Instructor: 
Office Hours: 

TA: 

Course Overview: This course provides an overview of non-native species ecology and management. Non-native invasive species raise concern because they restructure ecosystems, affect the evolutionary trajectory of native species, lead to the extinction of species, and impact local industries. They have been ranked as the second greatest threat to our natural areas and native species. Through lectures, readings, projects, and discussions, students will examine the extent and consequences of introductions as well as management efforts. This course builds upon the fundamentals of ecology and also addresses economics, ethics, policy, and management practices relevant to nonindigenous species.

Objectives – By the end of the course students will be able to interpret and synthesize information about non-native species to create an ecologically based, useful management document and, separately, to create an informative, synthetic paper of a topic important to our current understanding of invasive species ecology or evolution. Students will also build skills of reading pertinent primary literature and presentation.

Assignments

Participation: You will not be graded on attendance and participation, but your participation is important to your learning and the learning of your peers. Please come prepared, ask questions, and contribute with your insights and expertise.

Readings and Homework: There are five published readings to do for the class and each has corresponding questions that you must turn in as homework. Homework also includes handouts to read and associated questions about the 10s rule and about policies. Bring in hard copies of your homework.

Undergrads: You must present at the board to the class about the introduction (draw and explain your concept map) or methods and results (schematics and figures) for one of the three research papers.
Ecology & Management of Biological Invasions – ESM 485 (14762)/585 (14763)
Fall 2016; Tuesdays & Thursdays Noon-1:50PM in CH 359

the readings

Textbook: Lockwood JL, Hoopes MF, Marchetti MP. Invasion Ecology. Blackwell Publishing. (I’m okay with older editions but the newest is better).

Required papers are listed below; their numbers correspond to the number on the schedule on page 1 of this syllabus. These required readings are available via the PSU library system and via D2L. You’ll need an ODIN account to access library materials and D2L. If you don’t have one, go to: https://www.account.pdx.edu/, call (503 725 4357), or email (help@pdx.edu) the office of information technologies help desk.

Optional: http://harpers.org/archive/2015/09/weed-whackers/


Management Project: Select from one of the projects below (pp 3-5). Conduct your project with your group outside of and in class. You’ll create group methods and a group written product from your project, and give a brief (~15 min) group presentation on it to the class. The presentation must have 12 or fewer slides. Each student should work on the project for ~ 20-25 hrs through the term, including meetings and other planning. The methods write-up should include: the goal of project; a description of what ways and extent to which your group will be meeting that goal; a time table, a description in your words of your vision for your final product (which should be in line with what the partner wanted and what you think you will be able to provide them); and if not already included in the above, a list and explanation of what components you are planning to turn in to me and your partner.

Ecology Topic, analytical paper: Select an invasions topic that has to do with your management project (e.g., if your management is on biocontrol, then it would be good to do an ecology topic on propagule pressure, Allee effects, or something that has to do with the species being controlled, such as allelopathy – if you’re not sure, I can help with this) and research it intensely. Write a brief (5-page 1.5-spaced) paper reviewing key research and ideas about this topic. Early on you’ll identify the specific thesis for your individual paper, which should be a thesis that seems reasonable based on the literature you are reading. Modify your thesis, as needed, for the subsequent assignments. Next, you have your choice between a) writing a formal outline that shows your major ideas and how you’ll develop them or b) drawing a concept map which does the same in a less linear form, hopefully also helping you to see linkages between the components and see structure to the information you’re reading. I encourage you to do both but am only requiring you to turn in one. For the final paper, you must cite at least 12 (585) or 8 (485) primary literature articles from peer-reviewed journals in your paper and at least one review article or book chapter. The goal for your paper is that it reads like a review paper from Trends in Ecology & Evolution or the like.

Ecology Topic, oral presentation: You must do a practice presentation for the TA and modify it according to her suggestions.
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485: 4-6 min + questions, 1-3 slides. Start with your thesis statement, then summarize the evidence you’ve read and synthesized that supports &/or refutes the thesis, and finally end w/ a general take home for invasions regarding your thesis.

585: You will give a presentation (22-26 min plus ~ 3 min for questions) to the class on your ecology topic. These presentations should proceed as above but with a lot more information and serve as the perfect mini-lesson for your peers about the topic.

Exams: There will be one midterm exam and one comprehensive exam. Students may bring in one page (one side) of notes to consult during the test. The comprehensive exam will be based on all material covered in class (but with more questions on the last half) including student and guest presentations.

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<tr>
<th>Grading component</th>
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<tr>
<td>Homework &amp; readings</td>
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<td>Midterm exam</td>
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<td>Comprehensive exam</td>
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<td>Management project: methods due</td>
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<td>Management project: product</td>
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<td>Management project: presentation</td>
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<td>Management project: evaluations</td>
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<td>Ecology topic: thesis</td>
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<td>Ecology topic: concept map or outline</td>
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<td>Ecology topic: peer review</td>
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<td>Ecology topic: analytical paper</td>
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<td>Ecology topic: practice for oral presentation</td>
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<td>Ecology topic: oral presentation</td>
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Total grade 100 100

Ecology Topic Choice
By the 2nd day of class, select an invasions ecology topic you would like to research. You may select from the list below or think of your own topic that links to ecological theory and get it approved by me. 585 students: I’d prefer you selected one of the topics in italics.

Allelopathy
Alternate stable states
Biosecurity
Climate change and invasions (see Ch 14)
Disturbance
Dynamics of invasions (e.g., lag times)
Earthworms
Ecosystem engineers
Ecosystem services
Effects on soil (nitrogen)
Extinction from NIS: Case study commonalities
Evolution of NIS in new regions (e.g., Ch 11)
Facilitation

NIS spurring evolution of natives
NIS in foodwebs
Forecasting spread (ch 7)
Forest fires & invasions
Inducible defenses Island invasions (e.g., Hawaii or Guam)
Invasional meltdown
Niche conservatism
Overcompensation
Parasites & invasions
Policies & laws - laws & guiding philosophies
Restoration

Management Project Descriptions for Bioinvasions
Create a regional list of high risk invasive species. Check species lists of invasive species councils, gather and review existing risk assessments of regional invasive species, and interview people from invasive species councils to create a master list of possible species and to narrow that list down to the highest risk
Mapping the local distribution of nutria. Contact agency and other natural resource personnel, create a database for the contacts and for known locations of nutria in the greater Portland metropolitan area, and map the locations. Also, gather and input information on and perhaps map their density and any damage at each location. Group 1-2 students. Contact Person: Mark Sytsma sytsmam@pdx.edu

Risk assessment for aquatic weeds. Create a risk assessment for Sagittaria platyphylla and Bacopa rotundifolia, following ODA protocol: Your risk assessment should provide information that helps Oregonians understand the level of threat posed by these water weeds. Students working on this project will need to gather and synthesize information on each species into a risk assessment. Risk assessments should evaluate the potential for spread and establishment and the potential environmental, economic, and human health impacts of each species. You must turn in a rough draft and correct it for a final version. Sample assessments: http://www.oregon.gov/OISC/reports.shtml, http://www.oregon.gov/ODA/programs/Weeds/OregonNoxiousWeeds/Pages/RiskAssessments.aspx, and http://www.oregon.gov/OISC/calendar_january09_assessment.shtml Group: 1 student per assessment. Contact Person: Mark Sytsma sytsmam@pdx.edu

Fact sheet on Biocontrol Releases for Homeowners. Biocontrol agents are occasionally used as a nuisance plant management tool in Portland. In 2015, Galerucella spp., previously released to control purple loosestrife (Lythrum salicaria) in Oaks Bottom (and never previously effective largely due to spring freshets), reached an unusually large population size. Many beetles left the target area and fed on non-target species, including neighbors’ ornamentals. Though the beetles dissipated within a week, homeowners in the area were alarmed and angered. In the future, such a situation may be mitigated if homeowners had information on why biocontrol agents are used, what possible non-target effects are, and what to do if they find them in their yards. For this project students will both create a fact sheet on biocontrol agents for purple loosestrife directed to Oaks Bottom: ID tools, non-target lists, what homeowners should do, the unique hydrologic situation at Oaks Bottom, etc. Additionally, students will investigate conditions that lead to a “population explosion” of Galerucella beetles at Oaks Bottom to assist with predicting future outbreaks. The target audience is the general public, the fact sheets should be non-technical and include photos. Group: 4-5 students. Contact: Dominic Maze, Invasive Species Coordinator, Biologist; City of Portland Environmental Services.

Updated Construction Specifications. The City of Portland Standard Construction Specifications outline protocols to be followed by city staff and contractors working on construction projects. The specifications are updated periodically, largely to reflect changes to the state specifications. For the next update, we would like to include improved protocols for preventing the spread of weed propagules. For this project, students will research equipment sanitation, inspection, and survey procedures to improve prevention efforts, and draft language to be included in the updated specifications. Group: 2-3 students. Contact: Dominic Maze, Invasive Species Coordinator, Biologist; City of Portland Environmental Services.

Restoration background synthesis. Review the literature and interview experts then create a written synthesis and accompanying powerpoint presentation on each of three topics about restoration: 1) chemical use/herbicide application to manage non-native plants; 2) managing novel, urban landscapes of our own making; 3) the effect of soil complexity and chemistry on plant community composition and diversity. Group size: 3-6 students. Contact: SOLVE: Steve Kennett steve@solveoregon.org
Kill or be killed: on translating success/progress in invasive species management in real terms.
Managers are often asked to translate their invasive species efforts into simple metrics for assessing success. Often times complicated strategic management plans are boiled down to “# of acres treated” or “% population removed”. Forget the big reports, the perceived success (and continued funding) of programs are tied to these simplified results. This project will challenge you as a group to look at how we communicate results of complicated efforts and to think about what we need to know to change the conversation. ex: Protected acres vs treated acres: Travis Ziehl
This group could be made up of 3-4 people max who really like the idea of sinking their teeth into exploring and debating an idea that doesn’t have a right or wrong answer (yet!). There are a couple of ways to approach this project but here’s a potential product: A literature review, background document and a gap analysis. Contact:
Robyn Draheim, Invasive Species Coordinator – USFWS, OISC robyn_draheim@fws.gov

Invasive species campaign. Building your social media empire is hard work: targeting opportunities, attracting and growing your audience, developing new content, attracting earned media, staying relevant... The Kardashians know this but invasive species managers don’t have their budget for staff (or their wardrobes). Leveraging partners and their social media connections to spread a small message far and wide can be the key to a successful awareness campaign. But developing a coordinated outreach campaign requires a lot of work on the front end to make it seem effortless and still be effective. It isn’t all re-tweets and nice pictures.

“The heart of a coordinated outreach campaign is in the words “working cooperatively and with a unified message strategy to achieve a single goal or to serve a shared interest.” As these words imply, there must be (1) a reason for entering into a coordinated outreach campaign (e.g., a problem that must be solved or an opportunity to be pursued) and (2) a commitment to working cooperatively.” from https://www.nae.edu/Publications/Bridge/51063/51090.aspx

Here’s an ex: #TroutTuesday Taking an unloved day of the week and sharing the story of the interior redband trout http://usfwspacific.tumblr.com/post/103581147920/introducing-trout-tuesdays-finally-something

Pitch a few campaign ideas to the OISC Social Media Committee, we pick one and then you work with the Outreach Campaign Template (to be provided) to flesh out your ideas. Here are the parts that you’ll need to think out: Issue, Background, Level of Controversy, Media Interest, Communication Goals, Strategy, Products/Action Needed, Key Messages and Talking Points

This group could be made up of 4 students and your final product will be a draft communication strategy (in template form) for the outreach campaign idea selected by the OISC social media committee. If done superbly, we’ll use it. Contact: Robyn Draheim, Invasive Species Coordinator – USFWS; OISC; robyn_draheim@fws.gov

Web pages for policy makers. Well-informed policymakers are critical to effective invasive species management. This project would entail developing legislative district-specific web pages that highlight local invasive species problems, projects, and individual expertise that legislators and prospective legislators could visit to learn about invasive species issues relevant to their constituents. House and Senate webpages for selected districts in Oregon and Washington would be developed. Issues and individuals change over time. Future students could update and expand the webpages to ensure that they remain up-to-date, so this could be a long-term project with utility well into the future. Partners: Raquel Crosier, Wash. Invasive Species Council; Mark Sytsma, Oregon Aquatic Invasive Species Plan.

Fact sheets. Portland Parks & Recreation City Nature group would benefit from a fact sheet on one of the following topics:
• “New” weedy tree species (Horsechestnut, a maple fact sheet (Norway, Sycamore), Fraxinus excelsior)
• An ivy fact sheet that discusses the variety of ivies we have in the area (Hedera helix, H. hibernica and H. colchica)
• Information about barred owls. We are seeing increased incidents from barred owls attacking park patrons, particularly runners. Signage and/or a brochure educating people about barred owls, behaviors and impacts would be of interest.

Group size: 1-3; Contact: Kendra Petersen-Morgan, <Kendra.Petersen-Morgan@portlandoregon.gov>

Policies

Late policy: Your grade will be reduced by 15% if it is late; also I likely will not grade it until the end of the term. Extension requests must be made >36 hrs before the assignment due date.

Illness policy: If you’re contagious, please don’t come to class. Work with me to figure out how to compensate for missed class and email me or upload your assignments as they’re due (if you didn’t ask for and receive an extension).

Email policy: Sabra and I will return emails within 48 hrs given no unforeseen circumstances.

Conduct: We are to ‘realize’ the ‘highest ethical standards of professional’ and student behavior. Check out the Student Code of Conduct, to which you are bound: http://www.pdx.edu/dos/codeofconduct

Also, if you have not already done so, please go through the on-line training for creating a safe, respectful campus: https://d2l.pdx.edu/d2l/home/425907

Please consult the Purdue OWL regarding plagiarism and other writing issues: https://owl.english.purdue.edu/owl/resource/589/01/

Resources & Services:

Don’t forget to check out the ESM webpage for all sorts of info on what the department is doing...:
http://www.pdx.edu/esm/

ESM student council: Email the ESM student council <esmsc@pdx.edu> with ideas for developing the ESM community, issues regarding student advocacy, ... or to join the council.

Library Research Tutorials: http://guides.library.pdx.edu/home/howto and http://guides.library.pdx.edu/biology

DRC: If you are a student with a documented disability and are registered with the Disability Resource Center, please contact me so that we can arrange whatever academic accommodations you need.

Veterans: If you are a Veteran and have questions about University services or need assistance with your transition from military to campus life, please contact Chris Goodrich, Coordinator of Veterans Services at the Office of Veterans’ Services, SMSU room 425.

Learning Center/Free Tutoring...: http://www.pdx.edu/tutoring/ PSU library rm 245

Writing Center: for class assignments, resumes... http://www.writingcenter.pdx.edu/ Cramer rm 188

Please consult the Purdue OWL regarding plagiarism and other writing issues: https://owl.english.purdue.edu/owl/resource/589/01/


Queer Resource Center: www.pdx.edu/queer
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Departmental honors: http://www.pdx.edu/esm/esm-undergraduate-honors-program

LSAMP (Louise Stokes Alliance for Minority Participation) enhances the undergraduate experience for underrepresented students in STEM. Funded by the NSF, our LSAMP program focuses on: Creating a community among LSAMP scholars that values excellence, diversity, and persistence; and Expanding opportunities for LSAMP scholars through participation in undergraduate research experiences and leadership initiatives. If you’re interested in finding out more, visit our LSAMP center in 103 Epler Hall, talk to ESM-LSAMP faculty advisory member Cat de Rivera <derivera@pdx.edu>, SRTC 238e, or check out: http://www.pdx.edu/lsamp/home