

Biophysical Chemistry Laboratory aka Biochemistry Lab

CHE 421 or CHE 5421 or CHE 420 or CHE 5421

Total Credit Hours 3 Lab

Classroom: Lab Room H415 (primary location) and Lab Room H401 (secondary location)

Time: Lab Mondays 15:30-18:20 (3:30pm to 6:20pm)

Instructor

Dr. Scoty Hearst

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Office Hours: MWF 1:00pm to 4:00pm by appointment only

Course Description

The course meets three hours per week to reinforce chemical concepts covered in the lecture of the Biochemistry courses. The laboratory covers basic methods for determination of protein and nucleic acid structure, stability, and/or function. The laboratory covers the basic methods utilized in the purification and chemical analysis of biological molecules with applications to medicinal and forensic chemistry. The laboratory also covers biochemical pathways using animal models, where student researchers will investigate signaling, metabolic processes, and drug mechanisms in a living system. By understanding the pathways affected by a drug's biochemistry, allows student researchers to identify potential drug targets and develop new therapies, which can then be tested in animal models before moving to human trials. Animal research training will be required when applicable.

Rationale for Course

This course will provide practical experiences that will lead to a general understanding of biochemistry chemistry lab techniques for chemistry and biology majors. This course will provide practical research experiences that will lead to a general understanding of biochemistry techniques used in biomedical research. Development of problem solving and critical thinking skills will be stressed.

Learning Objectives

Students will learn biochemistry chemistry lab techniques.

Christian worldview: Helpful Bible Verses-

- If any of you lacks wisdom, you should ask God, who gives generously to all without finding fault, and it will be given to you. (James 1:5)
- But seek first the kingdom of God and his righteousness, and all these things will be added to you. (Matthew 6:33)

- Commit to the LORD whatever you do, and he will establish your plans. (Proverbs 16:3)

Prerequisites

Prerequisites for this course are CHE304 and Bio112 or by instructor's consent.

Instructional Materials

You will need a scientific calculator, lab notebook, lab safety goggles, and any PPE required by the Chemistry Dept. Lab Pdfs will be provided. MS Excel is required.

Methods of Instruction

We will use the C.U.R.E. teaching (Course-based Undergraduate Research Experience) approach. Using biochemistry/ analytical chemistry techniques such as: ICP, PCR, Immunofluorescence, Cell Culture, Genotyping, DNA Extraction, Gel Electrophoresis, Plasmid Purification, Protein Purification, Enzyme Kinetics, and Western Blotting, we will approach novel research questions in the fields of biochemistry, neuroscience, cell biology, environmental biochemistry, and parasitology.

Methods of Evaluation

Laboratory grades will consist of Lab Sheets worth 25pts, Data Reports worth 50pts (a one-page report displaying results and a description paragraph), Formal Lab Reports worth 100pts, and oral presentation worth 100pts. Lab cleanup points are worth 20 and will be deduced for leaving the lab dirty. If assigned, Mid-Term and Final Exams for Lab will be worth 100pts.

MC Syllabus Statement

The MC Syllabus contains all policies and procedures that are applicable to every course offered by Mississippi College, both on campus and online. The policies in the MC Syllabus describe the official policies of the University as they relate to instruction and will take precedence over those found elsewhere. It is the student's responsibility to read and be familiar with every policy. The MC Syllabus may be accessed at any time on the MC website at the following: <https://www.mc.edu/provost/mcsyllabus>.

MC Honor Code

A fundamental principle of academic, business, and community life is honesty. Mississippi College has adopted an Honor Code that applies to all members of our academic community. The code is as follows: "As a member of the Mississippi College community, I will live, speak, and work in a way that honors myself and others around me. I will hold myself and others to the highest standards of virtue and truth." Upon accepting admission to Mississippi College, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor Code. As such, academic dishonesty is not tolerated. Students will be required to affirm this statement on examinations, research Academic Affairs—2.19 Academic Honesty 2 papers and other academic work. Ignorance of the rules does not exclude any member of the Mississippi College community from the requirements or the processes of the Honor Code. For additional information, please visit: <https://mc.edu/provost/honorcode>.

Grading Policy

The grading scale for this course is based on the percentage of total points earned in the course, and is as follows:

A range	≥ 90%
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B range	80-89%
C range	70-79%
D range	60-69%
F range	< 60%

Do not contact the instructor at the end of the course to request an extra assignment, bonus opportunity, or grade change for any reason except an error in the calculation of the final grade. Grade appeals should follow the process outlined in MC Policy 4.20.

Right to Modify the Course:

Should COVID conditions change, Mississippi College reserves the right to modify this class at any point during the term. Potential changes include the implementation of safety protocols, the mode of course delivery, or any other aspects of the course which may become reasonably necessary. Faculty have the right to require students to wear masks inside the classroom and labs.

General Agreement:

Enrollment in this and other classes at MC affirms your agreement to abide by the rules, regulations, mission and standards of Mississippi College, including requirements and limitations implemented at any time for health and safety. Failure to abide by the rules, regulations, and limitations may result in suspension from the class, the university, or termination of enrollment.

Attendance: Your attendance at all class meetings is expected. Please refer to the 2022-2023 Mississippi College Undergraduate Bulletin for a discussion of the university's attendance policy. An accumulation of 8 absences results in an automatic F in the course. If a regular class meeting is missed, it is the student's responsibility to obtain any assignments or instructions that were given by the instructor. Missing a class is not an excuse for not preparing for the next class meeting or not having an assignment ready on time. Do not miss a scheduled test! In the event of an extreme emergency and an excused absence, a make-up test will be given. The test must be made up prior to the graded tests being returned to the class. Make-up tests are usually different from the regular test and may be more difficult. If the student cannot return to class until after the tests have been returned, the grade on the final exam may be substituted for the missing grade if the absence was excused.

Tardiness: If you are late to class, you may miss a quiz given at the beginning of class. Quiz grades are not made up. In regards to exam days, tardiness is completely prohibited! In addition, if you leave before the class is dismissed, you will receive an absence. If a quiz is given on that day you will receive a zero. In other words, you cannot just come take the quiz and leave.

Classroom Policies:

No one other than the students enrolled in this class will be allowed to come to class. This includes parents. If a sibling or prospective student is interested in attending a class meeting, you must get permission from first. Your grade will not be discussed with anyone else or your parents. If your parents want to know your grades, that is your responsibility to report this information to them. Cellphones are a distraction to both you and me. Do not have your phone out and/or in use during class or exams. Do not ask for extra credit if you are not satisfied with your grade, you can start today working toward the grade you want. We do not give extra credit opportunities to a single student. If there is an extra credit opportunity, we will announce it in class to everyone.

Formal Lab Report:

- (1) Title and statement of purpose. These should be on a cover page. Your name, as author, should also be in this page, along with a list of your partner. The statement of purpose should be one sentence.
- (2) Introduction. This should briefly give background information relevant to your purpose or your hypothesis.
- (3) Materials and Methods section. This should be a brief description of performed standard laboratory techniques such as pipetting fluids or weighing substances. Do not list instructions.
- (4) Results section. This should report the results only, not discuss them. Numerical results should be given in the form of tables and graphs. Tables and graphs should be neatly done, clearly labeled and explained. All your raw data should be included. Figure Legends are required for each figure.
- (5) Discussion section. This is a very important part of your report. This should relate back to the purpose of the experiment and it should contain a thorough analysis of your results, literature comparison and future applications.
- (6) Literature Cited. You are required to cite at least two references. Internet web page is not a source.

Outdoor Lab Sampling: Portions of this Lab will require outdoor environmental sampling. Attendance to these outdoor lab sessions are encouraged, but not required. We will collect biological samples at Choctaw Trails as a part of the class. When performing field research at Choctaw Trails, students must sign a liability waiver before riding on the Chemistry Department's UTV.

Use of Biochemistry Lab Equipment: Students must properly use analytical equipment and clean-up after each use. Make sure to turn off equipment when applicable.

Early Alert System:

Mississippi College has adopted the practice of finding students early in the semester who may be exhibiting behaviors that could ultimately have a negative impact on their academic progress. These behaviors are often called "red flag" behaviors and include, but are not limited to, excessive absences, poor test grades, and lack of class participation or evidence of non-engagement. Identifying these behaviors early gives the instructor the opportunity to raise the "red flag" on behalf of a particular student so that the student can take the appropriate action to redirect his/her progress. The system alerts the student, the student's advisor, and the Office of Student Success. These messages are intended to help a student recognize an area of concern and to encourage him/her to make some choices to improve the situation. When a student receives an Early Alert message, the student should quickly make an appointment to talk with his/her professor about the situation. Also, students can make full use of the Office of Student Success to set academic goals and connect to campus resources.

Students with Disabilities:

Mississippi College is committed to creating a learning environment that meets the needs of its diverse student body. If you have a disability or think you may have a disability, please contact the office of Student Counseling and Disability Services to request an official accommodation. You can find more information about Student Counseling and Disability Services, including contact information, here: <https://www.mc.edu/offices/counseling/>.

Academic integrity:

Mississippi College students are expected to be scrupulously honest. Dishonesty, such as cheating or plagiarism, or furnishing false information, including forgery, alteration or misuse of University documents, records or identification, will be regarded as a serious offense subject to severe penalty, including, but not limited to, loss of credit and possible dismissal. See the Mississippi College Student Handbook or University Policy 2.19 for specific information regarding penalties associated with dishonest behavior at Mississippi College. Copies of the Mississippi College Student Handbook are available in the Office of the Vice President for Enrollment Management and Student Affairs, Nelson 313. Copies of University policies are available on the Mississippi College web site.

Disclaimer

The instructor reserves the right to modify the schedule proposed in the syllabus as necessary. Modifications will be provided in writing.