Academic Syllabus

Course Name: Computational Approaches for Biological Data
Course Number: BDS 311
Course Credits: 3
Course Location: Corvallis
Faculty: TBD
Contact Info: TBD
Class Meetings: TR 10:00-11:20

Course Catalog Description:

Real-world biological datasets to implement fundamental concepts of efficient algorithm design. Synthesize previously acquired knowledge and skills in biology and computer science to analyze, implement, and apply algorithms that process biological datasets, including large-scale datasets.

Prerequisites: (BI 212 OR BI 212H) AND (MTH 252 OR MTH 252H) AND CS 261 AND (BI 213* OR BI 213H*) AND (ST 351* OR ST 351H*) OR instructor consent

Co-requisites: None

Learning Outcomes:

Students will be able to:
1. Integrate knowledge across the life and quantitative sciences.
2. Select appropriate methods for working with large biological datasets.
3. Deconstruct datasets to understand the underlying nature of the problem.
4. Apply principles of algorithm design to analyzing biological datasets.
5. Use communication effectively to work collaboratively in accomplishing common goals.

Course Content:

Sample schedule of class meeting topics:
Week 1 Biological datasets: defining the input through the lens of a biologist
Week 2 Biological datasets: defining the input through the lens of a data scientist
Week 3 Introduction to computing environments
Week 4 Brute force designs
Week 5 Greedy algorithms
Week 6 Don’t reinvent the wheel: evaluating community resources
Week 7 Complexity analysis (e.g., big-O notation)
Week 8 Divide-and-conquer main ideas
Week 9 Dynamic Programming
Week 10 Documenting algorithms

Evaluation of student performance:

Students will be evaluated on the basis of quizzes (30%) homework assignments (40%), a final project (20%), and effectiveness in working in groups (10%). Short quizzes will be given in class to test knowledge on the basic concepts covered during the week. Homework assignments will be group-based and involve the development of algorithms that implement the principles
covered during the week. The final project will involve the application of a well-documented algorithm designed to analyze an instructor-selected biological dataset. Student groups will be required to describe, via an oral presentation, their thinking, challenges, and application of knowledge in their design. Students will also be required to describe how the students worked collectively to address a common goal.

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**Learning Resources:**
There is no textbook for the class. Students will be responsible for identifying relevant material from the library.

**Statement Regarding Students with Disabilities:**
Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

**Link to Statement of Expectations for Student Conduct:**
http://studentlife.oregonstate.edu/code

**Diversity Statement:**
Oregon State University strives to create an affirming climate for all students including underrepresented and marginalized individuals and groups. Diversity encompasses differences in age, color, ethnicity, national origin, gender, physical or mental ability, religion, socioeconomic background, veteran status, sexual orientation, and marginalized groups. We believe diversity is the synergy, connection, acceptance, and mutual learning fostered by the interaction of different human characteristics.

Oregon State University strives to respect all religious practices. If you have religious holidays that are in conflict with any of the requirements of this class, please contact the instructor immediately so that we can make alternative arrangements.

**Student Evaluation of Courses:**
The online Student Evaluation of Teaching system opens to students the Wednesday of week 8 and closes the Sunday before Finals Week. Students will receive notification, instructions
and the link through their ONID. They may also log into the system via Online Services. Course evaluation results are extremely important and used to help improve courses and the learning experience of future students. Responses are anonymous (unless a student chooses to “sign” their comments agreeing to relinquish anonymity) and unavailable to instructors until after grades have been posted. The results of scaled questions and signed comments go to both the instructor and their unit head/supervisor. Anonymous (unsigned) comments go to the instructor only.