

**BIOL 5340 (Bioinformatics)  
Fall 2016**

**Professor:** Jeffery P. Demuth, Ph.D.

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**Office Hours:** by appointment

**Time and Place of Class Meetings:** Tu. 2:00-4:50 (Life Science Building, Room B27)

**Course Content and Learning Outcomes:** This course is an applied introduction to bioinformatics and computational genomics. The course is geared toward the student with a biology background and *limited* programming experience. The course provides an entrance to commonly used programming/scripting languages and an introduction to numerous aspects of modern genomic data analyses (e.g. identification of coding and regulatory features in novel sequences, expression analysis, and comparative/phylogenetic analyses).

**Prerequisite:** Introductory Biology. Genetics.

**Text for the course:**

Course materials will all be made available via Blackboard or other online resources.

**Software:**

Scientific computing is almost exclusively the territory of UNIX/Linux. For this course you will be required to use Bio-Linux 8 ([environmentalomics.org/bio-linux/](http://environmentalomics.org/bio-linux/)). Bio-Linux is a very useful Linux distribution based on Ubuntu 14.04, and it comes with most of the other software packages we will use preinstalled. There are several ways to run Bio-Linux. Instructions for each option are online: [environmentalomics.org/bio-linux-installation/](http://environmentalomics.org/bio-linux-installation/)

- 1) bootable USB or DVD drive
  - a. only option for running on UTA computers
  - b. USB provided by Biology Department – **MUST BE RETURNED** at end of semester
  - c. storage limited to USB drive but it is persistent, making the environment portable
  - d. may be slower than other options (depends on USB and host machine)
- 2) run in a virtual machine - free VM software [www.virtualbox.org/wiki/Downloads](http://www.virtualbox.org/wiki/Downloads)
  - a. best option for mac users and some newer PC users
- 3) install it on your system (by itself or dual boot)
  - a. recommended only for advanced users
  - b. driver support can be an issue on new machines

**Online tools:**

ROSALIND - There will be a number of programming assignments over the semester that are administered via ROSALIND. Even if you already have a ROSALIND account, you will need to register for my course so that the correct homework assignments are available to you. Register by following this link <http://rosalind.info/classes/enroll/35435b5990/>

TACC – Texas Advanced Computing Cluster. UT system supercomputing resources. Register for a TACC user account <https://portal.tacc.utexas.edu/> . **Email me your TACC username** so you can be added to the resource allocation for the course.

**Descriptions of assignments:**

Homework (70% of overall semester grade) : (7 x 100pts = 700pts)

There will be 7 homework sets assigned. For full credit each problem in the set must be completed BEFORE class on the due date. Points will be assigned on a percentage basis each week (e.g. if 7/7 problems complete = 100pts, 6/7 = 85.7pts, etc.). Problems completed after class starts on the due date will be earned at 75% credit.

Final Project (30% of overall semester grade): (300pts)

Grad students = individual projects, Undergraduates may form groups (up to 3 students).

Requirements:

1. Project proposal (5%) (1 page - DUE: before class begins on November 8th)
2. Oral presentation (10%) (12 minute presentation 3 minute Q&A – DUE: final 2 weeks)
3. Written report (15%) (maximum 10 pages, not including code)

Final letter grades will be assigned on the standard scale:

90-100% = A, 80-89 = B, 70-79=C, 60-69=D, <60=F.

I reserve the right to curve final grades and or modify the scheduled assignments. Any modifications will be announced in class.

**Important University Policies:**

**Attendance:** At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I do not take attendance, but failure to attend each lecture is sure to negatively impact your grade. If you miss class, do not expect that I will cover the same material with you during office hours. While UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Blackboard. This date is reported to the Department of Education for federal financial aid recipients.

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

**Disability Accommodations:** UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA)*, *The Americans with Disabilities Amendments Act (ADAAA)*, and *Section 504 of the Rehabilitation Act*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: The Office for Students with Disabilities, (OSD) [www.uta.edu/disability](http://www.uta.edu/disability) or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability).

Counseling and Psychological Services, (CAPS) [www.uta.edu/caps/](http://www.uta.edu/caps/) or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

**Title IX Policy:** The University of Texas at Arlington (“University”) is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. For information regarding Title IX, visit [www.uta.edu/titleIX](http://www.uta.edu/titleIX) or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or [jmhood@uta.edu](mailto:jmhood@uta.edu).

**Academic Integrity:** Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

*I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*

*I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents’ Rule* 50101, §2.2, suspected violations of university’s standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University. Additional information is available at <https://www.uta.edu/conduct/>.

**Electronic Communication:** UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

**Campus Carry:** Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit <http://www.uta.edu/news/info/campus-carry/>

**Student Feedback Survey:** At the end of each term, students enrolled in classes categorized as “lecture,” “seminar,” or “laboratory” shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

**Final Review Week:** A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research

problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

**Student Support Services:** UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include [tutoring](#), [major-based learning centers](#), developmental education, [advising and mentoring](#), personal counseling, and [federally funded programs](#). For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to [resources@uta.edu](mailto:resources@uta.edu), or view the information at <http://www.uta.edu/universitycollege/resources/index.php>.

**Tentative Course Schedule:**

Weeks

- 1 Introductions, Bio Linux setup, enrollment in ROSALIND and TACC
- 2-5 Unix and Python scripting basics, using git to organize projects
- 6 Intro to remote computing and cloud computing
- 7-8 Sequence alignment and BLAST
- 9-10 Introduction to R
- 11-13 Special topics (e.g. genome assembly, inferring selection, RNA-seq, finding genes)
- 14-16 Student projects

*As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course.*