INFO-Informatics

Courses

INFO 101. Introductory Bioinformatics Seminar. 1 Hour.
Faculty-led seminar course that exposes students to cutting edge research topics and career opportunities in the field of bioinformatics. Students will read assigned articles and be prepared for discussion. Subject matter varies by term and students will take this course during multiple semesters for a maximum of two credits.

INFO 302. Bioinformatics-I. 3 Hours.
Introduction to bioinformatics and methodologies, with emphasis on concepts and application of informatics tools to molecular biology. Focus on experimental models to collect data from genomics, transcriptomics and proteomics, applied statistics when it relates to experimental design, construction of bioinformatics tools into pipelines, representing biological data, biological sequence analysis, gene annotation, basic programming, basic web/data analysis programming, sharing of biological information, social/legal aspects of open science.
Prerequisites: BY 210 [Min Grade: C] and CS 103 [Min Grade: C] and PUH 250 [Min Grade: C] and INFO 101 [Min Grade: C]

INFO 403. Bioinformatics-II. 3 Hours.
Development of computational algorithms to solve biological questions with a significant problem-solving component. This includes computational techniques such as dynamic programming, optimization, hidden Markov models, graph algorithms, and other mathematical and statistical approaches. In addition, data mining and machine learning methods in computational biology will be covered.
Prerequisites: INFO 302 [Min Grade: C] and CS 303 [Min Grade: C]

INFO 404. Biological Data Management. 3 Hours.
Introduction of biological data management concepts, theories, and applications. Basic concepts such as data representation, database modeling, ontology representation, and relational database queries will be introduced. Various database systems, particularly relational databases and emerging big data techniques, will be introduced. Application of biological data management in biology will be covered using case studies of high-impact widely used biological databases.
Prerequisites: INFO 302 [Min Grade: C]

INFO 412. Visual Analytics for Bioinformatics. 3 Hours.
In this course, we will explore the use of visualization techniques as a concise and effective way to help analyze, understand, interpret and communicate complex biological data. Principles of design, visual rhetoric/communication, and appropriate usage will be introduced. We will cover representation of different data types, concentrating on those generated by data-rich platforms such as next-generation sequencing applications, flow/mass cytometry, and proteomics, and will discuss the use of visualization techniques applied to assessing data quality and troubleshooting. Various topics including dimension reduction, hierarchical visualizations, unsupervised learning, graph theory, networks/layouts and interactivity will be discussed. We will review the algorithmic underpinnings of various methods that lead to their appropriate and effective use. Finally, we will review a variety of genomics/bioinformatics-related visualization tools that are available. We will use Matlab throughout the course to create beautiful and effective visualizations.

INFO 497. Research in Bioinformatics. 0-4 Hours.
Research in Bioinformatics for non-honors students under the supervision of a faculty sponsor.
Prerequisites: PSDO 200 [Min Grade: C] and CS 103 [Min Grade: C]

INFO 498. Honors Bioinformatics Research. 0-4 Hours.
Honors Research is an innovative course that will provide undergraduate students with an opportunity to engage in rigorous scholarly practice of the core bioinformatics skills necessary for performing independent research. Program faculty will closely work with students to identify a project that explores an area of interest for the student based on the integration of prior learning. Students will be performing bioinformatics analyses on laboratory data or publicly available large-scale data, incorporate quality control and develop software pipelines.
Prerequisites: PSDO 200 [Min Grade: C] and CS 103 [Min Grade: C]

INFO 499. Bioinformatics Capstone. 3 Hours.
With mentoring and guidance from program faculty, the student will identify a bioinformatics-oriented research project that will form the basis of their capstone project. This research project may be a continuation of an existing research project or represent an entirely new project. The capstone project is expected to culminate in a public presentation of the project as well as a formal scholarly work reflecting integration of the scientific knowledge gained through the project. The scholarly work may take the form or a written manuscript or semester report.
Prerequisites: INFO 403 [Min Grade: C] and INFO 404 [Min Grade: C] and PSDO 200 [Min Grade: C]