

# **Adaptation to Climate Change: Perspectives at the Nexus of Science, Society, and Resource Management**

# **SYLLABUS**

RNR 440/540  
Fall 2018

## COURSE SYLLABUS - FALL 2018 – Full Version

# Climate Change Adaptation: Perspectives at the Nexus of Science, Society, and Resource Management RNR 440 – 540

**COURSE DESCRIPTION:** Much of modern society's experience of managing resources and protecting people and infrastructure has occurred during a period of relatively stable climate. In the most recent decades in the Southwest, we have observed a cascade of impacts associated with temperature increases, including changes in snow hydrology, in phenology, and in the severity of drought impacts. Projected future climate changes and impacts may lie outside the range of climate variation that we have observed and may have more serious consequences for society and the environment. Anticipating changes will allow society to identify response options across a range of vulnerabilities and manage the risks associated with projected climate changes. In the best possible cases, these actions, or *adaptations*, may provide economic and other benefits to society.

In this 3-credit course, we will examine actions to reduce vulnerabilities or increase resilience to the potential impacts of climate change. Each of the class sessions is designed to include thought-provoking presentations by practitioners, land managers, and researchers – to ground state-of-the-art science and theory with on-the-ground realities. While the general focus will be on impacts and responses in the arid Southwest (water, fire, species, ecosystems), we will also investigate the tools, philosophies, and frameworks for advancing action and incorporating adaptation planning at the local, regional, national and international scale.

The course is open to graduate students and to seniors from relevant academic programs, with the permission of the instructors.

**TIME:** Thursdays, 2:00 to 4:50 PM

**LOCATION:** Environment and Natural Resources Building 2, Room S210

### **LEAD INSTRUCTORS:**

Gregg Garfin ([gmgarfin@email.arizona.edu](mailto:gmgarfin@email.arizona.edu)) (Office: ENR2, N419; Office Hours: Thursdays, 11:00 AM-12:00 PM)

David Breshears ([daveb@email.arizona.edu](mailto:daveb@email.arizona.edu)) (Office: ENR2, N227; Office Hours: by appointment)

### **Contributing Instructors**

Kathy Jacobs ([jacobsk@email.arizona.edu](mailto:jacobsk@email.arizona.edu)) (Office: ENR2, N462, Office Hours: by appointment)

Jim Buizer ([buizer@email.arizona.edu](mailto:buizer@email.arizona.edu)) (Office: ENR2, N519; Office Hours: by appointment)

**FORMAT:** Lecture, discussion, group exercises. Frequent guest presentations by practitioners, natural resource managers, and researchers. Optional field trip to a site where adaptation measures are being implemented.

**COURSE GOALS:** We will explore perspectives on climate change adaptation through a series of topical presentations and discussions. The course will include exposure to key scientific literature, agency and organizational source material, analytical and planning methods, and numerous project and case studies. The overall goal of the course will be to provide students with a *broad perspective* of issues related to climate change adaptation, and to identify key themes, important concepts, tools and methods, best practices, and emerging lessons from this experience.

**LEARNING OUTCOMES.** By the end of this course, students will:

- Be familiar with key literature on adaptation to climate change, climate science, and impacts on natural resources and other sectors
- Develop an understanding of tools and methods used in assessing vulnerability to climate change, developing adaptation options, and planning for adaptation to current and future changes
- Develop critical thinking skills with respect to the science upon which climate change adaptation decisions, practices, and policies are based
- Develop skills in oral and written synthesis of course concepts

**EXPECTATIONS:** Registered students should be prepared to:

- Attend all presentations and discussion sessions
- Review all background materials *prior to* the class sessions
- Participate actively in discussion sessions
- Complete multiple written assignments for selected sessions during the course
- Complete an individual research paper, project report, or proposal, and make a short presentation of this assignment to the class

**REQUIRED READINGS:** Two to three core readings per week will be identified and made available electronically (via the course D2L site); optional readings for each topic will be offered for those students interested in further study. Some materials will be distributed as handouts during class sessions.

**GRADING:** Since the course seeks to cover a broad set of concepts by highlighting applications in a range of program settings, class attendance throughout the semester is mandatory.

**For all students:**

- **Attendance and active participation** in class sessions will account for **20% of the grade for the course**.
- **ASSIGNMENTS** (details in ASSIGNMENTS & GUIDANCE document)
  - **Please submit graded assignments via D2L.**
- **Graded writing assignment.** Students will select one **topical** class session of particular interest during the semester, and prepare a written synthesis for that sessions. Topics include: forest management (September 20), wildlife and assisted migration (September 27), water resources (October 18). (See ASSIGNMENTS & GUIDANCE document for details). Assignments are due no later than Week 10 (October 25). ***This written assignment will constitute 10% of the grade for the course.***
- **Research paper, including preparation assignments and oral presentation.** Students will identify a research topic, project or policy report, or develop a research proposal, to pursue in greater depth during the semester. Topics will be discussed with and approved by the instructors by Week 7 (October 1). ***The research paper, including all components and the research presentation, will account for 70% of the student's grade, as follows:***
  - Students will prepare a brief **research prospectus**, including a title, a description of the overall topic, the importance or relevance of the topic (including the climate adaptation elements of the topic), and an overview of the research. The prospectus is due during Week 5 (September 20). ***(5% of the course grade)***
  - Students will prepare an **annotated bibliography** of at least 5 sources of information that you will use in your research paper. The annotated bibliography is due during Week 5 (October 11). ***(5% of the course grade)***
  - Students will prepare a well-developed **outline of their research paper, including references and a preliminary figure or table**. The outline and figure/table is due during Week 11 (November 1). ***(10% of course grade)***
  - Students will give a 5 minute “lightning” **presentation** of their final paper during the Week 15 class (November 29). The presentation should include a brief description of the overall topic, the climate adaptation elements of the topic, your key findings, and the importance of your findings. ***(10% of course grade)***
  - The final **research paper** is due by **6 pm on December 5, 2018**—the final day of classes.
    - Undergraduate students: The final paper should be 3,000-4,000 words, not including references, figures, or tables in the word count.
    - Graduate students: The final paper should be 5,000-6,000 words, not including references, figures, or tables in the word count. Graduate students should aim to produce a final written assignment that is consistent with the quality of submissions for a professional journal article.
    - ***The research paper will constitute 40% of course grade.***

## Grading Summary

Assignment	Due Date	Weight (out of 100)
Initial assignment: What is your academic background and what are your interests? What do you want to get out of this class? 300-500 words – <i>(Counted as part of the participation grade)</i>	August 30	0 (non-graded)
Research prospectus	September 20	5
Annotated bibliography	October 11	5
Synthesis paper	November 1	10
Outline and preliminary synthesis figure or table	November 1	10
Research presentation	November 29	10
Final paper	December 5	40
Participation	Ongoing	20
<b>TOTAL</b>		<b>100</b>
Extra credit: field trip	TBD	5

## 2018 COURSE STRUCTURE AND TOPICS (22 August 2018)

Week	Date	Topic
1	8/23	<b>Organizational meeting</b> , Course overview Breshears (syllabus), Garfin (overview); Instructors panel (All – brief intro to your work); What is Adaptation? (Part 1) – Garfin
2	8/30	<b>Overview 1:</b> Climate variability and change – overview and general principles – Garfin; What is Adaptation? (Part 2) – Garfin
3	9/6	<b>Overview 2:</b> Politics, policy, and law – Fisher, (Guests: Kozachik [City of Tucson, Ward 6], Engel [AZ Legislature/UA Law])
4	9/13	<b>Overview 3:</b> Adaptation: theory, practice, trends, and challenges – Garfin, Guest case study (Bavishi via Zoom; <i>tentative</i> )
5 Forest	9/20 <b>Prospectus due</b>	<b>Forest management</b> in an era of climate change – Breshears (Guests: Falk [UA SNRE], Stetson [USDA-Forest Service])
6 Wildlife	9/27	<b>Wildlife management:</b> Assisted migration – Garfin (Guests: Christianson [UA SNRE], Bogan [UA SNRE])
7 Landscape	10/4	<b>Adaptation Cases:</b> Challenges and case studies – Garfin (Guests: Keith [UA CAPLA] <i>tentative</i> ; Simms [Pima County] <i>tentative</i> ) – Large landscapes, Urban Areas
8	10/11 <b>Annotated Bibliography due</b>	<b>Summary discussion and review</b> ; mid-course evaluation – Garfin <b>Term Paper peer review</b>
9 Water	10/18	<b>Adaptation, Development, and Climate Services:</b> the emerging global architecture for addressing climate change – Buizer, Garfin
10	10/25	<b>Water:</b> Climate change and water management in the arid Southwest – Jacobs, Garfin (Guest: Seasholes [Central Arizona Project])
11 Tools 1	11/1 <b>Outline due AND Synthesis paper due</b>	<b>Tools 1: Vulnerability assessment</b> – Garfin, Jacobs, (Guest: Guido [UA Institute of the Environment], Knudson [UA Institute of the Environment])
12 Tools 2	11/8	<b>Tools 2: Scenario planning</b> – Garfin (Guests: Marra [Southwest Water Resources Consulting])
13 Tools 3	11/15	<b>Tools 3: Adaptation planning</b> – Jacobs, Garfin, (Guest: Meadow [UA Institute of the Environment])
14	11/22	<b>THANKSGIVING</b>
15	11/29 <b>Presentations</b>	<b>Final student presentations</b> – Garfin, Breshears, Buizer, Jacobs
	12/5 <b>Final Papers due</b>	<b>Final Papers</b> (no class this week)



## **CLASSROOM BEHAVIOR:**

- All cell phones and beepers must be turned off prior to entering the classroom. These sounds and conversations distract both students and instructors alike. The sole exception will be for those individuals involved in emergency services.
- While in class, students are expected to conduct themselves in a manner conducive to learning and in a way that does not distract the other students from learning. Respect and common courtesy to fellow students and the instructor is expected.
- *We will not tolerate texting or emailing during class sessions – this will result in reduction of your overall grade.*
- The Arizona Board of Regents' Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one's self. See: <http://azregents.asu.edu/rrc/Policy%20Manual/5-308-Student%20Code%20of%20Conduct.pdf>.

**SPECIAL NEEDS AND ACCOMMODATIONS:** Students who need special accommodation or services should contact the Disability Resources Center (DRC), 1224 East Lowell Street, Tucson, AZ 85721, (520) 621-3268, FAX (520) 621-9423, email: [uadrc@email.arizona.edu](mailto:uadrc@email.arizona.edu), <http://drc.arizona.edu/>. You must register and request that the DRC send the course instructor official notification of your accommodations needs as soon as possible. Please plan to meet with the instructor by appointment to discuss accommodations and how the course requirements and activities may impact your ability to fully participate. *The need for accommodations must be documented for the DRC.*

**STUDENT CODE OF ACADEMIC INTEGRITY:** Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: <http://deanofstudents.arizona.edu/codeofacademicintegrity>

**CONFIDENTIALITY OF STUDENT RECORDS:** See <http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

**SUBJECT TO CHANGE STATEMENT:** Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.