



## CMB 706 Enzymology and Metabolism

**Course Description:** Topics include Thermodynamics, pH and acid-base chemistry, Metabolism and metabolic regulation including glycolysis, TCA cycle, and oxidative phosphorylation. Tissue-specific metabolism studies will include liver metabolism, muscle metabolism, hormonal action and blood clotting. Students will also explore how alteration of these metabolic pathways relates to the development and progression of some human diseases.

**Credit Hours:** 4

**Course Prerequisites:** Baccalaureate degree; CMB 705

**Course Dates:** Summer 2024-25

**Course Times:** online; asynchronous

**Course Location:** online

**Instructors:**

Dr. Bettye Sue Hennington

Professor, Cell and Molecular Biology

Email: [bhennington@umc.edu](mailto:bhennington@umc.edu)

Phone: 601-955-9970

Office Hours: Tuesday 12pm - 3pm

Wednesday 12pm - 3pm

Thursday 12pm - 3pm

Dr. Maryam Syed

Assistant Professor, Cell and Molecular Biology

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Phone 601-984-5502

Office Hours: Monday 9am – 12pm

Friday 9am – 12pm

**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. Lecture notes for a few of the video lectures will be available for download.
4. Required Text: *Marks' Basic Medical Biochemistry: A Clinical Approach, 6<sup>th</sup> Edition*. Other Suggested Texts include *Medical Biochemistry*, John Baynes, and *Case Files: Biochemistry*, Eugene Toy.
5. Other video files found at sources such as Khan Academy and YouTube will be used.

6. Selected primary research journal articles will be used.

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

<b>Topic</b>	<b>Assignments</b>	<b>Instructor</b>
II.1. Enzyme Catalysis: Thermodynamics & Bioenergetics		Hennington
II.2. Enzyme Kinetics and Regulation	Problem Set I	Hennington
II.3. Bioenergetics in the Cell I		Hennington
	Problem Set II (Part 1)	
II.4 Bioenergetics in the Cell II		Hennington
	Problem Set II (Part 2)	
<b>Exam I</b>	<b>Modules 1-4</b>	
II.5. Oxidative Phosphorylation		Hennington
II.6. Mitochondria, ROS and Cellular Apoptosis and Disease		Syed
II.7. DNA Mutation and Repair and Genetic Diseases	Project I	Syed
II.8. Control of Gene Expression		Syed
<b>Exam II</b>	<b>Modules 5-8</b>	
II.9. Carbohydrate Metabolism and Hormonal Regulation	Project 2	Hennington
II.10. Lipid Metabolism and Hormonal Regulation		Hennington
II.11. Liver Structure and Function and Metabolic Diseases		Syed
<b>Exam III</b>	<b>Module 9-11</b>	
II.12. Blood Chemistry and Disease Detection		Syed
	Problem Set III	
II.13. Fibrous Proteins, Skeletal Muscle Structure & Function	Project 3	Syed
<b>Exam IV</b>	<b>Module 12-13</b>	
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**\*\*Schedule is subject to Change**

**Learning Outcomes:** Students will be able to

- Explain enzyme function and methods of control of metabolic pathways.
- Explain key metabolic pathways and energy balance in specific tissues.
- Explain key metabolic pathways and energy balance in specific diseases.
- Describe enzymatic reaction mechanisms and signal transduction.
- Explain the laws of thermodynamics and their relation to metabolic pathways.
- Determine pH, pOH, and pKa of selected solutions.
- Describe the homeostatic acid-base balance in the mammalian body.
- State the focus of work for biochemists.
- Read and critically evaluate the scientific literature.
- Interpret and communicate experimental data.
- Develop logical steps in a series of experiments.
- Explain the relevance and significance of results in selected scientific literature.

- Communicate research results effectively through written and oral presentations.
- State an ethical issues in the biomedical/molecular life sciences and create a solution.

### Grading Policy and Rubric:

Quizzes (14-18):	10%
Problem Sets (3):	35% (~11.67% each)
Projects (3)	30% (10% each) (Rubrics will be used to grade each Project)
Exams: (4)	20% (5% each)
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, quiz dates and exam dates. The student must turn in assignments on the designated date and time and quizzes and exams are to be taken on designated days. Students must follow the calendar a minimum of 90% for assignments/quizzes/exams. **You will be assessed 1% points for each day the assignment is late.** Late assignments, missed quizzes or tests will be considered absences. *There are no make-up exams unless otherwise granted by the Program Director PRIOR to an examination date. Failure to take an EXAM (mid-term and/or final) without prior permission from the Program Director will be recorded as 0.*

### 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 daily.** Students are responsible for contacting the UMMC Helpdesk (601-984-1145) if there are problems with email log in.

### Submission of assignments

All assignments will be submitted through CANVAS learning management platform at UMMC. All assignments are due on dates given.

## **Learning Platform:**

The School of Graduate Studies in the Health Sciences uses CANVAS Learning Management System (LMS) software to deliver course content. Once you are enrolled in a course by the faculty you can go to <http://umc.instructure.com> to login and retrieve course material. You will receive an email notifying you of enrollment in a course using CANVAS. A headset with a microphone or webcam with integrated microphone is required.

## **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>)

### **B. 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.

### **C. CANVAS**

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

### **D. 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. 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 Pretests 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

## 7. UNIVERSITY POLICIES:

### **Students with disabilities (ADA) statement**

[www.umc.edu/graduateschool/forms-documents-and-procedures/policies-and-procedures.html](http://www.umc.edu/graduateschool/forms-documents-and-procedures/policies-and-procedures.html)

### **Academic honesty statement**

[www.umc.edu/graduateschool/forms-documents-and-procedures/policies-and-procedures.html](http://www.umc.edu/graduateschool/forms-documents-and-procedures/policies-and-procedures.html)