Spring Semester, 2010

Biol 4590A

Research Project Lab

Computational Approaches to Molecular & Structural Biology

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Course Objectives: Obtain hands-on knowledge and training in methods used in Molecular and Structural Biology Research Using Bioinformatics and Computational Biology Approaches. Following initial training experiments students will design and carry out a research project, communicating the overall goal and results in an end-of-semester poster presentation and in senior seminar.

Lecture – Tuesday 12:05-12:55 PM, Room 322, C. Emerson Bldg

Laboratory – Tues 1:05-3:55 PM and Thurs 12:05-2:55 PM, Room 306, C. Emerson Bldg

Office Hours

By appointment. Please, use your Georgia Tech email account with the course number in the subject line. We will not answer emails from other accounts (hotmail, gmail, etc.).

Textbook (Optional):


Additional sources on methods:
Bioinformatics, biology, biochemistry, and biophysics journals.

RULES AND REQUIREMENTS

Students should organize into groups with generally 2 students per team.

Please see www.honor.gatech.edu for Georgia Tech’s Academic Honor Code, which you are required to uphold.

It is not acceptable to use cell phones in class or during the lab.
Grading.

Quizzes and attendance 15%
Quality of Notebooks 15%
Written Reports on Planned Experiments 15%
Independent Research Project
  Proposal 10%
  Final Research Paper 40%
  Poster 5%

Notebooks.

Your notebooks should be handwritten in ink, and should include original notes you take during or immediately after experiments and preparatory notes. They are graded individually (each student is required to present his/her own notebook). Your notebooks should contain description of the procedures you have performed, and actual/original data. It is not necessary to rewrite the protocols (you may attach them if you wish to) in your notebooks. However, it ought to outline experimental steps so that a person (including yourself) should be able to follow and repeat your experiments without reference to the original detailed procedures. In addition, it is required that you include all the changes made to planned protocols as well as all calculations, measurements/observations, etc. Students who want their notebooks back should make requests no later than one month after the completion of the course. Notebooks remaining beyond that point will be regarded as unwanted and discarded.

Written reports on planned experiments: Each student should turn in a written report for experiments I and experiment II even though they will work in teams in obtaining the data in the experiments. These reports should be no more than 3-4 pages of text along with figures, calculations, and references. They should be written in a manuscript style with an introduction, results and discussion. See for example, articles in Proceedings of National Academy of Sciences & instruction to authors (http://www.pnas.org/site/misc/iforc.shtml#submission).

Independent Projects: Pairs of students will choose a project in consultation with instructors. Discussion of possible projects will occur throughout the initial phase of the course, and will be discussed in more detail two weeks before the projects begin.

Project Proposal: This will be no more than a two-page (single spaced 12-point font) description of the research to be conducted. The proposal should include background and justification of the project, what experiments will be conducted and interpreted and how the expected results will relate to the overall goal of the research area. Although students will work in pairs, each student will write their own proposal.

Final Project Manuscript: This should be typed as a double-spaced manuscripts according to the format of the specific scientific journal (for example; Proceedings National Acad. Sci., Journal of Biological Chemistry, JBC). A manuscript generally includes the following sections: Abstract (or Summary), Introduction, Materials (or Experimental Procedures), Results, Discussion, and References Cited. Experimental data should be presented as figures or tables with appropriate legends. Although the research will be conducted by pairs of students each student will write his or her manuscript independently. The results and materials and methods section can be the same for each team. The introduction and discussion sections must be independently written.
Tentative Schedule Spring 2012.
Week 1, 1/10  Discussion of course; introduction to Experiment I
Lab: Exercise I, Experiment I - Structural Biology.

Week 2, 1/17  Lecture: Protein structure
Lab: Experiment I.

Week 3, 1/24  Lecture: Methods in structural biology
Lab: Experiment I - Structural Biology; project discussion with lab
partner and/or instructors. Turn in notebooks – Thurs.

Week 4, 1/31  Lecture: Databases I
Lab Experiment II - Molecular Biology.

Week 5, 2/07  Lecture: Discussion of research projects & initiation I
Lab Experiment II - Molecular Biology; project discussion with lab
partner and/or instructors. Lab Quiz 1 – Thurs.

Week 6, 2/14  Lecture: Discussion of research projects & initiation II
Lab: Independent project preparation and background data Proposal

Week 7, 2/21  Lecture: Discussion of research projects
Lab: Independent project preparation and background data

Weeks 8-16  Independent projects. Tuesdays: 12:05-12:55 PM for discussing
issues, problems, etc.

Week 8, 2/28  Lecture: Discussion of research projects
Lab: independent lab projects begin

Week 9, 3/06  Lecture: Discussion of research projects
Lab: independent lab projects. Lab Quiz 2 – Thurs.

Week 10 3/13  Lecture: Discussion of research projects
Lab: independent lab projects

Week 11 3/20  Spring Break

Week 12 3/27  Lecture: Discussion of research projects
Lab: independent lab projects

Week 13 4/03  Lecture: Discussion of research projects
Lab: independent lab projects

Week 14 4/10  Lecture: Discussion of research projects
Lab: independent lab projects

Week 15 4/17  Last week of lab. Write up research papers. Prepare Posters
Final Papers Due April 19 along with Notebooks.

Week 16 4/24  Poster session (possibly 4-6pm?) TBD.