



COURSE SYLLABUS

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|------------------------|-------------------------------------|----------------------|-----------------------------------------------|
| COURSE TITLE: | Population Ecology | | |
| COURSE CODE: | 22915 | TERM: | Winter 2019 |
| COURSE CREDITS: | 3 | DELIVERY: | Lecture & Practicum (Lab) |
| CLASS SECTION: | 01 | START DATE: | January 4, 2019 |
| CLASS LOCATION: | Rm 125 Thompson (Biology) Building | LAB LOCATION: | Rm 122 and/or 212 Thompson (Biology) Building |
| CLASS TIME: | MWF 12:30–1:20 | LAB TIME: | L1 Fri. 1:30–4:20 pm |
| WEBSITE: | Via blackboard & main frame website | | |

Instructors

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Lab Coordinator
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Office Hours: Appointments can be set up with instructors by email. However, most inquiries will be best answered with an email response. Responses to specific questions about course material are at the discretion of each instructor. Further information about individual policies may be provided in the lecture or laboratory by each instructor.

Course Description

This course is designed for undergraduate students specializing in biology with emphasis in ecology; however, we encourage students from a variety of departments to take this course because the principles of population analysis cross several disciplines within the Colleges of Arts and Science, Agriculture, and Veterinary Medicine. The course includes 3 lectures and 1 lab per week.

Major topics include: links with evolutionary theory, population limitation and regulation, structured population models, population viability, competition, predation, parasitism and disease, population stability and pest outbreaks, dispersal, sampling, spatial aspects of populations, life histories, and conservation biology. The course also covers contemporary topics in plant and animal population dynamics, including human population dynamics.

Prerequisites: By its very nature, much of the course takes a quantitative approach and so students are expected to have a reasonable background in algebra. Some background in elementary calculus will also be helpful but is not absolutely necessary. Students should be familiar with descriptive statistics, confidence intervals, and linear regression analysis. Formal prerequisite(s): BIOL 228 and a course in statistics. BIOL 302 is recommended. Note: Students with credit for BIOL 263 or BIOL 473 may not take this course for credit.

Learning Outcomes

By the completion of this course, students will be expected to:

- Develop an advanced understanding of population ecology.
- Be able to describe how the scientific method is applied in examples of ecological studies;
- Be able to explain the structure and functioning of populations, including develop simple population models, interpret the results of model analyses, and, most importantly, appreciate how population ecology applies to our understanding of the ecology and evolution of plant and animal systems;
- Practice and apply numerical skills by compiling, summarizing and interpreting population data;

- Build critical thinking skills through the process of evaluating scientific information in laboratories and from the literature.
- Apply concepts of population ecology to the management and conservation of species.
- Develop writing skills in the lab and through lecture exams that include essay-type questions.

Information on literal descriptors for grading at the University of Saskatchewan can be found at the end of this document, and at:

<https://students.usask.ca/academics/grading/grading-system.php>

Please note: There are different literal descriptors for undergraduate and graduate students. More information on the Academic Courses Policy on course delivery, examinations and assessment of student learning can be found at:

http://www.usask.ca/university_secretary/council/academiccourses.php

The University of Saskatchewan Learning Charter is intended to define aspirations about the learning experience that the University aims to provide, and the roles to be played in realizing these aspirations by students, instructors and the institution. A copy of the Learning Charter can be found at:

http://www.usask.ca/university_secretary/LearningCharter.pdf

Schedule

The course consists of 50 minutes of lecture, three times a week; and one lab, once per week.

Lecture Schedule (2019)

| Lecture Schedule | |
|------------------|--------------------------------------------------------------------------------------------------------------------|
| Week of | Topic |
| Jan 4 | Course Introduction; Natural Selection and Population Ecology |
| Jan 7 | Population Regulation and Limitation; Exponential Growth |
| Jan 14 | Introducing Structured Models; Life Tables |
| Jan 21 | Leslie Matrices; Sensitivity and Elasticity Analysis |
| Jan 28 | Stochasticity in Population Dynamics; Population Viability Analysis; Logistic Growth |
| Feb 4 | Logistic Growth, cont.; Stability, Oscillations, and Chaos; Allee Effects |
| Feb 11 | Multi-species Interactions; Competition |
| Feb 18 | Reading Week (No Classes) |
| Feb 25 | Predation and Consumer-Resource Dynamics; Parasitism and Disease |
| Mar 1 | MIDTERM EXAM during lab period |
| Mar 4 | Population Sampling and Distribution of Organisms; Spatially Structured Populations and Metapopulations; Dispersal |
| Mar 11 | Life History Theory; Bridging Population and Evolutionary Dynamics (Eco-evolutionary Dynamics) |

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| Mar 18 | Eco-evolutionary Dynamics, cont.; Special Topics in Population Ecology of Animals (e.g., human population growth; rise and fall of civilizations; fisheries and harvest management) |
| Mar 25 to Apr 3 | Special Topics in Population Ecology of Animals, cont.; Special Topics in Population Ecology of Plants (e.g., population structure issues, demographic studies of long-lived plants, self-thinning) |
| Apr 5 | Review |
| TBA | FINAL EXAM (scheduled by the University) |

Laboratory Schedule (2019)

| Laboratory Schedule (all labs held in Room 212 unless otherwise indicated) | |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lab | Topic |
| Jan 11 | Setting up plant competition experiment: Introduction due January 18 (2% of final grade) , Experiment termination Mar 1, Materials and Methods due March 8 (2% of final grade) , Full Report due April 5 (6% of final grade) |
| Jan 18 | Plant competition measurements. Population Growth (sample problems due in lab [2% of final grade] plus assignment due Jan 25 2% of final grade)* |
| Jan 25 | Plant competition measurements. Life Tables (assignment due at end of lab [2% of final grade])* |
| Feb 1 | Plant competition measurements. Population Regulation and Key-Factor Analysis (report due Feb 15 [6% of final grade]) |
| Feb 8 | Plant competition measurements/Flex time for Key-Factor Analysis |
| Feb 15 | Plant competition measurements. Population Viability Analysis (assignment due Mar 8 [6% of final grade]) |
| Feb 22 | Reading Week (No Classes) |
| Mar 1 | LECTURE MIDTERM EXAM during lab period Plant measurements and termination of Plant Competition Experiment. |
| Mar 8 | Functional Response of Predators to their Prey (exercise due Mar 22 [5% of final grade]) |
| Mar 15 | Population Estimation Using Mark-Recapture (exercise due Mar 29 [5% of final grade]) |
| Mar 22 | Plant Competition Data/Mark-Recapture Flex Time |
| Mar 29 | Some Practical Techniques used in Wildlife Population Ecology |
| Apr 5 | Competition Tutorial (graded sample problems in lab [2% of final grade])* |

* denotes labs with in-lab assignments

SPECIAL NOTE: LAB ON JAN 11 IS FOR SETTING UP AN EXPERIMENT

LABORATORY LOCATION: Room 122 or 212 Biology (Thompson), Friday, 1:30-4:20 pm

Midterm and Final Examination Scheduling

Midterm and final examinations must be written on the date scheduled.

If a student is unable to write the midterm exam through no fault of his or her own for medical or other valid (University-approved) reasons, an opportunity to write the missed exam will be given; however, students must inform the instructors of their absence and reason within three business days to qualify for a deferred midterm exam.

The final exam may be scheduled at any time during the examination period which extends from April 6 to 29, 2019; students should therefore avoid making prior travel, employment, or other commitments for this period. **Please note, final exams are rescheduled ONLY with a fee and by application to your College, following University-approved procedures.**

Students are encouraged to review all examination policies and procedures:

<http://www.usask.ca/calendar/exams&grades/examregs/>

Course Resources

An unofficial text for the course, written in chapter format, has been developed by your instructor for this class. These notes will be made available freely to students online on a weekly or semi-weekly basis as “Lecture Notes Supplements”, in pdf format; along with a pdf of powerpoint slides. However, we are fortunate this year, to have the 2nd edition of a text your instructor used to develop his online notes, published by Dr. Dick Neal (past instructor of this course), which we are hoping to adopt for this class going forward. Unfortunately, as at writing, this text is not yet available (it was just published in December 2018). Full title of this text is:

***PLEASE DO NOT PURCHASE A TEXTBOOK YET. The textbook will be discussed on January 4th.**

Other Resources and Downloads

Journal research articles will be assigned during the lecture, which students will be responsible for reading as part of their studies and preparation for exams. The laboratory portion of this course will require a working knowledge of computers and various computer programs, including MS Excel and Word. Computers will be used extensively to collect and analyze data and prepare reports in the laboratory. You will need to access your University computer account during the laboratory; make sure you know your university NSID and password and how to log on to your account. Further details are in the lab manual.

These will be available as appropriate online (e.g., Blackboard or Main Frame websites). Please download and familiarize yourself with the course syllabus. Please note that instructor’s PowerPoint slides are provided to you as a courtesy. You are not required to download or print these slides. While we will endeavor to have the lecture PowerPoint slides posted sometime in advance of the lectures, we will not guarantee this. Each instructor will provide you with additional information about accessing information from websites.

From time to time, your instructors may make supplementary material available to you. This material will not replace the lecture or lab experience and you are encouraged to attend all lectures and take your own notes.

Grading Scheme

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| Mid-term | 20% |
| Final exam | 40% |
| Laboratory Reports | 40% |
| Total | 100% |

Exams (Lecture Only)

Midterm Exam

Value: 20% of final grade
Date: March 1st, 2019 (in lab)
Length: 100 Minutes
Type: Short- and long-answer
Description: **Scientific calculators are required**, but note that cell phones and smart phones or other digital devices other than a calculator are not allowed.

Final Exam

Value: 40% of final grade
Date: Consult Final Exam Schedule
Length: 3 hours
Type: Short-and long-answer
Description: **Scientific calculators are required**, but note that cell phones and smart phones or other digital devices other than a calculator are not allowed.

Criteria That Must Be Met to Pass

An overall course grade of 50% must be obtained to pass this course. Attendance at laboratories is mandatory.

Attendance Expectations

Students are encouraged to attend all lectures, and laboratories are mandatory.

University of Saskatchewan Grading System (for undergraduate courses)

Exceptional (90-100) A superior performance with consistent evidence of

- a comprehensive, incisive grasp of the subject matter;
- an ability to make insightful critical evaluation of the material given;
- an exceptional capacity for original, creative and/or logical thinking;
- an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.

Excellent (80-90) An excellent performance with strong evidence of

- a comprehensive grasp of the subject matter;

- an ability to make sound critical evaluation of the material given;
- a very good capacity for original, creative and/or logical thinking;
- an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.

Good (70-79) A good performance with evidence of

- a substantial knowledge of the subject matter;
- a good understanding of the relevant issues and a good familiarity with the relevant literature and techniques;
- some capacity for original, creative and/or logical thinking;
- a good ability to organize, to analyze and to examine the subject material in a critical and constructive manner.

Satisfactory (60-69) A generally satisfactory and intellectually adequate performance with evidence of

- an acceptable basic grasp of the subject material;
- a fair understanding of the relevant issues;
- a general familiarity with the relevant literature and techniques;
- an ability to develop solutions to moderately difficult problems related to the subject material;
- a moderate ability to examine the material in a critical and analytical manner.

Minimal Pass (50-59) A barely acceptable performance with evidence of

- a familiarity with the subject material;
- some evidence that analytical skills have been developed;
- some understanding of relevant issues;
- some familiarity with the relevant literature and techniques;
- attempts to solve moderately difficult problems related to the subject material and to examine the material in a critical and analytical manner which are only partially successful.

Failure <50 An unacceptable performance

Integrity Defined (from the Office of the University Secretary)

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals section of the University Secretary Website and avoid any behavior that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All students should read and be familiar with the Regulations on Academic Student Misconduct (http://www.usask.ca/university_secretary/honesty/StudentAcademicMisconduct.pdf) as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals (http://www.usask.ca/university_secretary/honesty/StudentNon-AcademicMisconduct2012.pdf)

For more information on what academic integrity means for students see the Student Conduct & Appeals section of the University Secretary Website at:
http://www.usask.ca/university_secretary/pdf/dishonesty_info_sheet.pdf

Access and Equity Services for Students (AES)

Students who have disabilities (learning, medical, physical, or mental health) or require other accommodations are strongly encouraged to register with Access and Equity Services for Students (AES) if they have not already done so. Access and Equity Services, formerly Disability Services for Students (DSS), is guided by Saskatchewan's Human Rights legislation and the duty to accommodate individuals requiring accommodations based on disability, religion, family status and gender identity. Student who suspect they may have needs for these services should contact AES for advice and referrals. In order to access AES programs and supports, students must follow AES policy and procedures. For more information please visit <https://students.usask.ca/health/centres/access-equity-services.php> , or contact AES at 306-966-7273 or aes@usask.ca.

Students registered with DSS may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through AES by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by AES.