## BIOL 7050 – Fall 2020

## Special Topics: Evolutionary Genomics

**Course Description:** We will focus on both the methods and concepts behind analysis of genomic data, with an emphasis on variation and evolution. The course will consist of a set of introductory exercises introducing the command line environment, file formats, and common tools for genomic analysis. The bulk of the semester will be spent exploring reading and additional sets of analysis tools pertaining to student-selected and student-lead specific topics in genomics. All students will perform an individual, independent project using data, methods, and tools of their own selection.

## Logistics

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| **Instructor:** | Greg Ragland | **Office:** | Science 4113 |
| **E-Mail:** | Use Canvas messaging (see below) | **Phone:** | 785-307-9896 (cell) |
| **Course time:** | <u>Virtual meetings</u>: Thurs. 10AM - 12PM | | |
| **Course location:** | <u>Online</u> | **Canvas:** | https://ucdenver.instructure.com/courses/451481 |
| **Office Hours:** | Thursdays 12:30 – 1:30, and by appointment | | |

**Zoom links:**

Class meeting: https://ucdenver.zoom.us/meeting/register/tJElcu2qrD8jE9APh4mqQxEuyQeERSgRKyvT

(requires registration)

Office hours: https://ucdenver.zoom.us/j/91796114972

**Prerequisites:** Courses equivalent to undergraduate genetics and evolution. Some familiarity with basic population genetics would be helpful (e.g. HW equilibrium, phylogeny interpretation). No command line experience is necessary, but if you have not had this experience in the past, you will need to be especially diligent with absorbing the introductory material in the first few weeks.

**Course Communication:** I will primarily use Canvas for all communications; please make sure your current email address is correct in Canvas, and that you have your settings adjusted to receive notifications**. Please do not e-mail me directly;** use the canvas messaging system. I will bounce e-mails back to you and request that you use Canvas. I promise you this is not because I am trying to avoid you or make your life difficult. This is simply the best way for me to keep my teaching content organized and to be sure that your message does not get buried under the monstrous stack of regular e-mail I receive every day. In some cases content based-questions over Canvas messaging may be appropriate, but for general questions I encourage you to use a discussion thread on Canvas.

**Media Materials:**

We will rely on several sources of information:

1) We will start with a review of *nix command line basics. For this, we will use the first two content sections of the following online course walkthrough

   http://korflab.ucdavis.edu/Unix_and_Perl/current.html#part1

Note that we will be covering only through the 'Advanced Unix' section.

2) We will next proceed through additional material covered in a Coursera genomic data science course created by Johns Hopkins: https://www.coursera.org/learn/genomic-tools/home/welcome
3) Finally, we will work our way through student-selected topics pertaining to their chosen project. Each student will lead a course meeting, providing a reading assignment and exploring and presenting a software tool for data analysis related to the topic. I will work with each student individually to facilitate.

**Technology accessibility** There are several options for computers/platforms, but all will require that you have access to a personal or lab computer. Please let me know immediately if you need any tech accommodations, and we'll figure out a solution.

**Class Format:**  We will meet once per week for 2 hours online (zoom). These meetings will be real-time (synchronous) and are required. Class meetings will consist of some presentation, and lots of discussion. I will lead the first few class meetings, but the bulk of the semester class meetings will be student-led. I will help the leader to prepare for their presentation/discussion. Each class meeting will require that you have read assigned readings and/or performed assigned activities PRIOR to the class meeting, as indicated in the schedule.

## Course Goals

By the end of the semester, students will be able to navigate *nix file systems, manipulate files, and run command line tools related to the analysis of genomic data. Each student will also master a particular area of genomic analysis and produce an oral and written report.

## Assessment

Grades will be based on the following assessments:

| Assessment | Percentage of Final Grade |
|---|---|
| Participation, including completion of assignments and in-class participation | 20 |
| Student-led in-class meeting | 30 |
| Final project, oral presentation | 25 |
| Final project, written report, data, and code | 25 |

Final grades will be based on the following standard scale:

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|---|---|---|---|---|---|
| A | 93 – 100 % | Superior/Excellent | D+ | 67 – 69.9 % | Minimum passing |
| A- | 90 – 92.9 % | | D | 63 – 66.9 % | |
| B+ | 87 – 89.9 % | Good/Better than average | D- | 60 – 62.9 % | |
| B | 83 – 86.9 % | | F | < 60 % | Failing |
| B- | 80 – 82.9 % | | | | |
| C+ | 77 – 79.9 % | Competent/Average | | | |
| C | 73 – 76.9 % | | | | |
| C- | 70 – 72.9 % | | | | |

You will have access to your grades via Canvas as we progress through the semester. Please note that there will be no negotiation about changes in final grades. A curve on the final grade will be implemented, at the instructor's discretion.

**Grade Disputes:** Any disputes with grades reported on the Canvas grade book for any assignment must be reported to the instructor _within 1 week_ of the grade being posted. Problems will be resolved in a timely manner.

**Re-Grade Policy:** Mistakes do occasionally happen while grading. Students will be offered the opportunity to request that specific exam or quiz questions be re-graded. Each requested question will be re-graded in its entirety. The instructor will add _or_ subtract points if too few or too many points, respectively, were awarded the first time the question was graded.

## Reading or web-based assignments

Reading assignments, viewing of Coursera videos, and any accompanying exercises are intended to be completed prior to the class meeting in which we are scheduled to discuss related content. On the schedule, the assignment for a given week is posted in the same row as the class meeting for that week.

## Individual project

Each student will work with the instructor to develop an original project analyzing genomic data, either their own or data mined from online sources. The student will identify a question, identify appropriate data and analysis methods, analyze the data, report and interpret the results, then present the project in an oral presentation and a written report. More details on the format for the presentation/report will be forthcoming.

## Student-led in-class meetings

In preparation for their individual project, each student will lead a class session discussing relevant concepts and background, and at least one software tool to perform analyses related to their question. The student leader will work with the instructor to choose an appropriate paper or other reading and the software tool. The student leader will investigate the software tool (either with 'test' data or with their own data) and present the methods and results to the class. Everyone in class will read the assigned readings, and the student leader will lead a paper discussion as well. **Chosen readings must be posted one week in advance.**

## Late assignments

Assignments turned in late will receive a 10% grade deduction for each 24hr period after the deadline.

## Canvas course website

This class will use Canvas (See link at the top). Log in with your university user name and password (it should be the same as you use for your email). If you have any problems please contact cuonlinehelp@ucdenver.edu the first week of class. I will always try to help with IT issues, but often the IT professionals will provide the best solution.

Canvas will be used to post *some* lecture notes, and links to scientific articles and other readings aside from the text book.  The site should be checked regularly for course-related announcements and discussions.  **You should make sure that you are receiving notifications** (account settings in upper right banner, then click on "Notifications" in the left-hand navigation).  If you want it to, Canvas will text you, email you, send you a private tweet, use facebook notifications -- there's no excuse for not knowing what's going on in the course.

## Respect your fellow students

Please remember that the classroom should be an environment conducive to learning.  I will treat you with respect; please also treat your fellow students with respect.  In an online environment this includes muting when appropriate to limit ambient noise, being prepared for presentations having tested all the technology beforehand, and ideally, broadcasting video. I know it's tempting to multitask while you are on zoom, but please focus on the meeting at hand. Class begins and ends on time.  Adherence to the University of Colorado Denver Student Code of Conduct is expected. Finally, we will have lots of discussion in this course. Keep the discussion friendly and professional. I encourage and expect disagreement, but let's all play nice; everyone's input is valuable.

## Academic Dishonesty

Academic dishonesty is a serious offense that diminishes the quality of scholarship and the learning experience for **everyone** on campus.

**CLAS Academic Dishonesty Policy**: Students are required to know, understand, and comply with the CU Denver Academic Dishonesty Policy as detailed on the CLAS website. Academic dishonesty consists of plagiarism, cheating, fabrication and falsification, multiple submission of the same work, misuse of academic materials, and complicity in academic dishonesty. If you are not familiar with the definitions of these offenses, or wish to learn more, go to http://www.ucdenver.edu/academics/colleges/CLAS/faculty-staff/policies/Pages/AcademicIntegrity.aspx.  This course assumes your knowledge of these policies and definitions. Failure to adhere to them can result in penalties ranging from failure of the assignment or the course to dismissal from the University; be informed and be careful. If this is unclear to you, ask me.

**Plagiarism:** Writing assignments will be checked automatically (via software) and manually (by me) for plagiarism.  Papers/Quizzes that plagiarize the work of others will receive no points, may result in an 'F' grade for the course, and will be referred to Academic Ethic Committee. Copying and pasting from any source is **not acceptable**. The **only** exception are brief quotes that 1) appear in quotations marks in your paper, and 2) are properly cited.

## Other Administrative Issues

**Access, Disability, Communication:**  The University of Colorado at Denver is committed to providing reasonable accommodation and access to programs and services for students with disabilities.  To be eligible for accommodations, students must be registered with the UCD Office of Disability Resources and Services (DRS) (North Classroom 2514; 303-556-3450, 303-556-4766 (TTY)). The DRS staff has experience assisting faculty in determining reasonable academic accommodations and coordinating these accommodations.  I am happy to provide approved academic accommodations outlined in the DRS letter.

**Students Called for Military Duty:** If you are a student in the military with the potential of being called to military service and /or training during the course of the semester, you are encouraged to contact your school/college Associate Dean or Advising Office immediately.

**Incomplete Grade Policy:**  Incomplete grades will not be granted to avoid an undesirable grade in the course.  The faculty in the College of Liberal Arts and Sciences have passed the following policy relating to the awarding of Incomplete grades.  This CLAS policy is consistent with the UCD campus policy.

Incomplete grades (IW or IF) are not granted for low academic performance.  To be eligible for an Incomplete grade, students must (1) successfully complete 75 percent of the course, (2) have special circumstances (verification may be required) that preclude the student from attending class and completing graded assignments, and (3) make arrangements to complete missing assignments with the original instructor.  A CLAS Course Completion Agreement is required. Completion of a CLAS Course Completion Agreement is strongly required. Incompletes cannot be awarded that stipulate: (1) a student may repeat

the entire course, (2) repeat or replace existing grades, (3) allow the student an indeterminate period of time to complete a course, or (4) allow the student to repeat the course with a different instructor. The CLAS Course Completion Agreement is available from the CLAS Advising Office, North Classroom 4002.

**Biology Department Grievance procedure:** If a student has a grievance with any aspect of a course, the first step is to meet with the instructor during office hours or by appointment to discuss the problem. This discussion should not take place by e-mail. Student and instructor should both maintain a professional, respectful demeanor during this discussion, and make an honest effort to listen carefully and to understand the other's viewpoint. In laboratory courses, the next step in resolving a grievance after meeting with the teaching assistant may involve a discussion with the faculty member in charge of the laboratory course. If the grievance cannot be resolved by an honest and sincere dialogue between student and instructor, the student may then make an appointment to discuss the problem with the department chair. If still not satisfied, the student may appeal to the Associate Dean. No step in this process may be skipped. See also "Procedures for Student Grievances about Courses or Faculty, CLAS."

## CLAS Academic Policies

For relevant university deadlines and procedures (such as the last day to withdraw from a course) as well as academic support sites, please see this website [https://clas.ucdenver.edu/faculty-staff/sites/default/files/attached-files/student_services_and_calendar.pdf](https://clas.ucdenver.edu/faculty-staff/sites/default/files/attached-files/student_services_and_calendar.pdf). "