

# MU Informatics Institute (INFOINST)

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**INFOINST 7002: Introduction to Informatics**

This course provides an overview to informatics foundations in addition to introducing topics regarding the current informatics-driven areas of science. Topics to include: recent trends in informatics; database management and Big Data analytics; data visualization, bioinformatics, health informatics, geoinformatics, nursing informatics, social informatics, and legal informatics. Graded on A-F only.

**Credit Hours:** 3**Prerequisites:** Instructor's consent

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**INFOINST 7010: Computational Methods in Bioinformatics**

(same as CMP\_SC 7010). Fundamental concepts and basic computational techniques for mainstream bioinformatics problems. Emphasis placed on computational aspect of bioinformatics including formulation of a biological problem, design of algorithms, confidence assessment of software development. Graded on A-F basis only.

**Credit Hours:** 3**Prerequisites:** CMP\_SC 4050 and STAT 4710

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**INFOINST 7430: Introduction to Health Informatics**

Introduction to the use of clinical information systems in healthcare. Topics include clinical data, standards, electronic medical records, computerized provider order entry, decision support, telemedicine, and consumer applications. Graded on A-F basis only

**Credit Hours:** 3**Prerequisites:** departmental consent required

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**INFOINST 8001: Topics in Informatics**

Organized study of selected topics. Subjects and earned credit may vary from semester to semester. Repeatable upon consent of department. Graded A-F basis only.

**Credit Hours:** 3

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**INFOINST 8005: Applications of Bioinformatics Tools in Biological Research**

This service course is designed for bioinformatics non-major students from life sciences, biological sciences, plant sciences, animal sciences, biochemistry, medicine fields and others. This course will provide an introduction to the current state of the art topics in bioinformatics and the computational tools available to the research community for application to biological research questions. Students will learn how to effectively utilize the tools and software packages to analyze data and visualize the results. Graded on A-F basis only.

**Credit Hours:** 3**Prerequisites:** Instructor's consent**Recommended:** Graduate students are expected to have basic knowledge in algorithms, databases, and molecular biology

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**INFOINST 8085: Problems in Informatics**

Independent, directed study on a topic in the area of informatics. Some sections may be graded A-F or S/U.

**Credit Hour:** 1-6**Prerequisites:** Instructor's consent required

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**INFOINST 8087: Seminar in Informatics**

Students attend and/or present at informatics seminars approved by the institute. Graded on S/U basis only.

**Credit Hour:** 0.5-1**Prerequisites:** instructor's consent required

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**INFOINST 8088: Lab Rotations in Informatics**

This course is designed to train students in both computational/informatics and life science/hospital laboratories to foster critical research collaborations in biomedical informatics. Students are expected to write reports with their advisors and the mentor of the rotation. Graded on S/U basis only.

**Credit Hour:** 1-3

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**INFOINST 8090: Dissertation (pre-candidacy) Research in Informatics**

Research leading to dissertation before comprehensive examination. Graded on S/U basis only.

**Credit Hour:** 1-99

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**INFOINST 8150: Integrative Methods in Bioinformatics**

(same as CMP\_SC 8150). With biology entering the Big Data era, scientists are overwhelmed with the amount and the diversity of the experimental, statistical, and omics data about the biological objects they study. As a result, the frontier bioinformatics and computational genomics methods have started to utilize a so-called integrative approach, where the computational and informatics methods are used to combine the high-throughput and low-throughput data. The main objective of this course is to teach students how to utilize bioinformatics and programming techniques for such multi-omics data integration. Graded on A-F basis only.

**Credit Hours:** 3**Prerequisites:** INFOINST 8005 or instructor's permission

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**INFOINST 8190: Computational Systems Biology**

(same as CMP\_SC 8190). This course covers current theories and methods in the modeling and analysis of high-throughput experiments such as microarrays, proteomics, and metabolomics. Topics include the inference of causal relations from experimental data and reverse engineering of cellular systems. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** INFOINST 7010 or CMP\_SC 7010; INFOINST 8010

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**INFOINST 8310: Computational Genomics**

(same as CMP\_SC 8130). This course introduces computational concepts and methods of genomics to students. The course covers genome structure, database, sequencing, assembly, annotation, gene and RNA finding, motif and repeats identification, single nucleotide polymorphism, and epigenomics. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** INFOINST 7010 or CMP\_SC 7010

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**INFOINST 8350: Integrative Methods in Bioinformatics**

Course objective is to introduce the most popular experimental methods from the point of view of the information sources that can be used in. Students will learn to use data obtained directly from biological experiments and how to suggest new experiments to improve results. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** INFOINST 7010 or CMP\_SC 7010

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**INFOINST 8390: Computational Systems Biology**

This course covers current theories and methods in the modeling and analysis of high-throughput experiments such as microarrays, proteomics, and metabolomics. Topics include the inference of casual relations from experimental data and reverse engineering of cellular systems. Graded A-F basis only.

**Credit Hours:** 3

**Prerequisites:** INFOINST 7010 or CMP\_SC 7010; INFOINST 8010 or instructors consent

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**INFOINST 8450: Precision Medicine Informatics**

(same as PTH\_AS 7450). This course will introduce students with the theoretical and practical aspects of precision medicine informatics. Topics include: complex diseases, computational genomics/proteomics, informatics of molecular interactions and biological pathways, somatic mutations, signal transduction and cancer, biomarker discovery, machine learning and data mining for PMI, networks methods for PMI, knowledge representation and reasoning for PMI. The course will consist of a set of didactic lectures, computational assignments, in-class demonstrations of PMI methods and discussions of recent publications.

**Credit Hours:** 3

**Prerequisites:** INFOINST 8005 with C or better or INFOINST 7010 with C or better or instructor's consent

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**INFOINST 8810: Research Methods in Informatics**

Research Methods in Health and Bioinformatics is a writing intensive course that provides students with an understanding of research proposal development, literature searching, research synthesis, research designs, evaluation methods, and ethics. Graded A-F basis only.

**Credit Hours:** 3

**Prerequisites:** Second semester or later in PhD program or instructor's consent

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**INFOINST 8870: Knowledge Representation in Biology and Medicine**

The main topics presented in the course are: logic systems, knowledge representation methods, production systems and representation of statistical and uncertain knowledge. Graded A-F basis only.

**Credit Hours:** 3

**Prerequisites:** BBME 7430 and BBME 7440

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**INFOINST 8880: Machine Learning Methods for Biomedical Informatics**

(same as CMP\_SC 8180) This course teaches statistical machine learning methods and their applications in biomedical informatics. The course covers theories of advanced statistical machine learning methods and teaches how to develop machine learning methods to solve biomedical problems. Graded on A-F basis only.

**Credit Hours:** 3

**Prerequisites:** CMP\_SC 7050 and INFOINST 7010 or CMP\_SC 7010 or INFOINST 8005

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**INFOINST 9090: Dissertation (post-candidacy) Research in Informatics**

Research leading to Ph.D. dissertation after comprehensive examination. Graded on S/U basis only.

**Credit Hour:** 1-99

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