

Lab sections

List of Prerequisites

The prerequisites for this course are Biology 2290F/G, Biochemistry 2280A; a minimum mark of 70% in Biology 2382A/B.

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Advisors) to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

2 Instructor and Contact Information

Instructor:

Y

(mcourch4@uwo.ca), and

Laboratory Technician:

Students must use their Western (@uwo.ca) email addresses and include Bio3326 in the subject line when contacting their instructor or TAs.

3 Course Syllabus, Schedule, Delivery Mode

Course description: Biology 3326F/G is a laboratory course which provides hand-on training in current cell biological methods such as animal cell culture, microscopy, karyotype analysis, PCR, SDS-PAGE, fluorescence staining of cellular organelles, and bioimaging. A discovery-based component of this course focuses on application of the mentioned methods to study changes in protein expression and cytoskeleton organization in cells exposed to microenvironmental stress stimuli.

Course Content and Learning Outcomes: The work in this course is divided into two modules, outlined below. **The first module** is intended to give students an understanding of and experience with the basic animal cell culture techniques and cell line characterization and authentication. **The second module** is

based on application of SDS-PAGE and fluorescence microscopy methods to study protein expression and remodeling of cytoskeleton systems in cultured cells in response to microenvironmental stress stimuli. The major training objectives are:

Module I. Basics of Animal Cell Culture: • Examining the microscope potential (upright vs inverted; magnification; numerical aperture; resolution; field of view; working distance) • Proper alignment of a bright-field light microscope (Köhler illumination) and a phase contrast microscope • Identification of cells and cellular components on slides and in cell culture flasks • Harvesting methods for adherent cell lines • Cell counts using hemacytometer • Cell density and confluency • Test for cell viability • Monitoring morphology of animal cells in culture • Bioimaging using an inverted microscope • Chromosome spreads from monolayer cultures • Staining procedure for chromosome spreads with Giemsa • Karyotype analysis of a cell line • Modal number of chromosomes and heteroploidy • Genetic instability in cell culture • Genomic DNA isolation • PCR assay for identifying cell lines • Agarose gel electrophoresis.

Module II. Cell Stress Biology and Bioimaging: • Preparation of cell lysates using RIPA buffer • Spectrophotometrical determination of protein concentration using Bradford assay • SDS-PAGE • Staining proteins in gels using Coomassie blue • Gel analysis using ImageLab software (Bio-Rad) • Fluorescence microscopy • Fluorochromes • Fluorescence microscope operation • Image capture • Direct fluorescence staining of actin microfilaments with phalloidin • Preparation of slides for fluorescence microscopy • Fixation procedure • Monoclonal and polyclonal antibody • Primary and secondary antibody • Indirect immunofluorescence staining • Blocking solution • Observation of microfilament, microtubules and intermediate filament modifications in response to stress stimuli • Bioimaging using fluorescence microscope • Northern Eclipse and ImageJ software.

By the end of the course, successful students will be able to:

Demonstrate a knowledge of animal cell culture models in cell biology.

Perform animal cell line characterization using regular light, inverted and fluorescence microscopy, karyotyping, SDS-PAGE, and PCR assay.

Isolate and quantify genomic DNA and proteins in animal cells.

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Lectures/Tutorials Schedule:

We will discuss the results collected in the lab, statistics, software for data analysis, assignment requirements, and upcoming lab classes.

Weeks	Dates (Tuesdays)	Tutorial topics
		Orientation and the first lab overview
		Animal cell culture methods
		Authentication of animal cell lines. Karyotype analysis
		Basics of PCR
		Midterm paper discussion
		In-class Test #1
		SDS-PAGE and protein analysis
		Methods of fluorescence staining in cell biology
		Data analysis; ImageJ
		Poster project requirements
		In-class Test #2
		Student's questions

Laboratory Schedule:

Weeks	Dates (Wed/Thu)	Laboratory classes
		Light microscopy in cell biology
		Animal cell culture methods (trypsinization, cell cou

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Contingency plan: Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will **not** change. Any assessments affected will be conducted online as determined by the course instructor.

4. Course Materials

Required materials from the Book Store at Western:

1. Student laboratory manual "**Biology 3326F/G Cell Biology Laboratory**", version 2021-22, # M12141.

Additional readings (available on reserve in the Taylor Library):

1. Freshney, R.I. (2016) **Culture of animal cells: a manual of basic technique and special**

5. Methods of Evaluation

Click [here](#) for a detailed and comprehensive set of policies and regulations concerning examinations and grading. The table below outlines the University-wide grade descriptors.

A+	90-100	One could scarcely expect better from a student at this level
A	80-89	Superior work which is clearly above average
B	70-79	Good work, meeting all requirements, and eminently satisfactory
C	60-69	Competent work, meeting requirements
D	50-59	Fair work, minimally acceptable
F	below 50	Fail

The overall course grade - **out of 100**- will be calculated as listed below.

Component	Notes	Value
Class participation	Based on tutorial attendance (1 point) and lab work (4 points)	5
Lab notebook	Marked 2 times by TAs (Module I and Module II)	15
Module tests	Two in-class tests (40 min), mixed questions [REDACTED]	25
Midterm assignment	Written report [REDACTED]	30
Poster Project	Final poster presentations [REDACTED]	25

Class Participation

Class participation includes tutorial attendance (1 point) and lab participation (4 points). Records of tutorial attendance will be taken during each session. The lab participation will be evaluated by your

(c) **All raw data must be entered in the notebook.** There will be some breaks between exercises in the lab; use them to enter all required information in your notebook. Tape in all images you collect. Also use OWL to save files with raw data, images, and other relevant materials.

(d) Lab notebooks should be sufficiently complete to allow any laboratory-literate person to duplicate your experiments and analyses. When it comes time to prepare yo

Poster Project

BIO3326F/G posters are group projects of 3-4 students usually working on the **same lab bench**. The electronic version of posters (no hard copies) will be presented as a teamwork by group members during special sessions [REDACTED].

The poster project will be based on the results of your lab work over the module II including effects of

9. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. If you have any questions regarding accommodations, you may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

Learning-skills counsellors at the Student Development Centre (<https://learning.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of

2. Make it a daily habit to log onto OWL to ensure you have seen everything posted to help you succeed in this class.
3. Take notes as you go through the lecture/tutorial material. Keeping handwritten notes or even notes on a regular Word document will help you learn effectively.
4. Connect with others. Try forming an online study group and try meeting on a weekly basis for study and peer support.
5. Do not be afraid to ask questions. If you are struggling with a topic, check the online discussion Forums or contact your instructor and or teaching assistant.
6. Reward yourself for successes. It seems easier to motivate ourselves knowing that there is something waiting for us at the end of the task.
7. Take advantage of office hours with your instructor.

11. Equal Opportunity and Evaluation Policy