

Biology 3134 - 001
Cell Biology Laboratory
Fall 2024

Course Syllabus

INSTRUCTOR **Ali Azghani, Ph.D.**
Professor of Biology
Office: BEP 105; (903) 566-7332
eMail: aazghani@uttyler.edu
<http://www.uttyler.edu/Biology>

Class time: Tuesdays 2:00- 4:50

Class Location: BEP 129

Office Hours: Tues & Wed; 10:00 -11:00 or by appointment.

Required Text

None – Handouts and Journal articles.

Required online Workbook

JoVE Science Education <https://www.jove.com/science-education> - Videos on
Laboratory Fundamentals – Free via UTT library

Course Description:

This course provides hands-on experience in cell and molecular biology technology. These techniques are some of the most popular protocols used in modern cell biology labs worldwide. Please refer to Chapter 18 of your textbook (Karp's Cell and Mol Biol) for more information on techniques in cell and molecular biology.

Course Objectives

Cell biology lab will prepare student for upper-level courses and technical positions at biomedical laboratory in academia and pharmaceuticals. Course material and assessments will be based on the learning goals and objectives of each lab. Briefly, students will:

- Use cell culture research model to study physiology and biochemistry of cells.
- Learn basic as well as advanced laboratory techniques including Precision Pipetting, Florescent Microscopy, DNA and Protein Extraction, and exploring Cell Signaling pathways.
- Gain experience in experimental design, hands-on assays, data collection & analysis, and data analysis.
- Understand disease mechanisms in cell and molecular level.
- Develop scientific writing and communication skills.

Please make sure to turn-on the “Announcement” in your account Notification Preferences to receive emails regarding new course announcements on Canvas.

Tentative Grading Policy:

Course grade will be determined as follows:

Pre-lab Quizzes	10%
Worksheets	20%
Comprehensive lab report on gene and protein expression in scientific articles format by incorporating relative lab methods and data.	30%
Midterm Exam	20%
Final Exam	20%
<hr/>	
Total Points	100%

Letter Grades will be assigned based on the following point levels:

A 90 -100; B 80 – 89; C 70 – 79; D 60 – 69; & F Under 60.

Exam Policy

Exam questions will be drawn from the pre-laboratory lectures, the lab handouts/manual, online modules, and principles of the experiments that you performed in this lab. You must take the exams on the scheduled dates. In case of emergency, you will need to provide appropriate, official documents for a make-up exam.

No late work will be accepted past the posted due time & date. Missing assignments will receive Zero point.

Documentation

University Note: Have your professor or coach email me a letter explaining the reason for the absence due to a prescheduled University excused absence.

Doctors Note: If you are sick, please bring proof of your appointment, and have the doctor explain that you were indeed sick, and should not or could not attend class.

Civil documentation: If there are other extenuating circumstances, please provide the obituary, police report, court documents, or other evidence explaining the absence.

Re-grading Policy:

If you feel that an error was made on the grading of your exam, please attach a typed statement that explains the error, and turn it in to your professor within 3 days of when the exam is returned. Oral arguments are not accepted.

Class Expectations

- Students will be expected to follow the University of Texas at Tyler Honor Code. Cheating will not be tolerated, and will be dealt with harshly, i.e. a zero on the assignment, exam or project at the minimum.
- Be Courteous and on time.
- Silence cell phones and other electronic devices, and do not answer your phone/text while in class.

Infectious Disease Policy

Students who are feeling ill or experiencing symptoms such as sneezing, coughing, or a higher-than-normal temperature will be excused from class and should stay at home. Students needing additional accommodations may contact the Office of Student Accessibility and Resources at University Center 3150, or call (903) 566-7079 or email saroffice@uttyler.edu.

The UT Tyler community of Patriots views adoption of these practices consistent with its Honor Code and a sign of good citizenship and respectful care of fellow classmates, faculty, and staff.

Copy right - Recording of Class Sessions

Class sessions may be recorded by the instructor for use by students enrolled in this course. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.

Faculty Office Hours: These are times when you can meet with your faculty to ask questions about the content, better understand the discipline, make career connections and more.

I RESERVE THE RIGHT TO MODIFY THIS SYLLABUS AT ANY TIME. THEREFORE, YOUR ATTENDANCE AND ATTENTION TO THE ANNOUNCEMENTS IN CANVAS ARE CRUCIAL BECAUSE IT WILL ASSIST YOU TO REMAIN CURRENT ON THE MATERIAL AND KNOW WHEN THE SYLLABUS MAY BE MODIFIED.

General information _ *Resources for UT Tyler Students Success*

Please refer to “Student Resources” and “University Policies and Information” on the course Modules/Canvas.

Helpful Links:

Pubmed: A resource for accessing biomedical literature.

- UT-Tyler Portal: <http://www.ncbi.nlm.nih.gov/pubmed?holding=txutrmlib>

Mendeley: A free reference manager: <https://www.mendeley.com>

Protein browsers: These websites are freely accessible resource for protein's amino acid sequence, conformation, structure, and features such as active sites.

- **Uniprot:** <https://www.uniprot.org/>
- **OMICS:** <https://omictools.com/blat-tool>
- **Protein Database (PDB):** <https://www.rcsb.org/>

- Protein Information Resource (PIR): <https://proteininformationresource.org/>

Genome browsers: These websites are repositories for genetic information. You can look at an entire chromosome using the genome browser, or focus on more detailed information for a specific gene.

- National Center Biotechnology Information: <http://www.ncbi.nlm.nih.gov/>
- European Genome Browser: <http://www.ensembl.org/index.html>
- DNA Data Bank of Japan: <http://www.ddbj.nig.ac.jp/>
- UC Santa Cruz genome browser: <http://genome.ucsc.edu/>

Gene-specific informatics: These websites provide more detailed information on genes and genetic disorders.

- Online Mendelian Inheritance in Man (OMIM): <http://www.omim.org>
- Genecards: <http://www.genecards.org/>
- Gene Tests: <http://www.genetests.org>
- Gene Reviews: <http://www.ncbi.nlm.nih.gov/books/NBK1116/>

Selected Animal Specific Informatics: These websites focus on the most popular genetic animal models.

- Mouse (*Mus musculus*) Informatics: <http://www.informatics.jax.org/>
- Zebrafish (*Danio rerio*) Informatics: <http://zfin.org/>
- Fly (*Drosophila melanogaster*) Informatics: <http://flybase.org/>
- *Caenorhabditis elegans* informatics: <http://www.wormbase.org/>
- *Saccharomyces cerevisiae* informatics: <http://www.yeastgenome.org/>

Programs to look at DNA sequence: Sanger sequencing produces chromatograms, as a read out. This readout can be viewed using a number of programs. These will convert the data into a string of nucleotides that can be analyzed further.

- A Plasmid Editor (ApE) - <http://biologylabs.utah.edu/jorgensen/wayned/ape/>
- CLC sequence viewer - <http://www.clcbio.com/products/clc-sequence-viewer/>
- FinchTV - <http://www.geospiza.com/Products/finchtv.shtml>
- Sequence Manipulation Suite: <http://www.bioinformatics.org/sms2/index.html>

General Science Resources:

- HHMI Biointeractive: <http://www.hhmi.org/biointeractive/>
- CSHL DNA interactive: <http://www.dnai.org>
- Science Friday Life Science Education: <http://www.sciencefriday.com/teacher-resources/index.html?subject=3#page/full-width-list/1>
- GeneEd: http://geneed.nlm.nih.gov/topic_subtopic.php?tid=1
- Cell and Molecular Online: <http://www.cellbio.com/education.html>

Technical Journals/Sites

- Biotechniques: <http://www.biotechniques.com>
- Nature Methods: <http://www.nature.com/nmeth/index.html>
- Methods: <http://www.journals.elsevier.com/methods/>
- JOVE: <http://www.jove.com>

Lab Schedule

Starting Date of week.	Activity	Assignments/Quizzes Due
Week 1 8/26/24	Introduction - Syllabus, Lab Safety, Overview of the Purpose & Topics Exercise 1: Precision pipetting	Signed Safety Acknowledgment & Contact lens Waiver Pre-test Lab manual (handout #1) – JovE video
Week 2 9/2	Cell Culture Model Exercise 2: Cell Culture Model - KARP's Ch 1.5 Cell Injury / Viability Assay- Handout	Worksheet1 (for Exercise1) due. Pre-Lab Read: Hemocytometer - JoVE Prelab Quiz 2
Week 3 9/9	Cell Organelles Exercise 3: Fluorescent Microscopy - Ch 18.3	Worksheet 2 Pre-Lab Read: Hand out on ZOE – Canvas, JoVE Prelab Quiz 3
Week 4 9/16	Exploring Protein phosphorylation and Cell signaling , Karp's Ch 15 Exercise 4: Protein Extraction & Quantitation - Handout	Worksheet 3 Pre-Lab Read : JoVE- SDS Electrophoresis, Western Blot - JoVE Prelab Quiz 4
Week 5 9/23	Signal Transduction Exercise 5: Gel Electrophoresis – Karp's Ch 18.13	Prelab Quiz 5 (Cell Signaling) <i>Start writing Intro & Methods for lab report</i> <i>Think of Hypothesis and Goals for Comprehensive lab report</i>
Week 6 10/1	Signal Transduction Exercise 6: Western Blot Analysis	Collecting and analyzing Data
Week 7 10/7	Finish up assignments, Exam 1 Review Q/A	Worksheet for 5 & 6
Week 8 10/14	Oct 15th , Lab Midterm, in-person	Materials from Exercises 1- 6.
Week 9 10/21	Molecular Biology Technology Exercise 7: RNA isolation	Molecular Cloning - JoVE Prelab Quiz 7

Starting Date of week.	Activity	Assignments/Quizzes Due
Week 10 10/28	Exercise 8: Molecular Biology Tech. cDNA construction	cDNA, PCR ; Primer Design - JoVE Prelab Quiz 8
Week 11 11/4	Nov. 4th Last Day to withdraw Exercise 9: Molecular Biology Tech. qRT-PCR - Ch18.21 Agarose Gel analysis – Karp’s Ch18.17 EGFR/ERK Signaling cascade Gene and protein expression analysis	Worksheet 8 Restriction Enzymes - JoVE Prelab quiz 9,
Week 12 11/11	Exercise 10: Bioinformatics Proteins Sequence & Structure, Genes Sequence Analysis & New Primer Design	Worksheet 9
Week 13 11/18	Finish up assignments, Exam 2 Review Q/A	
Week 14 25-29	Thanksgiving Day Holiday	
Week 15 12/3	In-person section of Final Exam Online assignment - Bioinformatics	* Comprehensive Lab Report on EGFR
Finals Week Dec 9-13	No lab Have a Great Holiday Season	–