2 terms in the program.

Credits: 3 | Offered: Fall

MPH 0013 Public Health Informatics

Course Director(s): TBD

Technology is progressing at lightning speed, revolutionizing every aspect of healthcare and life. As public health educators, we are charged with not only providing a strong foundation in the traditional practice of public health, but also preparing our students to lead the avant garde of public health as it is will be practiced tomorrow. Increasingly, such leadership requires a skill set that includes public health informatics.

Public health has always been highly interdisciplinary, but modern public health is rapidly becoming a field that requires an unprecedented level of technological savvy. Real-time syndromic surveillance, big data, mobile technologies, electronic health records, and other health information technologies are poised to benefit population health enormously. Practitioners who are not comfortably conversant in the use of these technologies will be unable to fully participate in, much less lead, the conversation. It is our responsibility to prepare our students and guide their exposure to this reality of modern healthcare. As standards of care shift, ISMMS students must be prepared to lead the way. Credits: 3 | Offered: Spring 2

MPH 0014 Program Planning

Course Director(s): Bower, Bill

Students will learn to design an evidence-based and culturally appropriate public health program, in both US and developing country contexts. Specifically, students will gain competence in analyzing local needs and resources; developing an evidence-based and technically and programmatically sound causal pathway; articulating program objectives; designing relevant program partnerships and technical components; and designing the program's monitoring and evaluation plan, implementation plan and budget.

Pre-requisite: Completion of 1-2 terms in the Program. Credits: 3 | Offered: Fall

MPH 0015 History of Public Health

Course Director(s): Theerman, Paul

An overview of the history of public health, chiefly in the United States, from the 18th century to the present.

The course will examine the evolving notions of a healthy public. It will look at the underlying social, political, and cultural structures that aid, hinder, and shape the public health mission, and consider the history of public health in the context of the larger histories of medicine, the nation, and the world. Several disease case studies will be looked at in detail, to provide insight into the factors that go into successful--and unsuccessful--public health movements. The course will conclude with a look at recent public health crises, to understand them within the context of global history.

Credits: 3 | Offered: Spring 2

MPH 0016 LGBTQI Health: Research, Policies and Best Practices

Course Director(s): Warren, Barbara

LGBTQI people have made considerable progress in securing equal rights, from open military service to marriage equality. Polling data indicates the general public has increasingly positive views of LGBTQI civil rights. Despite this, LGBTQI persons still face discrimination, stigma and exclusion in many policy arenas and significant health disparities. Development of an evidence base for LGBTQI health interventions remains in critical need of more dedicated efforts. This course reviews the demographics and diversity of LGBTQI populations; advances and gaps in LGBTQI health knowledge and research; and policies and strategies in public health practice towards achieving fuller health equity for LGBT persons.

Pre-requisites: MPH0001 Introduction to Public Health or
MPH0700 Introduction to Global Health Credits: 3 | Offered: Spring 2

MPH 0020 Public Health Thesis Workshop

Course Director(s): Oliver, Kristin

This course is required for students who will write a master's thesis as a final project. The thesis is more than a paper-it is a major independent project that requires you to design, implement, and present professional work of public health significance. The successful completion of a thesis signals that you have mastered the art of scholarly research, can synthesize complex information, and can write clearly and effectively. This course will help you design your thesis, write a thesis proposal, and give and receive feedback from peers. The course is heavily interactive. We will work with materials provided primarily by the students. By the end of the term, you should be ready to complete your thesis.

This course is the prerequisite for registering for MPH0099 Thesis.

Pre-requisites: Students must have completed MPH0320 Research Methods. Students must have their Thesis Proposal Outline completed and their Statement of Thesis Support submitted to the Program Office before registering for this course.

Credits: 1 | Offered: Spring

MPH 0021 Seminar in Applied Preventive Medicine

Course Director(s): Garland, Elizabeth; Oliver, Kristin

This weekly seminar focuses on current local, national, and international issues in public health and preventive medicine. Discussions center on critical review of the published literature in public health and include topics related to health policy and management, economic and legal issues, and the impact of these issues on the health of populations. On a rotating basis, each student is responsible for setting the agenda and chairing seminar discussions.

Pre-requisites: MPH0300 Introduction to Biostatistics; MPH0400 Introduction to Epidemiology
Students who are not Residents in the Department of Preventive Medicine must receive permission from Course Director prior to enrolling in this course. Credits: 3 | Offered: Fall

MPH 0023 Capstone Seminar

Course Director(s): Collins, Cappy

This seminar is designed for second year students who will be completing a capstone for their Culminating Experience.

WHEN MONDAY IS A HOLIDAY, CLASS WILL MEET FRIDAY THAT WEEK

Pre-requisites: Students must have completed MPH0320 Research Methods. Students must have their Culminating Experience Project Outline completed and their Statement of Support submitted to the Program Office before registering for this seminar.

Credits: 1 | Offered: All Terms

MPH 0090 Practicum for Public Health

Course Director(s): Brodbeck, Elisabeth

The Practicum experience provides the student with an exciting opportunity to implement and practice lessons learned in the classroom, offering the possibility to integrate knowledge and expose the student to new and exciting prospects for future professional development.

Pre-requisite: Students should complete at least 15 credits of MPH coursework before starting the Practicum; The Practicum Proposal and the Practicum Proposal Form must be submitted to the Program office for approval prior to the start of the practicum.

Credits: 0 | Offered: All Terms

MPH 0092 Applied Practical Experience

Course Director(s): Hennig, Nils

For students who matriculated in or after Fall 2017.

The Applied Practice Experience provides the student with an opportunity to translate theory into practice within a public health setting. The Applied Practice Experience Proposal must be submitted to the Office of Public Health Practice for approval prior to the beginning the experience. Students who matriculated in the Fall 2017 term or later will register for MPH0092 to satisfy the fieldwork requirement.

Pre-requisites:

¿ Applied Practice Experience Proposal

¿ Students should complete at least 15 credits of MPH coursework before starting the Practicum.

Credits: 3 | Offered: Spring

MPH 0095 Independent Study for Public Health

Course Director(s): Hennig, Nils

An Independent Study is an elective option, providing the student with an opportunity to delve more thoroughly into an area of public health of specific interest to him/her.

An Independent Study Proposal should be submitted at least six weeks prior to the anticipated start of the proposed project/course of study. This is to ensure that the goals meet the overall objectives of the Master of Public Health Program before a student commits any time and energy. Approval, when granted, is conditional upon the student completing all of the outlined requirements. The student must submit a Postscript Report and request that the faculty sponsoring the Independent Study complete the Evaluation Form. Final credits are awarded at the end of the project by approval of the Program Director.

Three credits are the maximum number of credits that may be awarded to any Independent Study. One credit represents approximately 45 hours of work. Please note that students will not receive any more than three credits for one project/course of study. Each student may complete no more than two independent study projects.

An Independent Study must be a unique experience. Material covered during an independent study project should be highly targeted and not simply a review of the regularly offered coursework. Independent study projects should not be attempts to take MPH courses that are offered routinely during the academic year. Students should not expect an Independent Study project to exempt them from required courses without approval by the Specialty Track Advisor and the Program Director. Please see the Student Handbook for the full policy and procedures associated with the Independent Study option. Credits: 3 | Offered: All Terms

MPH 0097 Culminating Experience

Course Director(s): Hennig, Nils

Students who are completing a manuscript or capstone should register for MPH0097 Culminating Experience (students who are completing a Master's Thesis should register for MPH0099 only).

Students register for their Culminating Experience on or before the Spring II Term of their second year while preparing to submit their manuscript or capstone.

Please refer to the MPH Culminating Experience Guide as a resource for the steps that need to be taken in fulfilling the Culminating Experience requirement.

Credits: 3 | Offered: All Terms

MPH 0099 Thesis: Masters in Public Health

Course Director(s): Hennig, Nils

Students register for their Master's Thesis on or before the Spring II Term of their second year while preparing to submit their Thesis.

Please refer to the Culminating Experience Guide as a resource for the steps that need to be taken in fulfilling the Master's Thesis requirement. Credits: 3 | Offered: All Terms

MPH 0103 Strategic & Program Management

Course Director(s): Gianelli, Arthur

This course is an introduction to understanding public health and health management, program planning, implementation and evaluation. Through readings, class discussion and the analysis of case studies students will have an opportunity to explore and identify key issues impacting public health and health programs; formulate and evaluate alternative solutions to problems; learn verbally and in writing to present analysis of managerial problems and proposals. The course will emphasize skill development in the management of mission, program operations and the business aspects of health organizations. Credits: 3 | Offered: Fall

MPH 0104 Healthcare in Communities and the Public Sector

Course Director(s): Roberts, Richard

A major focus of this class is on understanding how community life and health are related. Students will learn how to analyze communities, compare data regarding the health status of communities and to compare selected communities to each other. Case material will be used to emphasize the multiple ways one can assist communities as a whole and those at risk for health problems. Exemplars will be offered by guest lecturers involved in community change. Social and economic factors will be identified that affect community health status. Credits: 3 | Offered: Spring

MPH 0105 Health Economics

Course Director(s): Preker, Alexander

The intent of this course is to train future public health practitioners on the economic and political questions that emerge in the process of developing health systems.

The various sessions during the course will review core economic principles applied to the role of governments, the private sector and the competitive marketplace. The course will provide an overview of traditional microeconomic theory and practice as applied to demand, supply, competition, monopoly, and social welfare. It will drill down on topics such as role of governments, private sector, market competition, government failure and market failure. Special sessions will be devoted to topics on clinical services, non-clinical services, the health care workforce, health financing, the health related manufacturing sectors (pharmaceuticals, medical technology and information technology) and leadership/health management.

Students who successfully complete this course will be able to:

- ¿ Analyze the key policy and public health challenges faced by the US and other health care systems using economic principles, market analysis and health policy formulation
- ¿ Design key policy recommendations to address some of the public health challenges faced by vulnerable population groups that are consistent with underlying economic principles economic principles, market analysis and health policy formulation
- ¿ Apply the principles of economic evaluation to selected problems in the health sector and health industry verticals.

The major course output will be guided, semester-long exercises in analyzing and developing strategic development plans from a public health professional's perspective to guide political and economic decision making. The focus on health systems is a concrete means to understand the more general competencies involved in the application of economic analysis, which include political, financial, technical and organizational skills.

Credits: 3 | Offered: All Terms

MPH 0106 Public Health: Politics & Policy

Course Director(s): TBD

This course will survey the major policy issues affecting health care and examine the role of government in the health care system. We will discuss the role of policy analysis in the formation and implementation of national and local health policy. Because much of government health policy relates to or is implemented through payment systems, several sessions involve some discussion of the policy implications of how government pays for care.

The goal for the course is that students are conversant in the general economic and political science theory behind the current political landscape in health care. The focus will be in critically analyzing and discussing a wide set of policies and, ultimately, their impact on health.

Credits: 3 | Offered: Spring

MPH 0107 Accounting & Budgeting for Public Health Administration

Course Director(s): Cino, Frank

Financial statements enable managers to evaluate the performance of an organization and assess its financial position. Budgets, based on forecasts, take the form of projected statements and serve as an important managerial tool for planning and control purposes. This course provides an introduction the accounting, budgeting and financial reporting techniques commonly used in the health care and not-for-profit environment. Emphasis is placed on enabling students to become comfortable with financial analysis, budgets and commonly-used financial terminology so that they can effectively address financial matters they will encounter in leadership roles in health care and not-for-profit organizations. Credits: 3 | Offered: Spring

MPH 0108 Comparative Health Systems

Course Director(s): Preker, Alexander

The recent introduction of the Affordable Health Care Act and further proposed reforms under the American Health Care Act has had and will continue to have a major impact on the delivery of healthcare in the USA. The course will use a comparative health systems approach looking at what has worked well and not so well in both the USA and other countries. The course will explore each country's geography and culture, the history of its health system, followed by a detailed analysis of evaluation of cost, quality, access and innovation. The course is designed to be accessible by students of health administration, public health, nursing and other allied health professions. The major course output will be guided, semester-long exercises in analyzing a health system and developing strategic development plans expanding coverage for poor and vulnerable populations from a health systems perspective to guide political and economic decision making. The focus on health systems is a concrete means to understand the more general competencies involved in the application of systems analysis, which include political, financial, technical and organizational skills. The course will be particularly useful for students that may want to transition to a high level policy career or executive leadership and management role within health system.

Credits: 3 | Offered: Fall

MPH 0110 Pharmacoeconomics

Course Director(s): Arnold, Renee

This introductory course focuses on the major concepts and principles of pharmacoeconomics, with particular emphasis on modeling, methodologies and data sources. Students will learn about the international use of pharmacoeconomics in drug approval, regulation and pricing. Examples of pharmacoeconomic models used by the pharmaceutical industry and in government will illustrate the theoretical lessons. Credits: 3 | Offered: Spring

MPH 0111 Organizational Behavior & Human Resources

Course Director(s): Baney, Matthew

Human resource management in health organizations and the relationship between HR, organizational strategy, and organizational behavior is the focus of this course. We will analyze human work behavior at the individual, interpersonal, team and organizational levels. Included are topics such as motivation, communication, group and team dynamics, leadership, decision-making, job and organization design, conflict management, organizational culture and identity, and organizational change. We will apply organizational behavior theory and explore the factors that affect behavior, performance, and job satisfaction of people working in organizations. Credits: 3 | Offered: Spring

MPH 0112 Public Health Law

Course Director(s): Lowy, Marina

Familiarity with the legal environment is essential to an understanding of public health management and regulation, and to understanding assets and resources available to improve community health. This course introduces students to the legal system and to the process by which laws and policies impacting public health are formulated. We will explore the role of the law in shaping the provision of health services, disease and injury prevention, quality improvement, and other aspects of public health. Selected topics at the forefront of healthcare law will be discussed, including health insurance and alternative payment models, reproductive rights, compulsory vaccination and quarantine, the law and ethics of human subject research, and the regulation of genetic information (among others). Faculty will include attorneys specializing in the selected topics, as well as public health physicians and advocates.

Credits: 3 | Offered: Fall

MPH 0120 Managed Care & Health Insurance

Course Director(s): Bernstein, Richard

Following a brief survey of the 3000 year history of insurance, the course will focus on health insurance and reform in this country before examining the variety of techniques used by managed care organizations and various national health systems to balance health expenditures, access and quality of healthcare.

Through weekly Socratic-type discussions about contemporary healthcare controversies, the course will help develop students' critical thinking about health policy alternatives and managerial decision-making. Feedback on short weekly essays, student presentations, and a final essay will help students improve their written and presentation skills.

Credits: 3 | Offered: Spring

MPH 0121 Capstone Seminar in Health Care Management

Course Director(s): Baney, Matthew; Rosenberg, Gary

This course will assist students in designing and implementing their capstone project. Students will examine the formulation and implementation of business strategies in health organizations, models of strategic management and change, and the role of stakeholders in the strategic management process. They will also review specific analytical tools used in strategy formulation and presentation. This course is limited to students entering their second year in the Health Care Management track. Credits: 1 | Offered: Fall

MPH 0201 Introduction to Socio-Behavioral Health

Course Director(s): Foley, Mary

This core course provides an overview of the social and behavioral sciences and their importance in the interdisciplinary field of public health. A primary emphasis is on the social determinants of health, the social ecological model, its application to public health issues, and its use in the development of policies, strategies, interventions and programs. The course content will introduce students to several relevant social and behavioral theories as well as a range of community health assessment and planning models used by public health

professionals in both domestic and international venues. In addition, some lectures will focus on social networks, social support and community capacity building. Finally, a few lectures are reserved to provide students with insight into public health policy and health outcomes. Through a series of assignments, students will enhance their knowledge and awareness of the role of social and behavioral sciences in public health and its relevance to their specific discipline. Credits: 3 | Offered: All Terms

MPH 0203 Introduction to Medical Anthropology

Course Director(s): Torres-Velez, Victor

This course provides an introduction to the major theoretical perspectives and themes in contemporary medical anthropology. Medical anthropology examines the concepts and beliefs about illness, healing, and the body across cultures.

Using a comparative perspective, the course explores the impact of culture on the framework and understanding of health and illness (e.g., What does it mean to be healthy or sick?). Students will gain an understanding of the ecological, political, and social forces that affect health and will use a cultural perspective to gain insights to the treatment of disease (e.g., How does socioeconomic status, race, gender, and ethnicity affect health? Do immigrants from the Dominican Republic use medicinal plants or foods from their country of origin to treat particular diseases and ailments?).

An important objective of this course will be to critically examine the biomedical paradigm, the biology of disease.

Credits: 3 | Offered: Spring 2

MPH 0210 Health and Literacy: Improving Health Communication Efforts

Course Director(s): Korin, Maya

The issue of health literacy is critically important to the development of effective health communication strategies and outreach. National evaluations of literacy have raised serious concerns about the ability of nearly half the U.S. adult population to access, understand, and apply health communication messages (NAAL 2003), including those messages found in health information, related to healthcare services, and exchanged during health provider/patient interaction. This course explores the link between literacy and health in the US and how poor health literacy impacts accessing, understanding, and applying health communication messages. Course participants will learn how to take health literacy into account in their work as public health practitioners by understanding the consequences of low health literacy in health outcomes, conducting health literacy loads of spoken and written material, and developing skills to communicate health more effectively across a variety of settings and contexts. Credits: 3 | Offered: Spring

MPH 0211 Substance Abuse & Public Health

Course Director(s): Foley, Mary

Substance abuse is epidemic across NYC and the country. Approximately 20.6 million people ages 12 and over struggle with substance abuse or addiction. President Obama recently acknowledged the problem as a public health crisis. Substance abuse touches the lives of children, adolescents, and adults across all racial, ethnic, and socioeconomic backgrounds.

The course will explore the intersection of Substance Abuse and Public Health. Topics include substance abuse and mental illness, tobacco control, the epidemic of substance abuse in NYC, marijuana and teens, decriminalizing drug use, overdose in the ER, binge drinking on college campuses, substance abuse in the workplace, environmental and genetic risk factors for opioid addiction, and food as an addiction.

This problem-based course will be seminar style with an emphasis on personal experiences from a panel of recovering addicts coupled with evidence-based practice, policy, and research. Students will attend an AA or NA meeting. At the end of the course, they will present on a controversial area of addiction.

Students who successfully complete this course will be able to:

- 1) Assess the social, cultural, political, economic, and environmental factors that promote or prevent substance abuse in an individual or community.
- 2) Design an intervention or program to prevent or manage substance abuse on a population level.
- 3) Identify the behavioral and neurobiological effects of substance abuse. Credits: 2 | Offered: Spring

MPH 0212 Life Cycle of Violence: Implications for Public Health

Course Director(s): Rothenberg, Andrea

According to Healthy People 2020, “Acts of violence are among the top 15 killers of Americans of all ages.” Once thought of solely as a criminal justice issue, violence prevention and intervention have been embraced as a major public health issue. The television drama, Law and Order: Special Victims Unit (SVU), claims to be “fictional” and states that their show “does not depict any actual person or event.” Yet many episodes strongly resemble real-life situations “ripped from the headlines,” with a few added twists and turns to enhance the plot! Students will view SVU episodes and read peerreviewed articles to guide interactive discussions on the impact of violence over the course of the lifespan on health and wellbeing. Insights from this course will drive more thoughtful and informed practice when working with this important leading health indicator. Credits: 2 | Offered: Spring

MPH 0215 Teen Pregnancy Prevention & Intervention

Course Director(s): Rothenberg, Andrea

Pregnancy during the second decade of life is a complex issue requiring multifaceted interventions on a primary, secondary, and tertiary level. A broad range of sociological, cultural

and behavioral issues affecting adolescent pregnancy will be explored. Topics will include: predisposing and contributing factors to early pregnancy, protective factors and assets building during development, the strengths perspective, access to reproductive healthcare for women and men, options counseling, and evidenced based pregnancy prevention and intervention programs.

Teen mothers, young fathers, and the parents and children of teen parents as well as teens who have chosen not to have a baby will be guest speakers. Emphasis will be on assisting healthcare providers explore the latest trends in this area as well as their individual attitudes and beliefs about early pregnancy and parenting in order to enhance their ability to work effectively with young women and their families. Credits: 2 | Offered: Fall

MPH 0216 Health Promotion Strategies

Course Director(s): TBD

Health promotion involves the therapeutic use of lifestyle strategies, such as a predominantly whole food, plant-based diet, exercise, stress management, tobacco and alcohol cessation, and other non-drug modalities to prevent, treat, and reverse chronic disease. It is the practice of educating, equipping, and empowering individuals with the information and resources they need to protect their health and fight disease. This course offers the knowledge and skills recommended by a national panel of representatives from physician and health professional organizations as the basis for providing quality health promotion in lifestyle medicine services. Topics covered include the fifteen core competencies identified by the panel which focus on clinical processes, as well as a review of key modalities: nutrition, physical activity, sleep, coaching behavior change, tobacco cessation, managing risky alcohol use, and stress management/emotional wellness. The course provides basic grounding in the field of health promotion (HP) and in lifestyle medicine (LM), and focuses on practical skills for public health practitioners.

Pre-requisite: MPH0002 Public Health Surveillance

Credits: 3 | Offered: All Terms

MPH 0300 Introduction to Biostatistics

Course Director(s): Doucette, John

This course provides an introduction to the principles underlying biostatistical methods and their application to problems in epidemiology, public health and clinical research. Students will learn about basic probability distributions, descriptive statistics, presentation of data, hypothesis testing principles, and the specific hypothesis tests and analytic methods for a variety of data types. These analytic methods will include t tests, chi-square tests, nonparametric tests, analysis of variance, correlation, regression, and basic survival analysis methods. Students will have the opportunity to apply these methods to sample data both via direct calculation and using SAS® statistical software. Each week, a one-hour laboratory session will reinforce material from lecture with additional examples and instruction in use of the SAS®

software. Methods for determining sample size and power for a variety of commonly used study designs will also be presented, as will measures of the accuracy of diagnostic and screening tests. Credits: 3 | Offered: Fall

MPH 0305 Introduction to Qualitative Research Methods

Course Director(s): TBD

Heart disease, toxicants in food and water, HIV/AIDS, bio-terrorism and avian flu we live in an ever-changing landscape of risks where information alone does not necessarily lead us to practice good health behaviors. How people perceive, comprehend and prioritize the health information around them powerfully effects what they act on.

This course provides the student with an understanding of how attitudes and perceptions of an individual or group can impact their priorities and actions. Qualitative methodologies bring an enhanced understanding to quantitative research. The qualitative research methods we will cover in this course include: ethnographic/participant observation, in-depth interviews, focus groups, panels and small-scale surveying. Students will be required to design and conduct small field research activities throughout the semester. Methods and findings will be critiqued and refined with class input and participation. Credits: 3 | Offered: Spring

MPH 0306 Intro to Systematic Reviews and Meta-Analyses

Course Director(s): Pinotti, Rachel

This course is designed to provide an introduction to systematic review and meta-analysis methodology, a prerequisite for those students who intend to produce one of these types of articles as their thesis.

The course will cover:

- i) developing an appropriate research question
- ii) an overview of the process and best practices
- iii) drafting a protocol
- iv) designing a comprehensive search strategy
- v) logistics of the screening and quality appraisal steps in the process.

The course will also highlight the differences between a systematic review/meta-analysis that could feasibly be produced as a thesis project vs. a publication quality systematic review/meta-analysis.

Credits: 1 | Offered: Fall

MPH 0311 Multivariable Methods

Course Director(s): TBD

This intermediate-level biostatistics course involves in-depth study of statistical methods that examine the relationship among multiple (i.e., more than 2) variables at the same time. The methods covered include linear regression, logistic regression and Cox proportional hazards models. Students will also learn about tests of model fit, regression diagnostics, and

representation of categorical independent variables and transformations of dependent variables. Students are shown how to apply these methods using statistical software (SPSS®) and how to interpret the resulting computer output. THIS COURSE MEETS TWICE PER WEEK. MPH0311 LAB WILL MEET ON TUESDAYS FROM 6:30-7:30PM

Pre-requisites: MPH0300 Introduction to Biostatistics
MPH0400 Introduction to Epidemiology (may be taken concurrently)
Credits: 3 | Offered: Spring

MPH 0320 Research Methods

Course Director(s): Foley, Mary

Research Methods encompasses a set of fundamental skills and tools necessary for approaching the process of developing and answering a research question, being a future investigator, or an informed consumer of information in the marketplace. This course provides a solid and practical framework enabling students to successfully embark upon their Master's Theses. As a prerequisite in the conduct of research, it prepares students to conceptualize, propose, design, and write research papers in general.

Topics covered include the characteristics of a research study, formulating a research question, experimental research designs, survey construction, data analysis and interpretation, and evaluation of research. Also addressed are strategies for conducting literature searches, research ethics, informed consent, and elements of a research proposal. Students will be required to complete IRB training, HIPPA training, data security training, and outline a research proposal for their Culminating Experience project by the end of this course.

Full time students are required to take this course in the Spring II Term of their first year in the Master of Public Health Program. The course is only open to matriculated students in the Master of Public Health Program. This course is graded on a Pass/Fail basis.

Prerequisites:
MPH0001 Introduction to Public Health or
MPH0700 Introduction to Global Health Credits: 1 | Offered: All Terms

MPH 0400 Introduction to Epidemiology

Course Director(s): Factor, Stephanie

This introductory course focuses on the fundamental concepts of epidemiology and its application to the field of public health. The course will provide students with an insight to epidemiologic methods and how they can be used to study health outcomes in human populations. Students will learn the elements of epidemiology, such as causation, study design, measures of effect, and potential biases. Practical and theoretical training will include lectures, small group discussions, and readings. This class meets twice per week. Tuesdays 5:30-7:30PM, Thursdays 4:00-5:00PM Credits: 3 | Offered: Fall

MPH 0410 Epidemiology of Infectious Diseases

Course Director(s): Pathela, Preeti

Epidemiology of Infectious Diseases builds upon the concepts presented in Introduction to Epidemiology (P400), stressing the importance of considering the host, environment and disease agent in transmission dynamics. The nineteenth and twentieth centuries witnessed advances in prevention, treatment, and study of infectious diseases and the misconception that infectious diseases were disappearing. The study of infectious diseases leads to the continual development of vaccines, antibiotics, and technology, prompting epidemiologists to develop more advanced methods to monitor disease, investigate patterns of disease transmission, and evaluate innovative prevention modalities. The past thirty years have brought to light both new and re-emerging problems in the epidemiology of infectious diseases, including HIV, SARS, avian influenza, arboviruses, antimicrobial resistance, and the threat of bioterrorism.

This course will enable students to gain an understanding of the principles of infectious disease epidemiology, including modes of transmission, quantification of occurrence and risk, and methods for preventing disease at the population level. Students will receive a number of disease-specific lectures from public health practitioners who conduct surveillance for and epidemiologic studies on various infectious diseases. Students will also participate in classroom exercises, during which they will investigate an outbreak, create surveillance plans, present evidence of a disease threat, and recommend prevention and control measures

Pre-requisites:

MPH0300 Introduction to Biostatistics or MPH0800 Introduction to
Advanced Biostatistics

MPH0400 Introduction to Epidemiology

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Credits: 3 | Offered: Spring

MPH 0411 Journal Club for Health Professionals

Course Director(s): Senay, Emily

This intermediate level Journal Club builds upon the Introductory Journal Club, training students in the presentation of articles relevant to the public health specialties of environmental, occupational and preventive medicine. Each student will be assigned a week to be responsible for selecting and presenting an article relevant to their area of specialization. The student may decide to invite a Mount Sinai faculty expert in the particular topic to provide additional commentary on the article. Prior to class, all students are required to read the article and complete a short critique form. All students are expected to participate in class discussions.

Pre-requisites: MPH0300 Introduction to Biostatistics or

MPH0800 Advanced Introduction to Biostatistics

MPH0400 Introduction to Epidemiology

Students must be currently licensed health professionals, however if they are not currently licensed they must obtain the approval of the Course Director to enroll.

The Club meets once a month for the academic year. This course is graded on a Pass/Fail basis.

Credits: 1 | Offered: Fall

MPH 0412 Epidemiology II

Course Director(s): Stingnone, Jeanette

Epidemiology is the study of the occurrence and distribution of health-related events, states, and processes in specified populations. This includes the study of the determinants influencing such processes and the application of this knowledge to control relevant health problems. This course will provide students with a strong foundation in the core epidemiologic concepts that guide the design and analysis of modern epidemiologic studies including counterfactuals, confounding, effect measure modification, measurement error and bias. Students will learn how these concepts relate to practical considerations within various epidemiologic study designs, including their potential impact on study outcomes. In parallel with lectures and assigned readings, lab sessions will guide students through practical demonstrations and applications of these concepts including the construction of causal diagrams and the use of SAS software for epidemiologic design and analysis.

THIS CLASS MEETS TWICE PER WEEK. LECTURE: MONDAYS, 5:00-7:00PM; LAB: THURSDAYS: 4:00-5:00PM.

WHEN MONDAY IS A HOLIDAY, CLASS WILL MEET ON FRIDAY OF THAT WEEK

Pre-requisites:

MPH0400 Introduction to Epidemiology

MPH0300 Introduction to Biostatistics

Basic SAS proficiency Credits: 3 | Offered: Fall

MPH 0414 Cardiovascular Epidemiology

Course Director(s): Vedanthan, Rajesh; Agarwal, Sunil

This course provides a solid foundation of broad array of cardiovascular diseases from the perspective of individual to population with goals to improve health. The course provides basic understanding of cardiovascular disease pathophysiology and current paradigms in their management at the clinical and community levels. The course will discuss methods to estimate the impact of CV risk factors, and burden and secular trends of disease such as atherosclerotic disease, arrhythmia, and heart failure. It will give students an understanding of broader determinant of CVD health such as genetics, lifestyle, environment, and policy. Lastly, the course will provide a framework for thinking about improving cardiovascular health of

populations through reducing healthcare disparities, providing cost-effective and early interventions, and improved understanding of disease epidemiology. Prerequisite: MPH 0400 Introduction to Epidemiology. Credits: 3 | Offered: Spring

MPH 0415 Case Studies in Epidemiology: Environmental & Occupational Health

Course Director(s): Chiu, Yueh-Hsiu Mathlida

This course teaches students the practical steps involved in conducting an epidemiological investigation of a disease occurring in the workplace or due to a wider environmental exposure. Class discussions involve problem-based analysis of published case studies led by faculty with particular expertise in the relevant area of environmental or occupational epidemiology. Statistical analysis of datasets derived from case studies will be required for midterm and final evaluations, therefore basic knowledge of SPSS or SAS is needed.

Pre-requisites:

MPH0300 Introduction to Biostatistics

MPH0400 Introduction to Epidemiology

MPH0522 Clinical Occupational & Environmental Medicine or

MPH0500 Introduction to Occupational & Environmental Medicine Credits: 3 | Offered: Spring

MPH 0416 Cancer Epidemiology

Course Director(s): Boffetta, Paolo

The course will cover substantive and methodological issues in the epidemiology of cancer. Students will be presented with examples of descriptive and analytical epidemiology studies of the main types of cancer; aspects such as cancer registration and its contribution to epidemiology research, estimates of attributable fractions, the global burden of cancer, and preventive strategies will be also addressed. The course will complement the series of methodological courses offered within the epidemiology track, by providing an introduction to research in cancer epidemiology and control

Pre-requisite/co-requisite: MPH0412 Epidemiology II

Credits: 3 | Offered: Fall

MPH 0417 Mental Health in the Modern Age

Course Director(s): Montgomery, Guy

Mental health is a critical component for high quality of life. Poor mental health is in and of itself aversive, and can lead to poor physical health and in some cases even death. The purpose of this course is to develop understanding modern conceptualizations of mental health on a population level. This will be accomplished by: studying mental health within the context of its historical perspectives, providing foundational learning on the major classifications of mental health disorders and their impact on society, and providing insights into what is, and what

factors lead to, ¿good¿ or positive mental health. Pre-requisites: MPH 0400 Introduction to Epidemiology Credits: 3 | Offered: Fall

MPH 0418 Reproductive and Perinatal Epidemiology

Course Director(s): Swan, Shanna

In this course we will study the epidemiology of human reproductive function, pregnancy and pregnancy outcomes and the methodologic issues involved in studying these. Topics include: basic biology of male and female reproduction, male and female infertility, pregnancy outcomes, assisted reproduction, and factors (environmental, social and occupational) that impact reproductive function and pregnancy outcomes.

Pre-requisite: MPH 0400 Introduction to Epidemiology
Credits: 3 | Offered: Spring

MPH 0419 Environmental Epidemiology

Course Director(s): Chiu, Mathilda; Wright, Robert

This course focuses on the fundamentals of epidemiological methods specific to environmental health research. The course will provide students with an insight to appropriate study designs and methodologies to investigate health effects of environmental exposures. These include fundamental concepts involved in generating research hypotheses, as well as environmental health specific issues such as use of exposure biomarkers, models of exposure (e.g. air pollution), study design issues, confounding and other types of bias, and phenotyping issues as they relate to environmental factors. We will also review data analytic strategies unique to environmental health (e.g. mixtures), the nascent field of exposomics, and the interpretation of the study findings and public health implications for environmental epidemiological research. The students will also learn the techniques for critical appraisal of environmental epidemiological studies. These are achieved through lectures with in-depth discussion of current research status on environmental epidemiology, readings, homework assignments, and exams. Prerequisites: MPH0500 Introduction to Occupational & Environmental Medicine or MPH0522 Clinical Occupational & Environmental Medicine; MPH0400 Introduction to Epidemiology Credits: 3 | Offered: Spring

MPH 0420 Epidemiology III

Course Director(s): Stingnone, Jeanette

Building upon the foundations of epidemiologic methods and design introduced in previous courses, Epidemiology III will cover the theoretical and practical considerations of analysis and interpretation of data generated from epidemiologic studies. Through lectures and guided analysis of epidemiologic datasets, students will learn the analytic approaches and modelling techniques used to investigate exposure-disease relationships within various epidemiologic study designs. This course will also include more advanced topics such as mediation analysis and the use of sensitivity analyses to quantify the impact of potential biases. As part of this course, students will perform an independent analysis of epidemiologic data to demonstrate

mastery of the presented content. Students can use any statistical software they prefer for assignments, but all course examples, sample code and programming support will be provided using SAS only. MANDATORY EPIDEMIOLOGY III LAB WILL MEET ON THURSDAYS FROM 4-5PM IN THE SPRING II TERM.

Pre-requisite: MPH0412 Epidemiology II

Credits: 3 | Offered: Spring

MPH 0421 Research Seminar in Epidemiology

Course Director(s): Factor, Stephanie

This course is designed for second year MPH students in the Epidemiology track to provide direction and support for the development of their research proposal in preparation for the submission of the capstone project. To participate in this course, students must have identified a capstone advisor and a general area for their capstone project. In-class activities will include: student-directed discussions of peer-reviewed journal articles in their capstone-related area of interest; presentations by MPH program graduates on his or her experience completing the capstone process; and student-prepared presentations of their capstone research proposal. Discussions about how to lead a productive journal club, issues related to preparing a good research proposal, and how to prepare effective PowerPoint presentations and other data-reporting formats will be part of the course experience. Outside readings will be assigned as appropriate for the in-class discussions/presentations.

This course meets in the Fall and Spring I term. Fall registration only. This course is restricted to students in the Epidemiology track.

Credits: 2 | Offered: Fall

MPH 0425 Epidemiology IV

Course Director(s): Boffetta, Paolo

This advanced course in epidemiology is built around the overarching themes of the contribution of epidemiology to causal inference, and strategies for selection of study populations, prevention, control and quantitative assessment of bias, and options in study design and statistical analysis.

Pre-requisite: MPH0412 Epidemiology II
MPH0429 Epidemiology III Credits: 3 | Offered: Fall

MPH 0500 Introduction to Environmental Health

Course Director(s): Meyer, John; Zajac, Lauren

This course provides an overview of important topics pertinent to environmental and occupational health (OEH). A series of guest lecturers present an overview of environmental areas of air, water, and green housing. A diverse array of occupational diseases are included;

such as classic occupational exposure to heavy metals, pesticides, and solvents. The basic principles of recognition and evaluation of chemical, physical and biological hazards, exposure assessment, toxicological profiles, and control hierarchies are covered. Applicable principles in industrial hygiene and ergonomics as well as fundamentals of occupational and environmental regulation and legislature will be discussed.

The course provides basic underpinnings of the nature of theory and practice in OEM, and thus provides a structural framework for thinking about the field and identifying linkages with other disciplines and specialties. Credits: 3 | Offered: Spring

MPH 0515 Toxicology

Course Director(s): Sanders, Alison; Wright, Robert

This course provides an introduction to the major concepts in toxicology with particular emphasis on agents with public health relevance including metals, pesticides, air pollution, drugs, and stress. This curriculum is designed to make toxicology accessible to students with broad scientific backgrounds including those outside of the biological science disciplines. Students will learn the basic principles of toxicology, as well as review target organs systems, contaminants, and mechanisms of actions of certain classes of compounds. Specific target organ toxicities will include hepatic, renal, dermal, cardiovascular, pulmonary, neuronal, developmental, reproductive, and endocrine systems. We will use in-class exercises and small groups to discuss recent publications, apply concepts, and understand the current knowledge of specific toxicological agents and their effects. This course is designed to present toxicology as an interdisciplinary science in public health.

Credits: 3 | Offered: Spring

MPH 0516 Environmental Exposures, Risk and Public Health

Course Director(s): Zajac, Lauren; Harari, Homero

This course provides an introduction to key concepts in occupational and environmental exposure assessment and risk assessment – important topics for the practice of environmental public health. Students will learn how common exposures are measured for both communities and the workplace, and how to interpret and apply the data in a public health context. Students will learn the basics of how to characterize environmental risks to health, methods used to manage risk in communities and strategies to effectively communicate risk to stakeholders. Case studies and relevant risk assessment tools will be emphasized. Students will complete a project to enhance understanding and build practical skills for public health practice.

Pre-requisites: MPH0500 Introduction to Occupational & Environmental Medicine or MPH0522 Clinical Occupational & Environmental Medicine

Recommended Co-requisites (optional): MPH0515 Toxicology Credits: 3 | Offered: Spring

MPH 0522 Clinical Occupational & Environmental Medicine

Course Director(s): Meyer, John

Environmental and occupational exposures known to cause human disease are examined from the public health framework of exposures and etiology, clinical diagnosis, and prevention. Regulatory and other approaches to prevent and reduce exposure will be discussed. Important public health and policy implications of workplace and environmental exposures will be examined.

The course is targeted toward those training or working in health care, and is limited to residents, physicians and medical students except with the permission of the Course Director and Specialty Track Advisor of the Occupational & Environmental Medicine specialty track.

This course can fulfill the MPH 0500 Introduction to Occupational & Environmental Medicine course requirement.

Credits: 3 | Offered: Fall

MPH 0523 Advanced Occupational & Environmental Pulmonary Disease

Course Director(s): de la Hoz, Rafael

Pulmonary diseases due to occupational and environmental exposures have historically been at the center of the practice and science of occupational medicine. This course will review pulmonary diseases caused by occupational and environmental exposures from the perspectives of clinical diagnosis, toxicology, treatment, and prevention. Regulatory and other approaches to reduce exposure will be discussed. Public health and policy implications will be considered as well.

This course is limited to health care providers.

Credits: 2 | Offered: Spring 2

MPH 0525 Pediatric Environmental Health

Course Director(s): Collins, Cappy; Forman, Joel

This course introduces the learner to the potential health effects in children from exposures to chemical and physical agents from indoor and outdoor environments, such as lead and mercury, a wide variety of organic chemicals such as solvents, pesticides and air pollutants, and molds. It covers the basic principles of exposure assessment; skills in pediatric environmental exposure history taking; and the adverse effects of environmental exposures on child neurodevelopment. Students learn how to design risk communication strategies for environmental exposures targeted to a specific group of children, access pediatric health reference material, apply state of the art clinical evidence in the formulation of public health policy, and advocate for child health. The course format is participatory, and includes journal article critiques and reviews, lectures and clinical case scenarios.

This course will be capped at 20 students. Registration will be based on first come, first- served basis.

Credits: 3 | Offered: Spring

MPH 0621 Seminar in App Clin Epi & Hlth Svcs Rsch

Course Director(s): Lin, Jenny; Weiss, Jeffrey

This seminar focuses on current methodological, analytical and logistical issues in clinical epidemiology and health services research. The course helps participants develop, refine, implement, and evaluate a quantitative clinical epidemiology or health services research study. Attendees also learn to critically evaluate the methodological strengths and weaknesses of key clinical research designs including: retrospective and prospective cohort studies, patient and physician survey research, secondary dataset analysis, and interventional studies. All seminar members must present a research proposal during the one year period, as well as participate actively in critique and feedback to other presenters. The course is primarily intended for clinician trainees in the MPH outcomes research track or Masters of Science in Clinical Research (MSCR) program but welcomes all students interested in outcomes research analysis.

Pre-requisites: MPH0300 Introduction to Biostatistics or
 MPH0800 Advanced Introduction to Biostatistics
 MPH0400 Introduction to Epidemiology

This class meets on alternate weeks.

Credits: 1 | Offered: Fall

MPH 0623 Applied Analysis of Epidemiological & Outcomes Research Data

Course Director(s): Wisnivesky, Juan

This course is focused on learning the application of statistical methods for the analysis of epidemiologic and patient-oriented observational data. The emphasis will be on hands-on experience, involving case studies with real data and using the statistical software SPSS. The focus will be on choosing and on implementing the appropriate statistical methods to analyze and interpret different types of data. Attention will also be paid to the theory behind these tests and on testing the validity of the assumptions. The course will cover data management, exploratory data analysis, model formulation, goodness of fit testing, and other standard procedures, including linear regression, analysis of variance, logistic regression, and survival analysis. The grade will be based on the homework, midterm, and a final exam. This course will be particularly well suited to students who are actively involved in an epidemiology, outcomes, health services, or survey research project that is entering the data analysis phase.

Prerequisites: MPH0300 Introduction to Biostatistics OR MPH0800 Introduction to Advanced Biostatistics;

MPH0311 Multivariable Methods OR MPH0812 Applied Linear Models I

Credits: 3 | Offered: Spring

MPH 0624 Outcomes Research Methods

Course Director(s): Sacks, Henry; Sigel, Keith

The goals of this course are to provide students with a theoretical understanding and hands on experience in advanced epidemiology and outcomes research methods. The course will provide a review of each method within an interactive computing environment. Assignments requiring computer analysis of clinical data will be provide with each topics. Areas to be covered include decision analysis, cost-effectiveness analysis, propensity score analysis, instrumental variable analysis, clinical prediction rules, and analysis of repeated measurements. THIS COURSE MEETS TWICE PER WEEK. MPH0624 LAB WILL MEET ON WEDNESDAYS FROM 4:00-5:00PM.

Pre-requisites: MPH0300 Introduction to Biostats; MPH0311 Multivariable Methods

Credits: 3 | Offered: Spring

MPH 0700 Introduction to Global Health

Course Director(s): Hennig, Nils

This course provides an introduction to the major concepts and principles of global health with particular emphasis on neglected populations. The course provides students with an understanding of the principles of health within the context of development, human rights, and globalization, and provides an appreciation of the varied challenges and controversies. Students will learn about the establishment of global health priorities, developing an appreciation for issues related to underserved populations. Students will learn about the major players in the global arena and challenges of financing. A multidisciplinary approach is used to discuss the major determinants of health and disease with particular emphasis on the relationship between health and socioeconomic development. At the end of the course, students will be introduced to the most important challenges and variables of global health and their interactions. They will be prepared to advance to more specific and in-depth courses of the Global Health Track. A high level of classroom participation with active contributions to classroom discussion and debate will be expected. Credits: 1 | Offered: Fall

MPH 0703 Global Mental Health

Course Director(s): Katz, Craig; Kleinberg, Jeff

There is no health without mental health. Yet, while 450 million people struggle with mental disorders, sufferers in resource-limited areas receive little or no treatment. This course will describe how to strategically approach global mental health planning and implementation for scaling up mental health services within a public health framework. It will rely on a model known as the Wheel of Global Mental Health, which encompasses seven interdependent elements that together encompass the goals, resources, and dynamics integral to scaling up.

Credits: 3 | Offered: Fall

MPH 0705 Health of Underserved Populations

Course Director(s): Brodbeck, Elisabeth

This seminar will provide an in-depth introduction to the major conceptual frameworks and empirical research examining social factors that impact health and illness. We will utilize sociological perspectives of health and illness in order to engage with how underserved populations are defined; critically analyze the ways that race, class, gender, and other factors become framed in relation to public health problems; and evaluate how individual and systems-based interventions and policies are impacting disparities in health. Although this course will be a combination of lecture and discussion, much of the learning will be dependent on students' in-depth analysis and discussion of weekly readings.

Pre-requisites: This course is designed for second year students. Credits: 3 | Offered: Spring

MPH 0707 Humanitarian Aid in Complex Emergencies

Course Director(s): Sparrow, Annie

International humanitarian emergencies have been increasing over the past three-four decades largely due to war and political conflicts. Some of these emergencies have become chronic in nature contributing to significant increase of mortality and morbidity worldwide over prolonged period of time and affecting disproportionately developing and under-developed nations and poor. Many of these humanitarian situations result in massive displacement of population. Refugees confront problems beyond geographic dislocation from their homes; they face socio-cultural, economic, and health consequences on an individual level as well as on a broader population level. Displacement may result from natural disasters or man-made problems such as civil unrest and war. In many recent circumstances, population dislocation has resulted from a combination of both.

This course provides insight into the root causes of humanitarian emergencies with historical case examples, and will focus on the public health aspect of humanitarian emergencies and the impact of displacement on populations. The course will explore: the major causes of diseases and death; rates of morbidity and mortality and how they are measured; public health surveillance during the emergency and immediate post-emergency phases; how to identify the most vulnerable groups; ensuring an adequate and safe food supply, proper sanitation, and acceptable shelter; understanding the public health challenges such as epidemics; and the broad psycho-social impact of being labeled a refugee. This is an upper level global health course.

Pre-requisites: MPH0713 Health and Human Rights: Human Rights Abuses,
Torture & Its Consequences

Credits: 3 | Offered: Spring

MPH 0710 Global Environmental Change

Course Director(s): Collins, Cappy

A growing number of environmental problems are negatively impacting human health, including climate change, stratospheric ozone depletion, loss of biodiversity, changes in hydrological systems and the supplies of freshwater, accumulation of environmental toxins, deforestation, and the degradation of agricultural land. Recognizing the link between health and the ecosystem requires an understanding of the complex relationship between humans and the biosphere's life-supporting systems.

This course will focus on how global environmental change is affecting human health. The topics included in this course build upon available evidence from different parts of the world, including the cause and impact of natural and man made disasters, land use changes, poor housing, export of hazardous waste, environmental refugees, food and water insecurity, as well as overarching themes such as environmental injustice. We will discuss the public health policy implications of an out of balance global ecosystem, and the major challenges it represents to physicians, scientists, institutions, governments and concerned communities. We will also discuss local and global solutions to various problems described above.

Credits: 3 | Offered: Spring

MPH 0713 Health & Human Rights: Human Rights Abuses, Torture & its Consequences

Course Director(s): Henderson, Schuyler

Human rights abuses are pervasive and have both obvious and subtle health consequences. They also need to be understood from different angles: how they affect individual health (including psychological health) as well as population and community health; how human rights abuses involve ethical, scientific, political, social, and cultural considerations; and how the field of public health can address human rights abuses in multiple ways, including advocacy and testimony, influencing health-related practices, education, documentation and accumulation of data.

This course is designed to raise students' awareness of human rights abuses, including torture; to describe how human rights abuses adversely impact health; to introduce the epidemiology of human rights abuses; and to consider how disciplines within Public Health can address (and sometimes participate in) human rights abuses. The course covers the ethical and political foundations of Human Rights, how we know human rights abuses are occurring (the epidemiology of human rights abuses; testimony; the use of affidavits), and specific health ramifications of torture, forced migration and disparities. In addition, public health implications of human rights abuses will be discussed around special topics: children, gender, human rights law, and the role of health care providers in human rights abuses (from overt examples of participation in torture and genocide to more complex realms where public health imperatives may conflict with human rights, as with some forms of public health surveillance). Credits: 2 | Offered: Fall

MPH 0717 Maternal & Child Health

Course Director(s): TBD

This course introduces the student to the challenges that perpetuate high rates of maternal and childhood morbidity and mortality in low and middle-income countries. This includes not only

discussion of the health issues that drive this mortality, such as HIV/AIDS, malaria, diarrheal disease, obstetric complications and malnutrition, but also the respective health system and structural barriers that limit access to quality health services and contribute to the vulnerability of women and children. Approaches to improve maternal and child survival, including facility and community-based interventions, will be examined as well. The course is case-based and students will be involved in intensive small group problem solving exercises through which they will learn the necessary skills to address problems facing mothers and children in low and middle-income countries. The course emphasizes participatory learning, in-class discussion, self-directed research, and small group exercises. Introduction to Global health is a prerequisite for attending this course and registration is limited to 20 participants on a first come (register) first served basis.

Credits: 3 | Offered: Spring

MPH 0720 Preparation for Global Health Fieldwork

Course Director(s): Katz, Craig; Ripp, Jonathan

In this course students will learn essential skills for working in global public health or research projects in underserved and under-resourced settings. The course is designed to prepare participants with a career interest in global health for practical fieldwork. The course is case-based, emphasizes student participation, self-directed research, and development of relevant practical knowledge and skills. Topics include community-based needs assessment, project planning, survey design, focus group design, sampling for international research, cultural competency, and safety and security during international assignments. All students who are intending to carry out practical work or research in an under-served setting as part of their MD or MPH are expected to complete this course before going into the field. Students must be approved by course directors to attend this course and preference will be given to those who are planning a global health field experience within the following 12 months. Please email Renee Bischoff for approval and include information about your planned GH experience.

Credits: 2 | Offered: Spring

MPH 0795 Public Health Conference

Course Director(s): Brodbeck, Elisabeth; Hennig, Nils

The Public Health Conference provides students with the opportunity to delve deeper into public health topics presented at the annual Public Health Research Day at ISMMS. Students will be required to attend and be active participants during the full day of events, which includes a keynote lecture by Dr. Ariel Pablos, the former Assistant Administrator at USAID, oral presentations, and a poster session. Academic requirements include a 2 page topic summary for one aspect of the conference and a conference evaluation. Credits: 1 | Offered: Spring 2

MPH 0800 Introduction to Advanced Biostatistics

Course Director(s): Weinberg, Alan

This course provides a thorough introduction to the fundamentals of biostatistics--numerical and graphical summaries of data, hypothesis testing, and estimation. The emphasis is on

concepts and problem solving and not on the underlying mathematical theory. Specific topics include testing equality of population means (e.g., t-tests), simple categorical data analysis (e.g. chi-square tests), analysis of variance, correlation, and simple linear regression. This course is intended for students in the biostatistics or epidemiology tracks of the MPH Program and the PhD students in the Clinical Research Program.

Optional lab will meet on Wednesdays from 4:00-5:00pm. Credits: 3 | Offered: Fall

MPH 0801 Introduction to Probability

Course Director(s): Parides, Michael

This course provides an introduction to probability models emphasizing applications in medicine and biology. In addition to presenting basic probability theory and models, a variety of topics important in statistics will be covered, including: random variables; discrete and continuous probability distributions; conditional probability, joint probability, expectation and variance; independence; sampling distributions, combinatorics, and permutations. Credits: 3 | Offered: Fall

MPH 0802 Statistical Computing with SAS

Course Director(s): Doucette, John

This course provides students with the skills needed to utilize SAS systems for data management in order to prepare datasets for statistical analysis. In addition, procedures that are used to conduct basic statistical analyses and produce graphical output will be covered. Students will be given hands on-training using sample data provided by the instructor as well as (optionally) data from their own work. The lectures will take place in the Levy Library where SAS is available to the students during course instruction.

Pre-requisites: MPH0300 Introduction to Biostatistics or MPH0800 Introduction to Advanced Biostatistics

Credits: 2 | Offered: Spring

MPH 0803 Introduction to SAS Programming

Course Director(s): Doucette, John T.

This course introduces students to the SAS programming language, particularly as it pertains to data management tasks needed to work with SAS datasets and prepare them for statistical analyses. Procedures for basic statistical analyses and simple graphs are also covered. The course is designed for MPH students in the Epidemiology track and the Biostatistics track, who will be using SAS software in their future work. Students will be given hands-on training by using their own datasets as well as data provided by the instructor. The lectures will take place in the Levy Library where SAS is available to the students during course instruction. This course is limited to students in the biostatistics or epidemiology tracks.

Co-requisite: Introduction to Advanced Biostatistics Credits: 2 | Offered: Fall

MPH 0812 Applied Linear Models I

Course Director(s): Doucette, John

Regression analysis is a widely used set of methods for exploring the relationships between response variables and one or more explanatory variables. This course provides an introduction to regression methods for a single continuous response variable. Both linear and curvilinear regression models are considered. A brief introduction to regression of a single binary response will also be considered. The emphasis is on concepts and application rather than on underlying theory. As mathematical results are presented without proof, students are not required to be proficient in calculus or matrix algebra.

Pre-requisites: MPH0300 Introduction to Biostatistics or
MPH0800 Introduction to Advanced Biostatistics

Credits: 3 | Offered: Spring

MPH 0820 Statistical Inference

Course Director(s): TBD

Introduction to the theory of statistics focusing on the basic concepts and approaches to estimation and hypothesis. Specific topics include a study of common probability distributions, definitions of moments, the law of large numbers and central limit theorem, maximum likelihood, likelihood ratio tests, and decision theory. Knowledge of calculus (integration and differentiation) is required; however, an introduction and review will be provided.

Pre-requisites: MPH0801: Introduction to Probability or permission of the Course Director.

Credits: 3 | Offered: Spring

MPH 0821 Analysis of Longitudinal Data

Course Director(s): TBD

The aim of this course is to provide a systematic training in both the theoretical foundations and the model building strategies of linear regression models for MS/MPH and PhD students who have already had some data analysis experience. The course presents modern approaches to the analysis of longitudinal data. Topics include linear mixed effects models, generalized linear models for correlated data (including generalized estimating equations), computational issues and methods for fitting models, and dropout or other missing data. Students should take this class at the end of tier second year.

Pre-requisites: MPH0800 Introduction to Advanced Biostatistics
MPH0801 Introduction to Probability
MPH0812 Applied Linear Models
MPH0820 Statistical Inference

Credits: 3 | Offered: Spring

MPH 0822 Applied Linear Models II

Course Director(s): Curtin, Paul

This course provides a comprehensive overview of regression methods for analysis of categorical (binary and count) data and survival data, with applications to epidemiological and clinical studies. Topics discussed include logistic regression analysis, log linear model for contingency tables, Poisson regression, Kaplan-Meier survival curves, and Cox (proportional hazard) regression analysis. The emphasis is on concepts and application rather than on underlying theory. As mathematical results are presented without proof, students are not required to be proficient in calculus or matrix algebra. Class will meet from 4:00-6:00pm with a mandatory lab directly following from 6:00-7:00pm.

Pre-requisite: MPH0812 Applied Linear Models I

Credits: 3 | Offered: Spring

MPH 0823 Survival Analysis

Course Director(s): TBD

This course describes the analysis of time -to-event data. Several concepts of censoring are introduced, as are functions used to describe survival distributions. Cox regression is studied including the assumptions required, examining the validity of these assumptions, and dealing with time dependent covariates. Interval censored data are explored, as well as the analysis of multiple failures. Analyzing data sets will be required. Emphasis is on concepts and applications, but some appreciation of very basic statistical concepts is required to appreciate the topics to be covered. MANDATORY MPH0823 LAB WILL MEET ON THURSDAYS FROM 2:00-3:00PM.

Credits: 3 | Offered: Spring

MSN

MSN 5026 Structures of Embryology

Course Director(s): Laitman, Jeffrey

Embryology Module of Structures Medical School Course. ONLY open to MS Genetic Counseling students Credits: 2 | Offered: Fall