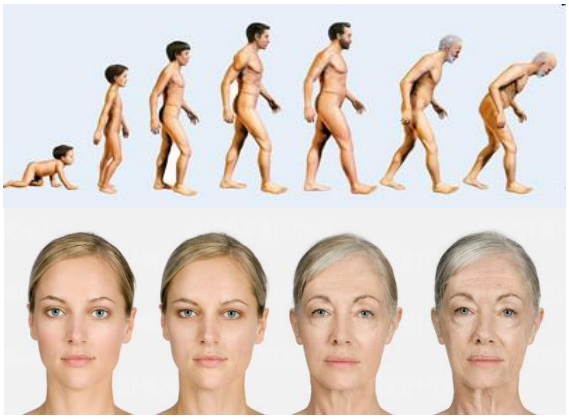

Bio 4355F: The Biology of Aging: Cellular and Molecular Aspects 2024 Syllabus

Instructor: Robert Cumming
Email: rcummin5@uwo.ca
Students must use their Western (@uwo.ca) email addresses when contacting instructor.
Office Hours: Tuesdays 3:30-4:30 pm, or upon email request. Location BGS 3078

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Prerequisites: Biology 3316A or Biology 3596 and enrolment in year 4 of an Honors Specialization module offered through the Department of Biology.
Completion of one of the following courses is recommended: Biology 3595A, Biology 3597B, Biology 3338A, Biology 3592A.

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.

Mode of delivery

The course will be delivered in person. Powerpoint lecture slides will also be posted in advance of each lecture. It is expected that students will attend every class, particularly as a participation component is included in evaluation (see below).

Course Description

From the moment we are born we start the process of dying. Every living organism faces the inevitable fate of aging. Humans have long questioned what is aging, why does it happen and how does it occur? Aging is an extremely complex multifactoral process that is governed by genetic, epigenetic, cellular, environmental and lifestyle factors. Multiple theories abound but no single universal theory fully explains the aging process. This course will examine concepts on aging primarily from a cellular and molecular perspective.

Learning Outcomes

Upon completion of the course students are expected to have gained an understanding of the molecular mechanisms that contribute to aging and disease. Students will also gain knowledge on the fundamentals of many cell and molecular techniques that can be transferred to other areas of biology. Finally, students will have gained valuable skills pertaining to interpreting and critically evaluating scientific data, designing experiments and scientific writing.

Course Structure

This course provides an introduction to the molecular and cellular aspects of aging. The first part of the term will provide a historic perspective on aging research leading up to the current state of knowledge with a focus on the primary research literature to highlight key developments in the field. The second half of the term will focus on more advanced molecular aspects of aging including age-associated diseases, stem cells, epigenetics and recent developments in aging research. Topics to be covered include but are not limited to:

1) Evolutionary theories on aging
2) Model organisms to study aging
3) Longevity variation among different species
4) The role of reactive oxygen species and apoptosis in aging
5) The anti-aging effects of caloric restriction
6) Signaling pathways that affect aging
7) The role of stem cells in aging
8) Senolytics as anti-aging drugs
9) Age-associated diseases
10) Identification of “aging genes” and epigenetic modifiers of aging
11) The microbiome and human health.

The course consists of one 2-hour lecture every week for 12 weeks. There are two exams: a mid-term exam, written in class, and a final scheduled exam. In addition there will be a question and answer response (250 works max) at the end of most lectures. Students are expected to attend every lecture, class participation is based on attendance, contributing to in-class discussions, and using the course website discussion forum. This course has no assigned textbook.

Tentative Schedule (subject to change)

Sept 10:	Introduction: Course outline and policies/ Lecture 1: Definitions and Evolutionary Theories
Sept 17:	Lecture 2: Longevity Variation Among Different Species/ Free Radical Theory
Sept 24:	Lecture 3: ROS Signaling/ Mitochondrial Hormesis
Oct 1:	Lecture 4: Cellular Senescence and telomere shortening/ *C.elegans* as a model for aging
Oct 8:	Lecture 5: Dwarfism and Insulin Signaling/ Caloric Restriction
Oct 15:	No class, Reading Week
Oct 22:	**MIDTERM EXAM – In Class**
Oct 29:	Lecture 6: mTor Signaling/Autophagy
Nov 5:	Lecture 7: Stem cells and aging
Nov 12:	Lecture 8: Chalk Talk – Experimental design and techniques
Nov 19:	Lecture 9: Alzheimer's disease/neurodegeneration
Nov 26:	Lecture 10: DNA damage and epigenetics/progeric diseases
Dec 3:	Lecture 11: The microbiome, health and aging

Methods of Evaluation

Midterm Exam:	Oct 22nd, 2024	30%
Lecture Q&A Responses	Best 5 of 7	10%
Article Critique	Nov 19th, 2024	10%
Class Participation:		10%
Final Exam:	TBA	40%

Make-up mid-term exam will be held at a mutually agreed upon time but no later than Nov 5th.

Student Absences

If the make-up mid-term exam is missed, with appropriate documentation, the weight of the mid-term will be added to the final exam. 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 makeup 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 the make-up Final Exam is missed, the student will receive an INC and complete the task the next time the course is offered. In the absence of proper documentation, failure to submit a Lecture Q&A Response by 11:55 pm on the Sunday following lecture will result in a grade of zero for the weekly assignment.
Alternate considerations may be given on excused absences on a case by case basis.

EDI statement

The pronouns used by Professor Cumming are: he/she/them

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.

More information about Indigenous Services (https://indigenous.uwo.ca/) and this Land Acknowledgement (https://communications.uwo.ca/comms/land-acknowledgement/) are available.

Accommodation and Accessibility

Accommodation Policies

Students with disabilities work with Accessible Education (formerly SSD) 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

For work totaling 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://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

The Student Medical Certificate is available at

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

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.**

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

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).

Academic Policies

The website for Registrarial 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.

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.

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.
Review Biology 2290 learning outcomes. You are expected to know what plagiarism is at this stage of your programme.

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 follow online etiquette expectations provided on OWL

☒ All course materials created by the instructor(s) are copyrighted and cannot be sold/shared

☒ Recordings are not permitted (audio or video) without explicit permission

☒ Permitted recordings are not to be distributed

☒ All recorded sessions will remain within the course site or unlisted if streamed

8. Support Services

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.

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

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 information about support services at Western University.

Appeal Procedures

Registrarial Services

Student Development Services

Student Health Services