Syllabus

Graduate Course

Introduction to Biology for Data Science

BIO 382K (unique #: 50155)

Spring 2017

“What I cannot create, I do not understand.”

Richard Feynman

Instructor: Dr. Hans A. Hofmann
Office hours: By Appointment
Office location: PAT 319
Contact information: 512-475-6754
hans@texas.edu

Location and time of Class:
First meeting: January 18, 2017
When: W 9:00-12:00
Where: FNT 1.206A
I) Course Aims and Objectives

This course will cover biological concepts and methods (including its assumptions and limitations), particularly in the areas of systems biology, medical and evolutionary genomics, and neuroscience, with an emphasis on those approaches that produce a lot of data but are analysis-challenged. We will also look at the conceptual foundations and historical roots of various research programs in theoretical and computational biology. This course is aimed at graduate students in the quantitative sciences (e.g., computer science, mathematics, physics, chemistry, and statistics), engineering, and the life sciences. Note that this course will not teach any scripting or coding!

The instructor for this course is Dr. Hans Hofmann, who is a faculty member in the Department of Integrative Biology (see URL http://cichlid.biosci.utexas.edu/). His research uses genomic and bioinformatic approaches to understand the neural and molecular basis of social behavior and its evolution.

Feedback is an important part of any kind of learning. Without feedback on how well you understand the material, it is more difficult for you to make significant progress. During this course you will give me feedback on your learning in informal and formal ways, such as questions, suggestions and assignments. I want you to let me know when something we discuss is not clear. This kind of communication will enable me to provide additional information when needed or to explain a concept in different terms.

II) Format and Procedures

Attendance is mandatory and active participation in lectures and discussions is expected. Every Wednesday, the class begins with a topical lecture by the instructor or a distinguished scientist in the field. After a short break, a student will give a journal club-style presentation of several original research articles to facilitate in-depth discussion and comprehension of the lecture topic. Students are encouraged to prepare by reading broadly and by discussing their topic with the instructor. Thus, throughout the semester, scientific papers or book chapters will be assigned for reading. All students are expected to complete those readings and to be prepared to discuss them in class in a scholarly manner.

During the final meeting, every student will give a short presentation on how the material covered in the course has informed his/her own research perspective, including possible ideas for new experiments and/or analyses.

No exams are given in this course.

Religious holy days sometimes conflict with class schedules. If you miss an examination, work assignment, or other project due to the observance of a religious holy day you will be given an opportunity to complete the work missed within a reasonable time after the absence. It is the policy of The University of Texas at Austin that you must notify each of your instructors at least fourteen days prior to the classes scheduled on dates you will be absent to observe a religious holy day.

Punctuality

Students are expected to be at class on time as tardiness is disruptive to both lecturer and students. Anyone attempting to enter the classroom 10 minutes or more after
the class has begun will **not** be allowed to attend that class (they will be asked to leave the room).

**Grading Rubric**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Research presentation</td>
<td>35%</td>
</tr>
<tr>
<td>Participation in lecture discussions</td>
<td>35%</td>
</tr>
<tr>
<td>Participation in journal club discussions</td>
<td>30%</td>
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**Grades:** 94-100=A; 90-93=A-; 87-89=B+; 84-86=B; 80-83=B-; 70-79=C;

**Undergraduate Students**

This course is a graduate seminar and as such aimed at an advanced audience of graduate students in the life sciences and related disciplines. However, under special circumstances, undergraduate students may be admitted with, and only with, the approval of the instructor. Interested undergraduate students should contact Dr. Hofmann as soon as possible.

**University Electronic Mail Notification Policy**

All students should become familiar with the University's official e-mail student notification policy. It is the student's responsibility to keep the University informed as to changes in his or her e-mail address. Students are expected to check e-mail on a frequent and regular basis in order to stay current with University-related communications, recognizing that certain communications may be time-critical. It is recommended that e-mail be checked daily, but at a minimum, twice per week. The complete text of this policy and instructions for updating your e-mail address are available at http://goo.gl/O3FAI0. In this course e-mail will be used as a means of communication with students. You will be responsible for checking your e-mail regularly for class work and announcements. Note: if you are an employee of the University, your e-mail address in Canvas is your employee address.

**Use of Canvas in Classes**

This course uses Canvas, a Web-based course management system in which a password-protected site is created for each course. Student enrollments in each course are updated each evening. Canvas will be used to distribute course materials, to communicate and collaborate online, to post grades, and to take online quizzes and surveys.

Students are responsible for checking the Canvas course site regularly for class work and announcements. As with all computer systems, there are occasional scheduled downtimes as well as unanticipated disruptions. Notification of these disruptions will be posted on the Canvas login page. Scheduled downtimes are **not** an excuse for late work. However, if there is an unscheduled downtime for a significant period of time, I will make an adjustment if it occurs close to the due date. Canvas is available at http://canvas.utexas.edu/. Support is provided by the ITS Help Desk at 475-9400 Monday through Friday 8 am to 6 pm, so plan accordingly.
III) Academic Integrity

Make a real effort to learn, participate, and prepare for the journal club. Use your own skills and intellectual qualities to improve your knowledge and understanding of the class. Have the respect and consideration for everybody. Turn off cell phones and other electronic devices before the class. You must be honest and fair with other students, professor and teaching assistants.

Scholar Dishonesty: We have been requested by our Dean to inform all students, in writing, that cheating is against University rules and will not be tolerated. Any student caught cheating will be reported to the Dean's office and we will make all efforts to see that those students will receive the maximum penalty permitted under University regulations. Follow UT regulations regarding cheating, plagiarism, misconduct, falsifying documents, academic records, copying of information for research assignments. Be aware that sexual or racial discrimination, sexual misconduct, violence, etc. will not be tolerated. The University of Texas at Austin Honor Code states:

“The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the University is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.”

For more information on Scholastic Dishonesty visit the UT web site at http://deanofstudents.utexas.edu/sjs

IV) Students with disabilities and chronic illnesses

Students with disabilities who require special accommodations need to get a letter that documents the disability from the Services for Students with Disabilities area of the Office of the Dean of Students (471-6259 voice or 471-4641 TTY for users who are deaf or hard of hearing). This letter should be presented to the instructor at the beginning of the semester and accommodations needed should be discussed at that time. Five business days before an exam the student should remind the instructor of any testing accommodations that will be needed. See this website for more information: http://deanofstudents.utexas.edu/ssd/providing.php
V) Course Schedule

January 18  Organizational meeting
January 25  Foundations of Theoretical and Computational Biology
February 1  Can Biologists Build a Radio?
              Journal Club (discussion leader: Hans Hofmann)
February 8  No class
February 15 Evolution of Nervous Systems
              Journal Club (discussion leader: Hans Hofmann)
February 22 Sanger and NGS sequence technologies
              What is a “Gene”? And what is “Junk” DNA?
March 1    Comparative Transcriptomics and the Evolution of Complex
              Phenotypes
March 8    Biological Rhythms
March 15   Spring Break
March 22   Grand Challenges
March 29   Tour of Core Facilities
April 5    Guest lecture by Dr. Rebecca Young (Integrative Biology):
              Evolutionary developmental mechanisms of the origin and
              diversification of phenotypes
              Journal Club (discussion leader: Becca Young)
April 12   Short course by Dr. Dennis Wylie (CCBB): Data Visualization
April 19   Guest lecture by Dr. Mikhail Matz (Integrative Biology):
              Addressing mechanisms of genetic adaptation through gene
              expression analysis
              Journal Club (discussion leader: Mikhail Matz)
April 26   Guest lecture by Dr. Spencer Wells (Insitome):
              The genetic impact of human cultural transitions
              Journal Club (discussion leader: Spencer Wells)
May 3      Student Presentations:
              Integrating Big Data in Biology into Your Research