Public Health Genomics
POP HLTH/MD GENETIC/GENETICS 636
University of Wisconsin-Madison
Spring 2022

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Class Time: Tuesdays 5:00-6:00 pm
Class Location: HSLC 3110D
Course Credit: 1 credit
Course URL: https://canvas.wisc.edu/courses/294171
Course Hours: This class meets one 60-minute class period each week over the spring semester and carries the expectation that students will work on course learning activities for a minimum of 2 hours out of the classroom each week.
Instructional Mode: In-person
Office Hours: 15 minutes before and after class or by appointment
Course designations and attributes: Graduate attributes
Pre-requisites: Junior standing and BIOLOGY/BOTANY/ZOOLOGY 151 or graduate/professional standing

A properly worn face mask is required for all class periods.
Please do NOT come to class if you are ill. See attendance policy below.

Course Description:
Provides an introduction to public health genomics through a review of fundamental principles of genetics; the use of genetic information in clinical and research settings; and its implications for disease management and prevention, and health promotion. Explores policies that guide public health and discusses current ethical, legal, and social implications of these policies.

Learning Outcomes:
The learning outcomes for undergraduate and graduate students are to:

- Understand and be able to discuss the impact of genetics on clinical care and public health practice
- Gain an awareness of genetic/genomic policies and be able to critically discuss the relevant ethical, legal, and social implications (ELSI) of these policies

An additional learning outcome for graduate students is to:

- Demonstrate the ability to read, summarize, critique, and relate current news articles to key concepts in public health genomics

Learning Activities:

The learning outcomes will be met through readings and videos, lectures, and discussions of recent journal articles and trending topics in public health genomics. Students will be assessed through short quizzes that emphasize key concepts presented in the lectures and a final paper highlighting a current topic in public health genomics in the context of a disease/health outcome for which genetic testing has impacted its course, treatment, and/or management.

Course Units:

Week	Topic	Assessment	Instructor
Week 1 1/25	**Lecture:** *Complex Inheritance*	Quiz/assessment to emphasize key concepts presented in lecture	Corinne Engelman
Week 2 2/1	**Lecture:** *GWAS and Sequencing*	Quiz/assessment to emphasize key concepts presented in lecture	Corinne Engelman
Week 3 2/8	**Journal Discussion:** *Polygenic Scores*	Journal article presentation/discussion	Students lead
Week 4 2/15	**Lecture:** *Utility of Genetic Testing in Clinical Practice*	Quiz/assessment to emphasize key concepts presented in lecture	Kaitlin Lenhart
Week 5 2/22	**Journal Discussion:** *ELSI of Genetic Testing in Clinical Practice*	Journal article presentation/discussion	Students lead
Week 6 3/1	**Lecture:** *Ethical and Legal Issues in Genomics*	Quiz/assessment to emphasize key concepts presented in lecture	Guest Lecturer: Pilar Ossorio
Week 7 3/8	**Journal Discussion:** *Ethical and Legal Issues in Genomics*	Journal article presentation/discussion	Students lead
Week 8 3/22	**Lecture:** *Policy and Genomics*	Quiz/assessment to emphasize key concepts presented in lecture	Guest Lecturer: Lauren Schmitz
Week 9 3/29	**Journal Discussion:** *Policy and Genomics*	Journal article presentation/discussion	Students lead
Week 10 4/5	**Journal Discussion:** *Direct to Consumer Testing*	Journal article presentation/discussion	Students lead
Selection of final paper topic and bulleted outline of paragraphs due on Friday, April 8, 2022			
Week 11 4/12	**Lecture:** *Integration of Genomics and Infectious Diseases and Public Health*	Quiz/assessment to emphasize key concepts presented in lecture	Guest Lecturer: Kelsey Florek
Week 12 4/19	**Journal Discussion:** *TBD*	Journal article presentation/discussion	Students lead

Week 13 4/26	**Lecture:** *Pharmacogenomics*	Quiz/assessment to emphasize key concepts presented in lecture	Guest Lecturer: Scott Hebbring
Week 14 5/3	**Lecture:** *Clinical implementation of Genomics Research*	Quiz/assessment to emphasize key concepts presented in lecture	Guest Lecturer: Stephen Meyn
Final paper due on Friday, May 6, 2022 @ 11:59pm			

Readings, Activities, and Lectures:

The readings, activities, and lecture notes can be found on the UW Canvas website and are updated annually for each semester. A representative reading list includes:

- Pearson TA, Manolio TA. How to interpret a genome-wide association study. JAMA. 2008; 299(11):1335-1344.
- Green RC, Berg JS, Grody WW, et al. ACMG recommendations for reporting of incidental findings in clinical exome and genome sequencing. Genet Med 2013; 15(7):565-574.
- Grody WW, Thompson BH, Gregg AR, et al. ACMG position statement on prenatal/preconception expanded carrier screening. Genet Med 2013; 15(6):482-483.
- Wolf SM, Ossorio PN, Berry SA, et al. Integrating rules for genomic research, clinical care, public health screening and DTC testing: creating translational low for translation genomics. Journal of Law, Medicine & Ethics 2020; 48:69-86.
- Juengst ET, Van Rie A. Transparency, trust, and community welfare: towards a precision public health ethics framework for the genomics era. Genome Medicine 2020; 12(98):1-3.

Quizzes:

Students will be required to take a short quiz on the content of each lecture. The quiz will be due by the Friday night (11:59 pm) immediately following the lecture.

The student will be given full credit if the quiz is completed in full by the deadline and no credit otherwise. Responses from the quizzes will be used to assess students' understanding of the material presented. Any confusing concepts will be clarified at the next class.

Journal Discussions:

The purpose of the journal discussions is to critically review and discuss current literature related to topics in public health genomics.

The class will be divided into small discussion groups and each group will be led by 1-2 students. The students leading the discussion should spend up to 10 minutes presenting the paper (please stick to this timeframe so we can have plenty of time for discussion). The rest of the time (approximately 30 minutes) should be spent in discussion either as questions arise, or at the end of the presentation.

For those leading the discussion: Give an overview of the paper and pose discussion questions/points that relate to concepts presented in the lectures. Discussion is often enhanced when the environment is less formal, so please do not use a PowerPoint presentation; just present the information orally or with a single-sided one-page hand out. You will be evaluated on your ability to facilitate dialogue, keep the small group focused, and on the reporting of key points/highlights from the discussion.

For those not leading the discussion: All students will prepare a set of 2-4 questions/points for discussion for each paper, which will be uploaded into canvas prior to each class. You will be evaluated on your preparation (uploading your discussion questions/points).

Presentation of Current Events:

The first 5-10 minutes of class will be available for discussion of current topics in public health genomics, unless otherwise noted. This presentation will be led by graduate/professional students with the objective of practicing science communication to a lay audience.

Graduate/professional students must identify and share one recent, relevant **news** article on public health genomics with the class. Please **DO NOT** choose a research/journal article. This is intended to be a news article accessible to the lay audience.

The student will be asked to:

- Share the article with the class at least 24 hours prior to the class period in which it will be presented.
- Summarize the article (as if you are speaking to your family/friends) by preparing a **single** PowerPoint slide with bulleted 2-3 key points. (3-5 minute presentation)
- Include in the PowerPoint slide an additional bullet on the relevance of the article to public health genomics and/or key concepts presented in class.

Final Paper:

For the final paper, students will be asked to select a current issue in public health genomics (e.g., precision/personalized medicine, pharmacogenomics, genomic screening, preimplantation genetic diagnosis). Students should then provide an example of a specific disease or health outcome in which the selected issue has relevance. A nice example of a past student paper will be provided in Canvas (this topic/health outcome combination may **NOT** be used by students).

The paper should contain a paragraph for each of the following topics. You may use these six items below as section headings within the paper.

1. Describe a public health genomics issue/concern and how it is relevant to a selected diseases/health outcome.
2. Evaluate BOTH the genetic and environmental aspects of the specific disease/health outcome.
3. Provide the current recommendations for genetic testing along with the benefits or limitations to this testing.
4. Summarize research initiatives to advance the incorporation of genetic testing into routine patient care or public health practices.
5. Explore at least two different ELSI related to the selected topic.
6. Policy implications related to the selected topic.
    a. If policies exist, please provide a review of them, as it applies to your topic. If there are no current policies, then provide at least two considerations for policy development.

The paper should be written as a review, rather than a personal narrative. Students should use 2-4 references for their paper. At least 2 peer-reviewed papers must be included in the references;

these may be supplemented with citations from reputable websites, such as those from government, academic, or other well-established organizations. The paper should not exceed 3 single spaced pages (not including references; size 8.5 x 11; 1-inch margins; minimum font size of 11).

To provide guidance and assist with development of the paper, students will be asked to turn in an outline of the paper. The teaching assistant and/or course instructors will provide feedback.

- Selection of the topic and bulleted points for paragraphs will be due on ***Friday, April 8, 2022***, four weeks prior to the final paper due date.
- Final paper will be due at 11:59 pm on ***Friday, May 6, 2022***.

Attendance Policy:

Students are expected to attend every class and stay for the entire scheduled class time unless excused by the professors.† Excused absences may include family emergency, illness, clinical rotation, conflicting exam schedule, presentation at professional conference, or military service. Please let the professors know before class if you will be unable to attend due to such circumstances. A maximum of two excused absences are allowed.

For excused absences, you will be expected to prepare and submit the journal article discussion questions on time or review the lecture material and take the quiz on time.

For unexcused absence (or greater than 2 excused absences), you will be expected to prepare the journal article discussion questions or review the lecture material, depending upon the day. However, on discussion days, you will not be awarded credit for turning in questions. On a lecture day, you will not be awarded credit for taking the quiz.

†Due to the surge in COVID-19 cases, the first two class periods are exempt from the attendance policy. Students may choose to not attend either of the first two in-person class periods; however, students are still expected to watch the lecture recordings and take the assigned quizzes for these classes. Please inform the instructors if you are choosing this option so we have an accurate count of the number of students in the course.

Evaluation:

Undergraduate students

Quiz/assessment of key concepts	20%
Journal Article Presentation (leading discussion)	15%
Journal Article Preparation (discussion questions)	15%
Final Paper	50%
TOTAL	

Graduate students

Quiz/assessment of key concepts	20%

Journal Article Presentation (leading discussion)	10%
Journal Article Preparation (discussion questions)	10%
Presentation of News Article	10%
Final Paper	50%
TOTAL	

The grading scale will be:

93-100 = A
88-92 = AB
83-87 = B
78-82 = BC
70-77 = C
60-69 = D
Below 60 = F

COVID-19 policies and procedures:

During the global COVID-19 pandemic, we must prioritize our collective health and safety to keep ourselves, our campus, and our community safe. As a university community, we must work together to prevent the spread of the virus and to promote the collective health and welfare of our campus and surrounding community. Please follow all UW-Madison guidelines provided on the COVID-19 Response website: https://covidresponse.wisc.edu.

Quarantine or isolation due to COVID-19:

Students should continually monitor themselves for COVID-19 symptoms and get tested for the virus if they have symptoms or have been in close contact with someone with COVID-19 (the latter is optional if fully vaccinated). Students should reach out to instructors as soon as possible if they become ill or need to isolate or quarantine, in order to make alternate plans for how to proceed with the course. Students are strongly encouraged to communicate with their instructor concerning their illness and the anticipated extent of their absence from the course. The instructor will work with the student to provide alternative ways to complete the course work.

Academic Integrity:

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to studentconduct.wiscweb.wisc.edu/academic-integrity/.

Accommodations for Students with Disabilities:

McBurney Disability Resource Center syllabus statement: "The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in

instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA." http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php

Diversity & Inclusion:

Institutional statement on diversity: "Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world." https://diversity.wisc.edu/