

# BSC 4330 – Invasion Biology

## Fall 2019, 3 credits

**Instructor:** Dr. Gregg Klowden (pronounced "Cloud - in")  
**Office:** Room 202A, Biological Sciences  
**Office Hours:** Wed 1:30 - 3:30p, Thurs 11:15a - 12:15p, or by appointment  
**E-mail:** gklowden@ucf.edu

I receive a large volume of emails from several courses. To help me help you, please include:

- Your first and last names
  - Course name (Invasion Biology)
- \* I will try to respond to emails within 48 hours however, response time may be greater.  
\* Please plan accordingly by not waiting to the last minute to contact me with questions or concerns.  
\* Due to confidentiality, I will only reply to questions emailed from your Knights email.  
\* Any questions about grades must be discussed in person and cannot be discussed via email.

**Class Meeting Times:** Tuesdays and Thursdays 12:30p -1:45p in BIO 209

### Required Resources:

- A. Lockwood, J. L. , M. F. Hoopes, and M. P. Marchetti. 2013. Invasion Ecology, 2<sup>nd</sup> edition. Wiley-Blackwell.
- B. Webcourses: Announcements, lecture notes, grades, etc. will be made available at this site.

**Intended Audience:** Advanced Biological Science majors & minors.

**Course Prerequisite:** Principals of Ecology (PCB 3044C) with a grade of C or better

### Course Description:

Humans have caused an unprecedented redistribution of earth's biota. Both incidentally and deliberately we continue to disperse an ever increasing array of species across previously insurmountable environmental barriers. The consequences of successful introductions are almost always detrimental to ecosystem function, biodiversity, and ecosystem service, and invasion is ranked as one of the major natural disasters today.

In Invasion Biology we will study introduced, non-native species and the factors that sometimes lead to their population explosions and negative ecological impacts in the new region. We will make explicit connections between fundamental concepts in ecology and evolutionary biology, topics specific to invasion ecology, and the idiosyncratic details surrounding particular invasive species. My goal is to emphasize the ecological importance of species invasions and to discuss sociological, economic, and associated issues.

### Course Goals:

After successfully completing this course, students will be able to:

- Differentiate between commonly (mis)used terms used to describe introduced species.
- Describe the major stages of, and barriers to, invasion success.
- Describe major hypotheses used to explain invasion success.
- Understand and explain fundamental concepts in ecology and evolutionary biology in the context of species invasions.

### Why study invasion biology?

Humans have transported thousands of species of plants, animals, fungi, and microbes 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 where they land, 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 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.

#### Some E-resources:

- USDA National Invasive Species Information Center: <http://www.invasivespeciesinfo.gov/>
  - Florida: <https://www.invasivespeciesinfo.gov/us/florida>
- US Forest Service Invasive Species Program: <http://www.fs.fed.us/invasivespecies/>
- US Geological Service Non-Indigenous Aquatic Species: <http://nas.er.usgs.gov/>
- International Union for the Conservation of Nature (IUCN) Invasive Species Specialist Group: <http://www.issg.org/>
- Florida Fish and Wildlife Conservation Commission
  - Nonnative Species: <https://myfwc.com/wildlifehabitats/nonnatives/>
  - Invasive Plant Management: <https://myfwc.com/wildlifehabitats/habitat/invasive-plants/>
- Florida Natural Areas Inventory – Invasive Species: <https://www.fnai.org/invasivespecies.cfm>
- Center for Aquatic and Invasive Plants, University of Florida: <https://plants.ifas.ufl.edu/>
- Florida Exotic Pest Plant Council: <https://www.fleppc.org/>
- Florida Invasive Plant species mobile field guide: <http://www.plantatlas.usf.edu/flip/>
- Audubon Florida Invasive Species Task Force: <https://fl.audubon.org/conservation/invasive-species-task-force>
- Early Detection and Distribution Mapping System: <https://www.eddmaps.org/florida/>
- IveGot1 – App to Identify and Report Invasive Animals and Plants in Florida: <https://www.eddmaps.org/florida/iphone/>

#### Student Responsibilities:

##### Etiquette:

Students should show proper classroom etiquette. Students should show up to class on time. *Please do not be late or leave early, this disrupts the class.* If this is unavoidable then you should sit near the door to reduce disruption to the class. All cell phones, pagers, etc. should be turned OFF (not on vibrate) when entering the classroom. Students should not disrupt other students (or the instructor) in class by talking unless instructed to do so by the instructor. If you use a computer to take notes please do not use it for any other purposes.

##### Email and Webcourses:

You will be expected to have daily access to Webcourses since I will be consistently posting assignment updates, additions, changes, clarifications, etc. All students at UCF are required to obtain a Knight's Email account and check it regularly for official university communications. If you do not own a computer, there are computers accessible to you in all UCF's computer labs, and most computer labs have computers connected to the internet. For further information on computer labs, please see the following website: [http://registrar.sdes.ucf.edu/webguide/index\\_quickfind.aspx](http://registrar.sdes.ucf.edu/webguide/index_quickfind.aspx).

##### Exams:

There will be three unit exams. The questions will be a mixture of multiple choice, fill in the blank and short answer essay. All questions will pertain to material covered in lectures, textbook readings and additional assignments. The final exam will not be comprehensive. Please bring a #2 pencil with you to each exam. Cell phones and PDAs must be turned off and stowed during the exam period. Grades will be posted on WebCourses. Exams can be reviewed individually in my office hours.

##### Late For the Exam Policy:

If you arrive late for any exam you will be allowed to take the test if no one has yet turned in an exam. However, you must turn in the test paper at the regular scheduled end of the test. You will not be allowed extra time unless a documentable emergency has occurred.

##### Makeup Exam Policy:

If you miss an exam, you will not automatically be granted a make-up: these will be given only in exceptional circumstances, with written documentation from a competent authority (physician, coach, counselor, etc.). Make up exams, IF permitted, will be in essay format. Unexcused absence from an exam will result in a failing grade for the missed exam.

### Public Awareness Campaign:

Reducing the proliferation of invasive species requires public cooperation and buy-in. As such, effective communication, messaging, and outreach to the general public is critical. Your challenge is to develop an educational awareness campaign to inform the public about an invasive species or a suite of species that are important or are likely to become important. All campaigns must have an associated website. Websites can be built and made publically available using one of the many freely available site building websites such as Weebly, WordPress, Wix, or Strikingly or by other means as long as it is made publically available on the internet for class review. Most students use Weebly as it contains a lot of features and if desired the site can be easily downloaded and transferred to another site in the future. In addition to the website, your public awareness campaign should include other elements such as posters, brochures, social platforms, videos, etc. - essentially any type of media that can reach the general public. Remember, INNOVATION is really important and campaigns that do something different to capture the public's attention are generally the ones that work the best. You will be developing your presentation in small teams. I will randomly select the teams to facilitate equal participation. At the end of the semester, each group will present / demonstrate all aspects of their public awareness campaign. Both Dr. Klowden and your classmates will evaluate the effectiveness of the message. Bonus points will be rewarded for campaigns believed most likely to be successful.

Complete instructions and deadlines for this assignment are available on the assignment webpage on Webcourses.

### Groups:

Group membership will be randomly assigned. Group composition may not be changed. While the dynamics of group work can be challenging, it offers many advantages including reduced work load and more effective partitioning of individual interests and abilities. Working well in a group is a skill that will benefit you in your professional life. Please try to act professionally and work out your issues amongst yourselves. If this is not possible then please come see me early and do not wait for the issue to fester. I expect that you will partition the work equally and no one will do more or less than his/her share. You will have the opportunity to anonymously evaluate your group member's adherence to this guideline in the contribution statements submitted several times throughout the semester. If it is clear that an individual is not playing nicely, his/her grade may be reduced.

### Statements of Contribution:

Several times throughout the semester you must fill out a survey on Webcourses describing your project progress and group member contributions. I encourage all group members to participate equally, to balance the workload and work together to achieve a common goal. As reported anonymously by the other group members, any member who is not pulling his/her weight or who is unnecessarily dominating will have his/her grade reduced.

Failure to submit the statement of contribution on time will result in a 5% reduction PER DAY in your individual grade for the project.

### Campaign Topic

On which invasive species or a suite of species your campaign is focused is up to you but is 1<sup>st</sup> come, 1<sup>st</sup> served. Each group must submit their preferred invasive species or a suite of species to Webcourses in the appropriate Discussion section. Before submitting your request, you should look through the other submissions to make sure your topic has not already been taken. All topics must be approved by Dr. Klowden. The due date for final approval is **Thursday 9/12 by 1:45 pm (the end of class)** but the earlier you submit, the more likely you will get your first choice.

- \* Only 1 person per group should submit your request.
- \* Prior to submission, each group must decide who is in charge of this task.
- \* Failure to have your topic approved on time will result in a reduction of your project grade by 5% for each day late.

### Optional Book Review Assignment:

This assignment is OPTIONAL. **Due 11/12 by 11:59 pm** submitted via Webcourses. If you choose to do this, it will be worth 4% of your total grade, replacing 4% of your lowest exam grade (making that one exam worth 21% rather than 25%). If you choose, pick an invasion ecology themed book (see approved book list on Webcourses) of at least 300 pages or more to read and write a summary report demonstrating that you read the entire book and your understanding and opinions of the book. I am particularly interested in your opinions so be sure they are amply represented. Summaries should be 500 to 750 words, no more, no less. Reviews should be for this class only and not a book used in another class. Summaries must be entirely your own work. Plagiarism will not be tolerated and will result in a failing grade for the course. I reserve the right to orally quiz you about the book if I suspect you have not read it.

Note - Optional assignments are not extra credit however like extra credit can boost your grade. As opposed to extra credit, which can be neutral or help your grade, optional assignments can benefit your grade IF you do a good job but could hurt your grade if you do a poor job. If you choose not to do the assignment it will not affect your grade. I design it this way as a way to encourage you to take the assignment seriously and to do a good job and to avoid you turning in a hastily prepared assignment in hopes of getting a point or two.

Performance Evaluation:	Proportion of grade
Attendance Assignment	1%
Exams (75%)	
Highest exam grade	28%
Middle exam grade	26%
Lowest exam grade	21%
Public Awareness Campaign	17%
Oral Presentation	<u>7%</u>
	100%

**Grading Scale:**

A 93.0 – 100%	B+ 87.0 - 89.9%	C+ 77.0 - 79.9%	D+ 67.0 - 69.9%	F 0 - 59.9%
A- 90.0 - 92.9%	B 83.0 - 86.9%	C 73.0 - 76.9%	D 63.0 - 66.9%	
	B- 80.0 - 82.9%	C- 70.0 - 72.9%	D- 60.0 - 62.9%	

**Grade Rounding Policy:**

The overall semester grade will not be rounded. In other words, either you have the grade or you don't. In other words, a 79.99 is still a 'C'. As there are many students in this class I strive for consistency and fairness. For this reason, there will be no exceptions to this policy and no other adjustments will be made (i.e. No additional curving or extra credit will be offered).

**Academic Integrity and Ethics:**

UCF faculty supports the UCF Creed. Integrity - practicing and defending academic and personal honesty is the first tenet of the UCF Creed. This is in part a reflection of the second tenet, Scholarship: -I will cherish and honor learning as a fundamental purpose of membership in the UCF community. Course assignments and tests are designed to have educational value; the process of preparing for and completing these exercises will help improve your skills and knowledge. Material presented to satisfy course requirements is therefore expected to be the result of your own original scholarly efforts.

Students should familiarize themselves with [UCF's Rules of Conduct](#). According to Section 1, "Academic Misconduct," students are prohibited from engaging in:

- *Unauthorized assistance:* Using or attempting to use unauthorized materials, information or study aids in any academic exercise unless specifically authorized by the instructor of record. The unauthorized possession of examination or course-related material also constitutes cheating.
- *Communication to another through written, visual, electronic, or oral means:* The presentation of material which has not been studied or learned, but rather was obtained through someone else's efforts and used as part of an examination, course assignment, or project.
- *Commercial Use of Academic Material:* Selling of course material to another person, student, and/or uploading course material to a third-party vendor without authorization or without the express written permission of the university and the instructor. Course materials include but are not limited to class notes, Instructor's PowerPoints, course syllabi, tests, quizzes, labs, instruction sheets, homework, study guides, handouts, etc.
- *Falsifying or misrepresenting* the student's own academic work.
- *Plagiarism:* Using or appropriating another's work without any indication of the source, thereby attempting to convey the impression that such work is the student's own.
- *Multiple Submissions:* Submitting the same academic work for credit more than once without the express written permission of the instructor.
- *Helping another violate* academic behavior standards.

Students who engage in academic misconduct contradict the educational value of your courses and undermine the value of the UCF degrees earned by their more honest peers. For more information about Academic Integrity, students may consult [The Center for Academic Integrity](#). For more information about plagiarism and misuse of sources, see "[Defining and Avoiding Plagiarism: The WPA Statement on Best Practices](#)".

**Responses to Academic Dishonesty, Plagiarism, or Cheating**

Students should also familiarize themselves with the procedures for academic misconduct in UCF's student handbook, [The Golden Rule](#). UCF faculty members have a responsibility for students' education and the value of a UCF degree, and so seek to prevent unethical behavior and when necessary respond to academic misconduct. Penalties can include a failing grade in an assignment or in the course, suspension or expulsion from the university, and/or a "Z Designation" on a student's official transcript indicating academic dishonesty, where the final grade for this course will be preceded by the letter Z. For more information about the Z Designation, see <http://goldenrule.sdes.ucf.edu/zgrade>.

### Course Accessibility Statement

The University of Central Florida is committed to providing access and inclusion for all persons with disabilities. Students with disabilities who need disability-related access in this course should contact the professor as soon as possible. Students should also connect with [Student Accessibility Services](#) (Ferrell Commons 185, [sas@ucf.edu](mailto:sas@ucf.edu), phone (407) 823-2371). Through Student Accessibility Services, a Course Accessibility Letter may be created and sent to professors, which informs faculty of potential access and accommodations that might be reasonable. Determining reasonable access and accommodations requires consideration of the course design, course learning objectives and the individual academic and course barriers experienced by the student.

### Campus Safety Statement

Emergencies on campus are rare, but if one should arise in our class, everyone needs to work together. Students should be aware of the surroundings and familiar with some basic safety and security concepts.

- In case of an emergency, dial 911 for assistance.
- Every UCF classroom contains an emergency procedure guide posted on a wall near the door. Please make a note of the guide's physical location and consider reviewing the online version at [http://emergency.ucf.edu/emergency\\_guide.html](http://emergency.ucf.edu/emergency_guide.html).
- Students should know the evacuation routes from each of their classrooms and have a plan for finding safety in case of an emergency.
- If there is a medical emergency during class, we may need to access a first aid kit or AED (Automated External Defibrillator). To learn where those items are located in this building, see <http://www.ehs.ucf.edu/workplacesafety.html> (click on link from menu on left).
- To stay informed about emergency situations, sign up to receive UCF text alerts by going to [my.ucf.edu](http://my.ucf.edu) and logging in. Click on "Student Self Service" located on the left side of the screen in the tool bar, scroll down to the blue "Personal Information" heading on your Student Center screen, click on "UCF Alert," fill out the information, including your e-mail address, cell phone number, and cell phone provider, click "Apply" to save the changes, and then click "OK."
- If you have special needs related to emergency situations, speak with your instructor outside of class.
- To learn about how to manage an active-shooter situation on campus or elsewhere, consider viewing this video. [You CAN Survive an Active Shooter](#)

### Deployed Active Duty Military Students

If you are a deployed active duty military student and feel that you may need a special accommodation due to that unique status, please contact your instructor to discuss your circumstances.

### Copyright

This course may contain copyright protected materials such as audio or video clips, images, text materials, etc. These items are being used with regard to the Fair Use doctrine in order to enhance the learning environment. Please do not copy, duplicate, download or distribute these items. The use of these materials is strictly reserved for this online classroom environment and your use only. All copyright materials are credited to the copyright holder.

#### Third-Party Software and FERPA

During this course you might have the opportunity to use public online services and/or software applications sometimes called third-party software such as a blog or wiki. While some of these could be required assignments, you need not make any personally identifying information on a public site. Do not post or provide any private information about yourself or your classmates. If appropriate you may use a pseudonym or nickname. Some written assignments posted publicly may require personal reflection/comments, but the assignments will not require you to disclose any personally identity-sensitive information. If you have concerns, please contact your instructor.

### Final Note:

The professor(s) reserve the right to change the syllabus and management of the class at any time during the semester. These changes will be announced in lecture.

## TENTATIVE Course Calendar (subject to change)

\*Indicates that attendance is mandatory (Each unexcused absence on these days will result in 5% reduction to your course grade)

Week	Date	Topic / Reading	Important dates
1	Tu 8/27	Introduction (Ch 1)	
	Th 8/29	No Class – Football game	Reading/ Attendance Assignment due Friday 8/30 by 5:00 pm.
2	Tu 9/3	NO CLASS DUE TO HURRICANE DORIAN	
	Th 9/5	NO CLASS DUE TO HURRICANE DORIAN	
3	Tu 9/10	Transport Vectors and Pathways (Ch 2)	
	*Th 9/12	Trends in Numbers of Invaders (Ch 3)	Group meetings Campaign Topic Approval Due by 1:45 p
4	Tu 9/17	Propagules (Ch 4)	
	*Th 9/19		Group meetings
5	*Tu 9/24	-----	Exam 1 (Chapters 1-4)
	*Th 9/26	Disturbance (Ch 5)	Group meetings
6	Tu 10/1	Establishment Success: The Influence of Biotic Factors (Ch 6)	
	*Th 10/3		Group meetings
7	Tu 10/8	Modeling the Geographical Spread of Invasive Species (Ch 7)	
	*Th 10/10		Group meetings Statement of Contribution 1 due by 11:59p
8	Tu 10/15	Ecological Processes & the Spread of Non-native Species (Ch 8)	
	*Th 10/17		Group meetings
9	*Tu 10/22	-----	Exam 2 (Chapters 5-8)
	*Th 10/24	Ecological Impacts of Invasive Species (Ch 9)	Group meetings
10	Tu 10/29	Impact Synthesis (Ch 10)	
	*Th 10/31		Group meetings
11	Tu 11/5	Evolution of Invaders (Ch 11)	
	*Th 11/7		Group meetings Statement of Contribution 2 due by 11:59p
12	Tu 11/12	Predicting and Preventing Invasion (Ch 12)	Optional book review due 11/12 by 11:59pm
	*Th 11/14	Eradication and Control of Invaders (Ch 13)	
13	*Tu 11/19		Group meetings
	*Th 11/21	Exam 3	Exam 3 (Chapters 9-13)
14	*Tu 11/26		Group meetings  Final submission of Campaign and Statement of Contribution 3 both due Tue 11/26 by 11:59p
	Th 11/28	No class – Thanksgiving	
15	Tu 12/3		Group meetings
Final Exam Week	*Th 12/5	Presentations– 10:00a – 12:50p	