

**University of Guelph**  
**Department of Integrative Biology**

**Course Title:** Arctic Ecology

**Instructors:** Dr. Sarah Adamowicz                      Phone: 1-519-824-4120  
& Dr. Alex Smith    ext. 53055 & 52007  
Biodiversity Institute of Ontario  
& Dept. of Integrative Biology,                      E-mail:  
University of Guelph,                                      [sadamowi@uoguelph.ca](mailto:sadamowi@uoguelph.ca)  
Guelph, Ontario    [salex@uoguelph.ca](mailto:salex@uoguelph.ca)  
N1G 2W1

**Dates:** July 7-21, 2012.

**Location:** Churchill, Manitoba.

**Cost:** Approx. \$1300 (includes accommodation and food for 14 days as well as course supplies – transportation to Churchill not included).

**Prerequisites:** University Invertebrate Zoology Course  
University Ecology Course  
University Statistics Course

**Enrolment:** 15 for U of G students, 5 for OUPFB students

**Description:** A two-week field course based at the Churchill Northern Studies Centre, Manitoba (<http://www.churchillscience.ca/>). Churchill is a diverse region for ecological study, being located at the junction of the boreal, arctic, and Hudson Bay biomes. The first week of the course includes exploration of terrestrial, freshwater, and marine arctic environments, as well as an overview of both aquatic and terrestrial collecting methods used to survey invertebrate biodiversity in these environments. Evening lectures provide background on arctic ecology and the use of genetic techniques for studying biodiversity. Weather permitting; excursions will include kayaking with the belugas. During the second week, students conduct independent research projects. Students are offered the opportunity to employ the tool of DNA barcoding in their biodiversity projects. This course provides an excellent opportunity to visit a spectacular sub-arctic locality; to learn about arctic ecology, arctic biodiversity, and DNA barcoding methods; and to conduct an independent research project.

**Assignments/  
Evaluation:** Natural History Journal - 20 % (due in September)  
Field Quiz - 2 @ 5%  
Individual Research Project - 50 % (report due in November)  
Participation - 20 % (during field component)

# COURSE OVERVIEW

## I. INTRODUCTION

Arctic Ecology aims to provide students with an introduction to arctic ecosystems through both group studies and individual projects carried out in the vicinity of Churchill, Manitoba. The initial 8 days of the course will focus on an exploration of biological diversity in freshwater, marine, and terrestrial environments of this area. These studies set the stage for individual research projects which ordinarily involve an experimental or analytical study of some organism or problem identified earlier in the course.

### Course Activities

We will be based at the Churchill Northern Studies Centre (CNSC – see <http://www.churchillscience.ca/>) for the duration of the course. These facilities are located about 15 km out of Churchill at the former Rocket Launch Facility of the National Research Council. Living conditions are shared and basic, but adequate and bear-proof! The Staff at the Centre will prepare our meals and aid in resolving other problems. Accommodation is in shared rooms (4-8/room). There are showers and washer/dryer for clothes (\$5/load).

### Faculty

The course participants will benefit from access to faculty members with varied expertise: Alex Smith (terrestrial invertebrates) and Sarah Adamowicz (freshwater invertebrates). Aside from “in house” expertise, you will likely profit from encounters with other scientists and graduate students working at the CNSC.

### Schedule of Activities

Our schedule of activities will be dependent on the elements (rain, fog, snow, wind)! However, whenever possible, field activities will occur between 8:00 a.m. and 5:00 p.m., while evenings will be devoted to structured discussions during the initial phase of the course. There will be flexibility in schedules once the transition to project mode has occurred. Evenings during the second week are typically spent working on individual projects.

### Discussion Topics

The following themes will be considered in our evening discussions. Although faculty will take the lead, active student participation is expected.

Topics will include:

1. Introduction to Churchill and CNSC facilities, brief review of course goals.
2. The Arctic Environment - a survey of habitat diversity in Canadian polar regions.
3. DNA barcoding and how to use genetic tools to study biodiversity.
4. Measuring species diversity.
5. Life in inland waters.
6. Life in marine waters.
7. Life in terrestrial environments.
8. Statistical design and data analysis.

## II. COURSE EVALUATION

Natural history journal	20%
Individual research project	50%
Field Quizzes (2)	10%
Participation	20%
	<hr/>
	100%

1. Your Diary is due on **Friday, September 28, 2012**
2. Your Individual project is due **Friday November 30, 2012**

### A. PARTICIPATION AND DIARY:

Your score on this component will be based on two factors.

1. Your involvement in course activities while in the arctic.
2. A diary describing your activities in the arctic. Employ a colloquial style, but clean the text of grammatical errors. Ensure that your report is reasonably comprehensive; this should involve the generation of about ½-1 page of double-spaced text per day.

### B. INDIVIDUAL PROJECT

Your individual project should be written up as a scientific paper. (i.e. include abstract, introduction, materials and methods, results, discussion, and references). Your reference section should follow the format employed the *Canadian Journal of Zoology*.

Three criteria will impact the evaluation of your report:

1. Quality of data collection, analysis, and interpretation.
2. Clarity of presentation and adherence to grammatical rules.
3. Placement of results in a broader scientific context.

### C. PRESENTATION DETAILS

1. Two hard copies of your diary must be submitted on or before **4:30 pm Friday, September 28, 2012**.
2. Two copies of your individual report must be submitted on or before **4:30 pm Friday, November 30, 2012**.
3. Presentations. Students will be responsible for delivering two short (10min) presentations during the course. The **first** will be on the research topics selected prior to the course initiation and will be delivered during the first week. A list of potential topics is below. The **second** will be at the end of the second week and will be on some early aspect of your proposed research project.

4. Field quiz. Two short field quizzes will be delivered in the first week and will be based on the identification of taxonomic groups and on the environmental features of the landscapes.

**Potential Presentation topics:**

Topics listed below are not to be considered exhaustive and others will be considered.

Northern Arthropod Temperature Adaptations  
Endangered Species in the North  
Early Biological Exploration of Canada's North  
Climate Change and Canada's North  
Life Cycle of Beluga Whales and Usage of Churchill River  
Patterns of Recent Sea Ice Change and Impacts upon Marine Wildlife  
History of Human Habitation of the Churchill Region and Uses of Wildlife  
Tree Species of the Churchill Region and their Adaptations to Sub-Arctic Life  
Growth Forms of Arctic Lichens and their Role in Arctic Ecosystems  
Actual and Potential Impacts of Shipping Industry on Churchill and other Arctic Ecosystems  
What is "The Tree Line" and How is it Changing?  
Invasive Species in the North

**III. ITINERARY** – Please note this may change by a day or 2 depending upon the final VIA rail schedule for summer 2012.

- July 06 Individuals flying direct to Churchill should arrive Friday July 06<sup>th</sup>, 2012. Individuals who are traveling by air/road/rail to Thompson and then via train should travel on the overnight train, arriving in Churchill on the morning of Saturday July 7<sup>th</sup>. See: [www.viarail.ca](http://www.viarail.ca)
- July 07 Tour of CNSC and Churchill area.
- July 8-13 Survey of biological diversity in marine, freshwater, and terrestrial habitats near Churchill. Weather permitting, this will include:
- Half-day tours of all major biological zones of the Churchill region (tundra, boreal forest, fen, bog, freshwaters, marine)
  - Half-day tour via kayak to Fort Prince of Wales and Churchill River, especially for beluga viewing
- July 14-20 Research Project
- July 21 Departure by train or plane. You can stay at the station for an extra day or two if you can't get a flight on July 21, but there will be an additional charge (approximately \$60/day) and a reservation is needed.

#### **IV. THINGS TO BRING**

##### **CLOTHING**

1. Fall coat
2. Hat and Toque
3. Raincoat and rain pants
4. Heavy sweater
5. Long sleeve shirts
6. T-shirts/turtleneck
7. Pants
8. Underwear
9. Mitts/gloves (waterproof)
10. Hiking boots (optional, as many people wear rubber boots the whole time outside)
11. Rubber boots (calf)
12. Running shoes
13. Socks (thick/thin; bring long ones that your rubber boots will tuck into)
14. Bug jacket or hat and mosquito netting

##### **LINENS**

1. Face cloth
2. Towel (they supply small ones)

##### **OTHER**

1. Day pack
2. Sunglasses
3. Insect Repellent
4. Spare glasses if needed
5. Binoculars\*
6. Laptop
7. GPS\*
8. Digital camera

\*Useful but optional.

##### **PERSONAL**

1. Hair brush
2. Shampoo/conditioner
3. Shaving kit
4. Soap
5. Toothbrush/paste/floss
6. Sunscreen/moisturizer
7. After-bite or other insect bite treatment
8. Antihistamines

You will have access to a washing machine/dryer at the CNSC (\$5/load)

## THINGS NOT TO BRING

1. You will not need a sleeping bag as sheets, pillowcases, etc are provided by the CNSC.
2. You can't use a tent because of bears.
3. Pack everything you need, but try to stick to one large pack plus your day pack, as the rooms are shared and cozy. Also, be sure to check on luggage restrictions on flights, as Calm Air limits are lower than for other airlines.

## V. THINGS TO DO (Soon!)

1. Fill out your application form for the course – due to Lori Ferguson by Friday December 2<sup>nd</sup> 2011. You will be informed about acceptance by the end of the semester. A waiting list position may be created if demand exceeds positions.
2. Upon acceptance, fill out the waiver forms for the University and return them to Lori Ferguson, Department of Integrative Biology, Room SCIE 2483, Science Complex, University of Guelph, Guelph, ON, N1G 2W1. Phone: 519-824-4120 **Ext.:** 56097. Email: [loriferg@uoguelph.ca](mailto:loriferg@uoguelph.ca)
3. Upon acceptance, notify the course co-ordinator (Sarah Adamowicz – [sadamowi@uoguelph.ca](mailto:sadamowi@uoguelph.ca), Alex Smith – [salex@uoguelph.ca](mailto:salex@uoguelph.ca)) of any pre-existing health issues or dietary restrictions (including vegetarian or vegan diet) which may require special attention.
4. Once you make your travel plans, notify Sarah Adamowicz and Alex Smith of your expected mode of travel, anticipated time of arrival, and flight numbers (if applicable).

## VI. Background Reading

It is critical that you do some background reading to broaden your understanding of arctic environments before the course. The following book provides the best low cost introduction to the arctic. It can be ordered from any bookseller (e.g. [www.amazon.ca](http://www.amazon.ca)) for about \$20.00.

*E.C. Pielou. 1994. A Naturalists Guide to the Arctic. University of Chicago Press, Chicago.*

## Other Information

There is a large amount of information on arctic life and environments at the following website:

1. [www.polarlife.ca](http://www.polarlife.ca)

You can learn more about DNA barcoding at the following websites:

2. [www.barcodinglife.org](http://www.barcodinglife.org); <http://www.ccdb.ca/>

## VII. Modes and Approximate Costs of Travel (excluding food)

1. Carpool to Thompson, sharing gas and 1 motel night. This journey can be done in 2 days but you might wish to take 3. Then, overnight train from Thompson to Churchill (current price is \$128 round trip with ISIC card).

*Total journey time:* at least 3 days total in each direction.

*Total cost per person:* ~\$300 but this varies depending on the number of people sharing.

2. 2-day bus from Guelph to Thompson on Greyhound (current price is \$200 round-trip with ISIC card and if booked at least 21 days in advance). Train from Thompson to Churchill (\$128).

*Total journey time:* 3 days in each direction.

*Total cost:* ~\$330 at current rates.

3. Fly Toronto to Winnipeg on Air Canada or West Jet (cost ~\$500-700 but you could get lucky with a seat sale). Then, 2-day train from Winnipeg to Churchill (departing Winnipeg on July 5<sup>th</sup>, arriving in Churchill July 7<sup>th</sup>; current price is \$369 round trip with ISIC card).

*Total journey time:* 2-3 days in each direction depending on your flight/train connection.

*Total cost:* ~\$800-1100.

(\*NOTE: Currently there is no train listed as departing Winnipeg on July 5<sup>th</sup>. According to the current VIA schedule, you would need to depart Winnipeg on July 3<sup>rd</sup> and arrive in Churchill on July 5<sup>th</sup>. You would then need to pay an additional two nights of accommodation at the research station.)

4. Fly to Winnipeg on Air Canada or West Jet (~\$500-700). Fly from Winnipeg to Churchill on Calm Air (approx. \$900-1200).

*Total journey time:* 1 day each way.

*Total cost:* ~\$1400-1900.

# APPLICATION FORM – ARCTIC ECOLOGY - BIOL\*4610

(Submit to Lori Ferguson, Integrative Biology, Science Complex, Room 2483)

<b>Name:</b>	<b>Program and number of semesters left to complete program:</b> _____
<b>Guelph Address:</b>	<b>Telephone Number:</b>
<b>Student I.D. Number:</b>	<b>Email address:</b>
<b>Home Address:</b>	<b>Home Telephone Number:</b>

## A. Academic Background

1. Cumulative Grade Point Average: \_\_\_\_\_

By May 2012, I will have taken the following courses or equivalent (list course #s).

2. Core Biology Courses: \_\_\_\_\_

3. Ecology: \_\_\_\_\_

4. Invertebrate Zoology: \_\_\_\_\_

5. Statistics: \_\_\_\_\_

**B. General Background** (Please write no more than 3 sentences for each section)

**1. Career Goals**

**2. Past Field Experience**

**3. Past Research Experience**

**4. Any other points you would like to raise.**