Syllabus
BI 483/583 Population Biology
Winter 2016 — M/W/F 1200-1300 — LInC 228

Course Description
Theoretical and empirical views of the structure and function of populations from across the tree of life, emphasizing the integration of ecological and evolutionary approaches.

Instructor
Dr. Benjamin Dalziel
Email: benjamin.dalziel@oregonstate.edu
Phone: 541 737 1979
Office: Cordley 5006

Office hours
Scheduled office hours: MWF 1330-1430 or by appointment
Open door policy: I want to talk with you about population biology! Please stop by anytime that is convenient for you. If I am not immediately available, I will be happy to setup an appointment at another time.

Course work
This course combines approximately 30 hours of instruction and activities for 3.0 credits.

Prerequisites
(MTH 241 or MTH 251) and (ST 351 or ST 351H) and (ST 352* or ST 411*) and ((BI 311 or BI 311H) or (BI 370 or 370H))
*may be taken concurrently

Weekly schedule of lecture topics
Week 1: Introduction
Week 2: Single species population growth: density (in)dependence
Week 3: Single species population growth: logistic map, cycles, chaos
Week 4: Exam 1, Introduction to population genetics
Week 5: Evolution of life histories, adaptive radiations
Week 6: Interacting species, community stability, resistance, resilience
Week 7: Lotka-Volterra models
Week 8: Exam 2, Ecology of infectious diseases (R0, cycles and chaos revisited)
Week 9: Evolution of infectious diseases (evolution of transmissibility and virulence)
Week 10: Space: the final frontier in population biology

Learning Outcomes
After successful completion of either 400-level or 500-level version of the course, students will be able to:
1. Define, contrast and synthesize the concepts of abundance, distribution and diversity
2. Interpret data on population abundance over time in terms of growth and regulation
3. Define and give examples of the six types of species interactions
4. Formulate and critique simple models of population dynamics
5. Interpret individual behaviors such as dispersal in an evolutionary context
6. Evaluate conservation strategies from a population dynamic standpoint
7. Recognize the potential impacts of population structure on growth and viability

In addition, students completing the 500-level version of the course will be able to:

1. Invent and critique hypotheses in population biology with reference primary literature
2. Formulate structured population models with reference to their fields of interest
3. Formulate a plan for how these models could be used to test hypotheses

Course materials
Required:


Hardcopies available at the OSU bookstore, and on reserve at the Valley Library

Recommended background reading:

*Cain Bowman and Hacker. Ecology. 3rd ed. 978-0-87893-908-4*

*Chapters 9 – 11.*

Available at the OSU bookstore, and on reserve at the Valley Library.

A note on the required text
The Hastings text has math in it. In most cases we will see that the equations in the text are easily understood as we engage with the underlying biology. The only math you need is what you saw in your first term of calculus: specifically, we will need to apply the basic concept of a derivative to biological scenarios, and to calculate the derivatives of simple exponential and polynomial functions. Occasionally the text uses more advanced mathematics. You are not responsible for deeply understanding those parts – we will carefully clarify the take home messages where needed.

Evaluation of Undergraduate Student Performance
Grading will be based on a combination of three examinations (exam 1, exam 2, and a final) and in-class activities.

*Exams*
Exams 1 and 2 will be in class, in weeks 4 and 8. Questions that are answered incorrectly by a significant majority of the class will not be used to determine grades.
In class activities - quizzes
Each class will begin with a brief quiz. If you are up to date with the material and prepared for lecture, the quiz should be easy. Quiz questions that are answered incorrectly by a significant majority of the class will not be used to determine grades.

In class activities – group work
The classroom will be a cooperative environment where we all work together to achieve learning. During most lectures, students will work in small groups to complete in-class activities. The output from these activities will be evaluated and will contribute to the in-class portion of your final grade.

Grade determination - undergraduate
Exam 1: 20%
Exam 2: 20%
Final exam: 30%
In-class activities: 30%

Evaluation of Graduate Student Performance
Grading will be based on a combination of three examinations (exam 1, exam 2, and a final) and in-class activities, as described above. In addition, graduate students will complete a research project presented as a scientific poster, described below.

Research Poster Project
In this project, due in class on the final day of lecture, graduate students will do the following. Identify a hypothesis in population biology from lecture (for example, that herbivorous populations tend to be regulated by predators and parasites, rather than by food availability). Read and synthesize the key primary literature on the topic. Identify an alternate hypothesis. Describe both hypotheses using a structured population model. Identify a population or set of populations where we could test this, by comparing the model to data. “Pitch” your experiment and analysis in a scientific poster.

Grade determination - graduate
Exam 1: 15%
Exam 2: 15%
Final exam: 20%
Research poster project: 20%
In-class activities: 30%

Regarding Exams
Attendance at all exams is required. Please plan your schedules accordingly. Photo ID is required at all exams. Make-up exams are not given. If you have an urgent and serious illness or another emergency that prohibits your attending the exam, you must contact the instructor ASAP to be made aware of the consequences or discuss alternatives. All submitted responses
on exams are final – you will not be credited with answers that you did not bubble and your bubbled TF number will not be subject to change once submitted.

**Student Conduct**
Choosing to join the Oregon State University community obligates each member to a code of responsible behavior which is outlined in the Student Conduct Code, available at [http://oregonstate.edu/studentconduct/offenses-0](http://oregonstate.edu/studentconduct/offenses-0). This Code is based on the assumption that all persons must treat one another with dignity and respect in order for scholarship to thrive. In particular, academic dishonesty, as outlined in the Student Conduct Code, will be penalized according to OSU’s regulations, which include, but are not limited to, receiving an “F” in the course.

**Mobile Electronic Devices in Lecture**
The purpose of lectures is to engage with course material by face-to-face interaction among students and instructors. All lecture materials will be posted online so you do not need to copy down information. You are free to think, and interact with the students and instructors in the lecture hall. In this context, the use of smartphones, tablets, laptop computers, and other such devices during class is detrimental to everyone’s learning, and is prohibited. Students found to be using these devices during lecture will be asked to leave the lecture hall, and will forfeit their grade for in-class activities that day. If you would like to use a mobile electronic device in lecture as part of an accommodation for a disability, you must obtain approval from OSU Disability Access Services (DAS).
Statement Regarding Students with Disabilities
Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Diversity Statement
The College of Science strives to create an affirming climate for all students including underrepresented and marginalized individuals and groups. Diversity encompasses differences in age, color, ethnicity, national origin, gender, physical or mental ability, religion, socioeconomic background, veteran status, sexual orientation, and marginalized groups. We believe diversity is the synergy, connection, acceptance, and mutual learning fostered by the interaction of different human characteristics.

Religious Holidays
Oregon State University strives to respect all religious practices. If you have religious holidays that are in conflict with any of the requirements of this class, please see me immediately so that we can make alternative arrangements.

Disclaimer
This class is a work in progress. Thus I reserve the right to change the schedule, policies, and assignments in this course due to extenuating circumstances or by mutual agreement between the instructor and students.