

MMG 233: Genetics and Genomics Fall 2021

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office hours: by appointment

Course meeting times and location: Tuesday & Thursday, 11:40 am-12:55 pm, tbt, and possibly (partially) online, in accordance with UVM's COVID-19 operations guidelines.

Prerequisites: Junior/Senior/Graduate standing in biological or computational sciences, with basic knowledge of genetics. Since this is NOT an introductory course in genetics, students should already be familiar with basic concepts/terms, such as allele, homozygous, heterozygous, genotype, Mendelian inheritance, etc.

Course description: Genetics is the key to understanding human health and disease. Genetic principles find their application to explaining a range of biological phenomena, including gene inheritance patterns, susceptibilities for diseases, etc, and they provide the basis for personalized medicine. However, while human genetics has focused traditionally on genetic and environmental factors that cause diseases, such as cancer, the advent of genomics and metagenomics enables scientists to start understanding human health in a novel way: we no longer define "health" as absence of disease, but we can start conceptualize it as a dynamic state whereby organisms show robust development and maintain physiological homeostasis, also in cooperation with the symbionts of our microbiomes. Our understanding of these concepts continues to evolve. Therefore, this newly revised course will delve into scientific discussions mostly based on recent literature rather than a textbook.

Drs. Chatterjee and Thali will jointly teach this course, where they will provide a flavor of different concepts, principles, and applications of employing genetics and genomics in understanding human health (and diseases). They will leverage recent publications and updates on recent technologies. The class is expected to be a hands-on course with active discussion, in-class activities, and lots of reading. There will be a small measure of reading prior to class, but the course is expected to be much fun with creative ways to think about and understand genetics and genomics. Both Drs. Chatterjee and Thali will also be available to address any questions or further discuss any topic before and after the class.

Textbook: We won't be using a specific textbook but will use original research, review articles and other reading resources. No text book yet appropriately covers recent discoveries and/or emerging new ways of studying biological phenomena that secure human health.

Blackboard: Course materials will be made available on Blackboard. Required papers/texts will be posted no later than Friday of the preceding week.

Grading: The course will follow an updated testing and grading module.

Class attendance and participation: 12 % of the final grade. The instructors will be mindful of extenuating circumstances of the students. The minimal expectation is class attendance.

Quizzes will take place every other week as indicated in the schedule: 28 % of the final grade. Five questions will be asked at the beginning of the scheduled class, where typically four questions will be asked on the last two classes and one question on the required reading(s) for the current class. Students will be given up to 10 minutes to answer on an online platform.

Summary and reflection folder: 30 % of the grade. At the end of each module, students will work at home on a reflective question posted on Blackboard. The response (which will encompass no more than 200 words) will summarize what was discussed in that module. The response must be submitted prior to the beginning of the next module. There are six modules in the syllabi. The first summary will not be graded.

Exams: 30 % of final grade. There will be three exams with multiple choice, true/false, match-type, and possibly short answer questions.

Graduate students will be required to take a lead in the in-class activities and group discussions and they will also get extra questions in the exams.

Exams:

Exam dates are posted on the Lecture Schedule. **There will be no Final!** The exams, including the third one, will test the material that was covered since the previous exam; the time limit is 75 minutes (also for the third one, which, again, is not a “final” as it is not cumulative).

Extra time will only be given to students with ACCESS permission.

Make-up or early exams will only be made possible by permission of the instructors and only if the instructors are notified by email of the scheduled absence at least 2 weeks in advance. Emergency situations in accordance with the UVM Guidelines will be addressed on a case-by-case basis.

Quizzes:

The roughly bi-weekly Quizzes (see Lecture Schedule) will (mostly) encompass the material covered in the preceding classes.

Absences must be notified to the instructor at least two weeks ahead of time to arrange for a make-up assignment.

Additional Information, Resources:

Student Learning Accommodations: In keeping with University policy, any student with a documented disability interested in utilizing accommodations should contact ACCESS, the office of Disability Services on campus. ACCESS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations via an accommodation letter to faculty with approved accommodations as early as possible each semester. All students are strongly encouraged to meet with their faculty to discuss the accommodations they plan to use in each course.

Contact ACCESS: A170 Living/Learning Center; 802-656-7753; access@uvm.edu; www.uvm.edu/access

UVM's policy on disability certification and student support: www.uvm.edu/~uvmppg/ppg/student/disability.pdf

Religious Holidays: Students have the right to practice the religion of their choice. *If you need to miss class to observe a religious holiday, please submit the dates of your absence to me in writing by the end of the second full week of classes.* You will be permitted to make up work within a mutually agreed-upon time.

Academic Integrity: The policy addresses plagiarism, fabrication, collusion, and cheating.
<http://www.uvm.edu/~uvmppg/ppg/student/acadintegrity.pdf>

Grade Appeals: If you would like to contest a grade, please follow the procedures outlined in this policy:
<http://www.uvm.edu/~uvmppg/ppg/student/gradeappeals.pdf>

Grading: For information on grading and GPA calculation, go to www.uvm.edu/academics/catalogue and click on Policies for an A-Z listing.

Code of Student Rights and Responsibilities: www.uvm.edu/~uvmppg/ppg/student/studentcode.pdf

FERPA Rights Disclosure: The purpose of this policy is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy Act (FERPA) of 1974. <http://www.uvm.edu/~uvmppg/ppg/student/ferpa.pdf>

Promoting Health & Safety:

The University of Vermont's number one priority is to support a healthy and safe community:

Center for Health and Wellbeing <http://www.uvm.edu/~chwb/>

Counseling & Psychiatry Services (CAPS) Phone: (802) 656-3340

C.A.R.E. If you are concerned about a UVM community member or are concerned about a specific event, we encourage you to contact the Dean of Students Office (802-656-3380). If you would like to remain anonymous, you can report your concerns online by visiting the Dean of Students website at <http://www.uvm.edu/~dos/>

Lecture schedule (order of topics subject to change)

Date	Topic	Lecturer(s)
Sep 2	Basics/overview- 1	NC/MT
Sep 7	Basics/overview- 2	NC/MT
Sep 9	QUIZ 1 Basics/overview- 3	NC/MT
Sep 13	Reflections and discussion of first set of summaries	MT/NC
Sep 16	Structure, composition of our genome- 1	MT/NC
Sep 21	QUIZ 2 Structure, composition of our genome- 2	MT/NC
Sep 23	Structure, composition of our genome- 3	MT/NC
Sep 28	Summary Reflections due; Exam 1	MT/NC
Sep 30	Gene expression- 1	NC/MT
Oct 5	Gene expression- 2	NC/MT
Oct 7	QUIZ 3 Gene expression- 3	NC/MT
Oct 12	Summary reflections due; discussion	NC/MT
Oct 14	Epigenetics- 1	MT/MT
Oct 19	QUIZ 4 Epigenetics- 2	MT/NC
Oct 21	Epigenetics- 3	MT/NC
Oct 26	QUIZ 5 Epigenetics- 4	MT/NC
Oct 28	Summary Reflections due; Exam 2	MT/NC
Nov 2	Hologenome/co-evolution of genomes- 1	MT/NC
Nov 4	Hologenome/co-evolution of genomes- 2	NC/MT
Nov 9	QUIZ 6 Hologenome/co-evolution of genomes- 3	NC/MT
Nov 11	Hologenome/co-evolution of genomes- 4	MT/NC
Nov 16	Summary Reflections due; QUIZ 7; discussion	MT/NC
Nov 18	Genome engineering- 1	NC/MT
Nov 30	Genome engineering- 2	NC/MT

Dec 2	Quiz 8 Precision medicine- 1	NC/MT
Dec 7	Final reflections about course Precision medicine- 2	MT/NC
Dec 9	Summary Reflections due; Exam 3	MT/NC