GENOMICS (BIOB 486, Fall 2018)

Location

- M/W/F 11:00-11:50
- Chemistry 102

Primary Instructor

- Dr. John McCutcheon, john.mccutcheon@umontana.edu
- Interdisciplinary Sciences Building 309
- Office hours: ISB 309, MWF 10-11, or by appointment

Materials

- Required textbook: None!
- Optional textbook: Genomics: A Very Short Introduction, by John Archibald. ISBN 978-0198786207.
- Class website on Moodle - https://moodle.umt.edu
- I will assign various readings from the primary literature and assorted books, available as PDFs through the moodle site.

Introduction

The field of genomics has transformed the study of biology and human health. Several exciting new technological advances have driven this genomics revolution, including the development of new methods of ultra high throughput DNA sequencing. This course will explore the foundations of this exciting field including the cutting-edge methods used to produce genomic data, the powerful computational techniques for their analyses, and the biological insights that can be gained from performing experiments on a genome-wide scale. As genomic data mean very little in isolation, particular emphasis will be placed on comparative genomic techniques, and in the application of evolutionary principles to genomic data.

Learning outcomes

1. Understand the basic structural features of genomes.
2. Learn and apply the principles of population genetics to understand genome evolution.
3. Develop an understanding of the basic methodological and computational methods used in genome biology.
4. Develop an understanding of how the principles of population genome inform our understanding of human evolution, health, and disease.
5. Be able to understand and evaluate the primary scientific literature.

Lectures

- MWF, 11:00 a.m., Chemistry (CHEM) 102
- Attendance at lectures is an important part of this course, and **all students are expected to attend lectures regularly**. Points will be included in your grade for participating during lecture. Videos will also be used during some lectures; examples presented in these videos will sometimes be used as a basis for exam questions.

Discussion groups

Attendance at lectures is an important part of this course, and all students are expected to attend lectures regularly. Points will be included in your grade for attendance and for participating during lecture. In addition to standard lectures, we will frequently have extended group discussions focused on the assigned readings and related homework questions. Most of your participation grade will come from the class meetings when we discuss the week's primary literature paper. In these discussions, different teams of students will explain various parts of that week's reading to the rest of the class. It will be difficult for you to get a decent grade in this class if you do not come prepared to discuss the assigned reading. The take home assignments will deal with both the lecture and primary literature material.

Miscellaneous information

- **Accommodations -** The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you have a disability that adversely affects your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

- **Late work policy** - This class will cover a lot of ground, and will require you to keep up with the assigned reading. If you have a problem understanding the material, or with turning an assignment in on time, we strongly encourage you to speak with us as early as possible. In general we will not accept late work, but we are sympathetic and reasonable if you deal with us in an upfront and honest manner and do not wait until the last minute to explain your situation.

- **Academic misconduct** will be reported and handled as described in the University of Montana Student Conduct Code. All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The work you turn in should be your own. You are of course free to discuss any aspect of the course with your classmates or us, including questions on the take-home assignments. You may come to consensus conclusions on the questions as a group, but at the point when you begin formulating your answer on the computer, the work must become completely your own. If we see any evidence of a student copying the work of another we will ask the involved students about the incident; if no obvious explanation exists we will treat the matter extremely harshly. This may include receiving a failing grade for the entire course and filing a report with the Provost & Vice President for Academic Affairs. We don't expect this to be an issue with this course, but we do want you to know that we take plagiarism very seriously. If you are unsure about any of this, we urge you to ask us before turning something in. This plagiarism diagram on the course moodle page might be helpful if you are unsure.

- **Dropping course or changing grading status**: Changing the grading status (to CR/NCR) is not automatically approved after the 30th day of instruction. Exceptions to these rules may be requested by petition, but the petition must be accompanied by documentation of extenuating circumstances. Requests to drop the course or change

the grading status after these deadlines simply to benefit a student's grade point average will not be approved.

- **Student Behavior**: To maximize their likelihood of success, students should attend each lecture, and complete any assigned readings before class. When in class students are expected to behave in a manner that is respectful of others. **All disruptive electronic devices must be turned off during lecture, during Discussion and Review sessions as well as during exams.** If you prefer, you may use laptops or tablets to take notes during lecture – please be respectful of others when doing so.

Grading

Exams will be designed to encourage synthesis of subject matter and not to simply test your ability to recall details. Make-up exams in case of emergency or illness will be administered if requests are made **prior** to the exam. You must contact Dr. McCutcheon *at least one week before an exam* if you need to make other arrangements to take an exam because you will be off campus due to other University activities. 25% over your grade (200 points) will be based on attendance and participation in class and weekly discussion groups.

Grades will be based how many of **600 points** you earn over the course of the semester.

(1) Two mid-term exams (100 points each; 200 points total, 33%)
(2) Participation in lecture and discussion groups (150 points total, 25%).
(3) Homework (100 points total, 17%).
(4) Comprehensive final exam (150 points, 25%). The Final Exam will be comprehensive and test lecture and discussion material covered throughout the semester.

Final grades will be based on your total points as a percentage of the 600 total points possible.

Pluses (+) and minuses (–) will be used (**A, A–, B+, B, B–, C+, C, C–, D+, D,** and **D–**) in the assignment of letter grades will be determined by the distribution of total scores, following these guidelines:

- ≥90% of points (540): A- or better
- ≥80% of points (480): B- or better
- ≥70% of points (420): C- or better
- ≥60% of points (360): D- or better

These cutoffs may be adjusted downward (in favor of the student) to better reflect natural breaks in the class scores.