

Systems Medicine (SYSM)

SYSM 5110 AI in Research and Work 1 Credit

This course provides an introduction to the effective and responsible use of artificial intelligence (AI) tools in academic research, programming, and everyday professional tasks. Emphasizing both conceptual understanding and critical application, students will explore how AI can streamline workflows while also learning to recognize and avoid its potential pitfalls. Topics include core AI terminology, major categories of AI tools (e.g., large language models and code assistants such as ChatGPT, Copilot, DEEPL, Google AI, Meta AI, claude.ai, and scite.ai), and practical applications in writing, research planning, and software development. The course also addresses the limitations of current AI systems, including hallucinations (factually incorrect output), ethical risks such as plagiarism, and the importance of transparency in AI-assisted work.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 5115 Compt. and Algorithm. Thnking 1 Credit

This course introduces fundamental algorithms used in bioinformatics, emphasizing both conceptual understanding and practical problem-solving. Students will study key computational methods including sequence alignment algorithms (e.g., Needleman-Wunsch, Smith-Waterman), string matching algorithms (e.g., Boyer-Moore, Knuth-Morris-Pratt), clustering techniques (k-means, DBSCAN), and tree-based data structures such as binary search trees. In addition to mastering these specific algorithms, students will learn to generalize core principles and apply them to novel or related computational problems. The course emphasizes step-by-step exercises completed on paper to build algorithmic thinking, reinforce theoretical knowledge, and prepare students to adapt solutions beyond standard cases.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 5410 AI Applctn in Structural Biol. 3 Credits

This course will cover key concepts in structural biology to provide students with a comprehensive understanding of the molecular basis of protein structure and function. Methodologies of structural determination such as X-ray crystallography, Nuclear Magnetic Resonance Spectroscopy, and Electron Microscopy will be covered. In addition, the course delves into the intersection of artificial intelligence (AI), drug design, and structural biology, exploring how advanced computational methods are revolutionizing the process of drug discovery. Through a blend of theoretical lectures and hands-on practical sessions, students will learn how AI techniques such as machine learning and molecular modeling are leveraged to analyze molecular structures, predict ligand-receptor interactions, and accelerate the identification of novel therapeutic compounds.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

SYSM 5420 Data Anal. and Viz. in Python 1 Credit

This introductory course provides students with the foundational skills needed to analyze and visualize data using Python. Designed for beginners, the course focuses on developing a solid understanding of Python programming principles while applying them to real-world data analysis tasks. Students will learn how to read, understand, and write Python code, and explore essential libraries such as scikit-learn, pandas, NumPy, Matplotlib, and Seaborn for data manipulation and visualization. In addition to traditional programming instruction, the course introduces the use of artificial intelligence tools to assist in code generation and optimization. Students will learn how to assess AI-produced code critically, identify potential errors or hallucinations, and ensure the reliability of their analyses. By the end of the course, participants will be able to analyze and visualize clinical, biomedical, or publicly available datasets to generate meaningful insights. Students will have a final project on real data to demonstrate their analysis and visualization skills. Classes will be a mixture of lectures, demonstrations, and practical (hands-on) exercises. All assignments will be administered through Canvas, and due dates can be found on the Syllabus page in Canvas.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

SYSM 5600 Systems Thinking 2 Credits

The approach most people bring to problem solving is based on the assumption that the challenge before them can be decomposed into a subset of simpler problems, and that any challenge can be met through a process of addressing these simpler questions and then following them up a "decision tree". In fact, most of the challenges facing us today do not lend themselves to such a straightforward decomposition. They exist in a complex, interconnected ecosystem where context is everything, and we must view the whole as more than the sum of its parts in order to effect change. This course will introduce you to the world of systems and systems thinking. You will learn to consider and shape the posture you take towards the complex challenges you face. You will understand the importance of embracing paradox and factoring in the inherent biases we all bring to how we see a problem before us. You will also be introduced to tools and methods to help understand, reason with, and make better decisions with problems in a system context.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

SYSM 5610 System Architecting and Design 2 Credits

System Architecting and Design focuses on the practical application of systems engineering tools and techniques to capture and communicate the fundamental behavior and structure of systems to satisfy stakeholder expectations. The course emphasizes defining and using the various architectures that span the definition of a system from a variety of viewpoints including: Operational, Functional, Physical, Requirements and Verification. The course builds upon the foundations of systems engineering established during the Design Thinking and Systems Engineering course. The focus of this course is on expanding our understanding of the system to define it in sufficient detail to communicate that understanding to users, operators, developmental engineers, testers, sponsors and other stakeholders. System architecting and design is not a spectator sport, so emphasis is on practical hands-on application through in-class exercises and a comprehensive course final project. Students will gain a working knowledge of state-of-the-art model-based systems engineering (MBSE) tools and use them to develop key artifacts used to capture and communicate system architectures and preliminary design. Extensive examples are also presented as case studies to highlight lessons learned from other projects. The course stresses the importance of early architecture definition in supporting and balancing project cost, schedule, performance and risk objectives.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 5620 Design Thinking and Syst Eng 2 Credits

Design Thinking and Systems Engineering introduces students to the foundational principles and tenets leading to a holistic and empathetic formulation of a problem, need, or opportunity – and the resolution of this via the synthesis of a response system or solution. This course enables students to more effectively conceive and architect solutions that meet customer needs or respond to market opportunities while reducing validation and verification risk. This is a highly interactive graduate level course that leverages engaged lectures and a group project that students pursue in small teams (3 to 5 students per team, as a function of class size). This course provides students with a disciplined approach for formulating a customer or stakeholder need/opportunity and translating this understanding into a solution or response concept through a highly iterative process of prototyping and concept development. Ultimately, the students will translate this solution approach into a set of specifications for a system or service that meets the need/opportunity. The focus initially is on developing an outside-in view that treats the system as a black box, without regard to the components from which it will be built. The course emphasizes the distinction between an operational need/opportunity and a system solution, and stresses the importance of understanding the customer/stakeholder need before converging to a solution. The course helps students understand how to think through the choices at each step of the process. What decisions have to be made? What factors should be considered in making them? It is the answers to these questions that make for good systems thinking when formulating a response strategy to an operational shortfall or opportunity, not just adherence to a standard process. The primary objective of this course is to achieve a strong foundation in design thinking and systems engineering principles and processes.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 5630 Syst. Integ, Verif. and Valid. 2 Credits

Using a combination of lectures, interactive discussions, group exercises, and case studies this course empowers participants to better understand and perform system integration and test in their projects. The workshop emphasizes models & analytics for information gain & risk reduction using a lite process framework to integrate non-deterministic, dynamic, complex systems at scale. At the end of this course, you will have the knowledge, tools, and experience to apply systems engineering to perform system integration and test to reduce risk across the lifecycle.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Students cannot enroll who have a program in Systems Medicine, Systems Medicine, Systems Medicine or Systems Medicine.

SYSM 5650 Microbiome Seminar Series 1 Credit

Microbiomics touches upon a broad range of disciplines, including microbiology, immunology, biochemistry, and bioinformatics. This new discipline can further elucidate our understanding of the complex interactions among hosts, the immune system, and health at every stage of life. This seminar series will bring leading experts in the field of microbiome and introduce students to the broad range of current research such as human immune systems, wellness and aging, environmental health, neurological functions, and population health. The course will consist of lectures by instructors and guest speakers. The course will touch upon the role of next-generation microbial sequencing, including indications for, and how to interpret the results of the taxonomic and metagenomic analyses as an introduction to the advanced course on microbiomics and health.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

SYSM 5700 Microbiome Health: Clin Apps 2 Credits

Microbiomics touches upon a broad range of disciplines, including microbiology, immunology, biochemistry, and bioinformatics. This new discipline can elucidate further our understanding of the complex interactions among host, immune system and health at every stage of life. This course will introduce the broad and important roles that the microbiota can play such as in human immune systems, wellness and aging, environmental health, neurological functions, and population health. The course will consist of lectures, including invited guest speakers, hands-on sessions, and a panel discussion. We will also cover study design, statistical considerations for microbiomics, and critiques of the microbiome literature. Students will learn about the role of next generation microbial sequencing, including indications for, and how to interpret the results of the taxonomic and metagenomic analyses.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to students with a program in Microbiology Immunology, Microbiology Immunology, Microbiology Immunology, Microbiology Immunology, Systems Medicine, Systems Medicine, Systems Medicine or Systems Medicine.

SYSM 5710 Genomics Precision Med Policy 2 Credits

This is a 2-credit introductory survey seminar course that explores the social and policy implications of cutting-edge issues and controversies related to genomics and precision medicine. Ethical frameworks will be used to construct analyses and argumentation around current and future policies. Classes will be interactive, with scholarly discussions. Students will (1) prepare short written assignments; (2) deliver several mini oral presentations; and (3) write a policy brief, which will be peer reviewed and revised for final grading. There are no course prerequisites because understandable scientific background will be provided through readings and asynchronous presentations.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

SYSM 5720 Physiological Genomics 5 Credits

This course integrates principles of physiology with genomics utilizing the concepts of Systems Biology. With the completion of several sequencing projects: the Human Genome, the HAPMAP, the ENCODE and the Genome Wide Association Studies, the field of Physiological Genomics has emerged from the need to link function to thousands of mapped genes and better understand human physiology at all levels of biological organization. The course concepts and tools for student mastery represent advanced competencies of how we can utilize genomic knowledge to re-establish physiologic wellness, if there has been some aberration of the genome leading to a pathologic outcome. This course will cover the function of human body systems and will provide a strong foundation to understand the relationship of genes to complex physiological functions. The course is designed as a combination of lectures, an interactive journal club, and hands-on sessions. Students will focus on both monogenic and more complex polygenic diseases to critically analyze and dissect the genetic effects on the physiological function of major organ systems. The hands-on session will cover the use of various clinical data. Each week will focus on an organ system and its diseases. Students will have a unique opportunity to analyze real patient exome sequencing data and learn to write a clinical report based on disease findings. The goal of this course is to provide students with a strong understanding of the function of major organ systems as a basis for understanding human health, learn how to analyze research papers, and think critically on the effects of genetics/genomics on human pathophysiology.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

SYSM 5730 Innovation in Medicine 2 Credits

A hands-on introduction to methods and concepts used in technology companies to drive innovation and their application to systems medicine. This course will introduce students to design thinking, lean startup, data visualization, product management and more. An ongoing project during the term will help students learn to apply these ideas and bring the concepts to life.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

SYSM 5740 Intro to Clinical Anatomy 2 Credits

This course is an introductory level course designed for Master level students. Students will gain familiarity with gross anatomy and become conversant with any medical professional, including the allied health field. Body regions that will be covered include the thorax, abdomen, pelvis, upper and lower limbs. Students will be assessed by weekly quizzes, both formative and summative. At the completion of the thorax, abdomen and pelvis sections, students will be introduced to the cadaver and have an opportunity to view prosected cadavers in the laboratory. This latter activity will be considered enrichment, but will be mandatory for all students enrolled. This course does not include hands-on dissections. Lectures will be delivered via pre-recorded videos, but instructor will meet the students for a weekly discussion session.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 5750 Selected Topics: Personalized Med 1 Credit

This is an interactive journal club formatted course with a mixture of presentations and hands-on sessions. The course will focus on recent research published in selected areas of Personalized Medicine. Students will present selected papers developing critical analysis skills and lead discussions. Papers will be selected in consultation with GUMC faculty. The main goal of the course is to help students to think and analyze a research paper in the new field of Personalized Medicine critically. The course will include a wet-lab session which will give the students experience of performing Genotyping.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to students with a major in Systems Medicine, Systems Medicine, Systems Medicine or Systems Medicine.

SYSM 5760 Genomics in the Lab 3 Credits

The sequencing of the human genome was the beginning of the acceleration of the "big data" era in biology. We have seen technological advances and the availability of mobile sequencers that can generate DNA sequencing data in a matter of a few hours. The advent of these mobile sequencers has made it possible to generate sequencing data in a classroom. The objective of this course is to provide hands-on experience in using one such hand-held sequencer, the MinION to sequence a piece of DNA. and carry out Next-Generation Sequence analysis. Students will have a hands-on experience in the extraction, purification, loading of the DNA to the sequencer and the analysis of the Next Generation data collected from the sequencer. The course will be a combination of lectures and hands-on providing students in the "know-how" of DNA sequencing and analysis.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to students with a program in Systems Medicine, Systems Medicine, Systems Medicine or Systems Medicine.

SYSM 5770 Medical Biochemistry 0-2 Credits

Biochemistry is fundamental to understanding the underlying cause of diseases and their treatments. This didactic course will be an intensive course, covering many aspects of biochemistry including biomolecules and metabolism. This course will be approached from a medical perspective. The course is designed as a combination of lectures and practical computer-based exercises utilizing functionalities of web-based resources. The students will experience the effect of mutations and polymorphisms on the genes that are causative of the underlying disease in each metabolic pathway. The lectures will be presented as a series of case-studies. Most encountered clinical cases will form the core of the course. Aspects of Complementary and Integrative Medicine (CIM) approaches to health and disease states will be discussed. At the end of the course students will be able to understand these diseases from a biochemical, informatics, and integrative medicine perspective.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

SYSM 5780 AI Foundations: Ethics Policy 1 or 3 Credits

This course introduces foundational concepts of artificial intelligence in healthcare, emphasizing its clinical applications, opportunities, and limitations while developing practical skills in Python programming for biomedical data analysis. Students learn core computational principles, including data manipulation, visualization, and reproducible workflows, using real-world clinical and biological datasets. No prior programming experience is required. In parallel, the course examines the ethical, equity, and policy implications of AI in medicine. Topics include bias and fairness, health disparities, data governance, explainability, model transparency, privacy (HIPAA), regulatory frameworks (FDA, IRB), reproducibility, and responsible deployment in healthcare systems. Students critically evaluate how data quality, representation, and model design influence fairness and trust in healthcare technologies. By integrating computational foundations with ethics and policy, the course prepares future clinicians, researchers, and health leaders to responsibly engage with AI-driven tools and to contribute thoughtfully to data-informed healthcare innovation. Class will be a mixture of lectures, demonstrations, and practical (hands-on) exercises. All assignments will be administered through Canvas. Due dates can be found on the Syllabus page in Canvas.

Level: Graduate, Undergraduate

Prerequisites: SYSM 5900

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to students with a program in Systems Medicine, Systems Medicine, Systems Medicine or Systems Medicine.

SYSM 5790 Ethics Policy in Syst. Med. 2 or 3 Credits

This 3-credit seminar course explores how applying ethical frameworks can promote best practices and policies in systems medicine. We will analyze key components of systems medicine, including genomics, personalized/precision medicine, public health, drug development, big data, and artificial intelligence, including machine learning and natural language processing. We will also assess implementation considerations for various stakeholders, including patients, consumers, industry, research participants, underserved populations, and healthcare systems. Finally, we will consider how systems medicine approaches can be effectively leveraged to reduce health disparities and improve health equity. Students will participate in scholarly discussions, prepare brief presentations, and provide short written commentaries on several topics.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to students with a program in Systems Medicine, Systems Medicine, Systems Medicine or Systems Medicine.

SYSM 5800 AI Applctn in Systems Medicine 3 Credits

This comprehensive 3-credit course delves into the interdisciplinary field of Systems Medicine and explores its integration with Artificial Intelligence (AI) in the context of healthcare. Students will learn how AI techniques, including machine learning, deep learning, and data analytics, can be leveraged to analyze complex biological systems, decipher disease mechanisms, and personalize medical treatments. The course covers foundational concepts in systems medicine, including omics technologies, network biology, and personalized medicine, while examining how AI methodologies can enhance our understanding of health and disease.

Throughout the course, students will explore the interdisciplinary intersection of Systems Medicine and AI within healthcare. Through engaging lectures, interactive discussions, illuminating case studies, and hands-on projects, they will delve into AI techniques such as machine learning, deep learning, and data analytics. These techniques will be applied to analyze complex biological systems and personalize medical treatments, with a particular focus on integrating real-world data extracted from Electronic Health Record (EHR) systems. By the end of the course, students will have gained practical skills in AI-enabled systems medicine and developed the ability to apply these techniques to real-world biomedical problems, leveraging EHR data to enhance their understanding and impact in healthcare.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to students with a program in Systems Medicine, Systems Medicine, Systems Medicine or Systems Medicine.

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

SYSM 5850 An Intro to Genomic Medicine 3 Credits

Advances in genomics have led to a major paradigm shift in medical practice. While medicine has always been "personal," the availability of genomic data has made it possible to individualize care for many patients. This online course will provide an introduction to genomic medicine and will cover 5 main themes: (1) Clinical genetics and genomics; (2) Laboratory techniques; (3) Consumer genomics; (4) Ethical, legal, and social issues; and (5) Present and future opportunities and challenges.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 5900 Applctn of Biostat to Big Data 3 Credits

This course will introduce the idea of how to reason via statistical models to get and interpret information from big biological data. To introduce the idea of how formal models of data are used, examples will also be drawn from related sciences. Students will learn how to apply regression-type models to data and assess the consistency (or inconsistency) of the results they produce with theory. The course will encourage students to set biological or medical problems they are working on within the context of formal statistical models.

Prerequisites: College level Science/Mathematics courses

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

SYSM 5910 Biomedical Informatics 3 Credits

This didactic course will provide an overview of the field of Biomedical Informatics from different perspectives. This course will provide an overview of biology and medicine relevant to healthcare from an informatics perspective. This course focuses on utilizing data to solve relevant health and informatic problems that the healthcare system is facing. Emphasis is given to understanding the basic building blocks, various information resources and the application areas of Biomedical Informatics. Students will learn to explore the process of developing and applying computational techniques for determining the information needs of healthcare providers and patients. This class uses lectures, flipped classroom approaches where needed as well as student led discussions. Relevant topics include Electronic Health Records, Patient Quality Assessment and Improvements, Evidence Based Medicine, Natural Language Processing, Consumer and Public Health Informatics.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Mutual exclusion: BCHB 591

Course registration restrictions:

Enrollment is limited to students with a major in Systems Medicine, Systems Medicine, Systems Medicine or Systems Medicine.

Enrollment limited to students in the MS-SYSM-SM program.

SYSM 5920 Cancer Bioinformatics 1 Credit

While breakthroughs abound in cancer research, there is a profound disconnection in translating these discoveries into clinical medicine. This new didactic course will be based on application of computational biology and high throughput technologies to cancer research. The course is designed as a combination of lectures and practical computer based exercises utilizing functionalities of web-based cancer resources. The course will also cover some aspects of pharmacogenomics. The students will experience the use and applications of informatics resources and tools to different types of cancer. The main goal is to understand these diseases from a Systems Perspective.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Mutual exclusion: BCHB 592

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 5930 Critical Read/Sys Medicine 2 Credits

This course enables students to research published studies in the life and behavioral sciences that demonstrate a systems medicine approach to exploring a disease. This course will be formatted as an interactive journal club where students take turns presenting selected papers on Physiology, Genomics and Systems Medicine, critically analyze elements of the paper and lead interactive discussions. The main goal of the course is to help teach students to assess and critically appraise a research paper.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Mutual exclusion: BCHB 593

Course registration restrictions:

Enrollment is limited to students with a major in Systems Medicine, Systems Medicine, Systems Medicine or Systems Medicine.

SYSM 5940 Translational Bioinformatics 3 Credits

Translational bioinformatics is a field that enables transformation of basic science discoveries into clinically applicable knowledge. This provides opportunities for the practice of precision medicine and the application of systems approaches. This course will expose students to the wide range of biomedical data, from publicly available next-generation sequencing data to genetic and genomic data as applicable to cancer research. The course will comprise of a combination of lectures, invited seminars, and hands-on computer-based exercises utilizing web-based bioinformatics tools and publically-available databases. Using different cancer types as examples, students will learn how to analyze data generated by genomics, epigenomics, transcriptomics, proteomics, metabolomics and other high-throughput approaches. The main goal is to understand these diseases from a Systems Perspective and learn to translate this knowledge from bench to bedside. Students will learn to perform NGS, RNAseq data analysis and use of many cancer resources.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Mutual exclusion: BCHB 594

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 5950 Clinician Information Needs 2 Credits

This course explores the complex informatics issues related to the information needs that arise in the course of clinical care, and various methods for resolving those needs. The course begins with several didactic lectures on the topic and then proceeds to a graduate seminar format for the first half of the semester. The last half of the semester involves development of projects related to the theme of clinician information needs. Projects can include, but are not limited to, literature reviews, observational studies, log file analyses, and application development.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Mutual exclusion: BCHB 595

SYSM 5960 Clinical Metabolomics 2 Credits

This didactic course is designed to provide students an in depth understanding of molecular phenotyping technologies for basic, clinical and translational research. The course will cover the basics of mass spectrometry based metabolomics approach. We will discuss strategies for data generation as well as multivariate data mining tools and finally the clinical applications of this technology for studying disease onset and progression, drug metabolism and toxicity, discovery and validation of disease biomarkers and the effect of different treatments (drugs, radiation etc.) on the overall metabolism. The course will also include laboratory sessions that would provide practical insights into operations of a mass spectrometer and the use of interactive software for data analysis.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Mutual exclusion: BCHB 596

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 5970 Clinical Bioinformatics 3 Credits

This course will introduce the concepts of Systems and Network medicine approaches to understanding diseases. The course will integrate complex physiological processes and interactions with the human genome. This will aid in understanding Genomics in the context of human physiology. The course will provide a strong foundation for students with any background in the computational analysis and interpretation of biological data. The course is designed as a combination of lectures, hands-on sessions, and self-learning modules. The hands-on session will cover the use of several databases and tools for mining and extracting relevant physiologic data. Students will have the opportunity to understand informatics view of a diseases and how these are translated from bench to bedside.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Mutual exclusion: BCHB 597

Course registration restrictions:

Enrollment is limited to students with a program in Systems Medicine, Systems Medicine, Systems Medicine or Systems Medicine.

Enrollment limited to students in the MS-SYSM-SM program.

SYSM 5980 Informatics Grandrounds 2 Credits

This new didactic course will cover applications of bioinformatic tools and resources as they relate to human health and diseases. The course is designed as a combination of lectures and practical computer based exercises utilizing functionalities of web-based resources. The students will experience the use and applications of informatics resources and tools to a real disease situation presented as series of case-studies. The main goal is to understand these diseases from a Systems Perspective.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Mutual exclusion: BCHB 598

SYSM 7949 Systems Medicine Tutorial 0-4 Credits

Level: Graduate

Grading: Main Campus (UGrad, Grad)

SYSM 7950 Systems Med. Internship 3 or 4 Credits

This is the capstone course in which students will be working to pursue defined research objectives in systems medicine. The internship will be conducted at NIH, FDA, local companies in the Washington, DC area or Georgetown University. Internships can be in basic research, BIG data analysis or biomedical sciences.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Mutual exclusion: BCHB 602

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 7951 Sysm Med Internship-I 2 Credits

This is the capstone course in which students will be working to pursue defined research objectives in systems medicine. The internship will be conducted at NIH, FDA, local companies in the Washington, DC area or Georgetown University. Internships can be in basic research, BIG data analysis or biomedical sciences.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to students with a major in Systems Medicine, Systems Medicine, Systems Medicine or Systems Medicine.

Enrollment is limited to Graduate level students.

SYSM 7952 Systems Med Intership II 2 Credits

This is the capstone course in which students will be working to pursue defined research objectives in systems medicine. The internship will be conducted at NIH, FDA, local companies in the Washington, DC area or Georgetown University. Internships can be in basic research, BIG data analysis or biomedical sciences.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to students with a major in Systems Medicine, Systems Medicine, Systems Medicine or Systems Medicine.

Enrollment is limited to Graduate level students.

SYSM 7953 Case-based Practicum I 3 Credits

This is a practical/research-based program directed by GUMC faculty on an individual student basis, consisting of a practical, clinical use-case based project and/or specific translational/clinical research project in which the student will be required to integrate and apply the knowledge gained in the previous courses. The cases and projects will be developed by GUMC faculty in conjunction with their ongoing research interests and programs, and the student will be mentored throughout this course by the faculty member. The projects will be computer/internet and library based (not wet laboratory) and address specific clinically relevant questions in a systems medicine context. This is a two-part research practicum requirement; in Part I, 3-credits will be taken during the second semester of the student's MS curriculum, during which the student will be mentored in the development of the project and will conduct the necessary background literature research, resulting in formulation and presentation of a formal proposal for the project. Grading: Based on evaluation of the written proposal and its oral presentation. GUMC faculty

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Mutual exclusion: BCHB 691

Course registration restrictions:

Enrollment limited to students in the MS-SYSM-SM program.

Enrollment is limited to Graduate level students.

SYSM 7954 Case-based Practicum II 4 Credits

This is a practical/research-based program directed by GUMC faculty on an individual student basis, consisting of a practical, clinical use-case based project and/or specific translational/clinical research project in which the student will be required to integrate and apply the knowledge gained in the previous courses. The cases and projects will be developed by GUMC faculty in conjunction with their ongoing research interests and programs, and the student will be mentored throughout this course by the faculty member. The projects will be computer/internet and library based (not wet laboratory) and address specific clinically relevant questions in a systems medicine context. This is a two-part research practicum requirement; in Part I, 3-credits will be taken during the second semester of the student's MS curriculum, during which the student will be mentored in the development of the project and will conduct the necessary background literature research, resulting in formulation and presentation of a formal proposal for the project. Grading: Based on evaluation of the written proposal and its oral presentation. GUMC faculty

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Mutual exclusion: BCHB 692

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 9001 SYSM Tutorial 1-6 Credits

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 9002 Tutorial: Systems Medicine 0-3 Credits

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 9993 Continuous Registration

Continuous Registration

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

SYSM 9994 Continuous Registration

This course is intended for students to maintain a continuous registration status

Level: Graduate

Grading: No Grade

Course registration restrictions:

Enrollment is limited to Graduate level students.