

## CS419/519 BB499/599 – Algorithms for Computational Biology– 3 credits

**Learner Outcomes** –As a result of taking this course the students will:

Correctly understand the fundamentals of algorithms used in computational biology  
Understand the concepts of time-complexity, and how algorithms are constructed to be fast and efficient  
Correctly implement algorithms to compute desired outcomes for input sequences

### **Pre-requisites and Co-requisites**

CS261 Data Structures

CS325 Analysis of Algorithms (recommended)

### **Professor**

David Hendrix

### **Office Hours**

TBD

### **Teaching Assistant**

No teaching assistant this term.

### **Text:**

Class notes: <http://hendrixlab.cgrb.oregonstate.edu/teaching/acmb/ACMB.pdf>

Will be updated throughout the term.

Optional texts:

“Introduction to Computational Molecular Biology” by Setubal and Meidanis

“Biological Sequence Analysis” by Durbin, Eddy, Krogh, and Mitchison

### **Grading:**

#### **Undergrad:**

20% - Quizzes – 6 short quizzes, you can drop one of them. Quizzes will be given on Fridays

40% - Mid Term Exam

40% - Final Exam

Homeworks will be given weekly on Friday, but not collected. The quizzes will be based on the homework.

#### **Grad:**

Graduate students have more difficult quiz problems on some days, and additional challenging problems on MidTerm and Final.

20% - Quizzes – 6 short quizzes, you can drop one of them. Quizzes will be given on Fridays

30% - Mid Term Exam - on Friday May 2nd

40% - Final Exam

Homeworks will be given weekly on Friday, but not collected. The quizzes will be based on the homework.

10% - Project - Adapt one of the algorithms presented in class with a heuristic or improvement or modification for a specific task.

## **Syllabus:**

- 1 Introduction to Sequences and Probability
- 2 Sequence Comparison Algorithms
- 3 Sequence Alignment
- 4 Sequence Search Algorithms
- 5 Multiple Sequence Alignment and Phylogenetics
- 6 Motif Finding
- 7 RNA folding

We will take a quiz every Friday (not first week, not MidTerm week). 6 total.

## **Learner Expectations**

1. Attend lectures (exams will be based on subjects covered in lecture)
2. Prepare for lectures by reviewing lecture notes and readings BEFORE lecture.
3. Attend office hours if there is difficulty in understanding concepts or problems.
4. Talking, eating, chewing gum noisily, using cell phones and other distracting activities are inconsiderate to fellow students and the lecturer; be considerate.

**Statement Regarding Students with Disabilities:** Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098 (tracy.bentley@oregonstate.edu).

**Statement of Expectations for Student conduct:** The Student Conduct & Community Standards office has generated a set of standards & expectations for student behavior. This information is at <http://oregonstate.edu/admin/stucon/index.htm>

Cheating or plagiarism by students is subject to the disciplinary process outlined in the Student Conduct Regulations. Students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas:

- cheating – use or attempted use of unauthorized materials, information or study aids
- fabrication – falsification or invention of any information
- assisting – helping another commit an act of academic dishonesty
- tampering – altering or interfering with evaluation instruments and documents
- plagiarism – representing the words or ideas of another person as one's own

Behaviors disruptive to the learning environment will not be tolerated and will be referred to the Office of Student Conduct for disciplinary action.

*“The goal of Oregon State University is to provide students with the knowledge, skill and wisdom they need to contribute to society. Our rules are formulated to guarantee each student's freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning will not be tolerated, and will be referred to the Student Conduct Program for disciplinary action. Behaviors that create a hostile, offensive or intimidating environment based on gender, race, ethnicity, color, religion, age, disability, marital status or sexual orientation will be referred to the Affirmative Action Office.”*