

BIOLOGY 3040: Cell Biology Laboratory

The University of Toledo
Department of Biological Sciences/Natural Sciences and Mathematics
BIOL3040, Sections 001, 002, 003 and 005

Instructor:	Deborah Chadee	Class Location:	WO1205,
Email:	deborah.chadee@utoledo.edu	Class Day/Time:	M 2:00 pm -2:50 pm
Office Hours:	M,T 10:30 am -12:00 pm	Lab Location:	WO1256 (all sections)
Office Location:	BO3099	Lab Day/Time:	Section 1: T 1:00 pm -3:50 pm
Office Phone:	419-530-5077		Section 2: T 5:00 pm -7:50 pm
Term:	Spring 2017		Section 3: W 1:00 pm -3:50 pm
			Section 5: W 10:00 am-12:50 pm
		Credit Hours:	2 Credit Hours

COURSE/CATALOG DESCRIPTION

Laboratory exercises involving cell culturing, protein analysis, protein localization, and other techniques of modern cell biology.

COURSE OVERVIEW

BIOL3040 consists of laboratory exercises involving cell culturing, protein analysis, protein localization and other techniques of modern cell biology. BIOL 3040 is a laboratory based companion course to the Cell Biology lecture course (BIOL 3030). It is not necessary to take the courses simultaneously, however you cannot take the lab course before taking the lecture course.

TEACHING ASSISTANTS:

Section 1: Yangyang Zhang WO3257 (Section 1)
Section 2: Maisha Rashid WO4262A (Section 2)
Section 3: Srimathi Kasturirangan BO3099 (Section 3)
Section 5: Sahezeel Awadia BO3090 (Section 5)

STUDENT LEARNING OUTCOMES

Students who successfully complete the course will be able to:

1. Use some of the fundamental techniques in the field of Cell/Molecular Biology and understand the basic concepts behind these techniques. This will include basic microscopy, growth of mammalian cells in culture, analysis of protein expression, cell proliferation and cell death, and signal transduction.
2. Gain fundamental experience in Cell/Molecular Biology research including: design experiments, test a hypothesis, perform experiments, collect and analyze data, and communicate experimental results.

PREREQUISITES AND COREQUISITES

BIOL 3040 is a laboratory based companion course to the Cell Biology lecture course (BIOL 3030). It is not necessary to take the courses simultaneously, however you cannot take the lab course before taking the lecture course.

REQUIRED TEXTS AND MATERIALS

There is no required textbook or lab manual, however I would recommend the Molecular Cell Biology 7th edition (Lodish et al.) textbook that is required for the Cell Biology lecture course if you do not already have it. The Cell Biology Lab course will be a web-assisted course. All lab and lecture handouts as well as protocols will be available for you to print out on the course Blackboard site prior to the Monday lecture.

UNIVERSITY POLICIES

The University is an equal opportunity educational institution. Please read [The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance](#).

ACADEMIC ACCOMODATIONS

If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the [Student Disability Services Office](#).

COURSE EXPECTATIONS

Proper preparation prior to performing an experiment is essential for the success of the experiment, whether it is in a laboratory course or in an actual research lab. Therefore, it is important for each of you to be well prepared for each lab session. Although there is no formal lab manual for this course, the laboratory procedures and some brief background material will be posted on the course Blackboard page prior to the scheduled lab sessions. You are expected to read the material, write out any notes or questions about the experiment, and outline the experimental procedure in your lab notebook. Knowing what you need to do once you get to the laboratory bench will help to maximize your time and allow you to better understand the purpose of the experiment.

Attendance and active participation in each lab session is required. The teaching assistants are present to help you with any problems you may encounter during the lab session and in analysis of your results. The TAs are not there to tell you what to do at each step of the experiment. Several of the experiments that will be performed will be carried out over a period of from 2-4 weeks, making it essential for you to attend each laboratory session.

The lecture each week will be used to review and add to the material that will be encountered in the laboratory. This is a good opportunity for any questions you may have pertaining to the laboratory experiment. In addition, two of these time periods will be used to administer quizzes during the course of the semester to assess your knowledge of the material. The quizzes will be short and should take about 15-20 minutes to complete. A final, comprehensive exam will be given during the last lecture period of the semester.

Note: Attendance at the lecture is mandatory.

During the lab session it will be important to work efficiently to complete all of the steps in a timely fashion. There will be occasions where the entire lab period will not be needed to complete all of the steps. However, there will also be occasions when you will need to come into the lab to perform steps at other times during the week. Typically, these steps should not take much time but are necessary to successfully perform these experiments. For these experiments, the TAs will schedule set times that they will be in the lab to help with any problems that may arise should you need it. In addition, the lab will be open each day so that you can come in to observe your cultures or perform any necessary steps on your own. If for some reason you or your lab partner cannot come into lab to perform these steps, please let your TA know so that it can be taken care of for you.

For each lab session, bring your lab notebook that contains your outline for that days experiment as well as a copy of the formal lab protocol. Use the notebook for writing out exactly what you did at each step, especially if it deviates from the protocol. Also use the notebook for recording data and making observations. **Be sure to write out everything you do in the lab as this will make it easier when it is time to write lab reports.**

For each laboratory session, there will be a set of questions that you are required to answer in your notebook. These questions will help you prepare for the quizzes and in writing the lab reports. It will not be necessary for you to hand in the answers to these questions, but you are expected to do your best to answer them. **The lab notebooks will be collected and graded after the final quiz.**

ACADEMIC POLICIES

Course Policy on Absences: Students are expected to attend all of the lectures and lab sessions. In the event of an unanticipated absence due to illness or emergency it is the students responsibility to provide written documentation in the form of a doctor's letter or equivalent. For anyone that has substantiated to me that they had to miss a quiz due to illness or emergency, I will work with them to create a makeup quiz. It will not be possible to make up any missed lab sessions, but legitimate excuses will not result in the loss of credit for the missed session. However, it is still the student's responsibility to obtain any data and information from your lab partner or another student in your lab section from the missed lab for inclusion in lab reports. A missed lab session is not an excuse for not including any data/information from that lab session in your lab report.

Course Policy on Cheating: You are expected to participate in all lab sessions. Although you will be working with a partner during the lab session, it is your individual responsibility to prepare for each lab as if you were performing the experiment on your own. It is also each person's responsibility to analyze their data, answer the questions, and write their own lab reports. Plagiarism of lab reports or notebooks or cheating on quizzes will not be tolerated. Students caught cheating will be given a zero for that assignment, may be given an F for the course, and all information pertaining to the incident will be forwarded to departmental, college, and university disciplinary committees. See official Departmental Policy on Academic Dishonesty at the end of the syllabus.

Academic dishonesty will not be tolerated. Please read The University's Policy Statement on Academic Dishonesty available at <http://www.utoledo.edu/dl/students/dishonesty.html>.

Academic dishonesty by students enrolled in undergraduate and graduate courses and programs offered by the Department of Biological Sciences will not be tolerated. Academic dishonesty includes but is not limited to:

1. Obtaining assistance from another individual during an examination.
2. Giving assistance to another individual during an examination.
3. The unauthorized use of study material or textbooks during an examination.
4. Changing answers on an examination after it has been returned and then submitting it for regrading.
5. Plagiarizing written assignments. Plagiarizing includes but is not limited to : a) Copying laboratory reports from previous years, b) copying or paraphrasing reports, term papers, or these prepared by other students, c) unauthorized collaboration in the preparation of reports, term papers, or theses, and d) use of another author's materials without appropriate acknowledgement through quotation and citation.
6. Attempting to bribe or otherwise induce an instructor to alter either a grade or examination score.
7. Obtaining or attempting to obtain a copy of an examination prior to its administration.

In accordance with policies presented in The Student Handbook and The University Catalog, Instructors have the responsibility and right to report cases of alleged dishonesty to departmental, college, and university administrative units. Students involved in academic dishonesty may expect to receive a grade of F on specific assignments as well as in the course where the assignment was made. In addition, disciplinary action may be recommended through appropriate college and university disciplinary committees. Please consult your instructor for instructions on the implementation of this policy.

GRADING

There will be a total of 500 points available. The breakdown is as follows:

Lab Report 1	150
Lab Report 2	150
Quiz 1	25
Quiz 2	25
Final Quiz	50
In-Lab Worksheets	40
Lab Notebook	30
Attendance/Participation	30

Quizzes

There will be 2 **short** quizzes during the semester that will be given during the lecture portion of the class. Each quiz will count as 5% (25 points) of your final grade.

Quiz 1 - (2/20) - Eukaryotic Cell/Tissue Culture, Muscle Cell Differentiation, Western Blot Analysis

Quiz 2 - (3/27) - Cell Cycle Regulation, Apoptosis; Ras-MAP Kinase pathway, Cell Transformation and soft agar assay

Lab Reports

Lab Reports must be handed in to your TA on time. 10% will be deducted for each day the report is late. Lab reports that are more than 1 week late will not be graded and you will receive a zero for that assignment.

Lab Report 1 -Due in Lab on Tues./Wed. (2/21 for Sections 1 & 2 and 2/22 for Sections 3 & 5) Muscle Cell Differentiation

Lab Report 2 – Due in Lab on Tues/Wed (4/25 for Sections 1&2 and 4/26 for Sections 3 &5)
Student's choice: Ras Transformation/ERK pathway **or** activation of the NF- κ B pathway

GRADING SCALE:

Grade equivalents will be assigned as follows: This scale is based on the assumption that knowledge of 50% of the material is needed to pass this course.

<u>% of available marks</u>	<u>Grade</u>	<u>Standard</u>
90-100	A	Achievement of outstanding quality
88-89	A-	Achievement of slightly less than outstanding quality
85-87	B+	Achievement of slightly more than high quality
74-84	B	Achievement of high quality
71-73	B-	Achievement of slightly less than high quality
69-70	C+	Work of slightly more than acceptable quality
62-68	C	Work of acceptable quality
60-61	C-	Work of slightly less than acceptable quality
58-59	D+	Work slightly above the quality expected
52-57	D	Work below the quality expected
50-51	D-	Work slightly below the quality expected

LECTURE SCHEDULE

- 1/9 Introduction to Cell Culture and Muscle Cell Differentiation
- 1/16 **No Lecture – Martin Luther King Day**
- 1/23 Cryopreservation of Cells
- 1/30 Cell Lysis, SDS/PAGE and Western Blot Analysis
- 2/6 Writing Lab Reports
- 2/13 Cell Cycle Regulation
- 2/20 **Quiz 1**
- 2/27 Apoptosis
- 3/6 **Spring Break – No Lecture/Lab**
- 3/13 Cellular Transformation and Assays for Transformation
- 3/20 No Lecture
- 3/27 **Quiz 2**
- 4/3 Stress-activated signal transduction/Activation of the NF- κ B Pathway
- 4/10 No Lecture
- 4/17 TBA
- 4/24 **Lab Final Quiz**
- 5/1 Final Exam week - No Lecture/Lab

LABORATORY EXPERIMENT SCHEDULE

1/10-11	Week 1- Introduction to mammalian cell culture. How to split and count cells.
1/17-18	Week 2- Culture of mammalian cells-differentiation of muscle cells
1/24-25	Week 3- Preparation of whole cell extracts from muscle cells/Bradford assay
1/31-2/1	Week 4- Begin Western blot analysis on muscle-specific protein (run gel and transfer)
2/7-8	Week 5- Finish Western blot analysis (probe membrane)
2/14-15	Week 6- Cell cycle and chromosome staining
2/21-22	Week 7- Cell cycle and chromosome staining/ Lab reports due
2/28-3/1	Week 8- Apoptosis
3/7-8	Week 9- No Lab-Spring Break
3/14-15	Week 10- Ras-mediated cellular transformation/Invasion assay
3/21-22	Week 11- Ras-mediated cellular transformation/Invasion assay
3/28-29	Week 12- Invasion assay/Phospho-ERK Western blot analysis
4/4-5	Week 13- Activation of the NF- κ B pathway
4/11-12	Week 14-Activation of the NF- κ B pathway
4/18-19	Week 15-Activation of the NF- κ B pathway
4/25-26	Week 16- Finish NF- κ B lab/ Lab reports due
5/2-3	Week 16-Final Exam Week-No Lab