

Department of Biology Course Outline

SC/BIOL 4310 3.00, Physiology of Circadian Timing
Winter 2023/24

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: plakin@yorku.ca

I will try to respond within one working day, or answer your question at the next class meeting if appropriate.

Schedule

Tues 1pm-2:20pm, DB 1005

Thurs 1pm-2:20pm, DB 1004

WARNING: The classroom is different on Tues vs. Thurs.

Technology Requirements

Access to eClass for course materials.

Software (such as PowerPoint) for preparing presentation or poster for project assignment.

Evaluation

Midterm test 1 (written essay-style answers) = 20%

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

Tests will be in person during the 80 minute class period, written in standard test booklets.

Test questions will focus on the topics covered in lectures (for midterm 1) and the papers covered by student presentations (midterm 2).

Tests and quizzes are all open-book, open-notes. You may use anything on paper, including the textbook, papers, printouts of slides, and your notes during quizzes and tests. No electronics are allowed.

Quizzes (written short answers, best 16 out of 19) = 30%

Quizzes will be taken in class on paper.

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 session) and submitting peer evaluations of the poster presenters.

Project = 30%

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).

Project proposal = 3% (due Feb 12)

Project delivery = 27% (delivered after the midterm)

Quiz Policies

Out of 19 quizzes total, the best 16 will be used for the grade.

You can miss up to 3 quizzes without penalty. This covers any illness, religious accommodation or any other absence. No documentation will be required.

The sample quiz on Jan 11 will be graded and will only be included in the grade if it increases the average.

COVID quiz policy

Please **DO NOT COME TO CLASS** if you have symptoms. You will be excused from that day's quiz (in addition to your three free quizzes) if you have symptoms and you fail the Ontario self-assessment:

<https://www.ontario.ca/self-assessment/>

Send Dr. Pat a screenshot of your failed screening to be excused from the quiz.

Important Dates

Jan 9 – Feb 8: Lectures 1-10

Jan 19: Project choice due (fill out the form on eClass) by 4:30 pm

Feb 12: Project proposal due (submit the form on eClass) by 4:30 pm

Feb 13: Review session

Feb 15: Midterm 1 (Lectures 1-10)

Feb 20 & 22: Reading Week

Feb 27 - March 28: Student presentations

April 2: Review session

April 4: Midterm 2 (Student presentations)

Final exam (TBA): Poster session for autorhythmometry projects

Drop Deadline: March 11 (last day to drop without course on transcript)

Course Withdrawal Period: March 12 - April 8 (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 \$13.50 (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 and would be difficult to print. You need a paper copy to use in class for quizzes and exams.

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, neurodegenerative diseases, cardiophysiology

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 *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 plakin@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 16. If you miss a quiz for any reason, including illness or religious accommodation, it will come out of the 3 dropped quiz grades. There will be no make-up quizzes. (See COVID policy for dropping a quiz due to COVID symptoms.)

University Policies

Academic Honesty and Integrity

Academic misconduct undermines the values of honesty, trust, respect, fairness, and responsibility that we expect in this class. York University provides supports such as academic integrity workshops to ensure that all students understand the norms and standards of academic integrity that we expect you to uphold.

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. Please review and familiarize yourself with the policy.

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve your research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website:

Examples of actions that do not adhere to York's Academic Integrity Policy include:

- Plagiarism (passing off someone else's work as your own)
- Accessing unauthorized sites for assignments or tests
- Unauthorized collaboration on assignment and exams
- Uploading work to third party repository sites (e.g., Course Hero, One Class, etc.)
- Scanning, sharing, uploading, or publishing exams, tests, or scholarly work

For more information on what academic integrity is and why it is important see:

<https://spark.library.yorku.ca/academic-integrity-what-is-academic-integrity/>. Information on the process of investigations into breaches of academic honesty:

<https://spark.library.yorku.ca/academic-integrity-breach-of-policy-on-academic-honesty/>

Important Note from the FSc Committee on Examinations & Academic Standards (CEAS): 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. Whenever a student submits work obtained through an external site (e.g., Course Hero, Chegg), the submitting student will be charged with plagiarism and the uploading student will be charged with aiding and abetting. To avoid this risk, students are urged not to upload their work to these sites.

Assistance for Students (Academic and Well-Being)

Academic Advising*: <https://www.yorku.ca/science/academic-advising/> * Departments also offer program-specific advising. Check with your Department's Undergraduate Office.

Centre for Human Rights, Equity, and Inclusion: <https://rights.info.yorku.ca>

Centre for Indigenous Students Services: <https://aboriginal.info.yorku.ca/>

Food Access, Funding, & Supports/Resources: <https://students.yorku.ca/food>

Good2Talk 24-hour Ontario Student Helpline: 1-866-925-5454 /Text: GOOD2TALKON to 686868

Keep.meSAFE: <https://myssp.app/keepmesafe/ca/home>

Learning Commons (general academic learning supports including library research, time management, study skills, career planning, etc.): <https://learningcommons.yorku.ca/>

Peer Assisted Study Sessions (PASS): <https://www.yorku.ca/colleges/bethune/get-help/pass/>

Peer Tutoring: <https://www.yorku.ca/colleges/bethune/get-help/peer-tutoring/>

Sexual Violence Response and Support: <https://thecentre.yorku.ca>

Student Counselling, Health & Well-being: <https://counselling.students.yorku.ca/>

Support Services for International Students: <https://yorkinternational.yorku.ca/international-student-support/>

Writing Services: <https://www.yorku.ca/colleges/bethune/get-help/writing/>

York University Student Services: <https://family.yorku.ca/student-services/#SCD>

York University Student Well-being Resources: <https://www.yorku.ca/well-being/resources/students/>

Accessibility

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

If you are in need of these services, please register with accessibility 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 accessibility 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:

Student Accessibility Services: <https://accessibility.students.yorku.ca>

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. 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 accommodation request form at least 3 weeks *before the exam period begins*.

<https://secure.students.yorku.ca/pdf/religious-accommodation-agreement-final-examinations.pdf>

Student and Instructor 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-and-or-harassing-behaviour-in-academic-situations-senate-policy/>.

Academic accommodation refers to educational practices, systems and support mechanisms designed to accommodate diversity and difference. The purpose of accommodation is to enable students to perform the essential requirements of their academic programs. At no time does academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the University.

University rules regarding registration, withdrawal, appealing marks, and most anything else you might need to know can be found on the university's website, here:

<https://calendars.students.yorku.ca/policies-and-regulations>