Course Description

Population ecology is the science that helps us understand why abundances and densities of a particular species vary in space and time. It is a key component of the management of endangered, invasive, and harvested species.

By the end of the course, you should be able to:

1. Critically evaluate the evidence for biodiversity trends
2. Understand the key processes that affect a species at local and regional scales
3. Identify opportunities for effective management interventions
4. Construct and analyze statistical and process-based models in support of the first three goals

We will primarily focus on conservation applications, but will also consider examples from invasive species management and harvested species management.

Readings

There is no textbook for this course; I will post both required readings and reference material to the Gauchospace page.

Grading

- **40%** of your grade will be determined by homework assignments.
- **30%** of your grade will be determined by a final project.
- **30%** of your grade will be determined by your attendance and participation in classes. Chronic absences or failure to do the class preparation will cost you here.

Homework assignments

Homework assignments will involve the analysis of data and/or population models, together with interpretation of the results. Grading will be based on the accuracy and thoroughness of the analysis, and the thoughtfullness of the interpretation.
The homeworks will be due at 5PM on:

- Friday, Jan. 17
- Friday, Jan. 31
- Friday, Feb. 21
- Friday, Mar. 6

You should complete homework assignments individually. You may consult with one another (and with Bruce!) as you work on the assignment, but please:

- Write your own code
- Write up your analysis in your own words

**Final project**

This is an opportunity for you to apply the tools and ideas from this course to a species and management problem of particular interest to you. There are two general options:

1. If there is an aspect of your group project that could benefit from a population analysis, you may do a GP-related class project. If this is the case, please consult with Bruce in the first week or two of class, to ensure that your idea is within the scope of the class and is reasonably do-able. It is late in the game for GPs, so you may need to work on an accellerated schedule to get it into your final report.

2. Otherwise, you will select a species that interests you and that has management issues (e.g., related to conservation, harvest, or biological invasion); there must also be a published model describing its population dynamics. For your project, you will extend the published analysis to address scenarios or management problems not addressed in the published paper. You may need to extend the model in some way (e.g., to incorporate additional threats), or analyze the model under different parameters (e.g., to project the population under climate change).

The final write-up of your project will be due at the end of exam week (although you are welcome to turn it in earlier if that helps with other deadlines). There are some additional milestones along the way that will help you keep moving through the project (Bruce will give feedback on each of these, but they will not be formally graded):

- *Friday, Jan. 24*: Brief description of your planned project
- *Tuesday, Feb. 18*: Detailed description of the analyses you plan to do and how they will address the management question
- *Monday, Mar. 9*: Draft analysis

The detailed requirements for each of these will be posted separately.

Please hold the scheduled final exam slot for this class (Tuesday, March 17, 8:00–11:00) on your calendar. If there is interest, we will use this time (or a subset of it) for you to share your projects with the rest of the class with informal presentations. We will decide as a group later in the quarter whether to go ahead with this, once you better understand your deadlines and workload.

You may do the project individually, or in a group of up to 3 students. Unless you are doing a GP-related project, I recommend working with folks who are not in your GP!
Class participation

Classes will be a mixture of lecture and active participation by you. The latter activities will include discussions, computer exercises, and teach-ins. You will get full credit for participation if you:

1. Attend class (see “Attendance,” below, for information about absences)
2. Ask (and answer!) questions during lectures
3. Do the background preparation for in-class discussions and activities
4. Participate in in-class discussions and other activities

Computing in R

If you are a Bren MESM student you are very familiar with this! If you are another sort of student, and don’t have much R experience, please read some online tutorials (there are many).

There is no lab for this course, but we will sometimes do computer exercises in class (I will give you advance warning of this, so you can plan to bring your laptop). Please ensure that you have “recent” versions of R and Rstudio installed (the versions you installed last year for ESM 206 should be sufficient). Also, be sure to have the Tidyverse libraries installed; I will give you advance information about any other R libraries you will need.

Preparing for class

1. Visit the GauchoSpace page in advance of class for special instructions, readings, etc.
2. Do the readings When needed, I will post reading assignments on GauchoSpace. Please read these before class, as we will often spend some time discussing them. I know this is a busy time for Group Project, so I will keep these short and/or light. I highly recommend the first part of svmiller.com/blog/2014/09/taking-good-notes/ for useful advice on effective reading.
3. Do computational pre-activities For some in-class computer activities I will post detailed instructions in advance. So that we may spend the lab involved in more substantive issues around interpretation, please spend some time getting set up for the activity (downloading data, installing libraries, etc.). If I provide code, please ensure that it runs on your computer (that’s a good way to find missing libraries!). If you have difficulty with any of this, please email Bruce as soon as possible so that the issue can be resolved before class.

I will make every effort to get material for a given week posted by Friday of the preceding week. If I’m late, I’ll send an email when the material is up.

During class

Class will be a mixture of discussion, lecture, and computer demonstrations. I will post my slides, but note that I also do a lot of work on the board.

If you need advice on notetaking see the later part of svmiller.com/blog/2014/09/taking-good-notes/

If you’re ready to start on time I’ll let you go on time.
Attendance

*Showing up is 80 percent of life* – Woody Allen, via Marshall Brickman

Of course, ESM 211 is not life, and you will face other constraints (e.g., illness) and opportunities (e.g., an interview for your dream job) that will take you away from class. But I don’t work from a textbook, and there is a fair amount of interactive work that will happen in class, so “making up” a missed class is not something easily done.

If you miss class, please:

- Send me an email (in advance, if possible). Don’t tell me in person, as I will forget!
- Look to the GauchoSpace page for any relevant printed material, and talk to your classmates to find out what happened in class.

Office hours

I encourage you to talk to me outside of class about any questions you may have on material from class, or to dig deeper into some topics. Feel free to drop in to my scheduled office hours without an appointment. If you need to meet at a different time, send me an email proposing some times, or catch me after class.