**INVASION ECOLOGY – BIOL 5307**
**SPRING 2017**

*Course Instructor:* Dr Crystal Kelehear Graham, Assistant Professor
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*Office Hours:* 11:00-12:00 M, W | 14:00-16:00 Tu, Th | & by appointment

Lecture: 09:00-09:50 M, W, F | WSB 223

Course description:

Invasive species are a major threat to biodiversity, ranking second only to habitat loss in this respect. The economic damage caused by these invaders is estimated to exceed $110 billion per year in the US alone. In addition to damaging the agricultural and forestry industries, invasive species inflict immeasurable environmental damage on native ecosystems. However, species invasions do provide unique opportunities to study evolutionary change over unusually short time periods.

This course will focus on the ecology of invasive species and their effects at local (Trans-Pecos), regional (Texas), national and global scales. Course topics will include modes of introduction, life-history characteristics that are conducive to a species becoming invasive, rapid evolution and range advance, impacts of invasive species, and management. Class content will include lectures given by the course instructor, guest speakers, and both instructor-led and student-led scientific paper readings, presentations and discussions. There will be at least one optional field trip.

Recommended Text: Lockwood et al. 2013. Invasion Ecology. 2nd Edition. Wiley-Blackwell. In addition, students will be expected to read a minimum of two scientific papers per week.

Further Reading:

- Elton, C. S. (1958). The Ecology of Invasions by Animals and Plants. The University of Chicago Press. ISBN: 0226206386
- Davis, M.A. (2009). Invasion Biology. Oxford University Press. ISBN: 0199218757
- Richardson, D. M. (2011). Fifty Years of Invasion Ecology: The Legacy of Charles Elton. Wiley-Blackwell. ISBN: 1444335863
- Simberloff, D. (2012). Invasive Species: What Everyone Needs to Know. Oxford University Press. ISBN: 9780199922031

Useful Online Resources:

Global Invasive Species Database: http://www.iucngisd.org/gisd/

National Invasive Species Information Center: https://www.invasivespeciesinfo.gov/index.shtml

Texas Invasives: http://www.texasinvasives.org

Program Learning Outcomes:

The biology student graduating with a MS in Biology should be able to:

**1)** Understand and implement scientific methodology.
**2)** Utilize field techniques for addressing scientific questions.
**3)** Utilize statistics for the analysis of data within the discipline.
**4)** Effectively disseminate scientific findings using both written and oral communication.

Student Learning Objectives for this Course:

At the completion of this course, students should be able to:

**1)** Use and apply appropriate terminology for non-native species.
**2)** Discuss the primary pathways by which invasions take place.
**3)** Describe the stages of the invasion process.
**4)** Discuss the factors that facilitate a species invasion and range expansion.
**5)** Summarize the impacts of species invasions on communities and ecosystems and give examples.
**6)** List locally relevant invasive species and discuss their impacts.
**7)** Outline potential management strategies and give examples.
**8)** Synthesize and critique scientific literature in both the written and oral form.

Attendance:

Class attendance and **active participation** in discussion is required for this course. Students missing 20% of lectures (8 class periods) shall be dropped from the class with an F as per the SRSU catalog. Please notify your instructor **before** missing class for authorized activities (e.g., death in the family, or illness). Attendance at any field trips is not mandatory but is strongly encouraged as seeing invasive species in action will help put the knowledge you have built into context.

Assessments:

**1) Paper readings and discussion**

**1.1)** Instructor-led: Students will be expected to read the instructor-assigned paper in advance and submit a summary of the paper on the day of the discussion
**1.2)** Self-led: Students will choose one invasive species and do the following:

- Research this species and use this knowledge to contribute to discussion in class
- Read at least one paper per week on your study species and turn in a one-page (maximum) summary of the paper (due at the beginning of class every Friday)
- Present one paper about your species as an oral presentation in class and lead student discussion (presentations will be held on Fridays, schedule to be assigned)
- Compile a report on your study species (due Wednesday, May 3)

**2) There will be two exams**, the first exam will cover the preceding lectures, the second exam will be comprehensive and will cover the entire semester with a focus on applying your knowledge through case studies

Grading: **A** 90 – 100% **B** 80 – 89% **C** 70 – 79% **D** 60 – 69% **F** 0 – 59%

Class Participation (based on attendance, contribution to class discussions, and submission of the two paper summaries per week): 20%
Paper Presentation and Discussion (grade determined by your instructor and your peers): 25%
Invasive Species Report: 15%
Exam I: 15%
Final Exam: 25%

**TENTATIVE SCHEDULE**

| | Date | Topic |
|---|---|---|
| *Week 1* | | |
| 1 | Wednesday, January 18, 2017 | Course overview & a definition of invasive species (Ch. 1) |
| 2 | Friday, January 20, 2017 | Modes of introduction and the invasion process (Ch. 1-3) |
| *Week 2* | | |
| 3 | Monday, January 23, 2017 | Modes of introduction and the invasion process cont. (Ch. 1-3) |
| 4 | Wednesday, January 25, 2017 | The invasion process cont. + Instructor-led paper discussion |
| 5 | Friday, January 27, 2017 | Propagule pressure and habitat disturbance (Ch. 4-5) |
| *Week 3* | | |
| 6 | Monday, January 30, 2017 | Establishment success & invasion phases (Ch. 6-8) |
| 7 | Wednesday, February 01, 2017 | Range advance + Instructor-led paper discussion (Ch. 7) |
| 8 | Friday, February 03, 2017 | Climate change and invasive species (Ch. 14) |
| *Week 4* | | |
| 9 | Monday, February 06, 2017 | Evolution of invaders (Ch. 11) |
| 10 | Wednesday, February 08, 2017 | Evolution of invaders + Instructor-led paper discussion (Ch. 11) |
| 11 | Friday, February 10, 2017 | Ecological impacts (Ch. 9) |
| *Week 5* | | |
| 12 | Monday, February 13, 2017 | Ecological impacts cont. (Ch. 9) |
| 13 | Wednesday, February 15, 2017 | Ecological impacts cont. + Instructor-led paper discussion (Ch. 9) |
| **EXAM** | **Friday, February 17, 2017** | **Exam I** |
| *Week 6* | | |
| 14 | Monday, February 20, 2017 | Preventing and eradicating invasive species (Ch. 12-13) |
| 15 | Wednesday, February 22, 2017 | Eradicating invasive species cont. + Instructor-led paper discussion (Ch. 13) |
| 16 | Friday, February 24, 2017 | Guest Lecture – Salt Cedar Project – Dr Ritzi |
| *Week 7* | | |
| 17 | Monday, February 27, 2017 | Case Studies: Marine invaders |
| 18 | Wednesday, March 01, 2017 | Case Studies: Marine invaders + Instructor-led paper discussion |
| 19 | Friday, March 03, 2017 | **Student-led paper presentation & discussion** |
| *Week 8* | | |
| 20 | Monday, March 06, 2017 | Case Studies: Freshwater invaders |
| 21 | Wednesday, March 08, 2017 | Case Studies: Freshwater invaders + Instructor-led paper discussion |
| 22 | Friday, March 10, 2017 | **Student-led paper presentation & discussion** |

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| | | *— Spring Break —* |
| *Week 9* | | |
| 23 | Monday, March 20, 2017 | Case Studies: Terrestrial invaders |
| 24 | Wednesday, March 22, 2017 | Case Studies: Terrestrial invaders + Instructor-led paper discussion |
| 25 | Friday, March 24, 2017 | **Student-led paper presentation & discussion** |
| *Week 10* | | |
| 26 | Monday, March 27, 2017 | Case Studies: Terrestrial invaders |
| 27 | Wednesday, March 29, 2017 | **Student-led paper presentation & discussion** |
| 28 | Friday, March 31, 2017 | **Student-led paper presentation & discussion** |
| *Week 11* | | |
| 29 | Monday, April 03, 2017 | Case Studies: Parasites & disease |
| 30 | Wednesday, April 05, 2017 | Case Studies: Parasites & disease + Instructor-led paper discussion |
| 31 | Friday, April 07, 2017 | **Student-led paper presentation & discussion** |
| *Week 12* | | |
| 32 | Monday, April 10, 2017 | Case Studies: Parasites and disease |
| 33 | Wednesday, April 12, 2017 | Case Studies: Parasites & disease + Instructor-led paper discussion |
| N/A | Friday, April 14, 2017 | No classes – Good Friday Holiday |
| *Week 13* | | |
| 34 | Monday, April 17, 2017 | Case Studies: Island invasions |
| 35 | Wednesday, April 19, 2017 | Case Studies: Island invasions + Instructor-led paper discussion |
| 36 | Friday, April 21, 2017 | **Student-led paper presentation & discussion** |
| *Week 14* | | |
| 37 | Monday, April 24, 2017 | Case Studies: Successful control programs |
| 38 | Wednesday, April 26, 2017 | Case Studies: Successful control programs + Instructor-led paper discussion |
| 39 | Friday, April 28, 2017 | **Student-led paper presentation & discussion** |
| *Week 15* | | |
| 40 | Monday, May 01, 2017 | Controversies surrounding biological invasions |
| 41 | **Wednesday, May 03, 2017** | Controversies surrounding biological invasions + Instructor-led paper discussion \| **Invasive Species Report Due** |
| N/A | Friday, May 05, 2017 | No class or exam |
| *Week 16* | | |
| **EXAM** | **Tuesday, May 09, 2017** | (08:00am – 10:00am) **Final Exam** |

*Note* – Lecture topics are subject to change according to course interest, organization, and timing constraints, however the exam and assessment dates will remain the same.

The **Graduate Student Center**, located in BAB 104, provides resources and services for all SRSU graduate students. There is a computer lab with desktop computers and a networked printer/copier/scanner; laptop computers which can be checked out; a projector and screen for rehearsing student presentations; and a conference room for group study. Students can receive writing and thesis assistance by contacting sabra.laviers@sulross.edu or calling 432-837-8247.

**Students with disabilities will be provided reasonable accommodations.** If you would like to request such accommodations because of a physical, mental, or learning disability, please contact the ADA Coordinator for Program Accessibility at 837-8203, FH 112.