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**Syllabus**

**INFO 302/6xx Bioinformatics I**

**Introduction to Bioinformatics**

Date/Time: Fall 2022; Tuesdays-Thursdays 9:30 – 10:45

Location: Shelby 105

Course Instructor: Dr. Malay Basu

Office: West Pavilion, Room P220

Phone/email: 205-934-5251, malay@uab.edu

Office Hours: TBD

# COURSE DESCRIPTION

Introduction to bioinformatics and methodologies, with emphasis on concepts and application of informatics tools to molecular biology. Focus on experimental models to collect data from genomics, transcriptomics and proteomics, applied statistics when it relates to experimental design, construction of bioinformatics tools into pipelines, representing biological data, biological sequence analysis, gene annotation, basic R programming, basic web/data analysis programming using Perl/python, sharing of biological information, social/legal aspects of open science.

**Course Objectives**

* Becoming familiar with the computational environment(s) that support biological data analysis
* Learning the basic computational skills needed to perform bioinformatics analyses
* Introducing the datatypes managed and analyzed by bioinformatics.
* Providing an overview of the computational tools needed to analyze different types of biological data

**Course Prerequisites**

* BY 210: Genetics [Min Grade: C]
* CS 203: Object-Oriented Programming [Min Grade: C]
* PUH 250: Biostatistics [Min Grade: C]
* INFO 101: Introductory Bioinformatics Seminar [Min Grade: C]

**Topics for Discussion**

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| --- | --- |
| Week | Topic |
|  | Linux |
| 1 | Introduction to Linux |
| 2 | Linux Commands and Scripting |
|  | Technical skills |
| 3 | Unix toolchains and programming languages |
| 4 | Introduction to R and Bioinformatics data parsing |
| 5 | Basic statistics in R |
| 6,7 | Bioinformatics using R |
| 8 | Reproducible research in R |
|  | Applications |
| 9 | Homology search BLAST and HMMR |
| 10 | Advanced topic: Molecular evolution |
| 11,12 | Large-scale data analysis/introduction of NGS |
| 13 | Basic pipelines in NGS |
| 14 | Mutational processes and VCF |
| 15 | Introduction to RNASeq |
| 16 | Final Exam` |

# TEXTBOOK

Bioinformatics Data Skills: Reproducible and Robust Research with Open Source Tools (2015); Vince Buffalo; ISBN-13: ‎ 978-1449367374

**TECHNOLOGY REQUIREMENTS**

Students must have:

* Access to Canvas
* A UAB email account that can be accessed on a daily basis.
* Email software capable of sending and receiving attached files.
* A personal computer (Mac or PC)
* Virus protection software, installed and active, to prevent the spread of viruses via the Internet and email. It should be continually updated!
* Not having a computer, computer problems, computer crashes, loss of Internet, and/or loss of electricity are NOT acceptable excuses for late work, incomplete work, or a request for an assignment deadline extension. Students are expected to have a back-up plan in case any of these occur.

# COURSE EVALUATION

Grades for this class will be determined from class participation, a term paper, and individual presentations of the term paper in class.

Class participation: 30%

Exams 50%

Final Presentation: 20%

# Exams

Exams

# Lecture participation

Only 3 excused absences are permitted. Students will not receive participation points for unexcused absences.

# Term paper

The term papers are to cover topics assigned to each student by the instructor. Each topic will relate to a current problem in bioinformatics.

# Make-up policy

Late work will not be accepted except for instances where prior approval has been given.

# Grading Scale

90-100%: A; 80-89.9%: B; 70-79%: C; 60-69.9%: D; 0-59.9%: F

# POLICIES

**ATTENDANCE:**

Attendance is fundamental to course objectives and to the integrity of this course. This course requires a variety of activities that involve interaction with the instructor and/or interaction with other students. Excessive absences and missed assignments seriously jeopardize a student’s ability to successfully complete the course. In the event of excessive absences, students should be prepared to officially withdraw from the course through the Registrar’s Office.

The University regards certain absences as excused and in those instances requires that instructors provide an accommodation for the student who misses assignments, presentations, examinations, or other academic work of a substantive nature by virtue of these excused absences. Examples include the following:

* Absences due to jury or military duty provided that official documentation has been provided to the instructor in a timely manner in advance.
* Absences of students registered with Disabilities Services for disabilities eligible for "a reasonable number of disability-related absences" provided students give their instructors notice of a disability-related absence in advance or as soon as possible.
* Absences due to participation in university-sponsored activities when the student is representing the university in an official capacity and as a critical participant, provided that the procedures below have been followed:
  + Before the end of the add/drop period, students must provide their instructor a schedule of anticipated excused absences in or with a letter explaining the nature of the expected absences from the director of the unit or department sponsoring the activity.
  + If a change in the schedule occurs, students are responsible for providing their instructors with advance written notification from the sponsoring unit or department.
  + Absences due to other extenuating circumstances that instructors deem excused. Such classification is at the discretion of the instructor and is predicated upon consistent treatment of all students. In these instances, instructors must devise a system for reasonable accommodation including, for example, policies allowing for dropped exams/quizzes, make-up exams, rescheduling of student classroom presentations or early or later submission of written assignments**.**

**misconduct policy:**

The University of Alabama at Birmingham expects all members of its academic community to function according to the highest ethical and professional standards. Students, faculty, and the administration of the institution must be involved to ensure this quality of academic conduct. Review the Academic Honor Code and Non-Academic Student Code of Conduct linked below.

* [Academic Honor Code](http://www.uab.edu/students/one-stop/policies/academic-honor-code)
* [Non-Academic Student Code of Conduct](http://www.uab.edu/studentconduct)

**DISABILITY SUPPORT SERVICES:**

Accessible Learning: UAB is committed to providing an accessible learning experience for all students. If you are a student with a disability that qualifies under Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act, and you require accommodations, please contact Disability Support Services for information on accommodations, registration and procedures. Requests for reasonable accommodations involve an interactive process and consist of a collaborative effort among the student, DSS, faculty and staff. If you are registered with Disability Support Services, please contact DSS to discuss accommodations that may be necessary in this course. If you have a disability but have not contacted Disability Support Services, please call (205) 934-4205, visit [their website](https://www.uab.edu/students/disability/), or their office located in Hill Student Center Suite 409.

COVID-19 Adjustments for Students: Attendance will be a part of your grade in this course. All absences for COVID-19-related illnesses will be excused. Students concerned about their attendance as a result of COVID-19 should register with Disability Support Services.

UAB Disability Support Services (DSS) has established a process for UAB students to request temporary adjustments based on the impact of COVID-19. The process is similar to the traditional DSS registration procedures for accommodations based on disability. However, these requests will be referred to as "COVID-19 Related Temporary Adjustments". On the DSS website, there is a section (next to the traditional DSS application process) titled "Request COVID-19 Temporary Adjustments" where students can read the process and click to complete an application.

On the application, the student must complete an attestation and identify which of the following category(s) applies to their situation. Students will be allowed to submit documentation to support their requests.

* I am 65 or older
* My medical provider has determined that I am an individual who is considered high risk according to Centers for Disease Control and Prevention
* I care for or reside with an individual who has been determined to be high risk according to Centers for Disease Control and Prevention
* I have tested positive for COVID-19
* I am requesting adjustments for another reason

Any questions regarding this process should be referred directly to dss@uab.edu. For qualifying students, DSS staff will create a Notification of Temporary Adjustment Letter (PDF format) which will be provided to students. Students will share this letter, as needed, with instructors to request adjustments.

**TITLE IX:**

The University of Alabama at Birmingham is committed to providing an environment that is free from sexual misconduct, which includes gender-based assault, harassment, exploitation, dating and domestic violence, stalking, as well as discrimination based on sex, sexual orientation, gender identity, and gender expression. If you have experienced any of the aforementioned conduct we encourage you to report the incident. UAB provides several avenues for reporting. For more information about Title IX, policy, reporting, protections, resources and supports, please visit [UAB Title IX webpage](https://www.uab.edu/titleix/) for UAB’s Title IX, UAB’s Equal Opportunity, Anti-Harassment, Duty to Report, and Non-Retaliation policies.