

**Psychology 3S03**  
**Animal Behaviour Laboratory**

Mondays: September 8 – December 1, 2008

**Location: Psychology 204**

**Time: Mondays 11.30-14.20**

Instructor: Dr. Margo Wilson

PC109

[wilson@mcmaster.ca](mailto:wilson@mcmaster.ca)

Office Hours: To be arranged.

**Teaching Assistants:**

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Office Hours: to be arranged.

**Website for course:** <http://www.science.mcmaster.ca/psychology/index.php/undergraduate-studies/courses/141-psych-3s03-animal-behaviour-laboratory-term-1-dr-wilson.html>

**Learn Link for documents, postings, messages**

<http://www.learnlink.mcmaster.ca/>

**Course description and objectives**

Animal behaviour enjoys prime-time TV status, and while you've probably been amazed by the photographer's talents you've had your doubts about some of the commentary. With a little experience in the study of animal behaviour you can acquire a critical appreciation of how high-quality animal behaviour research is done. You can also acquire an appreciation of the lives of several species. What kinds of everyday problems do they face and how do they solve these challenges? There are several kinds of challenges that almost every animal faces: finding food, avoiding being someone else's dinner, attracting a mate, choosing a mate, being a good parent, being a fair cooperator, doing better than your competitor. In this course, there will be opportunities for behavioural studies in both the field and the laboratory with a variety of species including Canada geese, black-capped chickadees, grey squirrels, zebra fish, Siamese Fighting Fish, crickets, and humans. Research topics include social competition, aggression, anti-predator strategies, risk-taking, altruism, mate choice, and foraging for food.

Note: There is no guarantee that all these species and topics will be covered. We have to match our topics with the species and availability.

While developing an appreciation of animal behavior research, natural history, and the social/ecological context of where the animal lives, you will be improving your skills in critical thinking, problem solving, and scientific reasoning. You will also be improving your skills in collaborative and cooperative learning and research, in behavioural observation techniques, in developing empirically testable hypotheses, in developing appropriate research methodologies, in analyzing data, in interpreting

research findings, and in communicating research questions and findings. You will have the opportunity to master skills appropriate to writing research reports, grant proposals, ethics applications, and research talks.

### **Course Content**

This course entails studies of animal behaviour in both the laboratory and the field. There is no textbook for the course, but you will be required to research and read relevant primary research literature. Everyone will participate in the observation and recording of behaviour. Everyone will participate in the research projects. Everyone will participate in research teams for the completion of **TWO** research projects. **At least one of these projects must be done in the field.** By the “field”, I mean outdoors with animals like chickadees, geese, and squirrels. It is much more interesting to see the animals in their own habitat rather than inside a laboratory. There are locally and easily accessible places to study these animals and they are friendly and easy to observe. We also have the possibility of studying some small aquaria fish and crickets in the laboratory. We will discuss these various possibilities at the beginning of term so you can decide what you would like to do.

The projects will be conducted by researchers (you) in small research teams. Observations will be contributed by everyone on the team for statistical analysis and discussion. The research projects will focus on the collection of primary data to address a particular hypothesis (or hypotheses). Research team members will work together in planning their research projects and in the collection of their data. All members of a team will each submit a research proposal for the project, but the final research plan for the team’s project may be somewhat different after discussion about details of the methodology and how best to coordinate the research effort. Each team will informally present their research plans to the class for discussion. Submission of an ethics review application outlining the proposed protocol for each project must be submitted to the instructor for approval before data collection begins.

Coordination of data collection and exchange of information will be facilitated through the course folder on Learn Link ([www.learnlink.mcmaster.ca](http://www.learnlink.mcmaster.ca)) to which all registered students have access. If you are unfamiliar with this program there is help information at the Learn Link site.

### **Evaluated components & Grading Apportionment:**

For each of the two research projects you complete, you will receive a mark on each of four components. You will submit a research proposal (see below for description), an ethics application, and a final scientific report, as well as present a team talk to the class reporting on your findings just before the final scientific report is due.

The mark for each of the two projects will be weighted for each component according to the following guideline.

Research Proposal:	15%
Ethics application:	5%
Class talk as mini-conference:	10%
Scientific report:	70%
Total:	100%

**For the final mark in the course, each of the two research projects will be worth 50%, so the final overall grade will be the sum of the marks for the two projects.**

## Description of the evaluated components of the course

### Research Proposal:

Each person will submit a written proposal for the team research project. This is a short research proposal (4 double-spaced pages or less than 900 words) outlining the rationale for the study, the specific hypotheses, the proposed methodology (description of subjects, protocol, research design and statistical methods), and anticipated findings. You will develop an hypothesis (or hypotheses) based on (i) theoretically interesting questions, (ii) on what has been studied, and (iii) on what is known about a particular species. You will make decisions about the methodology that best addresses your hypothesis (or hypotheses). You will likely collect behavioural data using focal-sampling or scan-sampling techniques, and the design and statistical analysis of your study will be based on whether your study entails an experimental or correlational methodology. You will analyze and interpret your data in light of your hypothesis (hypotheses), and discuss the significance of your findings with respect to the question(s) of interest. The actual project's hypotheses and methodology will be discussed and coordinated among team members in consultation with the instructor and teaching assistants. The purpose of the written research proposal is to develop skill in grant and scholarship writing and to develop a well-planned team research project. *This proposal will very likely become the introduction and methods sections of your final scientific report so if it is well-done at the outset you save a lot of time later.*

### Ethics Application:

In any research project investigators are concerned with the ethical treatment of the animal (including *Homo sapiens*) they are studying. There are federal standards for assuring that the animals are safe, healthy, and not subject to undue distress. Like all animal researchers in Canada, you will prepare an ethics application as if it were being submitted to the relevant review panel (see below). This application will be attached to your research proposal. The following are links to the relevant application forms. The acronym, AUP, refers to "animal utilization protocol" and has a corresponding form for projects done in the "field". PSREC refers to "Psychology Student Research Ethics Committee" which consists of members of our Department of Psychology, Neuroscience & Behaviour. *Everyone will submit an ethics application attached to the research proposal.* **Note:** It is very likely that your methodologies will have been pre-approved by the ethics committees as I have approval for the kinds of studies you might do on the condition that you also prepare an ethics application to be submitted to your instructor. [AUP application](#) and [field application](#) or [PSREC application](#)

### **McMaster University Regulations for Use of Nonhuman Animals**

The [regulations governing use of nonhuman animals](#) are intended to ensure the considerate and ethical treatment of animals. To this end, a number of policy requirements have been developed. These include approval by the McMaster University Ethics Committee of the care and procedures using nonhuman animals. In addition, students who will be using animals housed in approved animal facilities in the Psychology department will need the following:

1. WHMIS training (see <http://www.mcmaster.ca/riskmanagement/#WHMIS>)
2. Instruction arranged by your instructor and the McMaster University Central Animal Facility about ethical treatment of animals and security regulations.

### Mini-conference or Class Talk:

Each team will present their project's findings to the class. This will be like a mini-conference. The teams will give a 15-20 minute talk with the use of power-point slides or posters. The talk presentation will describe the project (rationale, hypotheses and methodology), and your findings and interpretations. *Team members participate equally in the presentations and everyone receives the same mark.* A research talk gives you an opportunity to communicate the purpose of your study, the methodology, your findings and interpretations, but also entails additional skills. Coordinating the equal participation of all team members is challenging. And, you need to keep the audience's attention and

interest. The research talk will also aid you in the writing of your scientific report. Class members will have suggestions and thoughts about your project that you could incorporate into your final report to make it even better. The mini-conference will take place the week before your scientific report is due so you can benefit from the others' comments.

**Scientific Report:** Each person will submit a written report of the project utilizing the data collected by the research team. In order to develop skills in scientific report writing, the paper will include an introduction, description of methods, summary of results, and discussion of the findings. This is a short report (5 double-spaced pages of text or less than 1200 words, not including title page, figures, tables or references). Models for this kind of short report are publications in several primary research journals such as *Science*, *Nature*, *Proceedings of the Royal Society of London Series B*, *Biology Letters*, *Psychological Science*.

Each person will write a scientific research report describing the team's project. The data compiled by all members of the group will form the basis of your report. The individual papers will only be similar to those of others on their team with respect to the methods and the findings. The papers will vary among team members as people will vary in their introduction to the research project, in their interpretations of the findings, in their criticisms of the study, in their suggestions for future work, in their selection of relevant literature, and in their styles and points of view.

**Please note:** All written reports and papers submitted for marking by instructor must be formatted as double-spaced one-sided 8.5 x 11 inch white bond sheets with 1-inch margins using a 12-point font. All reports and documents for evaluation will be submitted electronically to the instructor (wilson@mcmaster.ca).

### **Possible Projects**

**The following projects are likely to be successful, straightforward, and can be completed within the time frame of the course. You are welcome to modify these studies, but we do have to think of the demands on our time and what is feasible. I can provide you with reading sources, equipment, and other resources that you may need. We therefore need to make plans early in the term so we avoid any delays.**

Among the possible projects are both "field" studies and "lab" studies. Depending on the research question(s) or hypothesis(es), and depending on the species, your project may be a (1) naturalistic correlational study in which you make predictions about how some naturally-occurring events, behaviours, or conditions may co-occur, or (2) an experimental study in which you manipulate an independent variable to see its effect on your dependent measures. Whatever the species or research methodology you use, you will learn to make and record observations of behaviour, analyse your data and interpret your findings. Both methods form the foundation of scientific studies of animal behaviour and other kinds of behavioural science.

In general, naturalistic correlational methods of studying behaviour are very powerful methods as long as the researcher is aware of likely confounding factors that can alter the interpretation of any associations among variables. Correlational research methods in natural environments surpass laboratory experimental methods with respect to ecological validity.

## **Field Projects**

### **Vigilance and feeding in Canada geese (*Branta canadensis*)**

You probably have noticed that Canada geese are abundant here. They are a social-living flocking species typically found feeding on grass in local parks, although they also spend a lot of time in the water. They are a large bird, but still they are vulnerable to predation by coyotes and dogs (and in the past by wolves and in some places today by hunters). The behaviour of being vigilant with head up and looking around suggests that they may be on the watch for any possible dangers.

Some good research questions include:

- Are vigilance rates and feeding rates correlated with flock size?
- Does time spent being vigilant or feeding vary as a function of position in the flock?
- Do cues of the risk of predation elevate the vigilance rate?

You can use scan-sampling and focal follow observational methods for this naturalistic correlational study.

### **Food preferences and predation risk in chickadees (*Poecile carolinensis*)**

In the fall, the local flock-living chickadees are no longer caring for their offspring and male-female dynamics are not at the forefront of their daily agendas. Instead, food is paramount! Chickadees are enthusiastic seed-eaters, and if we provide them with some of their favourite seeds they will collect and store them in various places in their “home territory”. They do remember an amazing number of storage places: can you remember where you placed 70 items in sequence? They are also vulnerable to predation from hawks in the area. There are lots of questions one could ask about foraging decisions.

- Do cues of the risk of predation modulate their seed preferences?
- Do cues of food competition modulate seed preferences?
- Will an animal accept greater risk of predation for preferred foods?
- Will an animal be more willing to expend effort and time for preferred foods?
- Do handling time and processing effort affect food preferences?

In order to address these questions, we can observe and record the behaviour of chickadees at feeding stations in the Royal Botanical Gardens. Our project can be a naturalistic correlational study or an experimental study. In my experience, everyone loves chickadees as they are cute, lively, and happy to accept our seed offerings.

### **Predators or competitors? Who are squirrels (*Sciurus canadensis*) most concerned about?**

Everyone has noticed the abundance of squirrels here, but I wonder if you have thought much about how their behaviour might tell us what kinds of concerns they have when collecting and storing food for the winter? Hard nuts like walnuts and hickory nuts might be stored away for eating in late winter. Squirrels, like chickadees, do remember where they’ve stored their foods. They have ground predators like coyotes and dogs, and aerial predators like hawks to be concerned about. We may be able to show which category (ground or aerial) of predator they are most concerned about by doing a simple experiment. Squirrels also have to be concerned to hide their foods from other squirrels (competitors) who might watch, dig up the walnut or hickory nut, and store it in a place for their own later use. We can use correlational and experimental methods to ask whether the squirrels’ behaviour reflect concern for predation (and which category) or concern about competitors.

- Can the squirrels’ behaviour be used to infer what kinds of predators (e.g. ground or aerial) imposed mortality risks for the animals’ ancestors?
- Do cues of food competition affect searching for food, food choice, and storing food?

- Do the kinds of food affect squirrels' preferences, and inclinations to eat now or store away for the future? Perishability of nuts would be a deciding factor on whether to store the nut or eat it right away, and also whether the nut is worth protecting from competitors or whether it is worth taking the risk of hiding the nut when predators may be present.

### **Risk-taking as Social “Display” in humans (*Homo sapiens*)**

There is evidence that driver-mortality rates are higher for young men when there are passengers in the car than when not; there is no similar effect for young women or older people of either sex. There is also evidence that young men take more risks (e.g. speeding, driving through a yellow light) when driving if other young people are possible witnesses (e.g. observing the traffic from a sidewalk and as passengers). Naturalistic observations of local driving practices, jay-walking or bicycling might be used to test hypotheses about risk-taking as “social display”.

### **Altruism as Social “Display” in humans (*Homo sapiens*)**

Why do people provide benefits to unrelated unacquainted persons who we are unlikely to ever see again? This has recently been the subject of much discussion in economics, anthropology, evolutionary biology and psychology. An obvious answer is that we were raised to be kind to other people and we feel good when we are able to help someone. However, this aspect of our sociality and our psychology would not have been selected for in ancestral environments unless, on average, the cost of providing benefits to others was offset by the fitness benefits. One possible kind of benefit derives from impressing others; women as potential mates and men as potential allies. Questions and hypotheses derived from these considerations might be addressed by both correlational and experimental methods.

Note: These projects and modifications of these suggestions are possible, but whatever the project the methodology must entail observational methods of naturally-occurring public behaviour.

## **Laboratory Projects**

### **Shoaling in zebrafish (*Danio rerio*)**

Zebrafish, like Canada geese, live in social groups; they are a shoaling species. Individuals prefer to join a group rather than be alone. Their shoaling behaviour and social preferences can be studied in relation to possible benefits and costs of group-living. Past studies of zebrafish have demonstrated that group size, the physical characteristics of the group, the complexity of the habitat, recent experiences, and overhead cover affect shoaling behaviour and social preferences. Using naturalistic observations combined with experimental methodologies we can make inferences about their social preferences and sensitivity to cues of predation risk.

### **Sexual selection in Siamese Fighting Fish (*Betta splendens*)**

Most people are familiar with this spectacularly-coloured aggressive species, but did you know that only males care for the young? Until very recently there were no studies of this animal in its natural environment. The field studies indicate that males establish territories, and females visit males on their territories for spawning. There are many questions about male-male competition and female mate choice that could be pursued. Here are some to consider.

- Do males modulate their aggressive displays in response to information about their opponent's aggressiveness?
- Are females affected by the mate preferences of other females?
- What characteristics of the “territories” of males affect female preferences for a mate?
- Does the female's choice of mate depend on the choices available?

### **Mate choice & male-male competition in house crickets (*Acheta domesticus*)**

The common house cricket is an ideal species to study mate choice by females, male-male aggression, and acoustic communication. Females appear to choose a mate on the basis of the acoustic properties of the males' chirping. Males appear to win competitive confrontations with other males on the basis of their body size, and there is some suggestion that properties of the chirping are correlated with body size. Simple sound recording and playback procedures can be used for a correlational or experimental study to address questions about mate choice and male competitive advantage in the house cricket.

### **Important Dates**

September 8: first animal behaviour laboratory class

September 15: last day for drop and add

October 13: Thanksgiving holiday

November 7: last day for penalty-free drop

December 1: Last day of classes

### **Tentative Schedule**

<b>Dates</b>	<b>Meeting Place</b>	<b>Agenda</b>	<b>Assignments</b>
Sept 8	Room 204	Overview of the course	
Sept 15	Room 204	Project research planning: for 1 <sup>st</sup> project (& tentatively for 2 <sup>nd</sup> project).	
Sept 22	Room 204	Informal discussion of research plans	1 <sup>st</sup> Research Proposal Due
Sept 29	Research site	Data collection	
Oct 6		Data analyses	
<b>Oct 13</b>	<b>Thanksgiving holiday</b>		
Oct 20	Room 204	Mini-conference	Research Talk (15-20 mins) of 1 <sup>st</sup> project.
Oct 27	Room 204	2 <sup>nd</sup> research project planning	Final report of 1st research project due
Nov 3	Room 204	Informal discussion of research plans	2 <sup>nd</sup> Research Proposal due
Nov 10	Research site	Data collection	
Nov 17		Data analyses	
Nov 24	Room 204	Mini-conference	Research Talk (15-20 mins) of 2nd Project
Dec 1	No class		Final report of 2nd research project due

### **McMaster University Policy for Medicals and Deferred Exams**

Please refer to the [Office of the Associate Dean of Science \(Studies\)](#) for important information regarding missed course work, medical exemptions (including the McMaster medical certificate), exam conflicts, and deferred exams.

### **Policy Reminder**

Attention is drawn to the Statement on Academic Ethics and the Senate Resolutions on Academic Dishonesty as found in the Senate Policy Statements distributed at registration and available in the Senate Office. Any student who infringes one of these resolutions will be treated according to the published policy.

### **Academic Dishonesty: notice from Dean's Office**

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at <http://www.mcmaster.ca/univsec/policy/AcademicIntegrity.pdf>

The following illustrates two forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has not been obtained.
2. Improper collaboration in group work.

### **Message from the Chair of Psychology, Neuroscience & Behaviour**

The instructor cannot be responsible for returning long distance calls from students. Any student wishing to reach an instructor is invited to e-mail the instructor.

### **Final Grade:**

A+ 90-100%; A 85-89; A- 80-84; B+ 77-79; B 73-76; B- 70-72;  
C+ 67-69; C 63-66; C- 60-62; D+ 57-59; D 53-56; D- 50-52; F 0-49%.

The instructor reserves the right to adjust final marks up or down, on an individual basis, in the light of special circumstances and/or the individual's total performance in the course. Furthermore, the instructor reserves the right to change the weight of any portion of this marking scheme. If changes in the marking scheme are made, your grade will be calculated using the original weightings and the new weightings, and you will be given the higher of the two grades. At the end of the course, the grades may be adjusted but this can only increase your grade and will be done uniformly. The instructor will use the grade equivalence chart of your calendar to convert between letter grades, grade points and percentages.

## McMaster University Information & Contacts of Possible Interest

Centre for Leadership in Learning (CLL)

[www.mcmaster.ca/cll](http://www.mcmaster.ca/cll)

ext. 2450

Centre for Student Development (CSD)

<http://csd.mcmaster.ca>

ext 24711

Human Rights & Equity Services

<http://www.mcmaster.ca/hres>

ext 27581

Ombuds Office

<http://www.mcmaster.ca/ombuds>

Security Services

<http://www.mcmaster.ca/security>

ext. 24281

Student Affairs

<http://studentaffairs.mcmaster.ca>

ext. 27455

Academic Integrity Office

<http://www.mcmaster.ca/academicintegrity>

ext. 24303

Academic Skills Online

<http://csd.mcmaster.ca/writing>

Writing Skills

<http://csd.mcmaster.ca/writing>