Welcome!

It is my pleasure to welcome you to BIO D53, Special Topics in Behavioural Ecology. This is a class intended to get you on track to your immediate career goals, whether they lie in animal behaviour or elsewhere. Many of the skills we will teach in this course will be directly or indirectly applicable to starting your career right, with a solid foundation of teamwork, support and mutual advocacy. Not only that, but we hope you will see that the best kept secret of behavioural ecology research is what a joyful and fun experience it can be.

Class meeting times

See attached Timetable (below) for a schedule of topics, meeting places and laboratory exercises

Mondays: Generally in lecture hall (BV 363), may be followed by prep time in laboratory
Thursdays: Generally in laboratory (SW 332*), sometimes in AC334: subject to modification, consult timetable (below)

*Note that SW332 is NOT listed in the calendar as a meeting place; but the class format has been changed to allow more hands-on activities and so will include short labs instead of tutorials. Please come to SW332 when indicated on the timetable

BIO D53 Overview

Animal behaviour is a topic of perpetual fascination to both scientists and laypeople. The science of animal behaviour is practiced widely and is informed by evolutionary theory, including the study of natural and sexual selection. Current approaches to animal behaviour as a
science benefit from genomics, real time brain imaging and automated movement analysis. Behavioural science and its techniques have wide application in fields as diverse as pharmacology, psychology, experimental evolution, conservation research, sociobiology, social network theory, pest control and agriculture.

This course will provide a working introduction to the modern study of animal behaviour, highlighting some selected issues and taking the format of immersion in a behavioural science lab group. Fundamentals of good experimental design will be emphasized, and a critical and inquisitive approach to the literature will be encouraged.

**Course Description**

This course is a special topics course intended for 3rd and 4th year students as an introduction to behavioural research in the laboratory environment. I hope to stimulate a classroom attitude of collegiality and teamwork that parallels an actual working behavioural lab. Activities are divided into topical lectures, paper discussions, skills intensives, and most importantly, laboratory investigations.

This course will cover diverse topics that are applicable to a wide range of animal taxa. Laboratory work will primarily be with spiders, mainly different species and populations of widow spiders (genus *Latrodectus*). These will be our main study model for many reasons: (1) spiders are good models for investigating a wide range of behavioural processes, (2) they are currently being reared in the lab at UTSC, so we can have access to animals throughout the term and (3) their behavioural responses are such that we will be able to collect meaningful data in a relatively short time period.

**Learning outcomes**

At the end of the course, students should have knowledge of and be comfortable with
- evaluating primary research and understanding the theoretical reasoning and methodology employed
- designing and conducting experimental and observational protocols
- writing up sections of research papers and proposals, to a publishable standard
- explaining statistical and methodological methods clearly, employing appropriate language and rigor
- basic techniques for husbandry and experimental manipulation of invertebrates

Students will also have a comprehensive and practical knowledge of *Latrodectus* (and selected other species) behaviour, from lectures, readings and laboratory experiments.

**Course Format**

**Lectures**

Some material is best presented as a talk; there will be some traditional lecture format sessions throughout the course. Notes should be taken, as my slides tend to include images, figures, and illustrations more than written material. You are responsible for all material presented in lectures
for tests, hence careful notetaking is recommended. Slides from the lectures will be made available for review on the class BlackBoard after scheduled class sessions (PDF format). All questions during lecture are welcomed, as animal behaviour is fascinating and complex, and should stimulate much discussion.

**Laboratory Exercises**

The laboratory will take up a significant amount of our effort, in terms of time and thought invested. Mainly our lab activities will take place on Thursdays, but see the course schedule for some exceptions. We may be headed to the lab following class activities on Mondays as well, should our subsequent work demand it.

**Biosafety and Laboratory protocols**

*Latrodectus* spiders produce a neurotoxic venom, though with the care we will emphasize throughout the course, the chances of receiving a bite are vanishingly small. Appropriate training and supervision with handling spiders will be provided. Because lab time is limited, certain class meetings will divide time between lecture hall and laboratory, in order to accommodate laboratory preparation.

**Skills Intensives**

Throughout the course, we will hold “skills intensives” where we dig down into particular everyday skills used by working scientists. These may surprise you!

**Literature Discussion**

We will have several literature discussions; students are expected to read assigned material prior to the class meeting in which the discussion is held. Literature discussions may take the form of led discussions or group-based brainstorming activities. The literature chosen will reflect current issues in animal behaviour research, as well as material with a direct bearing on our research goals.

**Class policies**

*AccessAbility*

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services as soon as possible. [AccessAbility Services](mailto:ability@utsc.utoronto.ca) staff (located in Rm SW302, Science Wing) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations 416-287-7560 or email ability@utsc.utoronto.ca. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course. Of particular concern to this course is any clinical diagnosis of insect allergy or arachnophobia. Both of these may severely impact the prospects of success in the course unless special arrangements are made early.
Academic Honesty

As academics, we strive to maintain an exemplary level of honesty and transparency in our work. This means that we must follow certain guidelines at all times when conducting any scholarship. Helpfully, UTSC has an Office of Research Integrity, and they have spelled out a comprehensive Code of Behaviour on Academic Matters, which all students, teachers, and research staff are expected to uphold. This document should be reviewed and followed to the letter. Specific instruction on several topics related to this Code will be provided during class meetings. In particular, all student assignments and classwork will be subject to the following criteria:

- all ideas or words in assignments quizzes and tests should be the student’s own, or if not, should be explicitly stated as a quotation or paraphrase, with acknowledgement provided to the originator of those ideas or words

- Student’s work should never contain false or misleading references

- When written work arises as a result of group discussions, collaboration in the discussion is expected, but students are expected to write up the results on their own, in their own words

- Imagery or artwork used in any academic communication should be used in accordance with the copyright stipulations of the artist, and all imagery not originating with the student should be attributed

If you are not sure what constitutes plagiarism, see:
www.utoronto.ca/academicintegrity or
www.writing.utoronto.ca/advice/using-sources
or talk to Dr. McCann, or visit the Writing Centre

Laboratory and classroom safety
Safety is of paramount importance in both the laboratory and classroom environment. The wellbeing of students and staff is foremost, followed by the wellbeing of our laboratory animals. To this end, we will seek to keep both the classroom and the laboratory free of any obstructions, hazards and spills of any kind. Emergency instructions from laboratory personnel, floor fire wardens, emergency responders and administrative staff should be followed promptly. If we have issues with allergies on the part of class participants, we will seek to minimize exposure to allergens.

Black widow spiders (Fig. 1) used in our laboratory present a risk to any personnel in contact with them, and we must abide by a biosafety protocol filed by Dr. M. Andrade governing their safe handling and care. During our lab work, any and all escapes must be promptly reported to the instructor or TA. Safe containment and escape protocols will be taught in the first laboratory session, and these protocols shall be followed during all subsequent spider activities.
Our laboratory policy requires the wearing of lab coats, long pants, and gloves; additional precautions and PPE (Personal Protective Equipment) will be stipulated prior to any laboratory session requiring them. Lab coats will be provided.

Figure 1: Western black widow (*Latrodectus hesperus*), one of the species we will work with in the lab. Photo © 2012 Sean McCann, used with permission.

Chemical use in the lab will be limited, but appropriate PPE, handling instructions and all relevant MSDS will be provided for any chemical use. A laboratory emergency response plan will be posted in a prominent location in the laboratory at all times.

**Working with animals**

Spiders and insects, being arthropods, are exempt from inclusion in University of Toronto Animal Care and Use Committee policies; however, all animals we work with in the laboratory are to be treated with respect and consideration. Euthanasia will be conducted only as needed, and we will seek to minimize potential stress and suffering of the research animals.

Some of the animals we work with will be on loan from Dr. M. Andrade’s research group, and may be critical to other research goals. Hence, excess mortality and injury to these animals is unacceptable. Laboratory practices that jeopardize the wellbeing of these animals (or personnel in the laboratory) will not be tolerated, and may result in a warning. Failure to heed such a warning may result in a suspension of lab privileges for the subsequent week, with a loss of marks attendant with an unexcused lab absence.
Our class will be responsible for care and maintenance of our own research and feeder animals, and we will take time every week to confer about issues related to their care and propagation. This is crucial to the success of our work, and will be a regular part of laboratory activities. All students are expected to participate to the maximum degree possible with maintenance of the laboratory and research animals.

**Grading and Assessment**

**Assignments, participation, quizzes, lab notebooks and final exam**
These five elements will make up your grade. The final exam will be cumulative, and will cover all material we cover during the course. The style of the final exam will be very similar in format to the quizzes, so the final will hold no surprises.

<table>
<thead>
<tr>
<th>Item</th>
<th>Percentage of grade</th>
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<tbody>
<tr>
<td>Participation*</td>
<td>10</td>
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<tr>
<td>Assignments</td>
<td>20</td>
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<tr>
<td>Quizzes</td>
<td>25</td>
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<tr>
<td>Lab notebooks</td>
<td>15</td>
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<tr>
<td>Final exam</td>
<td>30</td>
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*Participation mark depends on both classroom and laboratory participation.

Participation in laboratory activities not only includes participation in experiments and observations, but also contributing to the maintenance and running of the lab, which will be tracked via a sign-up sheet. The duties on this roster will not be onerous, but will ensure that we have a safe, effective and fun lab space to work in.

Assignments may consist of questionnaires, sample problems, discussion paragraphs, written up sections of experimental results, or something completely different. They are not expected to be onerous, but will challenge your creativity and scientific acumen. **Late assignments will not be accepted without a note from a physician or by previous arrangement. There will be no exceptions made to this rule.**

Quizzes are simply that, short tests involving multiple choice or short answer questions based on material from previous weeks. Taken in aggregate, the quizzes will reflect the difficulty and style of the final exam (although the final will obviously be longer).

Lab notebooks will be marked by Catherine Scott, and she will have specific recommendations as to the level of detail required. At minimum, they should closely document the experimental goals, the setup and design of the experiment, any and all results, notes on errors, and general impressions of each replicate you perform. You will receive detailed instruction on expectations in class.
# Tentative Classroom and laboratory schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Monday 12-2 pm</th>
<th>Date</th>
<th>Thursday 1-3 pm</th>
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<tbody>
<tr>
<td>January 2</td>
<td>• Intro to class</td>
<td>Jan 5</td>
<td>• Introduction to spider biology</td>
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<tr>
<td></td>
<td>• theoretical and practical underpinnings of animal behaviour research</td>
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<td>• Introduction to black widow behavioural ecology (C. Scott)</td>
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<td></td>
<td>• Assignment: Backgrounder</td>
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<td>• Meet in AC334</td>
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<td>• Meet in BV363</td>
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<tr>
<td>January 5</td>
<td>• Introduction to spider biology</td>
<td>Jan 9</td>
<td>• Observational studies and manipulative experiments</td>
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<td></td>
<td>• Introduction to black widow behavioural ecology (C. Scott)</td>
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<td>• Lab: Introduction to spiders and predation observations</td>
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<td></td>
<td>• Meet in AC334</td>
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<td>• Meet in SW332</td>
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<tr>
<td>January 9</td>
<td>• Skills Intensive: Library tutorial on research methods, reference management and Zotero</td>
<td>Jan 12</td>
<td>• Observational studies and manipulative experiments</td>
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<td>• Meet in AC286a (Library)</td>
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<td>• Lab: Introduction to spiders and predation observations</td>
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<td>• Please bring laptop (if you use one)</td>
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<td>• Meet in SW332</td>
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<tr>
<td>January 16</td>
<td>• Behaviour and sexual selection</td>
<td>Jan 16</td>
<td>• Lab: mating behaviour observations</td>
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<td>• Paper discussion</td>
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<td>• Assignment: summary of observations</td>
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<td></td>
<td>• Lab prep</td>
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<td>• Meet in SW332</td>
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<td>• Meet in BV363</td>
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<tr>
<td>January 23</td>
<td>• Predation behaviour and issues with studying it</td>
<td>Jan 19</td>
<td>• (Lab) competition between predators: Does size matter?</td>
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<td></td>
<td>• Statistical review</td>
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<td>• Meet in SW332</td>
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<td></td>
<td>• Quiz on widows and behavior</td>
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<td>• Meet in BV363</td>
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<tr>
<td>January 30</td>
<td>• Lecture: Red throated Caracara behaviour</td>
<td>Feb 2</td>
<td>• Lecture: Insights from the field on black widow behavior</td>
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<td></td>
<td>• Animal behaviour fieldwork</td>
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<td>• Skills intensive: informal communications</td>
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<td>• Lab maintenance</td>
<td></td>
<td>• Meet in AC334</td>
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<td>• Meet in BV363</td>
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<tr>
<td>Date</td>
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| February 6 | • Instinctual and learned behaviours  
                   • Paper discussion  
                   • Quiz on predation, widows and fieldwork  
                   • Lab prep  
                   • Meet in BV363                                                                 |
| Feb 9      | • Lab: falling posture instinct in spiders  
                   • Assignment: storyboard for short video  
                   • Meet in SW332                                                                 |
| Feb 13     | • Skills intensive: Working with visual media  
                   • Meet in BV363                                                                 |
| Feb 16     | • Lab: skills intensive recap: video production using storyboard  
                   • Meet in SW332                                                                 |
| Feb 19     | Family Day and READING WEEK (Feb 20-24)                                       |
| Feb 27     | • Chemical ecology  
                   • Binary and choice experiments  
                   • Paper discussion  
                   • Lab prep  
                   • Meet in BV363                                                                 |
| March 2    | • Lab: male response to contact pheromones  
                   • Assignment: propose an experiment  
                   • Meet in SW332                                                                 |
| March 6    | • Skills intensive: Analysis of behavioural data, experimental design, no-fail experimentation  
                   • Meet in BV363                                                                 |
| March 9    | • Lab: Free Lab time  
                   • Meet in SW332                                                                 |
| March 16   | • Chemical Defence and associated behaviour  
                   • Paper discussion  
                   • Quiz: experimentation quiz  
                   • Meet in BV363                                                                 |
| March 16   | • Lab: *Latrodectus* defensive silk: a volatile repellent?  
                   • Assignment: results and discussion  
                   • Meet in SW332                                                                 |
| March 20   | • Social information and eavesdropping  
                   • Lab prep  
                   • Meet in BV363                                                                 |
| March 23   | • Lab: social information exploitation by male widow spiders  
                   • Meet in SW332                                                                 |
| March 27   | • Final Lecture, course review  
                   • Meet in BV363                                                                 |
| March 30   | • Lab: Free Lab time  
                   • Meet in SW332                                                                 |
| April 3    | **Study Break**                                                                 |
| April 6    | **Study Break**                                                                 |
| TBA        | Open-book final exam                                                           |