

COURSE TITLE: Fall 2017 - HCOL 185D - Integrated Challenges of Biological Invasions
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A brief course description, including course objectives: Biological invasions are second only to habitat destruction in causing declines in native species and are currently cited as one of the primary drivers of global environmental change. However, species invasions also provide unique opportunities for testing basic theories in ecology and evolution and applying sustainable management practices. In this course we will review the process and underlying mechanisms of invasions, effects of invasions on communities and ecosystems, and sustainable management techniques. The focus will be on conceptual frameworks, research approaches, and the overall process of 'doing' science.

Course Objectives: Upon completion of this course, students should be able to:

1. Explain the history of invasion ecology
2. Describe and critically evaluate ecological, social, and economic hypotheses relevant to invasions
3. Summarize the effects of invasions on communities and ecosystems.
4. Understand costs and benefits of possible management strategies of invasives.
5. Synthesize, critique, and write about primary literature.
6. Discuss literature with fellow scientists, present research, and share outreach strategies.

Grading:

50 pts: Peer edits
100 pts: Research paper final draft
100 pts: Research presentation
200 pts: In-class participation
100 pts: Outreach campaign
100 pts: In-class exam

Research paper and presentation: You will self-select a non-native invasive species (terrestrial, marine, pathogen etc.) that has been identified as a threat to their novel environment. Using primary literature, you will prepare a review paper synthesizing the ecological, economic, sustainable management options, and policy impacts for the species. You will give a 20-minute presentation summarizing your findings and conclusions. See the table below for timeline.

Outreach campaign: Controlling invasive species requires a greater degree of cooperation and public input than most scientific endeavors. As such, communication and outreach to the general public is critical. Your challenge is to develop a campaign to educate the public on an invasive species or suite of species that are important or are likely to become important. You may not use a species or system that has already been discussed or researched in class. You will develop the campaign and presentation in small teams. We will determine teams and species during the first weeks of class.

You have nearly complete freedom to choose the format of your campaign. You can communicate using posters, brochures, web sites, videos - essentially any type of media that can communicate your message to the general public (no PowerPoint lecture - this is not an effective tool for most audiences!!). Your peers and myself will evaluate the effectiveness of the message. I strongly encourage creativity and integrating your backgrounds and personal interests. Have FUN!

Invasive Species Topic Options for Research Paper/Presentation and Outreach Campaign

(Basic info on many of the below species can be found at <http://www.invasivespeciesinfo.gov/>)

Aquatic Plants

Alligatorweed (*Alternanthera philoxeroides*)
Common Reed (*Phragmites australis*)
Didymo (*Didymosphenia geminata*)
Eurasian Watermilfoil (*Myriophyllum spicatum*)
Giant Reed (*Arundo donax*)
Purple Loosestrife (*Lythrum salicaria*)

Aquatic Animals

Sea Lamprey (*Petromyzon marinus*)
Nutria (*Myocastor coypus*)
Asian Carp (Multiple species)
American Bullfrog (*Lithobates catesbeianus*, formerly *Rana catesbeiana*) – In Europe
Lionfish (*Pterois volitans*)
Spiny Water Flea (*Bythotrephes longimanus*)
Asian Clam (*Corbicula fluminea*)
Rusty Crayfish (*Orconectes rusticus*)

Terrestrial Plants

Autumn Olive (*Elaeagnus umbellata*)
Canada Thistle (*Cirsium arvense*)
Chinese Tallow (*Triadica sebifera*)
Common Buckthorn (*Rhamnus cathartica*)
Dalmatian Toadflax (*Linaria dalmatica*)
Japanese Barberry (*Berberis thunbergii*)
Japanese Honeysuckle (*Lonicera japonica*)
Japanese Stilt Grass (*Microstegium vimineum*)
Kudzu (*Pueraria montana* var. *lobata*)
Leafy Spurge (*Euphorbia esula*)
Norway Maple (*Acer platanoides*)
Old World Climbing Fern (*Lygodium microphyllum*)
Oriental Bittersweet (*Celastrus orbiculatus*)
Scotch Broom (*Cytisus scoparius*)
Spotted Knapweed (*Centaurea stoebe*)
Tree-of-Heaven (*Ailanthus altissima*)
Yellow Star Thistle (*Centaurea solstitialis*)

Terrestrial Invertebrates

Africanized Honeybee (*Apis mellifera scutellata*)
Asian Citrus Psyllid (*Diaphorina citri*)
Asian Long-Horned Beetle (*Anoplophora glabripennis*)
Asian Tiger Mosquito (*Aedes albopictus*)
Bark Beetles – In China
Brown Marmorated Stink Bug (*Halyomorpha halys*)
Cactus Moth (*Cactoblastis cactorum*)
Common Pine Shoot Beetle (*Tomicus piniperda*)

European Spruce Bark Beetle (*Ips typographus*)
Giant African Snail (*Achatina fulica*)
Glassy-Winged Sharpshooter (*Homalodisca vitripennis*)
Hemlock Woolly Adelgid (*Adelges tsugae*)
Japanese Beetle (*Popillia japonica*)
Light Brown Apple Moth (*Epiphyas postvittana*)
Red Imported Fire Ant (*Solenopsis invicta*)
Soybean Aphid (*Aphis glycines*)

Terrestrial Vertebrates

Burmese Python (*Python molurus bivittatus*)
Brown Tree Snake (*Boiga irregularis*)
Cane Toad (*Rhinella marina*)
European Starling (*Sturnus vulgaris*)
House Sparrow (*Passer domesticus*)
Wild Boar (*Sus scrofa*)

Animal Pathogens

Avian Influenza (*Orthomyxoviridae*)
West Nile Virus (*Flavivirus*)
White-Nose Syndrome – In Bats

Plant Pathogens

Butternut Canker (*Sirococcus clavigignenti-juglandacearum*)
Citrus Canker (*Xanthomonas axonopodis*)
Citrus Greening (*Liberibacter asiaticus*)
Dogwood Anthracnose (*Discula destructiva*)
Late Blight (*Phytophthora infestans*)
Plum Pox (*Potyvirus: Potyviridae*)
Soybean Rust (*Phakopsora pachyrhizi, Phakopsora meibomiaie*)
Sudden Oak Death (*Phytophthora ramorum*)
Thousand Cankers Black Walnut Disease (*Geosmithia morbida*)
White Pine Blister Rust (*Cronartium ribicola*)

**Below is an example of an outline for research papers.
The content of the paper should be used to prepare your research presentation!**

Literature Review & Background

1. What does the scientific literature tell us about your species?
 - Explain the history of the invasion.
 - Natal and novel environments of your non-native species.
 - Biology and ecology of your non-native species.
 - Describe and critically evaluate the hypotheses to explain biological invasions.
 - Other information
2. Establishment & Spread
 - Transport and pathway of your non-native species.
 - Compare and contrast environments it is found in natal and novel environments.
 - How does it disperse?
 - How would you reduce establishment and spread?
 - Other information
3. Impact
 - Once your species has become problematic, what management options are available to reduce its impact?
 - What is the public perception of the species?
 - How feasible is ecological restoration if invasive species are controlled?
 - What was learned about species interactions based on the invasion?
 - What are the take home messages that you would communicate to the general public about your invasive species?
 - Other information.
4. Identify gaps in literature
 - Develop testable hypothesis
 - Develop one or more experiments or observations to test the hypothesis

Below are suggestions for your research presentation

1. Length

All presentations should be no longer than 20 minutes. At 15 minutes, I will ask you to wrap up and conclude. If your presentation is under 20 minutes or you do not get through all of your materials, your presentation grade will suffer. Use your peers to help you PRACTICE ahead of time. Hint: memorize what you'll say for the first slide – uncertainty about how to begin is the biggest time killer.

It is common to invest 4 hrs per hour of a presentation, this is **after** you've gathered all materials and outlined the presentation! Use the information you've gathered for your paper to construct your presentation! My default recommendation is no more than one slide per minute (30 slides max).

2. Questions

At the end of the presentation there will be 5 minutes for questions.

3. Format & Logistics

Presentations should be written in PowerPoint. Please make sure that your presentation displays correctly on a MAC– my laptop runs Windows.

4. Presentation style

Using cue cards will not affect your presentation grade. However, I encourage you to try not to use any sort of prompts. Do not read your presentation from a piece of paper – this can cause a stilted and distracting speech pattern, which will adversely affect your presentation grade.

Category	Scoring Criteria	Points	Score
Organization (15 points)	The type of presentation is appropriate for the topic and audience.	5	
	Information is presented in a logical sequence.	5	
	Presentation appropriately cites references.	5	
Content (45 points)	Introduction is attention-getting, lays out the problem well, and establishes a framework for the rest of the presentation.	5	
	Technical terms are well-defined in language appropriate for the audience.	5	
	Presentation contains accurate information.	10	
	Material included is relevant to the overall message/purpose.	10	
	Appropriate amount of material is prepared, and reflect their relative importance.	10	
	There is an obvious conclusion summarizing the presentation.	5	
Presentation (40 points)	Speaker maintains good eye contact with the audience and is appropriately animated (e.g., gestures, moving around, etc.).	5	
	Speaker uses a clear, audible voice.	5	
	Delivery is poised, controlled, and smooth.	5	
	Good language skills and pronunciation are used.	5	
	Visual aids are well prepared, informative, effective, and not distracting.	5	
	Length of presentation is within the assigned time limits. 25-30minutes.	5	
	Information was well communicated.	10	
Score	Total Points	100	

