CSE 428 Computational Biology Capstone

Credits
5.0 (5 hrs. lecture/meeting times)

Lead Instructor
Martin Tompa

Textbook
None

Course Description
Designs and implements a software tool or software analysis for an important problem in computational molecular biology.

Prerequisites
either CSE 303 or CSE 331; either CSE 326 or CSE 332.

CE Major Status
Selected Elective

Course Objectives
In the current revolution of high-throughput experimental methods in genomics, biologists are relying more heavily than ever on computational analyses. In this capstone course, students explore software development for real problems that arise in the analysis of such data. Solving such problems often involves aspects of data structures, algorithm design and analysis, discrete mathematics, machine learning, statistics, molecular biology, and genetics. There is a real sense of exploration and discovery in this area.

ABET Outcomes
(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

(i) a recognition of the need for, and an ability to engage in life-long learning
(j) knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Course Topics

Each team designs, implements, and experiments with software for a current research problems in Computational Molecular Biology. The team tests its tool on real biological data and presents the results at the end of the quarter. The topic of the research project changes with each offering.