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
CSE 312; CSE 331; 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
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, , and economic factors
(3) an ability to communicate effectively with a range of audiences
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

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.