

Advanced Computational Biology & Bioinformatics
BIO 513 / BIST 299, Fall Semester, 2012
Monday & Wednesday, 3:30-5:20PM
Location of Class: FXB G03

Instructors Information

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Teaching Assistant: None

Course Description

Students will select, discuss, and present papers on current topics in computational biology with a focus on interpretation of genomics data and will develop a research proposal in a related area. They will gain an understanding of current research in bioinformatics and computational biology.

Reading Materials:

Original research papers selected from current topics in computational biology with a focus on interpretation of genomics data.

Textbooks:

Required: None.

Optional:

1. Jonathan Pevsner. Bioinformatics and Functional Genomics, 2nd Edition. ISBN: 978-0-470-08585-1.
2. Greg Gibson and Spencer V. Muse. A Primer of Genome Science, Third Edition. ISBN 978-0-87893-309-9

Degree Program Competency Fulfilled

Course Objectives

At the end of the course the student will be able to:

1. Select, discuss and present papers on current topics in computational biology
2. Understand and interpret genomics data from current papers
3. Demonstrate understanding of what it is to do research in the bioinformatics and computational biology.
4. Understand the elements of developing a new research proposal.

Outcome Measures:

A. Class Participation

Active learning through class attendance, presentation of papers, and discussion are an important component of this course

A.1 Attendance (10%)

Attendance is mandatory. Although it is appreciated that circumstances do interfere with classes from time to time, points will be deducted in following cases unless prior notice is given and approval is received from the instructors: (1) Late arrival on more than one occasion; (2) Missing a class. Missing classes REPEATEDLY will result in an INCOMPLETE grade.

A.2 In-class Presentation of Research Papers (20%)

Papers presented by students will be critiqued and discussed by all the members of the class. To ensure adequate preparation, the presenter will select a date for presentation from the dates and papers offered at the course website.

A.3 In-class Presentation of Sections of Selected Papers by Assignment (10%)

Members of the class will be required to present certain sections (typically a figure or table) in a research paper on a randomly assigned basis. The goal is to encourage students to fully read each paper prior to each class and to be ready for active discussion during the class.

A.4 Paper Summaries (10%)

After each presentation, students are required to follow up within 1 week by submitting a written summary, which responds to comments on presentation/delivery/content made by participants during its verbal presentation. The instructors will grade these summaries and provide quick feedback.

B. Research Proposal

Another major requirement for the students is to develop a research proposal in an area that is related to one or more topics represented by the presented literature. However, they will not be required to complete the research or carry out any substantial data analysis. The goal is to help the students understand the key elements of a successful design and implementation of a scientific research proposal.

Research Proposal Outline (10%)

Early on in the semester, each student will select a research topic and present in-class a single slide containing: (1) Definition of a research question; (2) Summary of the approach conceptually; (3) Suggest a potential quantifiable outcome that may be obtained from the proposed research.

Midterm Exam (20%)

The students will further develop his/her research proposal and present in-class an experimental design (~15 minutes) followed by submitting a written summary that addresses the technical and design aspects of a question, including:

1. What question are you going to address in your research?
2. What data will you (hypothetically) collect?
3. What methods will you use to analyze the hypothetical data?
4. What kind of results will you get from such data analysis?
5. How would you interpret the results?
6. How will you validate your interpretations?

Final Exam (20%)

The students will continue to develop his/her research proposal and present in-class followed by submission of a written document that addresses the following questions:

1. What is the significance of your research?
2. Does this address an important question?
2. Do you have a solid research design?
3. Will the results convincingly support your hypothesis?
4. What kind of impact will your research have in the community?

Grading Criteria

Grades are based on a total of 100 points. This is the total from the evaluation of (A) Attendance and participation (50 points) and (B) Research Proposal (50 points). A break-down of these points is described in above.

Course Evaluations

Completion of the evaluation is a requirement for each course. Your grade will not be available until you submit the evaluation. In addition, registration for future terms will be blocked until you have completed evaluations for courses in prior terms.