

Department of Biology Course Outline

SC/BIOL 4310 3.00, Physiology of Circadian Timing
Winter 2021/22

Course Description

Examines the mechanism by which cells generate 24h (circadian) rhythms, how the numerous sites of these cells are coordinated by nerves and hormones and the critical roles of human circadian clocks in health and diseases.

Prerequisites (strictly enforced)

Prerequisites: One of the following: (1) SC/BIOL 2020 3.00 and SC/BIOL 2021 3.00 and SC/BIOL 3060 4.00 OR (2) SC/BIOL 2020 3.00 and SC/BIOL 2021 3.00, HH/KINE 2011 3.00 and HH/KINE 3012 3.00 OR (3) HH/SC NRSC 2000 3.00 and HH/SC NRSC 3000 3.00.

Course Instructor and Contact Information

Dr. Patricia Lakin-Thomas (Dr. Pat)

005 Farquharson, x33461

Office hours: Tues & Thurs 2:30 - 3:30 or by appointment (please email for appointment)

E-mail: clocklab@yorku.ca I will try to respond within one working day, or answer your question at the next class meeting if appropriate.

Schedule/Course Format

Tues & Thurs 1pm-2:20pm, DB 1004, in person

NOTE: This course will be delivered synchronously over zoom for the first two weeks (class meetings on Jan 11, 13, 18 & 20) and in person after that, unless further pandemic-related restrictions require continued online meetings.

Technology Requirements

Ability to participate synchronously for online meetings in the first two weeks. For in person class meetings, ability to log on to eClass with your own device in the classroom to take quizzes during the class meeting.

Evaluation

Midterm test 1 (written answers) = 20%

Midterm test 2 (written answers, not cumulative) = 20%

Quizzes (written answers, best 15 out of 19) = 30%

Tests and quizzes are all open-book, open-notes. You may use the textbook, papers and your notes during quizzes and tests. Test questions will focus on the topics covered in lectures (for midterm 1) and the papers covered by student presentations (midterm 2).

Quizzes will be taken live in class using your own device to log on to the quiz in eClass.

Tests will be take-home, with 24 hours to upload your answers to an eClass Turnitin assignment. Turnitin will check for copying from your sources or other students and evidence of plagiarism or collaboration will be taken very seriously.

Project = 30%

Project proposal = 5% (due Feb 14)

Project delivery = 25% (delivered after the midterm)

Students will choose either a group presentation (40 students, 4 per group) or an autorhythmometry data gathering and analysis project (the remaining students in pairs).

Quiz Policies

There will be an in-class quiz during lectures 3-10 (8 quizzes), based on a reading assigned in advance. There will also be in-class quizzes after each of the group presentations (10 quizzes), based on a paper assigned in advance and discussed by the presenters.

The final quiz grade will be based on participating in the poster session (during the final exam window) and submitting peer evaluations of the poster presenters.

Out of 19 quizzes total, the best 15 will be used for the grade.

You can miss up to 4 quizzes without penalty. This covers any illness, religious accommodation or any other absence. No documentation will be required.

Important Dates

Jan 11, 13, 18, 20: Lectures 1-4, synchronous online by zoom

Jan 21: Project choice due (fill out the form on eClass) by 4:30 pm

Jan 25 - Feb 10: Lectures 5-10

Feb 14: Project proposal due (submit the form on eClass) by 4:30 pm

Feb 15: Review session

Feb 17: Midterm 1 (Lectures 1-10)

Feb 22 & 24: Reading Week

March 1 - 31: Student presentations

April 5: Review session

April 7: Midterm 2 (Student presentations)

Final exam (TBA): Poster session for autorhythmometry projects

Drop Deadline: March 18 (last day to drop without course on transcript)

Course Withdrawal Period: March 19 - April 10 (course still appears on transcript with "W")

Resources

Website: eClass

Textbook (Required):

Title: Circadian Rhythms: A Very Short Introduction

Authors: Foster, R.G. and Kreitzman, L.

ISBN: 978-0-19-871768-3

Publisher: Oxford University Press (2017)

Paper copies are available in the bookstore for \$11.95 (a bargain!).

A free electronic copy is available by searching the York library catalog for the title "Circadian Rhythms: A Very Short Introduction" and using Passport York authentication. Note: This copy is not downloadable.

The bookstore lists a Will-o EBook version for \$4 but I am not including this on eClass since you can get it free through the library.

Learning Outcomes

Upon successful completion of this course, students should be able to:

1. Describe the basic properties, phenomenology and adaptive significance of circadian rhythms
2. Interpret various methods of displaying and analyzing rhythmic data
3. Compare molecular mechanisms and cellular substrates of circadian rhythms between several model organisms
4. Apply circadian concepts to physiological topics such as metabolism and sleep
5. Describe the impact of light on rhythmicity
6. Describe the influence of circadian rhythmicity on human health and disease
7. Depending on the project chosen:
 - a. Research and deliver an engaging lecture on a scientific subject to an audience of peers
 - b. Assay and interpret human physiological rhythms and present a scientific poster on the results

Course Content

See Expanded Lecture Schedule for details and assigned readings

Topics to be covered in lectures will include:

Basic circadian rhythm terminology and concepts
Molecular mechanisms of circadian oscillators in mammals, insects and bacteria
Neural basis of rhythms
Peripheral clocks outside the brain
The impact of light on the clock
Clock control of metabolism
Sleep in humans and flies
Human circadian activity patterns, normal and disrupted
Photoperiodism in plants and mammals

Additional topics will be chosen by students for presentations, and could include:

Circadian rhythms and human health such as shift work, mood disorders, neuro-degenerative diseases, cardiophysiology, athletic performance
Rhythms in non-human mammals such as food-entrainable oscillators, non-photic entrainment, metabolic syndrome
Rhythms in non-mammalian vertebrates such as zebrafish and birds
Rhythms in invertebrates such as *Rhodnius*, *Drosophila* photoreception, navigating using a sun compass in bees, learning in sea slugs
Rhythms in plants, fungi, bacteria

Course Policies

Missing a midterm

If a midterm is missed for a valid reason, a make-up midterm will be arranged during Reading Week (Midterm 1) or during the final exam period (Midterm 2).

Late policy

Presentations and posters will not be accepted after the assigned date unless you have a valid excuse, in which case a make-up presentation will be arranged.

Documentation for missed midterm or presentation/poster

Please email the course director at clocklab@yorku.ca

Note: Attending Physician's Statements or doctor's notes are not required for absences due to illness.

Missing a quiz

There will be 19 quizzes (including a quiz mark for participating in the poster session). The grade will be based on the best 15. If you miss a quiz for any reason, including illness or religious accommodation, it will come out of the 4 dropped quiz grades. There will be no make-up quizzes.

University Policies

Academic Honesty and Integrity

York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty (<http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>). The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards.

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students' research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at - <http://www.yorku.ca/academicintegrity/>

Important A note from the Faculty of Science Committee on Examinations and Academic Standards: Numerous students in Faculty of Science courses have been charged with academic misconduct when materials they uploaded to third party repository sites (e.g. Course Hero, One Class, etc.) were taken and used by unknown students in later offerings of the course. The Faculty's Committee on Examinations and Academic Standards (CEAS) found in these cases that the burden of proof in a charge of aiding and abetting had been met, since the uploading students had been found in all cases to be wilfully blind to the reasonable likelihood of supporting plagiarism in this manner.

Accordingly, to avoid this risk, students are urged not to upload their work to these sites. Whenever a student submits work obtained through Course Hero or One Class, the submitting student will be charged with plagiarism and the uploading student will be charged with aiding and abetting.

Note also that exams, tests, and other assignments are the copyrighted works of the professor assigning them, whether copyright is overtly claimed or not (i.e. whether the © is used or not). Scanning these documents constitutes copying, which is a breach of Canadian copyright law, and the breach is aggravated when scans are shared or uploaded to third party repository sites.

Access/Disability

York University is committed to principles of respect, inclusion and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including physical, medical, learning and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University.

Students in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disabilities services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs.

Additional information is available at the following websites:

Counselling & Disability Services - <http://cds.info.yorku.ca/>

Counselling & Disability Services at Glendon - <https://www.glendon.yorku.ca/counselling/>

York Accessibility Hub - <http://accessibilityhub.info.yorku.ca/>

Religious Observance Accommodation

York University is committed to respecting the religious beliefs and practices of all members of the community, and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete and submit an Examination Accommodation Form at least 3 weeks before the exam period begins. The form can be obtained from Student Client Services, Student Services Centre or online at http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf

Student Conduct in Academic Situations

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at - <http://secretariat-policies.info.yorku.ca/policies/disruptive-andor-harassing-behaviour-in-academic-situations-senate-policy/>