

# Concordia University

## BASIC POPULATION ECOLOGY (BIOL 351/4)

### Course Outline: January 2022

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**Note on delivery methods:**

In person (CC-115) or online via zoom (link below)

**SCHEDULE:**

Lectures: Wednesday & Friday, 11.45-13.00

<https://concordia-ca.zoom.us/j/82845299110>

Tutorials 01: Wednesday 13.15-14.30

Tutorials 02: Wednesday 14.45-16.00

**INSTRUCTOR:**

*Dr. Robert Weladji*

Office: SP-437.11, Phone: 848-2424 ext 3408,

Office hours: Monday between 13.30 and 14.30

(Inform me beforehand by email if you are coming)

Email: [robert.weladji@concordia.ca](mailto:robert.weladji@concordia.ca) (BIOL 351 in subject line).

**TEACHING ASSISTANTS:**

Tut 01 section by XXXXXX

Email: xxxx (BIOL 351 in subject line).

Tut 02 section by XXXXXX

Email: xxxx (BIOL 351 in subject line).

**COURSE DESCRIPTION**

BIOL 351 is an introduction to population ecology. This course introduces the processes which determine the distribution and abundance of individuals, and populations. The first part of the course deals with single species populations. Topics will include properties of populations, exponential and logistic population growth, and life history strategies. The second part of the course deals with population interactions and includes interspecific competition, predator-prey dynamics, plant-herbivore interactions, parasitism and mutualism. There will also be some applied lectures where topics such as human population growth, harvest or pest control will be discussed.

**Prerequisite:** Biology 226 or permission of the department

**REQUIRED MATERIALS**

- **Text book:** Smith M. S., Smith R. L. & Waters I. 2014. Elements of Ecology. 1st Canadian Edition. Pearson. Upper Saddle River, New Jersey, USA
- **iClicker:** can be purchased new or used from the bookstore

**RELEVANT MATERIALS FOR THE COURSE**

- Begon, M., C.R. Townsend and J.L. Harper. 2006. Ecology: from individuals to ecosystems. Fourth edition, Blackwell Publishing Ltd
- Krebs CJ (2008) Ecology: The Experimental Analysis of Distribution and Abundance (6th edition). Benjamin Cummings
- Rockwood LL (2006) Introduction to Population Ecology. Blackwell Publishing Ltd
- Alstad D (2001) Basic *Populus* Models of Ecology. Prentice-Hall Inc, NJ

**LECTURES**

Lectures will cover the material in all assigned chapters (or chapter sections). Whenever possible, review questions will be provided to assist you in understanding lecture and textbook material. I expect students to read the assigned chapter before coming to class and answer (or at least try to answer) the review questions. Because my lecture will not always follow the order in which the material is presented

in the textbook, I recommend that you attend lectures, where important points will be presented. I encourage students to talk to each other when thinking about the review or study questions.

### **CLICKERS:**

I will be using clickers this year to increase student involvement in the course. The clicker will be used mainly to answer review questions based on the assigned readings or the material covered during the last class; as well as discussion questions aimed to provoke students to think about issues. The clickers questions will count towards class participation.

### **How to Register Your i>clicker Remotes in Moodle**

Please follow the directions below to register your i>clicker remotes:

1. Log in to Moodle at *moodle.concordia.ca*
2. Locate the “I>CLICKER” block on top left of the homepage
3. Click the **Student Registration** link
4. Enter your i>clicker remote ID (printed on the back of your remote)
5. Click the **Register** button.

- Synchronization will only be possible after your iclicker has been registered
- Must be done before **February 1**

### **TUTORIALS**

These sessions are designed to help you with the more quantitative aspects of the material in the course. They will mostly be in the form of computer labs. We will (1) do some exercises, (2) develop, and interpret some of the population models introduced in the lectures. The *Populus* software (<http://www.cbs.umn.edu/populus>) will be used to enhance your understanding of the principles studied. I anticipate about 9 tutorial sessions. I will supervise the tutorials, but the Teaching Assistants will coordinate them.

### **ASSIGNMENTS AND EXAMS**

- You will be given two assignments during the course of the semester. These will be problems and questions designed to develop your ability to understand and use some of the basic concepts (e.g. equations) involved with population ecology. I encourage students to talk to each other when thinking about the questions; however, each student must submit in his/her own work.
- There will be one paper presentation (see below).
- There will be two mid-term examinations and a final examination. Copying from other students is plagiarism and academic misconduct (see Section 17.10.3 of the Undergraduate Calendar; <http://www.concordia.ca/academics/undergraduate/calendar/current/17-10.html>).

### **ORAL PRESENTATION**

The presentation will be based on current literature related to a topic relevant to the course. My goal with this is that you (1) gain experience in searching, reading and synthesizing the primary literature in ecology and (2) increase your skills in oral and written presentation of ideas. There will be a great deal of flexibility but the paper should be relevant to population ecology. The paper to be presented should be an article from a peer reviewed international journal (e.g. *Ecology*, *American Naturalist*, *Oecologia*, *Oikos*, *Journal of Animal Ecology*, *Behavioral Ecology*, *Behavioral Ecology and Sociobiology*, *Canadian Journal of Zoology*, etc.). **You should clearly state the problem, hypothesis/predictions, and methods used by the author(s), and you should identify which major population ecology issues your paper relates to.** You should also present the findings and tell us what you think about the paper. **All the key topics covered in this class should be covered, on a first-come, first-served basis.** Key topics (see below) must be selected by **March 1<sup>st</sup>** and you must submit the full reference of your article with a pdf copy of the paper by **March 18, 2022**. Feel free to discuss potential articles with me or your TA as soon as possible.

A team of 4 students will prepare and present an oral presentation of **12 minutes** based on a PowerPoint presentation of no more than **12 slides (excluding the front page and the bibliography)**. Presenters will give an overview of their selected papers, and then be available to

answer questions related to their paper. The group is evaluated collectively. We will also dedicate some time at the end of each oral presentation session as an open question period for attendees to ask questions to any presenter.

### EVALUATION

Surprise quizzes (beginning or at the end of class, including tutorials + clicker)	4%
Class participation: A factor of 1.25 will be applied with a maximum of 1 - i.e. 1/1 if clicking $\geq 80\%$ classes (No exception because you were sick or forgot your clicker, etc)	1%
Assignment 1 (posted Feb 4 and <b>due Feb 11</b> )	5%
Assignment 2 (posted Mar 11 and <b>due Mar 18</b> )	7.5%
Test I ( <b>Feb 16</b> ) – single species populations	17.5%
Test II ( <b>Mar 25</b> ) – population interactions	17.5%
Oral presentation (electronic copy to be submitted before the presentation+ one page reflecting Figure 1.4)	7.5%
Final Exam (all material covered)	40%

### GRADING SCHEME

A+>90, A=85-89.9, A-=80-84.9, B+=77-79.9, B=74-76.9, B-=70-73.9, C+=67-69.9, C=64-66.9, C-=60-63.9, D+=57-59.9, D=54-56.9, D-=50-53.9, F<50

### NOTES

- Late submission of assignments will incur a penalty of 10% per day and will not be accepted 3 days after the due date without convincing justification.
- There will be no make-up tests; **in the case of illness**, your final exam will count for more

### TENTATIVE SCHEDULE OF LECTURES AND ASSIGNMENTS

<u>DATE</u>		<u>ACTIVITY</u>	<u>READING</u>	<u>TUTORIALS</u>
Jan 7	L1	Course Description		
Jan 12	L2	Introduction – The Nature of Ecology	Ch. 1	
Jan 14	L3	Properties of population	Ch 9.1-9.7	
Jan 19	L4	Population growth	Ch 10	Tut 1
Jan 21	L5	Intraspecific competition I	Ch 11	
Jan 26	L6	Intraspecific competition II	Ch 11	Tut 2
Jan 28	L7	Dispersal, dormancy and migration	Ch 9.8-9.10	
<b>Feb 2</b>	L8	Introduction to metapopulation	Ch 12	Tut 3
Feb 4	L9	Life history strategies I <b>Post Assignment 1</b>	Ch 8	
<b>Feb 9</b>	L10	Life history strategies II	Ch 8	Tut 4
Feb 11	L11	Single species populations Ecological application 1: Human population growth (Ch 10, p.214) <b>Assignment 1 due</b>		
<b>Feb 16</b>		<b>Test I (Single species populations)</b>		Tut 5
Feb 18	L12	Interspecific competition I	Ch 13	
Feb 23	L13	Interspecific competition II	Ch 13	Tut 6
Feb 25	L14	Predations: Concepts	Ch 14	

Mar 2 & 4		MIDTERM BREAK		
Mar 9	L15	Plant-herbivore interactions	Ch 14	Tut 7
Mar 11	L16	Predator-prey interactions <b>Post assignment 2</b>	Ch 14	
Mar 16	L17	Parasitism	Ch 15.1-15.6	Tut 8
<b>Mar 18</b>	L18	Mutualism <b>Assignment 2 due</b> <b>Last day to submit selected research article</b>	Ch 15.7-15.13	
Mar 23	L19	Ecological application 2: Harvest		Tut 9*
<b>Mar 25</b>		<b>Test II (Population interactions)</b>		
Mar 30	L20	Ecological application 3: Pest control		Tut 10*
Apr 1	L21	Oral presentation		
Apr 6	L22	Oral presentation		
Apr 8	L23	Oral presentation		
Apr 13	L24	Wrap up and review (if necessary)		

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\*Work on your presentation (group work)

## **TENTATIVE TOPICS FOR THE TUTORIALS**

Tutorial 1	Plotting, estimating density, Mark-recapture, etc.
Tutorial 2	Life tables and survivorship curves
Tutorial 3	Density independent growth
Tutorial 4	Density dependent growth
Tutorial 5	Literature search – work on presentation
Tutorial 6	Trade-offs, Life history strategies
Tutorial 7	Interspecific competition; Lokta Volterra models
Tutorial 8	Predation; LV predator-prey models, phase planes,..
Tutorial 9*	Group work on presentation
Tutorial 10*	Group work on presentation

\* Work on presentation (group work)

## **ORAL PRESENTATION – TOPICS**

	<b>TOPICS</b>
1	HARVEST – MANAGEMENT
2	PEST-CONTROL
3	INTRA-SPECIFIC COMPETITION
4	INTER-SPECIFIC COMPETITION
5	DISPERSAL – METAPOPOPULATION

6	MIGRATION
7	LIFE HISTORY (TRADE-OFFS)
8	LIFE HISTORY (REPRODUCTIVE STRATEGIES)
9	SEXUAL SELECTION (INTERSEXUAL – MATE CHOICE)
10	SEXUAL SELECTION (INTRASEXUAL)
11	PREDATION – FORAGING THEORIES
12	PREDATOR-PREY
13	HERBIVORY
14	PARASITISM
15	MUTUALISM