Western Science

Department of Biology

Biology 3326G (Cell Biology Laboratory)

1. General Course Information

Course Information

Biology 3326G (Cell Biology Laboratory), Winter 2022

Lectures/Tutorials Tuesdays, 9:30am-10:30 am, online zoom synchronous

Labs section 002 (Tuesdays), section 003 (Wednesdays), section 004 (Thursdays), BGS-3077 or virtual synchronous labs, 1:30pm-5:30 pm

All zoom sessions related to this course are at https://westernuniversity.zoom.us/j/91619773158

List of Prerequisites

Unless you have either the prerequisites for this course or written special permission from your Dean 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. The prerequisites for this course are Biology 2290F/G, Biochemistry 2280A; a minimum mark of 70% in Biology 2382A/B.

2. Instructor and Contact Information

Instructor: Dr. Alexander Timoshenko

Office hours: Tuesdays, 11:00 am to 12:00 (noon), zoom sessions at https://westernuniversity.zoom.us/j/91619773158

Tel.: 519-661-2111 ex. 88900, E-mail: atimoshe@uwo.ca

Technical requirements to join zoom sessions (office hours, tutorials, virtual labs, and poster presentations) and to take online tests and quizzes:

Stable internet connection	Laptop or computer
Working microphone	Working webcam

Teaching Assistants: Joshua Frank (jfrank22@uwo.ca), Rada Tazhitdinova (rtazhitd@uwo.ca), and Ryley Yost (ryost@uwo.ca).

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

3. Course delivery and assessment with respect to the COVID-19 pandemic

Although the intent is for this course to be delivered in-person to the extent possible, the changing COVID-19 landscape may necessitate some or all of the course to be delivered online, either

synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience), as deemed most appropriate by the instructor. The grading scheme will **not** change. Any assessments affected will be conducted online as determined by the course instructor.

When deemed necessary, tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledging that you will be required to provide personal information (including some biometric data) and that the session will be recorded. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at: https://remoteproctoring.uwo.ca

4. 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.

5. Course Content and Student 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 identification. **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 hemocytometer • 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 and DAPI • 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 from 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 • Observation of microfilament modifications in response to stress stimuli and interpretation of these data • Bioimaging using fluorescence microscope • Nothern 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.
- ☒ Run horizontal and vertical electrophoresis to analyze biological molecules.

- ☒ Prepare chromosome spreads, stain chromosomes, and analyze cell karyotype.
- ☒ Stain the cytoskeleton and cell nucleus using fluorescent probes.
- ☒ Operate with inverted and fluorescence microscopes and perform bioimaging of live and stained animal cells.
- ☒ Understand the complexity and nature of the cell cytoskeleton and its remodeling under stress conditions.
- ☒ Analyze data using professional software such as ImageLab and ImageJ.
- ☒ Organize and analyse research projects by formulating hypotheses for each laboratory experiment and providing an interpretation of collected data in laboratory notebooks.
- ☒ Demonstrate competence with reading primary research articles, scientific writing, data assessment, and critical thinking by reporting their experimental results in a form of research paper manuscript and poster presentation.
- ☒ Develop good teamwork habits by working in pairs and discussing the results with lab partners and in the class.

6. Course Materials

Required materials from the Book Store at Western:

1. Life Sciences Student Lab Notebook (ISBN: 9781930882355, Publisher: Hayden-McNeil)
2. 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 specialized applications, Seventh Edition**, Willey-Blackwell. (Call No. QS525.F885c 2016). This textbook is also available online.
2. Lodish, H., et al. (2016) **Molecular Cell Biology, 8th Edition,** W.H. Freeman and Company, NY (**Chapter 4,** sections 4.1, 4.2; **Chapters: 8**, sections 8.5, 8.6; **Chapters 17**, **18**).
3. Alberts, B. et al. (2015) **Molecular Biology of The Cell, 6th Edition,** Garland Science, NY. (Call No. QH581.2.M64 2015).
4. Knisely, K. (2013) **A Student Handbook for Writing in Biology, 4th Edition**, Sinauer Associates (Call No. QH304.K59 2013). (This textbook is also available in the Book Store at Western).

Lecture notes, lab results, assignments, and grades will be available through OWL.
Any changes will be indicated on the OWL site and discussed with the class. Students should check OWL (http://owl.uwo.ca) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. If students need assistance, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800. Google Chrome or Mozilla Firefox are the preferred browsers to optimally use OWL; update your browsers frequently.

Copyright and Audio/Video Recording Statement
Course material produced by faculty is copyrighted and to reproduce this material for any purposes other than your own educational use contravenes Canadian Copyright Laws. You must always ask permission to record another individual and you should never share or distribute recordings.

7. Lectures/Tutorials Information

Lectures/Tutorials will be held on Tuesdays as online synchronous zoom sessions, 9:30-10:30am, at https://westernuniversity.zoom.us/j/91619773158 . 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
Week 1	January 11	Orientation and the course overview
Week 2	January 18	Microscopy in cell biology
Week 3	January 25	Authentication of animal cell lines (karyotype and PCR)
Week 4	February 1	Animal cell culture methods
Week 5	February 8	Data analysis and Midterm paper requirements
Week 6	February 15	In-class online Test #1
Week 7	**February 22**	**Reading Week, no classes**
Week 8	March 1	Animal cell lysis and protein assay
Week 9	March 8	SDS-PAGE; ImageLab
Week 10	March 15	Methods of fluorescence staining in cell biology
Week 11	March 22	Data analysis; ImageJ
Week 12	March 29	In-class online Test #2
Week 13	April 5	TBA

8. Laboratory Schedule and Rules

Lab classes (4 h) are held on Tuesdays, Wednesdays, and Thursdays in **B&GS 3077**, 1:30-5:30 pm depending on the laboratory section. *Due to covid restrictions week 1 to week 3 labs will be online.*

Weeks	Dates (Tue/Wed/Thu)	Laboratory classes
Week 1	*January 11/12/13*	*Orientation (virtual lab)*
Week 2	*January 18/19/20*	*Basics of light microscopy (virtual lab)*
Week 3	*January 25/26/27*	*Karyotype analysis and Chi-square statistics (virtual lab)*
Week 4	February 1/2/3	Animal cell culture methods (trypsinization, cell counts, viability assay)
Week 5	February 8/9/10	Genomic DNA isolation and PCR
Week 6	February 15/16/17	Agarose gel electrophoresis and gel imaging (ImageLab intro)
Week 7	**February 22/23/24**	**Reading Week, no classes**
Week 8	March 1/2/3	Quantification of total proteins in animal cell lysates
Week 9	March 8/9/10	SDS-PAGE, protein staining and quantification on gels
Week 10	March 15/16/17	Rotation labs: Fluorescence staining and microscopy (the actin cytoskeleton and nuclei; bioimaging)
Week 11	March 22/23/24	
Week 12	March 29/30/31	Data analysis and poster project discussion
Week 13	April 5/6/7	Virtual Poster Presentations

Student Responsibilities and General Conduct

All persons working in a laboratory are required to follow the Western University Safety Policy:

1. Laboratory dress code (shirt, long pants, socks and close-toed shoes).
2. Proper lab attire including safety glasses and lab coats.
3. Disposable gloves are to be worn in the laboratory.
4. Triple layer, non-medical, paper masks are to be worn at all times in the classroom.
5. No food or drinks are allowed in the laboratory.

To maintain social distancing and covid-19 restrictions (50% lab occupancy), students will be working individually in the teaching lab on a rotation basis (2/2 h weekly or 4 h biweekly models). However, elements of teamwork will be introduced for online data analysis and preparation of assignments.

9. 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 specified below.

Component	Notes	Value
Class participation	Based on tutorial attendance (1 point) and lab work (4 points)	**5**
Microscopy quiz	In-lab, January 18, 19, 20	**4**
*Lab notebook	Marked 2 times by TAs (Module I and Module II)	**12**
Module online tests	Two in-class tests (40 min), 20 multiple-choice questions each time, Tuesdays: February 15 and March 29	**24**
*Midterm assignment	Written report due Friday, March 4	**30**
*Poster Project	Final presentations in this class, April 5/6/7	**25**

* An Essential Requirement of this course (SRA are not applied to these components of the course).

Class Participation

Class participation includes tutorial attendance (1 point) and lab participation (4 points). Electronic records of tutorial attendance will be taken during each zoom session. The lab participation will be evaluated by your TAs and the average grade will be submitted to the instructor based on following four grading criteria, each is worth of 1 point:

1. **Lab Safety** (lab coat, safety glasses, long pants, socks and close-toed shoes, confine long hairs, no food/drinks in the lab).
2. **Punctuality and Readiness** (late to class, no labnotebook, did not read lab notes).

3. **Performance and Professionalism** (extra time, not doing right, proper labelling on slides, fail to clean lab benches, accuracy of lab reports, teamwork, cell phones, inappropriate behaviour).
4. **Engagement** (knowledge of protocols and workflow, proactive contribution, offering ideas, enthusiasm, ask appropriate questions).

Microscopy quiz

The quiz (4% of your final grade) will include 5 questions to answer via the "Tests & Quizzes" tab on OWL by the end of your week-2 online lab. Some questions may need calculations. The test will be opened for a **1 hour window period, 4:30pm to 5:30pm EST,** and have to be completed within 20 minutes. The purpose of this quiz is to assess your understanding of the material you studied in the virtual laboratory covering basics of light microscopy.

Lab Notebook

Complete and accurate record keeping is one of the most important elements in any piece of laboratory work. There are many acceptable forms of record keeping, depending on the nature of the study. In this course, you will be required to use *Life Sciences Student Lab Notebook* (ISBN: 9781930882355, Publisher: Hayden-McNeil). Your notebook **must** be with you whenever you are in the lab. Here are a few guidelines to keep in mind:

(a) Make entries in the notebook **as and when** you do things. Do not transcribe records for the sole purpose of making the book "look neat". It is important to note exactly what you did.

(b) The notebook should contain everything that is relevant to your project including literature, methods, protocols, images, etc. Keep notes or copies of your literature searches, relevant papers, ideas for solving problems in your lab notebook.

(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.

(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 your manuscript and poster presentation, your lab notebook will be your primary source of information.

The lab notebooks will be checked 2 times by TAs. The grades will be averaged and contribute to **12%** of your final grade. Grade zero will be assigned for each missing submission because we expect that you consistently take care about records in your lab notebook. The following **Lab Notebook Markers** will apply:

1. TOC, pages and entries dated (1 point).
2. Purpose of experiment, hypothesis (1 point).
3. Experimental procedure, protocols (1 point).
4. Raw data, drawings, photos, calculations, etc (5 points).
5. Interpretation, ideas (2 points).
6. Overall clarity and readability of your records (2 points).

Module online tests

Two multiple-choice-question online tests (12 points each based on 20 multiple-choice questions format) will be given during tutorial time window via the "Tests & Quizzes" tab on OWL at the end of each lab module. The length of each test is 40 min. Test #1 (Tuesday, February 15) will cover module I

(microscopy, animal cell culture, karyotyping, PCR) and Test #2 (Tuesday, March 29) will cover module II (SDS-PAGE, cytoskeleton, fluorescence microscopy, cell staining and bioimaging).

Midterm Assignment

Bio3326F assignments are designed to introduce you to scientific writing and to provide you with proper understanding of formal requirements to **research paper manuscripts** for scientific journals. The assignments will be based on your original experimental results obtained in the module I of the lab course (i.e. animal cell culture, PCR, and karyotype of animal cell lines) and their critical analysis using the literature data. The midterm assignments are allowed to be prepared by two students, who can share their results, implying that the same grade will be applied to co-authors. We expect that such format will encourage the teamwork and discussion of the collected data. The midterm assignment is to be organized as a formal manuscript for **The Journal of Cell Biology** as per the Instructions to Authors of this journal (separate handout) and must be submitted by Friday, March 4, 11:50pm as an electronic copy on OWL (late submissions will be penalized at a rate of 5% per day).

Poster Project

BIO3326F/G posters are group projects of 3-4 students working with same stress stimuli. The electronic version of posters (no hard copies) will be presented as a team work to the class by group members during special zoom sessions covering lab hours (1:30-5:30pm) on April 5/6/7. The poster project will be based on the results of your lab work over the module II including effects of stress on protein expression (SDS-PAGE) and on the actin cytoskeleton in cultured cells. The poster presentations will be your final report in this class. **Please note that the PowerPoint file of your poster should be submitted on OWL one day in advance of your presentation, i.e. by 1:30pm on the preceding day.** The peer evaluation may change the portion of your poster group mark by up to 10%. A separate handout provides you with the guidelines and instructions for the preparation and peer evaluation of BIO3326F/G Poster.

Missed Course Components

Attendance in the lab and completion of all lab exercises is mandatory. If you miss a lab class due to a valid reason confirmed by the Dean's office, your average grade will be applied to that class and the case will be dealt with on an individual basis. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. If you do not have the confirmation from Dean's office, there will be 5% deduction from your final mark (i.e. 1 unexcused absence results in a maximum possible final grade of 95%).

Tutorial attendance is mandatory and attendance will be taken. There will be a deduction of 5% from the final tutorial mark for each unexcused absence.

Late submissions of take-home assignment will be penalized at a rate of 5% per day (including the weekend) until the percentage of the assignment is used up.

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible.

10. Accommodation and Accessibility

Accommodation Policies
Students with disabilities work with Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The Academic Accommodation for Students with Disabilities policy can be found at: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf

Academic Consideration for Student Absence
Students will have up to two (2) opportunities during the regular academic year to use an on-line portal to self-report an absence during the semester, provided the following conditions are met: the absence is no more than 48 hours in duration, and the assessment for which consideration is being sought is worth 30% or less of the student's final grade. Students are expected to contact their instructors within 24 hours of the end of the period of the self-reported absence, unless noted on the syllabus. Students are not able to use the self-reporting option in the following circumstances:

- ☒ for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- ☒ absence of a duration greater than 48 hours
- ☒ assessments worth more than 30% of the student's final grade
- ☒ if a student has already used the self-reporting portal twice during the academic year

If the conditions for a Self-Reported Absence are *not* met, students will need to provide a Student Medical Certificate if the absence is medical or to provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs, see: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf, and for the Student Medical Certificate (SMC), see: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

Religious Accommodation
Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the Western Multicultural Calendar: https://multiculturalcalendar.com/ecal/index.php?s=c-univwo

Multiple Exam Situation
You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

11. Academic Policies and Statements

The website for Registrar Services is http://www.registrar.uwo.ca.

In accordance with policy, http://www.uwo.ca/its/identity/activatenonstudent.html, the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Turnitin ***aids*** in identifying plagiarism. All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (http://www.turnitin.com).

Completion of this course will require you to have a reliable internet connection and a device that meets the system requirements for Zoom. Information about the system requirements are available at the following link: https://support.zoom.us/hc/en-us . Please note that Zoom servers are located outside Canada. If you would prefer to use only your first name or a nickname to login to Zoom, please provide this information to the instructor in advance of the test or examination.

Professionalism & Privacy
Western students are expected to follow the Student Code of Conduct. Additionally, the following expectations and professional conduct apply to this course:

- ☒ Students are expected to be professional and scholarly in all online postings. Use proper grammar and spelling. Cite the ideas of others appropriately.
- ☒ All course materials created by the instructor are copyrighted and cannot be sold/shared
- ☒ Recordings are not permitted (audio or video) without explicit permission
- ☒ Permitted recordings are not to be distributed
- ☒ Students will be expected to take an academic integrity pledge before some assessments
- ☒ All recorded sessions will remain within the course site or unlisted if streamed

12. Support Services

The policy on Accommodation for Students with Disabilities can be found here: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf
The policy on Accommodation for Religious Holidays can be found here:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

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

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. You may also wish to contact Student Accessibility Services (SAS) at 661-2147 if you have any questions regarding accommodations.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: https://www.uwo.ca/se/digital/.

Learning-skills counsellors at the Student Development Centre (http://www.sdc.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice 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.

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

Additional student-run support services are offered by the USC, http://westernusc.ca/services.

The following links provide additional information about support services at Western University.
Academic Counselling (Science and Basic Medical Sciences)
Appeal Procedures
Registrarial Services
Student Development Services
Student Health Services

13. How to Be Successful in This Class?

Students enrolled in this class should understand the level of autonomy and self-discipline required to be successful outside the lab hours:

1. Invest in a planner or application to keep track of your courses. Populate all deadlines at the start of the term and schedule time at the start of each week to get organized and manage your time.
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 advantages of the zoom office hours with your instructor on Tuesdays.

14. Equal Opportunity and Evaluation Policy

All individuals involved in the offering of Biology 3326F/G were, at one time, undergraduate students themselves. Accordingly, your professor and your teaching assistants thoroughly understand the importance of course grades and the hard work that you will invest into this course. They are there to help you achieve your goals. We want you to do well in the course, but we also have to be fair. The university is committed to academic integrity and has high ethical and moral standards. All students will be treated equally and evaluated using the criteria presented in this course outline and their respective weights. The evaluation criteria are based strictly on actual achievement, not on effort or how hard the student tried. Claims of an excellent academic history, of attendance in the course components, or of personal issues (family, relationship, financial, etc.) cannot be used to justify a higher grade in the course because they are not criteria for evaluation. There is no extra work available for extra credit or to "make up" another grade. We do not offer any extra assignments, essays, or other work of any kind to any student. The requirement for a higher grade in order to, for example, maintain a scholarship, enter a program, or obtain a higher GPA for various reasons, is not a justifiable reason for increasing your grade. If we increased or "bumped" your grade (*i.e.* gave you a grade that you did not legitimately earn), it would be unfair to the other students and also a great disservice to the scholarships and programs who are evaluating all students on the basis of their grades.

15. Land acknowledgment

We acknowledge that Western University is located on the traditional lands of the Anishinaabek, Haudenosaunee, Lūnaapéewak and Attawandaron peoples, on lands connected with the London Township and Sombra Treaties of 1796 and the Dish with One Spoon Covenant Wampum. This land continues to be home to diverse Indigenous peoples (e.g. First Nations, Métis and Inuit) whom we recognize as contemporary stewards of the land and vital contributors of our society.

16. Funding acknowledgement

This course is supported by the Science Student Donation Fund. If you are a BSc or BMSc student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing the online form linked from the Faculty of Science's Academic Counselling site. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the Chair of the Department or email the Science Students' Council at ssc@uwo.ca.

17. University ground rules on COVID

Masking Guidelines

Students will be expected to wear triple layer, non-medical, paper masks at all times in the classroom as per University policy and public health directives. Students who are unable to wear a mask must seek formal accommodation through Western Accessible Education, and present medical documentation.

Students are not permitted to eat or drink while in class to ensure masks stay in place. Students will be able to eat and drink outside of the classroom during scheduled breaks. Students unwilling to wear a mask as stipulated by Western policy and public health directives will be referred to the Dean, and such actions will be considered a violation of the student Code of Conduct.

Course Absences due to Daily COVID Screening Questionnaire

Missed assessments (e.g., presentations, essays, quizzes, tests, midterms, etc.) require formal academic considerations (typically self-reported absences and/or academic counselling). Methods for dealing with missed work and course content are at the discretion of the instructor(s). Students should be aware that some learning outcomes cannot be easily made up and may need to be completed in a subsequent year. Your instructor will provide you with further information as to how this applies within this course. Students who demonstrate a pattern of routinely missing coursework due to self-reported COVID symptoms, and therefore do not demonstrate mastery of the learning outcomes of the course, will not receive credit for the course.

Contingency plan for an in-person class pivoting to 100% online learning

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will not change. Any remaining assessments will also be conducted online as determined by the course instructor. In the event that online learning is required, a stable internet connection with working microphone and webcam will be required. As has been the case in the past, the decision to pivot to online learning will be made by Western, and not individual instructors or departments (excepting temporary online instruction in the event of instructor illness).

Good Luck with your Studies!