

BIO 697 - Special Topics in Invasive Species: Ecology and Management
<http://bio697.blogspot.com>

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Description: This course is designed to provide students with an up-to-date perspective on invasive species. The first half of the course will cover characteristics of successful invaders, and the ecological processes that occur when a non-native species is introduced into a new habitat. There will also be an extensive review of the pathways that lead to the introduction and spread of invasives, from both the past and present. The second half of the course will cover invasive species impacts, and issues of invasive species control and management. Course literature will be a mix of recent peer-reviewed articles, reports, and landmark papers.

Grading:

Participation: 35%

Homework Assignments: 30%

Semester Project/Presentation: 35%

Syllabus:

- Week 1: **Introduction** – What is an invasive species? Scientists have been unable to agree on a single definition. We will explore several vocabularies that are in use by biologists, governments, and NGOs across the globe, and discuss the grey areas that cause disagreements.
- Week 2: **The “Ideal” invader** – What are the biological characteristics that make a successful invader? Topics for this week will include propagule pressure, competition, and response to environmental conditions.
- Week 3: **The process of invasion I** – We will first look at the process of natural invasion, and compare it to the ramped-up rates of invasion we see today. This week will also include discussion of the lag-time curve, and effects of genetic variation and genetic bottlenecks.
- Week 4: **The process of invasion II** - Disturbance – cause or effect? We will look closely at the relationship between disturbance and invasive species. The discussion will include causes of direct disturbance (habitat destruction, human interaction, etc.) and indirect disturbance (climate change, hydrologic change, etc.).
- Week 5: **The process of invasion III: Modeling** – There are many models that have attempted to describe or predict invasions. This week we will read selections from the book

- “Biological Invasions: Theory and Practice.” (Shigesada and Kawasaki 1997), and will look at products including Kolar and Lodge’s fish model, and models predicting zebra mussel spread.
- Week 6: **Vectors of Invasion I:** Introduction and History – This week we will review the many vectors that have lead to the accidental and intentional introduction of non-native species. This will give us the opportunity to review the “classic” invasive species literature by authors such as Elton, Crosby and Fosberg.
- Week 7: **Vectors of Invasion II:** Following a review of historical invasion pathways, we will discuss the current pathways that are the biggest threat, focusing on ballast water, the ornamental plant trade, and relationship between human travel and disease.
- Week 8: **Vectors of Invasion III:** Past, Present and Future – We will use this week to reflect on how pathways have changed, predicting what we should focus on in the future. Additional topics will include the difference between the “How” and “Why” of invasions, and how pathways of introduction can differ from pathways of spread.
- Week 9: **Invasive Species Impacts** – There are now hundreds of case studies of the impact of invasive species, we will look at several from across the plant and animal kingdoms, attempting to tease apart cause and effect.
- Week 10: **Playing Devil’s Advocate** – We will spend this week discussing the positive impacts of non-native species introductions, and will review evidence supporting this.
- Week 11: **Management Efforts I:** This week’s topics will include the many mechanical and chemical control options available for managing invasive species. Case studies will highlight successes and failures for the various technologies.
- Week 12: **Management Efforts II:** Biological controls are often the desired option for controlling invasive species. We will look into successes and failures in this field, and explore the process of testing a potential biological control.
- Week 13: **Management Efforts III:** Planning for the future – We will discuss the long-term options for invasive species management, taking a closer look at border/customs inspections, white lists, public outreach, and state/federal management plans. We will also discuss attempts at early detection/rapid response plans, and whether eradication is a realistic goal.
- Week 14: **Student Presentations**