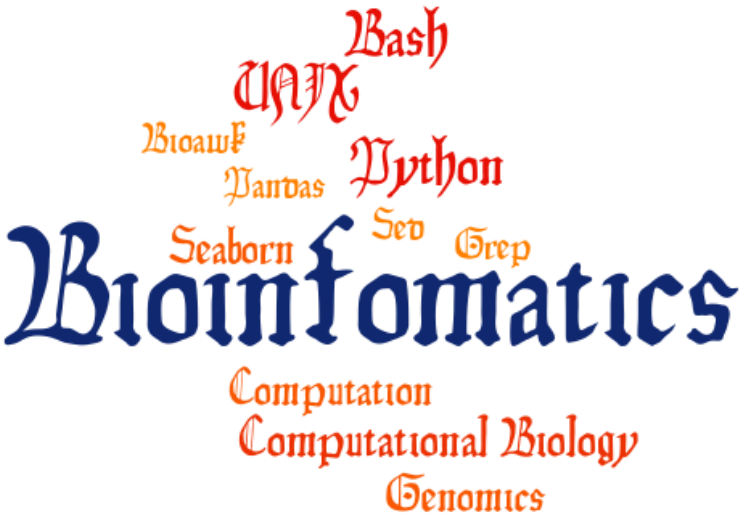
BINF 2111/2111L - Introduction to Bioinformatics Computing Syllabus



Instructor: Richard Allen White III, Ph.D.
Office Hours: TH 5:15-6:15 pm EST or by appointment.
Contact: rwhit101@uncc.edu
Office: NCRC Kannapolis (by appointment), Charlotte - 229

Teaching Assistant: Jose L. Figueroa
Office Hours: TH 5:15-6:15 pm EST or by appointment.
Contact: jlfiguer@uncc.edu
Office: NCRC Kannapolis (by appointment)

Essential course details:

- ***Credits:*** 4 credit class
- ***Meeting times:*** T/TH 11:30-12:45, TH lab 2:30-5:15 pm EST
- ***Office Hours:*** TH 5:15-6:15 pm EST or by appointment.
- ***Semester:*** FALL 2021 August 23rd to December 8th, 2021
- ***Location:*** Main/Uptown Center Campus - Bioinformatics building 217
- ***Style of instruction:*** *Face-to-face Instructional Method*
- ***Textbooks:*** *None required for this course*
- ***Website for the course:*** *https://github.com/raw-lab/BINF2111*
- ***CANVAS link:*** *TBA*
- ***Prerequisite:*** *BINF1101/1101L*

Course description

The aim of this course is to introduce programming methods commonly used in bioinformatics. This course introduces students to the UNIX environment, bash shell scripting, text manipulation (sed/grep/bioawk), and python scripting. Fundamentals of each scripting language are introduced in the context of real-world bioinformatics data analysis problems.

Learning objectives

- Use and understand UNIX command line environment
- Use built-in UNIX commands to manipulate files and data
- Text and file manipulation (sed, grep, bioawk, python)
- Basic knowledge and use of github
- Use bash shell scripts to drive pipelines of bioinformatics programs
- Use of supercomputer for running bash shell scripts (basic slurm)
- Use python scripts to read, manipulate and write bioinformatics datafiles

Instructional Methods

The course will be presented in a lecture format which will include the following elements as appropriate: presentation of concepts, theories and examples in a standard lecture format, interactive demonstrations of methods, and opportunities for student questions and discussion. Students will get hands on experience in UNIX, Bash, Sed/grep/bioawk, Github, Python programming and bioinformatics.

Grading Plan:

Students will primarily be evaluated on their ability to successfully write assigned code. Understanding of bioinformatics workflows and programming core concepts presented in class will be assessed through short answer quizzes. Assignments and quizzes will be given weekly throughout the semester. The final examination will consist of both short answer questions and a coding exercise.

Lab assignments: 30% (12 Lab assignments, 2.5% each, late assignments will NOT be graded)
Daily Quizzes: 40% (two lowest scores will be dropped)
Mid-term Exam: 10%
Final Exam: 10%
Classroom attendance/participation: 10%

Zero credit lab must be taken concurrently with the course
One grade for both BINF 2111 and 2111L

Grading

Grades are scaled on 100% total possible, where 100 to 90% is an A, 89 to 80% is a B, 79 to 70% is a C, and below 69 is a U. Pass or No credit with a grade of satisfactory (S) or unsatisfactory (U) are available. To exercise this option, the student must declare their intention to take a Pass/No Credit option by completing the appropriate form at the Office of the Registrar by the end of the eighth calendar day in the semester; this form requires the approval of the chair of the student's major department. Courses completed with the grade of Honors or Pass will count toward the hours needed for graduation, but they will not be considered in the computation of the grade point average. For further information on grading policy, please refer to this website(https://provost.uncc.edu/policies-procedures/academic-policies-and-procedures/grading-effective-until-fall-2021).

Any grade in-between will be rounded to the next highest grade. For example, 89.1 or 89.6% would be an A. While grades are important and you should strive to get the highest marks. The knowledge you take with you and gain will last a lifetime.

Extra credit

Extra credit may be provided at the instructor's discretion. There are no guarantees of extra credit. It is not recommended to rely on extra credit to improve or pass the course.

Academic integrity

All students are required to read and abide by the Code of Student Academic Integrity. Violations of the Code of Student Academic Integrity, including plagiarism, will result in disciplinary action as provided in the Code. Definitions and examples of plagiarism are outlined in the Code. The Code is available from the Dean of Students Office or online (https://legal.uncc.edu/policies/up-407).

Attendance

Attendance and participation are critical to learning process and is required. Students are encouraged to work directly with the instructor regarding class absences for medical appointments, sickness, military/court orders, or personal and family emergencies, such as a death in the immediate family, where a student can provide an instructor with appropriate supporting documentation of the absence.

Instructor absences or tardiness

If I am late in arriving to class, you must wait a full 20 minutes after the start of class before you may leave without being counted absent, or you must follow any written instructions I may give you about my anticipated tardiness. The instructor will provide a surrogate instructor on his behalf in an emergency, which will be announced via email, Canvas website and on the course website (https://github.com/raw-lab/BINF2111).

Withdrawing from the course

Students are expected to complete all courses for which they are registered at the close of the add/drop period. If you are concerned about your ability to succeed in this course, it is essential to make an appointment to speak with the instructor as soon as possible. The University policy on withdrawal allows students only a limited number of opportunities available to withdraw from courses. You must understand the financial and academic consequences that may result from course withdrawal (https://provost.uncc.edu/policies-procedures/academic-policies-and-procedures/withdrawal-and-cancellation-enrollment-policy).

An environment of non-discrimination and diversity

All students and the instructor are expected to engage with each other respectfully. Unwelcome conduct directed toward another person based upon that person's actual or perceived race, actual or perceived gender, color, religion, age, national origin, ethnicity, disability, or veteran status, or for any other reason, may constitute a violation of University Policy 406, The Code of Student Responsibility (https://legal.uncc.edu/policies/up-406). Any student suspected of engaging in such conduct will be referred to the Office of Student Conduct.

This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name than what is indicated on the class roster, please let me know. Feel free to correct me on your preferred gender pronoun. If you have any questions or concerns, please do not hesitate to contact me.

Mental healthcare and positive self-care

Mental health concerns or stressful events may reduce your ability to participate in daily activities or diminish academic performance. It is common for college students to experience challenges that may interfere with academic success, such as academic stress, sleep problems, juggling responsibilities, life events, relationship concerns, or feelings of anxiety, hopelessness, or depression. If you or a friend is struggling, we strongly encourage you to seek support. Helpful, effective resources are available on campus at no additional cost. You can learn more about the broad range of confidential mental health services available on campus via the Counseling and Psychological Services (CAPS) website at https://caps.uncc.edu/.

Title IX reporting of sexual harassment or other related reporting

UNC Charlotte is committed to providing an environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic violence, dating violence, and stalking. If you (or someone you know) have experienced or experiences any of these incidents, know that you are not alone. UNC-Charlotte has staff members trained to support you in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, helping with civil protective orders, and more.

Please be aware that all UNC Charlotte employees, including faculty members, are expected to relay any information or reports of sexual misconduct they receive to the Title IX Coordinator. This means that if you tell me about a situation involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, the instructor is expected to report the information to the Title IX Coordinator (https://cm.maxient.com/reportingform.php?UNCCharlotte&layout_id=125). Although the instructor expected to report the situation, you will still have options about how your case will be handled, including whether or not you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need.

If you wish to speak to someone confidentially, you can contact the following on-campus resources, which are not required to report the incident to the Title IX Coordinator: (1) University Counseling Center (counselingcenter.uncc.edu 7-0311); or (2) Student Health Center (studenthealth.uncc.edu 7-7400). Additional information about your options is also available at titleix.uncc.edu under the “Students” tab.

Disability accommodations

Students in this course seeking accommodations for disabilities must first consult with the Office of Disability Services and follow the instructions of that Office for obtaining accommodations. Accommodations will be provided to students presenting documentation from the Office Of Disability Services (ODS). Please check the ODS website (https://ds.uncc.edu/) for more details.

FERPA Notification

In establishing University Policy 402, Student Education Records, UNC Charlotte adheres to a policy of compliance with the Family Educational Rights and Privacy Act of 1974, also known as FERPA. This federal law affords students the following rights concerning their education records. For details, see the FERPA Annual Notification posted on the Office of Legal Affairs website. All questions concerning this FERPA Annual Notification may be directed to the Office of the Registrar's attention.

Course Calendar

The course calendar represents a tentative plan. Topics will be adjusted as the instructor sees to do so based on the comprehension and mastery of the material of the students.

COURSE CALENDAR (Tentative Plan)

Week 1 (Aug 23rd)	Introduction to UNIX and command line
Week 2 (Aug 30th)	UNIX commands (cut, grep, etc)
Week 3 (Sep 6th)	Github introduction and markdown
Week 4 (Sep 13th)	Sed/grep/bioawk file manipulation, Regular expressions
Week 5 (Sep 20th)	Bash shell scripting basics
Week 6 (Sep 27th)	Bash shell/slurm - SuperCPU operations
Week 7 (Oct 4th)	Basic Python Commands (Part I)
Week 8 (Oct 11th)	**No Classes - Student Recess**
Week 9 (Oct 18th)	**Mid-term Exam**
Week 10 (Oct 25th)	Basic Python Commands (Part II)
Week 11 (Nov 1st)	Python loops, lists, and basic file methods
Week 12 (Nov 8th)	Python functions, dictionaries, regular expressions
Week 13 (Nov 15th)	Python introduction Pandas and Seaborn
Week 14 (Nov 22nd)	No Classes - Thanksgiving
Week 15 (Nov 29th)	Review of course
Week 16 (Dec 8th)	**Final exam**