



THE UNIVERSITY OF  
**TENNESSEE**  
KNOXVILLE

**BIG ORANGE. BIG IDEAS.**

## **EEB 461/504 Invasion Biology, Spring 2017**

University of Tennessee, Knoxville

**Course Section:** Sec 001 (EEB 461) or Sec 003 (EEB 504)

**Meeting Time and Place:** 3:40 to 4:55 pm, Tuesday and Thursday, Dabney-Buehler Hall 488

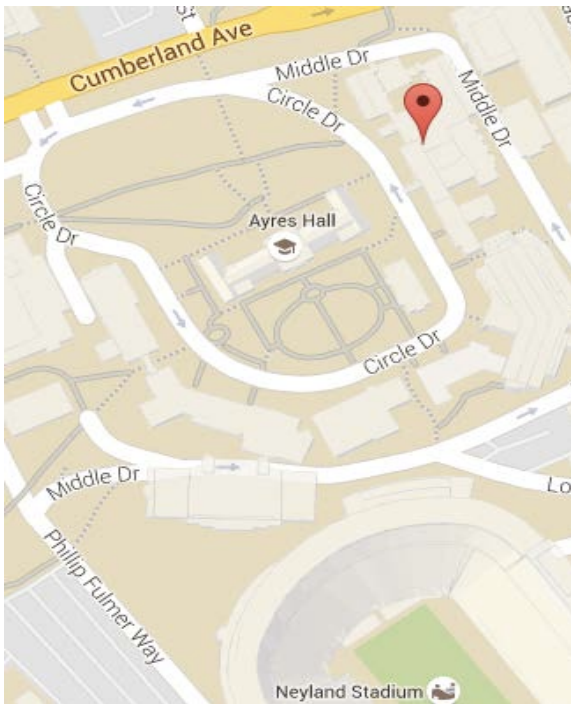
**Course Credit Hours:** 3

### **Faculty Contact Information**

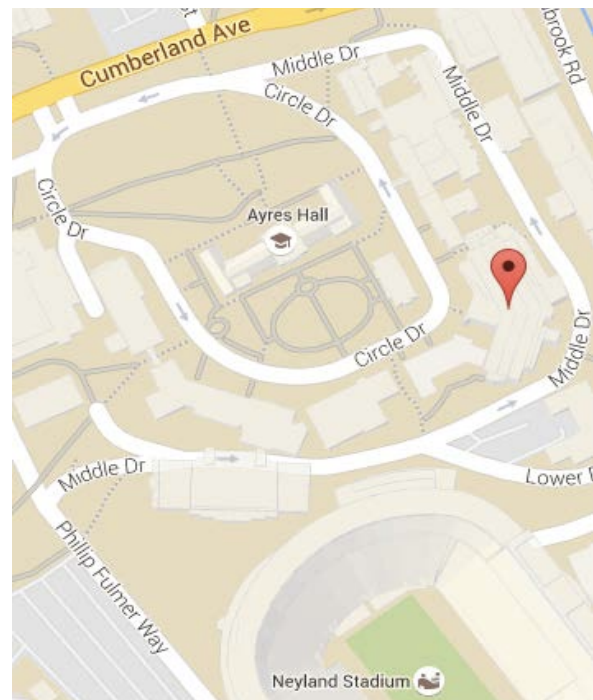
Instructors: Dr. Christy Leppanen ([cleppane@utk.edu](mailto:cleppane@utk.edu)) and Dr. Daniel Simberloff ([dsimberloff@utk.edu](mailto:dsimberloff@utk.edu))

Office hours: TTH 1-3 pm in SERF 415 or by appointment

For technical issues, contact OIT: <http://help.utk.edu/footprints/contact>



**Course Location: Dabney-Buehler Hall**



**Office Hours Location: SERF  
(Science and Engineering Research Facility)**

### **Required Textbook**

*Invasive Species: What Everyone Needs to Know* by Daniel Simberloff. 2013. Published by Oxford University Press, Oxford. 329 pages. ISBN: 978-0-19-99201-7 (hardback) or 978-0-19-99203-1 (paperback)

## **Why study invasion biology?**

Thousands of species of plants, animals, fungi, and microbes have been transported by humans to new locations. Without human assistance, species have always managed to spread, but much less often, much more slowly, and not nearly so far. This geographic rearrangement of the earth's biota is one of the great global changes now underway. Although many introduced species fail to establish populations or remain restricted to the immediate vicinity of the new sites they land in, others establish populations and invade new habitats, spreading widely and sometimes well beyond the initial point of introduction.

Many invasions have such idiosyncratic, bizarre effects that they cannot fail to get our attention simply as fascinating tales of natural history. For example, who would have thought that...

- Introducing kokanee salmon to Flathead Lake, Montana, and many years later, opossum shrimp to three nearby lakes would ultimately have led to population crashes of grizzly bears and bald eagles through a complicated chain reaction?
- Introducing myxoma virus to Great Britain to control introduced rabbit populations would have led to the extinction of the large blue butterfly there?
- Introducing a particular grass species would lead to hybridization with a native congener, subsequent polyploidization, and the origin of a new vigorous invasive species that would change entire intertidal systems?
- Competition for food with an Asian mosquito introduced to east Tennessee would render a native mosquito a more competent vector of La Crosse encephalitis?

Teasing apart such intriguing causal chains is a scientific accomplishment of the first order. The variety and idiosyncrasy of effects challenges biologists to produce general laws or rules to be able to explain why some introductions have no major impacts, yet others lead to huge invasions. Being able to predict which species will fall in the latter category if introduced, and which in the former, is the elusive holy grail of invasion biology.

## **Course Description/Information**

In this course, students will study the history, biology, and management of biological invasions. Students will learn about the geography and scale of invasions, ecological effects, impacts to humans, and the evolution of introduced and native species. Differences between "introduced" and "invasive" species will receive particular attention and will inform discussions about prevention, regulation, detection, management, and eradication. Each concept will include comprehensive consideration of interesting case studies. Students will be challenged to apply this knowledge in a variety of scenarios (e.g., research, management, policy making, regulatory compliance) and fields (i.e., education, conservation, resource management, law, real estate development, urban planning). The course will conclude with discussion of controversies surrounding biological invasions and prospects for the future of invasions, considering, e.g., biotic homogenization, animal rights, human activity, climate change, and management with new technologies.

## **EEB 461/504 Invasion Biology Course Schedule**

TH 12 Jan	<b>Invasion Biology - General Introduction</b>
TU 17 Jan	CASE STUDIES (Chapter 1)
TH 19 Jan	<b>Magnitude, Geography, and Time Course of Invasions</b> (Chapter 2)
TU 24 Jan	Successes and Failures; Propagule Pressure; CASE STUDIES
TH 26 Jan	<b>Ecological Effects of Introduced Species – Straightforward Impacts</b> (Chapter 3)
TU 31 Jan	Time Lags; Invasion Collapse; CASE STUDIES [Deadline for approval of species]
TH 2 Feb	<b>Impacts of Invasions – Complications and Impacts on Humans</b> (Chapter 4)
TU 7 Feb	Invasional Meltdown; CASE STUDIES [Deadline to submit report outline]
TH 9 Feb	CASE STUDIES
TU 14 Feb	<b>Evolution of Introduced and Native Species</b> (Chapter 5)
TH 16 Feb	Genetic Paradox of Invasions; Hybridization; CASE STUDIES
TU 21 Feb	<b>How and Why Do Invasions Occur?</b> (Chapter 6)
TH 23 Feb	STUDENT PRESENTATIONS – SPECIES PROFILES
TU 28 Feb	STUDENT PRESENTATIONS – SPECIES PROFILES
TH 2 Mar	STUDENT PRESENTATIONS – SPECIES PROFILES REPORTS DUE
TU 7 Mar	MID-TERM EXAM
TH 9 Mar	<b>Can We Predict Species Invasions?</b> (Chapter 7)
TU 14 Mar	SPRING BREAK - NO CLASS
TH 16 Mar	SPRING BREAK - NO CLASS
TU 21 Mar	<b>How Are Species Introductions Regulated?</b> (Chapter 8) RISK ASSESSMENT; CASE STUDIES
TH 23 Mar	<b>Detection and Eradication of Introduced Species</b> (Chapter 9)
TU 28 Mar	CASE STUDIES
TH 30 Mar	CASE STUDIES [Deadline for approval of research/management approach]
TU 4 Apr	<b>Maintenance Management of Invasions</b> (Chapter 10)
TH 6 Apr	CASE STUDIES [Deadline to submit outline]
TU 11 Apr	<b>Invasive Species Denialism: Biological Invasion Controversies</b> (Chapter 11)
TH 13 Apr	CASE STUDIES
TU 18 Apr	<b>Prospect – The Homogeocene?</b> (Chapter 12)
TH 20 Apr	STUDENT PRESENTATIONS – APPROACHES TO ADVANCE INVASION BIOLOGY RESEARCH AND/OR MANAGEMENT
TU 25 Apr	STUDENT PRESENTATIONS – APPROACHES TO ADVANCE INVASION BIOLOGY RESEARCH AND/OR MANAGEMENT
TH 27 Apr	STUDENT PRESENTATIONS – APPROACHES TO ADVANCE INVASION BIOLOGY RESEARCH AND/OR MANAGEMENT
TU 9 May	FINAL EXAM 12:30 – 2:30 PM Dabney Hall Room 488

## Course Requirements, Assessments, and Evaluations

Fundamental, background course material will be presented in lectures and readings. Case studies presented by instructors and students will be used in consideration of fundamentals and a variety of current topics in invasion biology. Readings from chapters in the required text are listed in the syllabus; additional readings will be assigned to accompany case studies.

### STUDENT REPORTS AND PRESENTATIONS (35% of grade)

Each student will write two reports and give two presentations based on the material in each of those reports. For the first report/presentation, each student will be matched with an invasive species, then research the literature for information about its introduction and impacts to report as a case study. For the second report/presentation, students will choose an existing or emerging technology that is being or might be applied to invasion biology research and/or management to advance the field. In this case, each student will describe the technology, then cite and justify particular cases where the technology is being or might be applied, discussing its application to particular research and/or management as well as to the field in general. Chosen topics must be approved by instructors, and tentative outlines of the written reports must be presented to instructors one week after approval.

### MID-TERM AND FINAL EXAMS (65% of grade)

Exams will focus on readings as well as information presented in class by instructors AND students. The more time spent or emphasis on a particular point, the more important it is for your grasp of course concepts, and the more likely that information will appear on an exam.

### Important Dates..... Percent of Grade

TU 31 Jan	Deadline for approval of species	
TU 7 Feb	Deadline to submit report outline	
TH 23 Feb	STUDENT PRESENTATIONS – SPECIES PROFILES	5%
TU 28 Feb	STUDENT PRESENTATIONS – SPECIES PROFILES	
TH 2 Mar	STUDENT PRESENTATIONS – SPECIES PROFILES	
	REPORTS DUE	15%
TU 7 Mar	MID-TERM EXAM	30%
TH 30 Mar	Deadline for approval of research/management approach	
TH 6 Apr	Deadline to submit outline	
TH 20 Apr	STUDENT PRESENTATIONS – MANAGEMENT/RESEARCH APPROACHES	5%
TU 25 Apr	STUDENT PRESENTATIONS – MANAGEMENT/RESEARCH APPROACHES	
TH 27 Apr	STUDENT PRESENTATIONS – MANAGEMENT/RESEARCH APPROACHES	
	REPORTS DUE	10%
TU 9 May	FINAL EXAM	35%
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	TOTAL	100%

**Attendance Policy**

Attendance is mandatory during STUDENT PRESENTATIONS; failure to attend on these dates may result in up to a 3-point deduction in your final grade PER SCHEDULED CLASS that is missed. Attendance during other lectures is not mandatory but strongly encouraged.

**Late Reports**

Up to 3 points may be deducted for each day (including weekends) a report is turned in late.

**Student's Responsibility**

- Prepare for all classes, read assigned materials BEFORE each class
- Respect others
- Contribute to the learning activities in class
- Abide by the UT Honor Code

**Instructor's Responsibility**

- Prepare for all classes
- Evaluate all fairly and equally
- Respect all students
- Create and facilitate meaningful learning activities
- Adhere to University codes of conduct

*The instructors reserve the right to revise, alter, or amend this syllabus as necessary. Students will be notified in writing and/or electronic communication of any such changes.*



*Dear Student,*

*The purpose of this **Campus Syllabus** is to provide you with important information that is common across courses at UT. Please observe the*

*following policies and familiarize yourself with the university resources listed below. At UT, we are committed to providing you with a high quality learning experience. I want to wish you the best for a successful and productive semester.*

*Interim Provost John Zomchick*

## **UNIVERSITY CIVILITY STATEMENT**

“Civility is genuine respect and regard for others: politeness, consideration, tact, good manners, graciousness, cordiality, affability, amiability and courteousness. Civility enhances academic freedom and integrity, and is a prerequisite to the free exchange of ideas and knowledge in the learning community. Our community consists of students, faculty, staff, alumni, and campus visitors. Community members affect each other’s well-being and have a shared interest in creating and sustaining an environment where all community members and their points of view are valued and respected. Affirming the value of each member of the university community, the campus asks that all its members adhere to the principles of civility and community adopted by the campus”

<http://civility.utk.edu/>.

## **EMERGENCY ALERT SYSTEM**

The University of Tennessee is committed to providing a safe environment to learn and work. When you are alerted to an emergency, please take appropriate action. Learn more about what to do in an emergency and sign up for UTAAlerts at <http://safety.utk.edu>. Check the emergency posters near exits and elevators for building specific information. In the event of an emergency, the course schedule and assignments may be subject to change. If changes to graded activities are required, reasonable adjustments will be made, and you will be responsible for meeting revised deadlines.

## **ACADEMIC INTEGRITY**

“An essential feature of the University of Tennessee, Knoxville is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the university, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity.”

## **YOUR ROLE IN IMPROVING TEACHING AND LEARNING THROUGH COURSE ASSESSMENT**

At UT, it is our collective responsibility to improve the state of teaching and learning. During the semester you may be requested to assess aspects of this course either during class or at the completion of the class. You are encouraged to respond to these various forms of assessment as a means of continuing to improve the quality of the UT learning experience.

## **DISABILITIES THAT CONSTRAIN LEARNING**

“Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Disability Services (ODS) at 865-974-6087 in 100 Dunford Hall to document their eligibility for services. ODS will work with students and faculty to coordinate reasonable accommodations for students with documented disabilities.” Information on accessibility at UTK is also at <http://accessibility.utk.edu>

## **WELLNESS**

The Student Counseling Center is the university’s primary facility for personal counseling, psycho-therapy, and psychological outreach and consultation services. <http://counselingcenter.utk.edu/>  
The Center for Health Education and Wellness engages in prevention and intervention efforts to increase awareness, impact student decision making, and positively influence our university community. The Center manages 974-HELP and <http://wellness.utk.edu/>.

## STUDENT REPORTS AND PRESENTATIONS

You will write two reports and give two presentations based on material in each of those reports. Chosen topics must be approved by instructors, and tentative outlines of the written reports must be presented to instructors one week after the approval deadline.

- For the first report/presentation, you will be matched with an invasive species, then research the literature for information about its introduction and impacts to report as a case study. Start thinking about and researching your choice of invasive species NOW! If you'd like advice, ask us! Is there a particular species (i.e., the rhesus macaque monkey, *Macaca mulatta*) or associated system (i.e., islands) or issue (i.e., impacts to endangered species) that you find interesting? Consider invasive species you have heard about in the news, that you've run across in your course work, or do a keyword search online using terms like "invasive," "alien," "invader," or "non-native," along with other keywords that help define your interests, such as "wetlands," "disease," "diversity," "insects," etc. Consider acquiring approval in advance of the deadline so you can get started early and consider your species alongside course material.
- For the second report/presentation, you will choose an existing or emerging technology that is being or might be applied to invasion biology research and/or management to advance the field. In this case, you will describe the technology, then cite and justify particular cases where the technology is being or might be applied, discussing its application to particular research and/or management as well as to the field in general. Same here... start thinking about and researching your choice of technology NOW!

Follow the formats and guidelines described below\*:

How to write a research paper: <http://www.aresearchguide.com/1steps.html>

How to format a research paper: <http://www.aresearchguide.com/4format.html>

How to cite your references (in the text): <http://www.aresearchguide.com/9parenth.html>

How to list your sources: <http://www.aresearchguide.com/12biblio.html>

Sample bibliography: <http://www.aresearchguide.com/sampleworks.html>

How to avoid plagiarism: <http://www.aresearchguide.com/6plagiar.html>

Presentation tips for public speaking: <http://www.aresearchguide.com/3tips.html>

\*Points will be deducted if these guidelines are not followed.

Goals of this exercise:

- become familiar with information important to consider when deliberating impacts of invasive species
- learn to locate and digest credible sources of that information
- pull together course concepts while developing expertise about a particular species and technology
- recognize challenges and opportunities confronting biologists, managers, and others describing, preventing, and managing impacts of invasive species