



CMB 708 Genetics, Development and Disease

Course Description: This project-based component will include studies in DNA repair mechanisms, the basis of selected genetic diseases and pedigree development, study of DNA mutations and treatment options for DNA-based diseases. Students will also explore how alteration of certain metabolic pathways relate to the development and progression of some human diseases. These projects will include the examination of regulations and ethics surrounding treatment and prevention of genetic diseases. Further, students will develop research, writing and presentation skills necessary for the work force.

Credit Hours: 3

Course Prerequisites: None

Course Dates: Summer, 2024-25

Course Times: online; asynchronous

Course Location: online

Instructors:

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Required text and other learning resources:

1. Recorded video lectures with Powerpoint Presentations will be provided on CANVAS.
2. Case Studies relating to the basic science material will be used to enhance learning.
3. Required Text: *Medical Genetics*, 5th edition or 6th edition, Jorde, Carey and Bamshad
Other Suggested Text: *Marks' Basic Medical Biochemistry: A Clinical Approach*, 6th Edition.
4. Other video files found at sources such as Khan Academy and YouTube will be used.
5. Selected primary research journal articles will be used.

Course Overview: Concepts covered in the course include the study of DNA mutations and repair including the abnormalities of chromosome numbers, chromosome abnormalities,

immunogenetics and microorganisms that cause disease such as influenza. During the course there will be presentations on Mendelian genetics and nontraditional modes of inheritance, the clinical cytogenetics and disease and causes of genetic variation. Students will also learn how epigenetics influences health. Through written and oral presentation assignments, the ethical considerations in disease research will be explored and case studies will be used to elucidate selected genetic diseases. Students will be given assignments that require them to read and critically evaluate the scientific literature and interpret and communicate experimental data through written and oral presentations.

Topics (Subject to Change)	Instructor
Introduction to Research Project/Course	
IV.1. Autosomal Dominant and Recessive Inheritance	Hennington
Assignment 1 Pedigrees	
Research Paper & Journal Club Topic Due**	
IV.2. Sex Linked Modes of Inheritance	Hennington
Assignment 2 Mendelian Genetics	
Annotated Bibliography Draft	
IV.3. Clinical Cytogenetics and Disease	Hennington
Assignment 3 Clinical Cytogenetics	
IV.4. Immunogenetics and Disease	Syed
Assignment 4 Case Study: SCID – Baby Joe	
Final Annotated Bibliography Due	
IV.5. Genetic Basis of Development	Syed
Assignment 5 Sonic Hedgehog and Holoprosencephaly	
IV.6. Epigenetics and Nontraditional Modes of Inheritance	Hennington
Assignment 6 Epigenetics: Twin Study	
Argumentative Paper Draft	
IV.7. Genetic Variation	Hennington
Assignment 7 Hardy Weinberg Problems	
IV.8. Multifactorial Inheritance and Common Disease	Hennington
Assignment 8 Alzheimer Disease and Schizophrenia	
IV.9. Genetic Testing and Gene Therapy	Syed
Assignment 9 Self-Paced Lecture	
FINAL ARGUMENTATIVE PAPER DUE	
IV.10. Genetics and Precision Medicine	Syed
Assignment 10 Self-Paced Lecture	
Grades Due	

****Journal Club Presentations Dates TBA**

Course Objectives: Upon completion of the course, students will be able to:

Learning Outcomes:

- Describe Autosomal Dominant and Recessive Inheritance.
- Describe Sex Linked and Nontraditional Modes of Inheritance

- Use the concepts of probability to determine frequency of fertilization events
- Use the Hardy-Weinberg Principle of Genetic variation to solve genetics problems
- Describe abnormalities of chromosome numbers and chromosomal abnormalities
- Investigate essential properties of specific genetic diseases
- Describe genetic diseases caused by multifactorial inheritance
- Describe genetic mediators that affect embryonic development
- Describe pharmacogenetics and how people respond differently to drug therapy based upon their genetic makeup
- Explain the concept of epigenetics and give examples of diseases
- Explain the relevance and significance of results in selected scientific literature.
- State an ethical issue in the current field of genetics and write a paper that gives possible ethical resolutions.

Grading:

Journal Club (TBA):	15% (Rubric will be used)
Assignments (10):	40%
Written Paper (1):	40% (Rubric will be used)
Attendance:	5%

The program follows a 100 point Grading Scale

A = 90-100

B = 80-89

C = 70-79

F = 0-69

Students must maintain a 3.0/4.0 average in the Certificate Program.

Course Policies:

Attendance is based on assignment due dates. The student must turn in assignments and research paper sections at the designated date. Students must follow the calendar a minimum of 90% for assignments/quizzes/exams. Late assignments, missed research paper dates will be considered absences. **1% of the final grade will be deducted per day that assignment is late.**

Course communication

- Electronic mail (email) services are provided to the UMMC community in support of the missions and administrative functions of the university. Users of the email system are expected to comply with the Email Policy, Information Policy, and all other UMMC policies.
- The email system may not be used for illegal or unlawful activities. Email users are expected to use the services in a professional and respectful manner.
- Students will receive information from instructors via email and their UMMC email account. **Therefore, students are expected to check their UMMC email accounts regularly.**

Submission of assignments

All assignments will be submitted through CANVAS learning management platform at UMMC.

All assignments are due on dates given. Late submissions will be counted as an absence. Students must comply with 90% of due dates including assignments, quizzes and exams.

Grading of assignments

All assignment grades and feedback will be posted in Canvas.

Instructor will have up to 48 hours after the due date to provide grades/feedback on daily/weekly HW assignments.

For writing assignments and projects, Instructor will have up to 5 business days after the due date to provide feedback on assignment.

Students may work ahead and turn in assignments prior to the due date, however, the Instructor will be grading according to the due date schedule.

1. POLICIES

A. SOCIAL MEDIA

- a. UMMC recognizes social media is an important and timely means of communication. Students who use these websites must be aware that posting certain information is illegal. Offenders may be subject to criminal and civil liability and adverse institutional actions. Offenders also may be subject to adverse academic actions up to and including dismissal.
- b. The purpose of this policy is to
 - i. Provide guidelines outlining how students can engage in the appropriate use of social media platforms.
 - ii. Minimize the business, legal and personal risks that may arise from an individual's use of social media.
 - iii. Protect the privacy and safety of UMMC students, employees and contractors.
- c. All students in UMMC schools and programs will comply with the UMMC Policy and Guidelines for Personal Use of Social Media.
(<https://www.umc.edu/graduateschool/files/SGSHS%20Student%20Handbook.pdf>)

A. INFORMATION POLICY

The purpose of the UMMC Information Policy is to establish management direction and requirements to ensure the accomplishment of the UMMC mission through the appropriate protection of all UMMC Information from accidental or intentional misuse or unauthorized access modification, destruction or disclosure.

B. CANVAS

Each course syllabus and schedule are available to students electronically on the internet via CANVAS, UMMC's student online learning platform.

C. E-MAIL

- a. Electronic mail (email) services are provided to the UMMC community in support of the missions and administrative functions of the university. Users of the email system are expected to comply with the Email Policy, Information Policy, and all other UMMC policies. (<https://www.umc.edu/graduateschool/files/SGSHS%20Student%20Handbook.pdf>)
- b. The email system may not be used for illegal or unlawful activities. Email users are expected to use the services in a professional and respectful manner.
- c. Students will receive information from instructors via email and their UMMC email account. **Therefore, students are expected to check their UMMC email accounts daily.** If there is a problem with log in to UMMC email account, students are responsible for contacting the UMMC Helpdesk (601-984-1145).

2. ACADEMIC INTEGRITY

- A. **HONOR CODE:** Because integrity is the foundation of scientific endeavors, a student in the Certificate Program pledges to be honest and trustworthy in all proceedings. The student will not cheat on examinations, plagiarize the work of others, or falsify assignments.
- B. **Dishonesty** is defined as "an (intentional) act of deception" in one or more of the following areas:
 - a. **Cheating:** Use or attempted use of unauthorized materials, information, or study aids.
 - b. **Fabrication:** Falsification or invention of any information.
 - c. **Assisting:** Helping another commit an act of dishonesty.
 - d. **Tampering:** Altering or interfering with evaluation instruments and documents.
 - e. **Plagiarism:** Representing the words or ideas of another person as one's own.
 - f. **Other examples** include but are not limited to:
 - i. Use of textbooks, notes or any unauthorized materials during an exam.
 - ii. Looking at other student's tests during an exam.
 - iii. Collaborating on assignments when collaboration is not allowed.
 - iv. Having someone take an exam for you or taking the exam for someone else.
 - v. Obtaining exams or questions from exams through illicit means.
 - vi. Use of unauthorized websites during computerized exams.
 - vii. Assisting someone in one of these behaviors.
- C. Evidence of dishonesty may result in a grade of "F" on the examination/assignment that involved cheating and/or an "F" in the course.
- D. Important Notice about Plagiarism:

Plagiarism is not tolerated and will be punishable by expulsion from the certificate program. If plagiarism is detected after the certificate has been awarded, the certificate may be rescinded.

Avoiding Plagiarism: There are numerous resources available to assist students in avoiding plagiarism. The leading tool for plagiarism detection is Turnitin.com. Students may be required to submit assignments and/or formal papers to Turnitin.com to evaluate for originality and intellectual integrity (i.e. plagiarism). Turnitin.com checks papers and assignments against a collection of national databases and generates a report that highlights any blocks of text in the submitted document that match reference sources with links back to the matching documents. Students may submit a draft of their paper and use the Originality Report to determine if revisions are needed to prevent plagiarism before submitting the final paper for grading.

 - a. In some instances, students may be required to submit the final version of papers or assignments to Turnitin.com first, then to the instructor for grading. **PLEASE DO NOT SUBMIT YOUR REFERENCE PAGE OR TITLE PAGE. MAXIMUM % ACCEPTED WILL BE no greater than 20% AS DETERMINED BY TURNITIN.COM (excluding question stems/prompts and instructor written instructions/guidelines).** Written work will be submitted to turnitin.com as assigned by instructors.
 - b. Turnitin.com also checks for Artificial Intelligence additions. **Please be aware that we only accept 0% AI.**

- c. For a good discussion about plagiarism and how to properly cite your sources, please visit:
<http://mediasite.video.ufl.edu/Mediasite/Play/adaa44500eaf460a84f238e6b9a558f9>

3. STUDENT SUPPORT

- A. Tutoring Services - Available at no cost to the student. Contact your instructor for more information. The faculty shall make every effort to remediate less-than-adequate academic performance through one-on-one consultation, extra online sessions, the use of tutors and any other mechanisms needed to return the student to good academic standing.
- B. Student Complaint Policy – Students have the right to complain, whether verbally or in writing, regarding any area of academic or student life without fear of coercion, harassment, intimidation, or reprisal from the institution or its employees. Students must submit Student Grievance/Complaint Form to Program Director or Dean of school.
- i. This policy is intended to guarantee the rights of students without encroaching on academic freedoms or restricting the traditional prerogatives of faculty.
 - ii. A student academic grievance consists of a complaint against faculty, administrators, staff members, or other employees concerning evaluation of student performance, conduct of instructors, and other activities related to academic policies of the school.
 - iii. Students should be aware of their rights and responsibilities under University policies covering admission, academic performance, and retention. Denial of a student’s right under these policies may constitute grounds for an academic grievance.
 - iv. The burden of proof of academic mistreatment lies with the student.
- C. Faculty Advisement – Faculty advisors are important academic, career and personal counseling resources for Certificate Program students. Faculty are available to act in the capacity of advisor.
- D. Academic Support – Faculty are available for one-on-one online sessions to provide assistance with developing the skills and behaviors that are essential to academic success and professional development. These faculty may address a wide range of issues including time management, study skills, stress management, testing strategies, communication skills, clarifying career goals and coping strategies. Students will need to make an appointment through the Program Director.
- E. See <https://www.umc.edu/graduateschool/files/SGSHS%20Student%20Handbook.pdf>

4. RIGHT TO PRIVACY

- A. The institution is prohibited from releasing educational information that is personally identifiable, other than directory information about the students, without their written consent, except to specified agencies and persons such as school officials and certain federal or state offices as defined by federal law.
- B. Directory information includes students’ names, the educational program in which they are enrolled and their classification, home and local addresses, and local telephone numbers.
- C. Students who wish to exclude themselves from the directory must file a written request with the Registrar’s Office within two weeks after the beginning of the first semester of study.

5. EQUAL OPPORTUNITY STATEMENT

- A. UMMC adheres to the principle of equal education and employment opportunities without regard to race, creed, sex, color, religion, marital status, sexual orientation, age, national origin, disability or veteran status.
- B. This policy extends to all programs and activities supported by UMMC.

- C. Under the provisions of Title IX of the Education Amendments of 1972, UMMC does not discriminate on the basis of sex in its educational programs or activities with respect to admissions or employment.

6. **EVALUATION OF PROGRAM**

A. Formative Evaluation:

Item analysis on quizzes and exams

Rubric analysis by Students on Case Studies and Projects

Analysis of Student Pre-tests and Post-tests for each module

B. Summative Evaluation

End of semester student evaluations for instructors

End of semester student evaluation of course

End of semester course evaluations by Internal Advisory Team

Measure program effects on students by assessing the progress on the learning outcomes using student questionnaires

University Policies:

Students with disabilities (ADA) statement

Refer to UMMC policy

Academic honesty statement

Refer to UMMC policy

Sample Syllabus