

Biology 3355A (Molecular Cell Biology of Stress)

1. General Course Information

Course Information

Biology 3355A (Molecular Cell Biology of Stress), **Fall 2023**

List of Prerequisites

The prerequisite for this course is Biology 2382B (Cell Biology).

Unless you have either the requisites 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.

2. Instructor and Contact Information

Instructor: Dr. Alexander Timoshenko

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

Students must use their Western (@uwo.ca) email addresses and include Bio3355 in the subject line when contacting their instructor or TAs.

3. Course Syllabus, Schedule, Delivery Mode

Course Description and Learning Outcomes: Biology 3355A is an advanced course in cell biology. This course will cover a range of environmental, physiological, and pathological stresses common to animal cells. The focus will be on evolutionarily conserved cell stress responses, individual signaling pathways and the molecules controlling the action of specific stress stimuli. The lecture topics may be adjusted to reflect current progress or to introduce new and exciting developments in the field.

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

- ☒ Describe signaling processes underlying heat shock response, endoplasmic reticulum stress and unfolded protein responses, oxidative stress, hypoxic stress, osmotic stress, metal stress, inflammatory stress, DNA damage response, and nucleolar stress.
- ☒ Understand the structure and properties of stress-related transcription factors and discuss molecular mechanisms of their activation in mammalian cells.
- ☒ Apply the knowledge of cell stress biology to discuss and explain biological principles of some human diseases.
- ☒ Describe the experimental methods used to study cellular stress responses and understand how to apply these methods in cell biology laboratories.
- ☒ Develop and practice their presentation skills by performing the oral presentation of novel concepts, current methodology and techniques in cell stress biology and reviewing primary articles published in scientific journals (tutorial component).
- ☒ Demonstrate competence with scientific writing and critical thinking by preparing a midterm assignment on transcription factors and miRNAs using available bioinformatics online tools.

Anticipated Lecture Topics: Unit 1: Introduction; Unit 2: Heat shock response; Unit 3: Unfolded protein response; Unit 4: Hypoxic stress; Unit 5: Oxidative stress; Unit 6. Stress and redox regulation; Unit 7: MicroRNAs in stress responses; Unit 8: Bioinformatics tools for THA; Unit 9: Osmotic stress ; Unit 10: Metal stress; Unit 11: Inflammatory stress; Unit 12: Genotoxic stress; Unit 13: Nucleolar stress; Unit 14: Glycobiology of cellular stress responses; Guest lectures.

Tutorial Schedule: The tutorials will be hosted and run in-person by our Teaching Assistants. You have registered into one of 4 tutorial sections of 30 students where you will attend a tutorial about every other week. Tutorial sections 002 & 003 will alternate weeks with sections 004 & 005. An explanation of tutorial rotation dates and presentation expectations will be given during your first orientation tutorial session.

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

There is no specific textbook assigned to this course. The list of recommended readings (links to primary and review scientific articles), lecture handouts, announcements, tutorial assignments, and other important course information, will be posted on OWL: <http://owl.uwo.ca>. Any changes will be indicated on the OWL site and discussed with the class. Students should check OWL (<http://owl.uwo.ca>) regularly 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 with assessing course materials, they can seek support on the [OWL Help page](#) or, alternatively, can contact the [Western Technology Services Helpdesk](#) by phone at 519-661-3800 or ext. 83800.

As additional resources, students may consider the following textbooks related to some course topics and activities:

1. Lodish et al. (2021) Molecular Cell Biology, 9th Edition, Austin, Macmillian Learning.
2. Alberts et al. (2015) Molecular Biology of the Cell, 6th Edition, New York, Garland Science.
3. Knisely, K. (2021) A Student Handbook for Writing in Biology, 6th Edition, Macmillian Learning.

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 and available lecture handouts.

Technical Requirements: When offered in online mode all students must have access to a stable internet connection, and a computer with a working microphone and/or webcam. During in-person learning it is highly recommended that students bring a portable computer that can be used for in-class learning and reporting activities.

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 specified below:

| Component | Notes | Value |
|------------------------|--|-------|
| Take-home assignment | OWL submission | 12 |
| Tutorial presentation | Individually scheduled | 15 |
| Tutorial participation | Individual Reports and Attendance | 5 |
| Midterm Test 1 | 45 min, in-class | 15 |
| Midterm Test 2 | 45 min, in-class | 15 |
| Final Exam | TBA and scheduled by the Office of the Registrar (2 h) | 38 |

Take-home assignment

A short-written assignment will be based on a bioinformatics search and analysis of regulatory factors of stress-related genes using available online tools and resources (GeneGards, Harmonizome, and Diana Tools). The purpose of this assignment is to identify and describe tentative **transcription factors** and **miRNAs** that can be involved in transcriptional and post-transcriptional regulation of your gene-of-interest. You will be responsible for selecting a stress-sensitive gene for your analysis. All assignments must be done individually and be submitted as an electronic copy on OWL.

- All assignments are due at 11:55 pm EST unless otherwise specified
- Written assignments will be submitted to Turnitin (statement in policies below)
- Students will have unlimited submissions to Turnitin
- Rubrics will be used to evaluate assignments and will be posted with the instructions
- Late submissions will be penalized at a rate of 5% per day (including the weekend) until the percentage of the assignment is used up

Tutorial information

In groups of two, students are required to select one primary research article from a peer-reviewed journal to present during tutorial sessions. The PowerPoint presentation (12 min and 3 min Q&A) is intended to broaden your knowledge of animal and human cell stress biology and to provide students with the opportunity to develop their oral presentation skills. The purpose of the presentation is to convey novel concepts or findings in cellular responses to microenvironmental stress, current methodology and techniques, and their application in a specific situation. The presentation is not intended to be a critique of the paper.

Students may only attend the tutorial section in which they are registered unless special permission has been granted by the instructor. **Tutorial attendance** will be taken and contribute to your final grade (max 5 points). The tutorial participation grade will be proportionally adjusted for any unexcused absence in tutorials. Tutorial participation implies submission of **individual reports** to Teaching Assistants or Instructor by the end of each tutorial summarizing your brief reflection to the presentations, which should indicate one interesting fact that you learned from each presentation.

Midterm tests and final exam

There will be two in-class midterm tests, each covering five lectures. There will only be one make-up for each midterm test on **Monday, the next week**. The final exam will be cumulative. Midterm tests and the final exam will have the same format and be based on a combination of multiple-choice questions and short answers.

6. Student Absences

If a student misses both the midterm test and the makeup with a valid excuse from your Faculty Academic Counselling, its weight will be transferred to the final exam (15+38 or 30+38).

Tutorial attendance is mandatory, and attendance will be taken. There will be a corresponding deduction from the final tutorial participation mark for each unexcused absence (1 point per tutorial).

There will be no make-ups or re-weights for missing tutorial presentations, which are pre-scheduled, unless with a valid excuse from your Faculty Academic Counselling.

Late submissions of the 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, please follow the procedures below.

Assessments worth less than 10% of the overall course grade: For work worth less than 10% of the total course grade, the instructor is empowered to grant academic considerations without referring the student to their academic counsellors.

Assessments worth 10% or more of the overall course grade: For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at

https://uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration.pdf.

The Student Medical Certificate is available at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

Students should 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.

Absences from Final Examinations: If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a make-up Final Exam). You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period). If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under [Special Examinations](#)).

7. Accommodation and Accessibility

Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at <https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

Accommodation Policies

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

8. Academic Policies

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.

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>).

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

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, 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.

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/>.

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

10. 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 of the class 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 office hours with your instructor.

11. Equal Opportunity and Evaluation Policy

All individuals involved in the offering of Biology 3355A 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.

12. 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.

Good Luck with your Studies!