MCB 2321: Exploring Our Genome
Quest 2

I. General Information

Class Meetings

- Fall 2025
- Hybrid (80% asynchronous, 20% synchronous weekly Discussion sections. Per student registration times),
- Enrollment cap = 152 students

Quest and General Education Credit

- Quest 2
- Biological Sciences

This course accomplishes the Quest and General Education objectives of the subject areas listed above. A minimum grade of C is required for Quest and General Education credit. Courses intended to satisfy Quest and General Education requirements cannot be taken S-U.

Instructor – contract info

Jennifer Drew, PhD, jdrew@ufl.edu
Office hours: Thursdays 9 to 10am on Zoom. Link posted in Canvas. Or by appointment.
Microbiology and Cell Science Dept, 352-392-1906
Available by email: jdrew@ufl.edu or Canvas mail

Teaching Assistants and contact info

Open TA-led student hours will be announced first week of class.

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Course Description

Genomics has exploded with exciting discoveries and spawned new technological developments. Personal genomics and personalized health care are now a reality – it's possible and affordable to have your genome scanned. This course investigates the same fundamental questions while using the same approaches and techniques as scientists who study genetics, behavior, and disease. These pressing questions include: What does genetics tell us about ourselves? How do we study and analyze our personal genome data? How can common genetic variations inform our decisions about disease risk, lifestyles, and behaviors? We will delve into the field of genomics, learn how genome sequence data is obtained and analyzed, the limitations of that data, the ethical, legal and societal implications of that data, and most importantly, to increase

scientific literacy, we will explore human genome data in a semester-long, guided research project. This course will equip students with basic skills in how to manage datasets, compose statistics, and provide meaningful analysis of genomic data using tables and charts. The concepts learned can connect to other fields, adding to students' "toolbox" of professional and scientific skills. All majors and interests complement this course. No prior scientific or statistical/analytical background is assumed. This course affords students the ability to critically examine and evaluate the principles of the scientific method, model construction, and use the scientific method to explain natural experiences and phenomena.

II. Course Objectives

At the end of this course, students will be expected to have achieved the Quest and General Education learning outcomes as follows:

Content: *Students demonstrate competence in the terminology, concepts, theories, and methodologies used within the discipline(s).*
CLO1: 1-1) Explain the structure, function, components of the human genome. 1-2) Present how genomics and biotechnological advancements have changed biology and the questions that can be addressed
CLO2: 2-1) Outline the process of DNA replication and how DNA structure was determined. 2-2) Predict DNA and protein sequences. 2-3) Recognize what can be revealed in a whole genome sequence and the limits of the interpretation.
CLO3: Evaluate the process and impact of clinical, research, and consumer-based genetic testing and technology.
CLO4: 4-1) Characterize inheritance and mutations. 4-2) Apply clinical information using brief case studies to determine the underlying genetic mechanism. 4-3) Describe how epigenetic factors influence genetic expression.

Critical Thinking: *Students carefully and logically analyze information from multiple perspectives and develop reasoned solutions to problems within the discipline(s).*
CLO5: Analyze ongoing genome-wide association study (GWAS) data to draw conclusions and test hypotheses about genetics and the human condition
CLO6: Evaluate published studies and clinical resources.
CLO7: 7-1) Discuss ethical (ELSI) issues stemming from personal genomics, precision medicine, and genetic technology.

Communication: *Students communicate knowledge, ideas, and reasoning clearly and effectively in written and oral forms appropriate to the discipline(s).*
CLO8: 8-1) Create a brief, visual and written research summary using peer collaboration to communicate findings from a published study. 8-2) Present a talk on recent genetic research on a disease/condition of interest.

Connection: *Students connect course content with meaningful critical reflection on their intellectual, personal, and professional development at UF and beyond.*
CLO9: Describe how genetic, evolutionary, and cultural factors intersect and shape disease and health, thereby the human condition
CLO10: Self-reflect on your personal and scientific development throughout the course.
CLO11: Apply principles and standards of ethical and professional scientific behavior, including ethical authorship and peer review.

Required Readings and Works

Lewis, Ricki. (2024). Human Genetics: Concepts and Applications, (14th ed.) Boston: McGraw-Hill Publishers. Available via UF All Access.

Recommended as supplemental:
ISBN-13: 9780136538882
Taylor, M. Simon, E., Dickey, J., and K. Hogan (2020). Campbell Biology: Concepts & Connections (10th Edition). New York: Pearson.

All other readings and works are available in Canvas.

Materials and Supplies Fees: n/a

II. Graded Work

Description of Graded Work

Assignment	Requirements	Percentage
Quizzes *Series of 12 lecture-based modules, each worth 4% of total course grade. Students may drop lowest scoring assignments.*	Weekly homework quiz that assesses understanding of concepts and critical thinking. Each quiz can be taken two times, and the highest scoring attempt will count.	48%
Discussion Assignments Each weekly discussion section will carry an assignment, which includes participation credit as well as written component. Each worth 2.5% of course grade.	Independent assignments to build on discussion section topics and share on Perusall.	38%
Capstone Assignments Final course project focused on a topic of student choice to be shared in course Virtual symposium. Worth 12% of course grade.	Final project is a 4 min video presentation. The last 2 weeks of the course will focused on these presentations (shared and discussed in Perusall). Two discussion sections will be dedicated to helping students prepare.	12%
Self-reflection	Students provide written self-reflection s	2%
		TOTAL = 100%

Grading Scale

For information on how UF assigns grade points, visit: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

A	94.0 – 100%		C	74 – 76%

A-	90.0 – 93.9%		C-	70.0 – 73.9%
B+	87.0 – 89.9%		D+	67.0 – 69.9%
B	84.0 – 86.9%		D	64.0 – 66.9%
B-	80.0 – 83.9%		D-	60.0 – 63.9%
C+	77.0 – 79.9%		E	<60.0

III. Weekly Schedule with Critical Dates

Quiz and discussion-based assignment are due each week by Weds at 11:59 PM.

Weekly Topic and Key Specific Learning Objectives • Lecture titles listed below each topic • Average lecture duration = 15 min	Dates Assignments	Corresponding Textbook Chapters All other readings posted in class
1. Overview of Human Genome • What is a genome • Structure and Function of Genome • Precision Medicine	Aug 21 – 27 Quiz 1 Discussion 1	1
2. History and Fundamentals of Genomics • Major Milestones of genetics and genomics • Fundamentals of Inheritance (Mendelian Genetics) • Modes of inheritance	Aug 28 – Sep 3 Quiz 2 Discussion 2	4
3. From Gene to Protein • Central Dogma: From Gene to Protein • Transcription • Genetic code • Translation • Gene Regulation	Sep 4 – 10 Quiz 3 Discussion 3	10 and 11
4. Mutations and Single Gene Disorders • Mutations • Causes of Mutations • Nature of Mutations and Genetic Diseases	Sep 11 – Sep 17 Quiz 4 Discussion 4	12
5. Genetic Diversity and Ancestry • Genetic Variation in Populations • Changing Frequencies • Molecular Evolution • Genetics of Identity	Sep 18 - 24 Quiz 5 Discussion 5	15 - 18
6. Genetics of Complex Disorders • Complex Traits • Genome-wide Association Studies • Polygenic Risk Scores and Precision Medicine	Sep 25 – Oct 1 Quiz 6 Discussion 6	7
7. Nutrigenetics and Metabolism • Introduction to Nutrigenetics • Five mechanisms of nutrigenetics • Statistical Applications: A Case Study of the “Great Florida Spitting Contest”	Oct 2 – 8 Quiz 7 Discussion 7	

• Advanced Topics in Nutrigenetics		
8. Genetic Technology – Classic Biotechniques • Extraction and Modification • Amplification • Genotyping and Sequencing	Oct 9 – 15 Quiz 8 Discussion 8	21 and 22
9. Genetics Technology: Applications and Advances • Genetic Testing • Pharmacogenomics • Genome editing, gene silencing and gene drive • Genetic-based therapies	Oct 16 – 22 Quiz 9 Discussion 9	21 and 22
10. Cancer: Disease of the Genome • Overview of Cancer • Hallmarks of Cancer 1 – 4 • Hallmarks of Cancer 5 – 10 • Hallmarks of Cancer 11 - 14	Oct 23 – 29 Quiz 10 Discussion 10	20
11. Genetics of Immunity and Human Response • Response to Self • Response to Environment - Epigenetics • Response to Commensal Microbial communities • Response to Infection	Oct 30 – Nov 5 Quiz 11 Discussion 11	19 and 11
12. Genetics of Behavior • Guest Lecture • Student-driven Q and A	Nov 6 - 12 Quiz 12 Discussion 12 **Capstone Project due**	8
13. Our Genome – Capstone and Colloquium • Student generated project presentations	Nov 13 – Dec 3 Reflection DUE	

Online Proctoring with Honorlock

In order to maintain a high standard of academic integrity and assure that the value of your University of Florida degree is not compromised, quizzes will be proctored. You will take your quiz electronically using the course website. You **do not** need to register for your quiz. However, you will need to have installed and enabled the Google Chrome Honorlock extension prior to taking your quizzes. You will need a webcam, speakers, microphone, laptop or desktop computer, and reliable Internet connection to be able to take your quizzes. Wireless internet is not recommended. You may also need a mirror or other reflective surface. Google Chrome is the only supported browser for taking exams in Canvas. There will be a room scan.

Generative AI

While you may use generative AI tools to help you bounce ideas, look up terms, and contextualize concepts, it is crucial to ensure that your final submission reflects *your own* understanding and analysis of the topic. Any indication of misuse, such as copying and pasting responses directly from generative AI outputs, will result in a zero score for that question or assignment. Remember, a primary goal of our course assignments is to develop your critical thinking, i.e., via your scientific literacy, presentation, and writing skills. This requires that you engage thoughtfully with the material. Accordingly, we expect that your own original insights will be reflected in your work. You are responsible for the work you submit and AI can be misleading and inaccurate.

Minimum Technology Requirement

The University of Florida expects students entering an online program to acquire computer hardware and software appropriate to their degree program. **Students are expected to have ongoing computer and internet access.**

Most computers are capable of meeting the following general requirements.

A student's computer configuration should include:

- Webcam
- Microphone
- Physical keyboard
- Broadband connection to the internet and related equipment (cable/DSL modem)
- Microsoft Office Suite installed (provided by the university)

The Student Computing Requirements state: "The University of Florida requires all students to have continuous ongoing access to computer hardware and software appropriate to their degree program. Coursework in all degree programs requires the use of a computer and reliable high-speed internet connectivity. Activities related to student life including academic advisement, course registration, official university correspondence, use of library resources, and student financial affairs are predicated on access to a computer with internet connectivity." For more information, please see: https://policy.ufl.edu/policy/student-computing-requirements/Links to an external site..

Late assignments will not be accepted due to technical errors or malfunctions.

Computing labs are available on campus at these locations: https://cals.ufl.edu/current-students/studentresources/computer-lab/.

Not all published literature is open access. Some required readings may require log-in via Gatorlink with a VPN. You can download such articles using off-campus access through UF libraries, with instructions here: https://uflib.ufl.edu/using-the-libraries/off-campus-access/.

Individual colleges may have additional requirements or recommendations, which students should review before starting their program.

IV. Quest Learning Experiences

Synchronous Discussion Sections

Students will meet in weekly synchronous Discussion Sections, held on Zoom, at their registered times. Students will receive participation points in their associated assignment for actively engaging in the session.

To prepare for these discussions, students will reflect on prompts, and in break-out sessions, in real-time, they will together weave course concepts and real-world applications. Some sessions will be centered around "Genetics in the News", where students will bring and discuss breaking research in the relevant areas of genomics. Other sessions will serve as framework for course concepts, while others will offer a supportive space to brainstorm and receive feedback on the

Capstone presentation. Together, these Discussion Sections will provide a space where theoretical understanding, practical experience, collaboration, and communication converge.

Capstone Presentation

The final project is a 4-5 minute video presentation on a topic or application of Human Genomics of their choice. It is expected that students will apply concepts from course lectures, exploring how theoretical knowledge translates into practical scenarios.

The capstone is founded upon three essential pillars:

- **Connection:** Through networking and collaboration, students will establish valuable connections with professionals in the field, enriching their understanding of genomics' practical implications.
- **Critical Thinking:** The literature review and synthesis foster critical thinking, enabling students to distill complex information and identify gaps in knowledge.
- **Communication:** By presenting their findings to the class, students will hone their communication skills, ensuring that intricate genomic concepts are accessible and engaging.

Students should allocate sufficient time to curate their talk in the latter part of the semester. Two Discussion Sections will be dedicated to helping students prepare. Guidance will be provided mid-semester on the project requirements, as well as advice on how to focus the presentation.

The culmination of this project is a comprehensive learning experience spanning the last weeks of the course. Instead of lecture-based learning, the modules will be focused entirely around these presentations (shared and discussed in our engagement program, Perusall). During this phase, students will share their projects with classmates, fostering interaction and knowledge exchange. This exchange will not only showcase their discoveries but also provide an opportunity for reflection on the skills and insights gained.

Self-reflection

In this course, students are asked to reflect on the growth of their critical thinking abilities, research skills, and scientific literacy. Self-reflection will be an integral part of the experiential learning journey, providing students with opportunities to assess their progress at various stages. The self-reflection component serves as a means for students to assess their intellectual and personal growth, fostering a deeper understanding of their journey in this course and its potential impact on their academic and professional trajectories.

V. Required Policies

Please see full UF policy statement here: https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/