UTTyler MEDICINE

BIOT 5211L **Advanced Biotechniques LAB** **Credit Hours: 2**

Semester: Fall **Year:** 2024
Class Day/Time: Friday 9 am – 5 pm **Class Location:** BMR Lab D12

Instructor of Record: Dr. Amy Tvinnereim and Dr. Osamu Sato
Office: BMR 314 (Dr. Tvinnereim) BMR Lab A2 (Dr. Sato)
Office Phone: 903-877-5189 (Dr. Tvinnereim)
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Office Hours: Any time by appointment

Course Description: Lab component. An introduction to standard molecular biology techniques such as: isolation and purification of proteins and nucleic acids, cloning and expression of recombinant proteins with lecture component.

Prerequisite: As per program entry. **Co-requisite:** BIOT 5211

Goals of Course & Course Objectives:

Course Objectives:

1. To understand and apply practical techniques used in fundamental biotechnology.
2. To understand the basic theory and background behind biotechnology techniques.
3. To be able to apply problem solving techniques in biotechnology.
4. To be able to find and process scientific information.
5. To be able to communicate in scientific formats with both oral and written methods.

Student Learning Outcomes (Course Competencies):

1. The student will demonstrate the ability to correctly maintain an accurate record of laboratory procedures, techniques and exercises.
2. The student will demonstrate the ability to perform fundamental biochemical calculations such as pH, molarity, concentrations and dilutions.
3. The student will demonstrate the ability to find and understand pertinent scientific information.
4. The student will demonstrate the ability to write in an appropriate technical scientific format.
5. The student will demonstrate the ability to perform basic laboratory procedures and interpret results generated from these procedures.

Course Assessment/Methods of Evaluation:

Student skills will be evaluated with a laboratory notebook, graded subjectively, and pre- and post-written assignments. All assignments are due at the beginning of class on the dates indicated in your schedule.

1. *Laboratory Notebook*: A clear, complete, and concise record of all laboratory actions will be maintained within the lab. This lab notebook is worth a total of 25% of the laboratory grade and will be graded subjectively.
2. *Pre-lab Assignments*: Student preparation prior to every laboratory will be evaluated based on assignments turned in prior to the exercise. These assignments will be worth a total of 25% of the total lab grade.

3. *Post-lab Assignments*: Student understanding of all laboratory activities will be evaluated based on assignments turned in following the exercise. These assignments will be worth a total of 25% of the total lab grade.
4. *Reports*: Reports written in correct scientific technical format will be scored based on content, clarity, and quality of writing. These reports will be worth 25% of the total lab grade.

Grade:

A >90%
B 89-80%
C 79-70%
D 69-60%
F <59%

Assignments

Students are expected to turn in assignments on time. Late assignments will be handled as follows:

1 day late	5% deducted from overall assignment grade
2 - 3 days late	10% deducted from overall assignment grade
4 -7 days late	20% deducted from overall assignment grade
7-14 days late	30% deducted from overall assignment grade
14+ days late	No credit will be given for the assignment

Linked Program Learning Outcomes:

The student learning outcomes listed above address the following Biotechnology Program PLOs:

- PLO-1. The student will demonstrate English communication skills in both oral and written forms.
- PLO-2. The student will demonstrate mastery of basic and advanced biotechnology methods
- PLO-3. The student will demonstrate the ability to safely operate basic and advanced laboratory equipment, analytic devices and computers.
- PLO-4. The student will demonstrate independent and critical thinking skills integrated with the ability to utilize multiple informational resources.
- PLO-5. The student will explain the principles, mechanisms and interrelatedness of both in vivo and in vitro biochemical, molecular biological and genetic processes.
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Textbook:

Current Protocols Essential Laboratory Techniques second edition; Sean R. Gallagher & Emily A. Wiley; John Wiley & Sons, Inc.; 2012; ISBN 978-0-470-94241-3.

Course Content: All lab protocols and any supplemental material will be available on Canvas 1 week prior to each lecture.

1. Getting Started and Staying Organized. Micropipettes and Pipet Aids
2. Standardization of Pipetting Techniques
3. Quantification of Nucleic Acids and Proteins Using a Spectrophotometer
4. Making Buffer Solutions and Measuring pH
5. Restriction Digestion of Lambda DNA and Plasmid DNA

6. Polymerase Chain Reaction (PCR)
7. Purification of Nucleic Acids
8. Preparation and Transformation of Competent Cells
9. Plasmid Purification
10. Polyacrylamide Gel Electrophoresis
11. Preparation of Agar Plates and Culture Media. Bacterial Growth Curve and Bacterial Stocks
12. Preparation and Transformation of Competent Cells
13. Dot Blot and Western Blot

Other Class Policies:

Attendance:
Regular and punctual attendance is expected. If a student misses a class or lab, the student is responsible for obtaining any information distributed during those times. Make-ups are possible only under certain instances (labs cannot be made up). Arrangements for any make-ups and/or missed labs should be discussed directly with the instructor for that day's class.

Students are expected to attend all classes. Students will be allowed to miss **1 class** without penalty. Additional absences will be handled as follows:

2 absences	Lose 5% of overall grade in class
3 absences	Lose 10% of overall grade in class
4 absences	Lose 15% of overall grade in class
5+ absences	Student will have to remediate the course

Students will be considered absent if they arrive more than **30 minutes** after the start of class.

Emergencies
In the event of an emergency or sickness, the student **MUST** contact their PI and/or the Program Coordinator (Kim Tutt) by phone or email **THE DAY OF** the expected absence. Failure to do so will result in the absence being counted as 2 absences, resulting in a 10% decrease in the class grade.

Academic Honesty:
Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

Cheating
Dishonesty of any kind involving examinations, assignments, alteration of records, wrongful possession of examinations, and unpermitted submission of duplicate papers for multiple classes or unauthorized use of keys to examinations is considered cheating. Cheating includes but is not limited to:

- Using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class.
- Falsifying or inventing any information, including citations, on an assigned exercise.
- Helping or attempting to help another in an act of cheating or plagiarism.

Plagiarism
Plagiarism is presenting the words or ideas of another person as if they were your own. Materials, even ideas, borrowed from others necessitate full and complete acknowledgment of the original authors. Offering the work of another as one's own is plagiarism and is unacceptable in the academic community. A lack of adequate recognition constitutes plagiarism, whether it utilizes a few sentences, whole paragraphs, articles, books, audio-visual materials, or even the writing of a fellow student. In addition, the presentation

of material gathered, assembled or formatted by others as one's own is also plagiarism. Because the university takes such misconduct very seriously, the student is urged to carefully read university policies on Misconduct in Research and Other Scholarly Activity 05.00. Examples of plagiarism are:

- Submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another.
- Submitting a work that has been purchased or otherwise obtained from an Internet source or another source.

Incorporating the words or ideas of an author into one's paper without giving the author due credit.

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Adding/Dropping:
The official deadline for adding and dropping courses is as published in the academic calendar and Graduate Bulletin (typically the day before Census Day). However, students are strongly encouraged to meet with their graduate advisor or the Program Coordinator prior to adding/dropping courses. Movement into and out of classes after the 4th class day requires approval of the Program Director. Students can drop until mid-semester without a WP or WF. Drops after mid-semester require approval of the Dean. Each student is responsible for their own enrollment status with the university.

Disability Accommodations:
UTHSCT abides by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act, which mandate reasonable accommodations be provided for students with documented disabilities. If you have a disability and may require some type of instructional and/or examination accommodations, please contact me early in the semester so that I can provide or facilitate provision of accommodations you may need. If you have not already done so, you will need to register with the Student Services Office (located on the UT Tyler Campus). You may call 903-566-7079 for more information.

Use of Artificial Intelligence:
UT Tyler is committed to exploring and using artificial intelligence (AI) tools as appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course (see below) is considered a breach of academic integrity. The student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy.

For this course, **AI is not permitted in this course at all.**
To best support your learning, you must complete all graded assignments by yourself to assist in your learning. Doing your own work, without human or artificial intelligence assistance, is best for your efforts in mastering course learning objectives. This exclusion of other resources to help complete assignments includes artificial intelligence (AI). Refrain from using AI tools to generate any course context (e.g., text, video, audio, images, code, etc.) for any assignment or classroom assignment.

UTTyler MEDICINE

The University of Texas at TYLER HEALTH SCIENCE CENTER

Program:	Master of Science in Biotechnology
Degree:	MS
Department:	Cellular and Molecular Biology
School:	Medical Biological Sciences
Course:	**BIOT5211/5211L – Advanced Biotechniques** (and associated lab)

Area	Marketable Skill*
TASKS	Maintain accurate laboratory records and data.
	Design molecular or cellular laboratory experiments, oversee their execution, and interpret results.
	Perform laboratory procedures following protocols including deoxyribonucleic acid (DNA) sequencing, cloning and extraction, ribonucleic acid (RNA) purification, or gel electrophoresis.
TECHNOLOGY SKILLS	Analytical or scientific software; Graphics or photo imaging software - GraphPad, ImageJ, Adobe; Office suite software - Microsoft Office
SKILLS	**Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
	Writing — Communicating effectively in writing as appropriate for the needs of the audience.
ABILITIES	**Written Comprehension** — The ability to read and understand information and ideas presented in writing.
	Written Expression — The ability to communicate information and ideas in writing so others will understand.
WORK ACTIVITIES	**Documenting/Recording Information** — Entering, transcribing, recording, storing, or maintaining information in written or electronic/magnetic form.
	Getting Information — Observing, receiving, and otherwise obtaining information from all relevant sources.
	Processing Information — Compiling, coding, categorizing, calculating, tabulating, auditing, or verifying information or data.
	Updating and Using Relevant Knowledge — Keeping up-to-date technically and applying new knowledge to your job.
WORK CONTEXT	Wear Common Protective or Safety Equipment such as Safety Shoes, Glasses, Gloves, Hearing Protection, or PPE.
	Importance of Being Exact or Accurate

*All marketable skills listed for this course and program were drawn from the Knowledge, Skills, and Abilities identified by the US Department of Labor and Statistics for “Biological Technicians” and “Molecular and Cellular Biologists” as published on O*Net Online (www.onetonline.org)