

Concordia University

BASIC POPULATION ECOLOGY (BIOL 351/4)

Course Outline: January 2017

SCHEDULE:

Lectures: Wednesday & Friday, 11.45-13.00, Loyola CC-308
Tutorials 01: Wednesday 14.45-16.00 (Room: CC-203)
Tutorials 02: Thursday 14.45-16.00 (Room: CC-203)

INSTRUCTOR :

Dr. Robert Weladji
Office: SP-437.11, Phone: 848-2424 ext 3408,
Email: robert.weladji@concordia.ca
Office hours: see me after class, by appointment, or drop by
Tuesday between 1030 and 1200

TEACHING ASSISTANTS:

Amelie Paoli, SP 301.16
Office Hours: XXXXXX or by appointment Email:
XXXXXXXXXXXX (Include BIOL 351 in the subject line of
your email).

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 TEXT

Smith M. S., Smith R. L. & Waters I. 2014. Elements of Ecology. 1st Canadian Edition. Pearson. Upper Saddle River, New Jersey, USA

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
- **iClicker:** can be purchased new or used from the bookstore

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.

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 and (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. Tutorials will be coordinated by the TA under my supervision.

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 issue 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.** You may present during “ecological application” lectures.

Key topics (see below) must be selected by **March 8th** and you must submit the full reference of your article by **March 22, 2015**. Feel free to discuss potential articles with me or the T.A. as soon as possible.

A team of 4 students will make an oral presentation of **15 minutes** based on a PowerPoint presentation of no more than **12 slides (excluding the front page and the bibliography)**.

EVALUATION

Surprise quizzes (beginning or at the end of class, including tutorials)	5%
Assignment 1 (posted Feb 3 and due Feb 10)	5%
Assignment 2 (posted Mar 17 and due Mar 24)	7.5%
Test I (Feb 17) – single species populations	17.5%
Test II (Mar 29) – population interactions	17.5%
Oral presentation (electronic copy to be submitted after 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 11	L1	Course Description		
Jan 13	L2	Introduction – The Nature of Ecology	Ch. 1	
Jan 18	L3	Properties of population	Ch 9.1-9.7	Tut 1
Jan 20	L4	Population growth	Ch 10	
Jan 25	L5	Intraspecific competition I	Ch 11	Tut 2
Jan 27	L6	Intraspecific competition II	Ch 11	
Feb 01	L7	Dispersal, dormancy and migration	Ch 9.8-9.10	Tut 3
Feb 03	L8	Introduction to metapopulation Post Assignment 1	Ch 12	
Feb 8	L9	Life history strategies I	Ch 8	Tut 4
Feb 10	L10	Life history strategies II Assignment 1 due	Ch 8	
Feb 15	L11	Single species populations Ecological application 1: Human population growth (Ch 10, p.214)		Free
Feb 17		Test I (Single species populations)		
Feb 22 & 24		MIDTERM BREAK		
Mar 01	L12	Interspecific competition I	Ch 13	Tut 5
Mar 03	L13	Interspecific competition II	Ch 13	
Mar 08	L14	Predations: Concepts	Ch 14	Tut 6
Mar 10	L15	Plant-herbivore interactions	Ch 14	
Mar 15	L16	Predator-prey interactions	Ch 14	Tut 7
Mar 17	L17	Parasitism Post Assignment 2	Ch 15.1-15.6	
Mar 22	L18	Mutualism Last day to submit selected research article	Ch 15.7-15.13	Tut 8
Mar 24	L19	Ecological application 2: Harvest Assignment 2 due		
Mar 29		Test II (Population interactions)		Tut 9*
Mar 31	L20	Ecological application 3: Pest control		
Apr 5	L21	Oral presentation		Tut 10*
Apr 7	L22	Oral presentation		Tut 11
Apr 12	L23	Oral presentation		
Apr 18	L24	Wrap up and review (If necessary)		

*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; Lotka Volterra models
Tutorial 8	Predation; LV predator-prey models, phase planes,..
Tutorial 9*	Group work on presentation
Tutorial 10*	Group work on presentation
Tutorial 11	Parasitism and/or review

* Work on presentation (group work)

ORAL PRESENTATION – TOPICS

	TOPICS
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