Department of Biology Course Outline

SC/BIOL 4070 3.0 Behavioural Ecology
Winter 2025 – In-person Delivery
Components may change up to January 20th, 2025

Course Calendar Description

Behavioural ecology focuses on the behavioural interactions among individuals at both the intraspecific level in natural populations and the interspecific level in natural communities. Three lecture hours per week. No labs. One term. Three credits.

Taught in person: Lectures are not recorded.

Prerequisites

- SC/BIOL 2050 3.00 *Ecology*;
- SC/BIOL 2060 3.00 *Statistics for Biologists*.

Course Instructors and Contact Information

- Professor Alex Mills
  - ammills@yorku.ca, Room 134 Chemistry Building
  - There are no course TAs

Expanded Course Description

Behavioural ecology asks questions about proximate and ultimate causes of behaviour, the development of behaviour, the flexibility of behaviour and learning, the adaptive value of behaviour for survival and reproduction, and the phylogenetic relationships among diverse behavioural patterns. In an overarching sense, it considers behavioural interactions against the metric of evolutionary fitness. A common focus of behavioural ecologists' research is to consider how efficiently animals use their time and energy in obtaining mates and resources against measures of survival and reproductive success, including analyses of the trade-offs associated with optimizing the use of time and energy.

This course explores the many behavioural contexts that are manifest in natural populations of animals. Major themes include (a) behaviours under competition, including evolutionary stable strategies, frequency dependence, and the application of game theory; (b) behavioural plasticity; (c) changing behaviours in environments of changing or complex selective pressures; (d) territorial behaviour and economic defendability; (e) sex-specific patterns of behaviour in the mating realm, including the operation of sexual selection, the phylogeny of mating systems, the mediation of challenges based in sexual conflict, and behaviourally flexible alternative mating strategies; (f) patterns of behaviour related to parenting, including mother-father conflict, parent-offspring conflict, and sibling conflict; (g) both antagonistic and cooperative social behaviours, including alloparenting and the special case of social insects; and (h) communication and signaling behaviours in diverse sensory realms.

This course is lecture-based, supplemented by related or complementary readings.

Course Learning Outcomes

Upon successful completion of this course students should be able to demonstrate an understanding of the following:

Area 1. Fundamental Understanding:

- Use terminology appropriate to the field of behavioural ecology
- Recognize key conceptual ideas central to behavioural ecology, such as evolutionary stable strategy
- Using fundamental principles from evolutionary biology, demonstrate an understanding of selective environments and adaptive behaviours
- Using fundamental principles from life history biology, demonstrate an understanding of behavioural trade-offs in terms of time, resources, and energy
- Develop models for applying game theory and the calculus of economic defendability to behavioural contexts
- Apply the principles of hypothesis testing to behavioural ecology situations
- Compare the operations of evolutionary arms races in different behavioural contexts, such as predatory, parasitic, and competitive relations
- Contrast behavioural attributes of species that are mostly solitary versus those that are social, and identify the benefits or each and the ecological constraints generating each
- Differentiate among theories of sexual selection, and the contributions each makes to the reality of sexual conflict and to the evolution of different mating systems
- Distinguish among different patterns of parental care, including group parenting, dual parenting, single parenting, and alloparenting
- Identify and contrast different types of relationships in intra-family conflict, including mother-father, parent-offspring, and sibling conflict
- Present arguments for circumstances that lead to cooperative behaviours either among kin or among non-kin
- Compare and contrast the utility of different sensory realms in communication and signaling behaviour
- Apply the principles of behavioural ecology to issues of conservation
- Apply behavioural ecology principles to wildlife management challenges
- Use natural history knowledge

Area 2. Critical Thinking Skills

- Employ case studies as exemplars of behavioural ecology concepts
- Draw generalized concepts from the results of particular scientific studies or experiments (inductive reasoning)
- Present arguments that explain evolutionary phenomena such as evolutionary stable strategies and alternative mating strategies
- Apply course content to new data sets
- Employ metaphors for conveying the principles of behavioural ecology
- Assess the effectiveness of experimental designs in answering questions about behaviours in natural settings

Area 3. Problem Solving Skills

- Accept a position regarding a contentious theory in behavioural ecology and formulate the argument in favour of that position
- Apply principles from the scientific literature to new fact situations
- Consider diverse field or lab methods for collecting data and apply appropriate methodologies to particular questions related to behavioural ecology

Area 4. Effective Communication

- On tests and exams, clearly construct written answers to questions and clearly construct written explanations or arguments for scenarios or fact situations
- In written submissions, effectively summarize information and draw conclusions based on that presentation of information
- In lectures, ask and answer questions, make relevant observations, and effectively defend a position regarding a principle of behavioural ecology, including referencing material from a reading list in support
- Present an audiovisual presentation summarizing a behavioural ecology theme

Area 5. Analytical Skills

- Articulate an hypothesis and design a test of that hypothesis
- Analyze data generated in behavioural ecology research in order to assess the validity of working hypotheses in the field of behavioural ecology
- Analyze datasets to assess whether they support specific hypotheses in behavioural ecology, such as natural, sexual selection, or kin selection of particular phenotypic attributes, or of co-evolved behaviours
- Apply statistics to behavioural ecology datasets

Evaluation

Mid-term Exam #1 - Wednesday, January 29th, 2025, in class — 15 %
- Lectures from January 6 to and including January 22

Mid-term Exam #2 - Wednesday, March 5th, 2025, in class — 20 %
- Lectures from January 27 to and including February 26

Cumulative Final Exam during the April Final Exams period (April 8 to 25) — 45 %

AV presentation conference (with one partner): March 12th to April 2nd — 15%
- One page synopsis of AV presentation for eClass, due on same date — 5%

Missing Mid-terms is not optional. You must provide documentation within 48 hours of missing a Mid-term. If you do miss a Mid-term and your excuse for missing it is approved, your final exam will be worth the additional value.

Important Dates

- Last Day to drop the course without receiving a grade: Friday, March 14th, 2025

Experiential Education and E-Learning

- Experiential Education: Analysis of real data (lab exercise)

Course Content and Format

The course lecture content will be delivered through 4 means:

1. Lectures delivered in class twice per week
2. Readings posted on eClass
3. Student AV presentations during lecture time, including 1-page synopses posted on eClass
4. PowerPoint slides (used in lectures) posted on eClass
5. Online office hours by Zoom for troubleshooting and clarification (optional)

Course Policies

- **Questions and Concerns should be directed to**
  - *Lecture material:* During office hours by Zoom or by email to ammills@yorku.ca
  - *Missed assessments, late submissions, grading errors, accommodations:* By way of email to Professor Mills ("BIOL 4250" in the subject line) using ammills@yorku.ca

- **Late Submissions**
  - Students lose 20% per day

- **Policy for a missed test or exam or for a late exercise**
  - Neither *Travel* nor *Employment* exempts a student from writing a test or a deferred test
  - Don't purchase a travel ticket that conflicts with a test or the Final Exam period
  - Medical reasons are valid reasons, but you need to have your reason approved, and you need to advise Professor Mills within 48 hours if you wish to not get a zero grade
  - You may be required to supply an Attending Physician Statement

Copyright and Intellectual Property

- PowerPoints used during lectures are the © property of Professor Mills
  - Permission is granted to copy them for your own use
  - Advice: **Print in grayscale**, or you will spend too much money on ink!
  - It's a breach of copyright to upload them to the internet, including sites like One Class, Course Hero, WeChat, Chegg, etc.
- Both Mid-term tests and Final Exams are the © property of Professor Mills
  - It's a breach of copyright to copy them in any form, and it is a breach therefore to upload them to the internet, including to sites like One Class, Course Hero, WeChat, Chegg, etc.
  - It's a breach of York's Policy on Academic Honesty to upload tests or assignments to third party sites on the internet, including to sites like Once Class, Course Hero, WeChat, Chegg, etc.

University Policies

Academic Honesty and Integrity

Suspected breaches of academic honesty will be investigated and charges shall be laid if reasonable and probable grounds exist.

Major prohibitions under York's policy are the following, and some of these are also prohibited by the Criminal Code of Canada:

- No cheating
- No impersonation
- No falsification of documents
- No plagiarism
- No prohibited collaboration
- No obstruction
- No aiding and abetting others
- No disseminating information without permission

Please familiarize yourself with the full *Senate Policy on Academic Honesty*, found at http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/

Please also familiarize yourself with the *SPARK Academic Honesty tutorial* found at https://spark.library.yorku.ca/academic-integrity-what-is-academic-integrity/

Message from the Faculty of Science Dean's Office Regarding Academic Honesty

Numerous students in Faculty of Science courses, including NATS courses, have been charged with academic misconduct when materials they uploaded to third party repository sites (e.g**. Course Hero**, **One Class**, **WeChat**, **Chegg**, 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 willfully blind to the reasonable likelihood of supporting plagiarism in this manner. Accordingly, to avoid this risk, students are **prohibited from uploading** 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.

Academic Accommodation for Students with Disabilities

York University shall make reasonable and appropriate accommodations and adaptations in order to promote the ability of students with disabilities to fulfill the academic requirements of their programs. The nature and extent of accommodations shall be consistent with and supportive of the integrity of the curriculum and of the academic standards of programs or courses.

Please familiarize yourself with the full Senate Policy on Academic Accommodations for Students with Disabilities, found at http://secretariat-policies.info.yorku.ca/policies/academic-accommodation-for-students-with-disabilities-policy/

- Student Accessibility Services - https://accessibility.students.yorku.ca/
- York Accessibility Hub - http://accessibilityhub.info.yorku.ca/

Note: A student registered with SAS and choosing to write with Alternate Exams, is responsible for making the appropriate arrangements within the timeframes set by Alternate Exams.

Alternate Exams - http://altexams.students.yorku.ca/

Religious Observance Accommodation

Students who will have an academic conflict as a result of a religious observance at any point in the term should make the instructor aware of such at least three weeks prior to the conflict.

For religious conflicts occurring during an official examination period, please complete the Examination Accommodation Form available at https://www.yorku.ca/science/chemistry/wp-content/uploads/sites/189/2021/01/Religious-Accommodation-Agreement.-fillable-form.pdf and submit to your instructor at least three weeks prior to the final exam.

Student Conduct in Academic Situations

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect and to refrain from actions disruptive to such a relationship. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom 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. A statement of the policy and procedures regarding disruptive and/or harassing behaviour by students in academic situations is available on the website of the University Secretariat (http://secretariat.info.yorku.ca/).

Other Resources

Learning Commons
The Learning Commons brings together key supports for your learning: writing, research, learning skills and career services. http://www.library.yorku.ca/cms/learning-commons/

goSAFE
goSAFE is a complimentary service provided to the York Community. At the Keele campus, goSAFE has two routes: North Route & South Route which will safely transport community members by vehicle from one specified hub to another on campus. goSAFE operates seven days a week, all year round, including University closures (with the exception at Glendon during the Christmas holiday closure).

Call the goSAFE office at 416-736-5454 or extension 55454 during hours of operation. Please give your name, location and destination. http://www.yorku.ca/goSAFE/

Mental Health and Wellness at York University
Outlines a variety of resources available to support mental health and wellness
http://mhw.info.yorku.ca/resources/resources-at-york/students/

Good2Talk
Post-Secondary Student 24 hour Helpline
http://www.good2talk.ca/ 1-866-925-5454