

LAB AND LECTURE SYLLABUS
BIOL 4415 Desert Ecology Summer I 2014

Instructor: Dr Sean P. Graham
Lectures: online blackboard modules
Laboratory: Field trip June 22-July 7
Office: WSB 221

Office Hours: For online section, I will be reachable electronically(email) MTWTRF noon-1pm.

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Course Description: Deserts are harsh environments that do not sustain high biodiversity and ecological productivity. However, in large part because of this, deserts are living laboratories for understanding ecological processes. Deserts have relatively simple food webs and comprehensible levels of species richness, and therefore interactions between species as well as adaptations to environmental conditions are frequently obvious. This course will combine online self-tutorial modules and an intensive, 16 day field trip that will immerse students in the fascinating study of desert ecology: the interactions between desert organisms and their environments. We will focus on the community ecology of the four recognized North American deserts—the Chihuahuan, Sonoran, Mojave, and Great Basin Deserts. The course is therefore approximately 50% online lectures and plant identification tutorials, and 50% applied learning in the field. Both sections of this course are necessary for completion, and since this course totals 6 credit hours, both sections will be exceedingly intensive; the online section will be an intellectual challenge requiring very rapid identification and memorization of large numbers of plants (> 200 species). The field portion will not only be intellectually and physically demanding (we are visiting the deserts during the hottest, driest time of the year, and the hikes will be difficult to exceedingly strenuous), but possibly emotionally demanding as well. Some people do not function well in small groups for long time periods. But social skills and working well with others is an integral part of field biology. The course will be a unique field experience that will test the student's usual biological learning capacity as well as sharpen their abilities to be individuals responsible for themselves in challenging field conditions.

Desert Ecology is an innovative online-field hybrid course. During the first half of the course students participate in online modules designed to introduce them to the basics of ecology as well as the interactions and workings of the desert. Readings encourage understanding of the value of deserts and prepare students for the stark beauty and unforgiving danger of the desert. Tutorials walk students through the process of identifying over 200 plants characteristic of the North American deserts. All of these materials can be accessed and completed from the comfort of your own home.

Then we will mount up and leave. Out there. To the desert.

The 16 day field course begins close to home in the Chihuahuan Desert at Big Bend National Park. We quickly resupply and drive west to Arizona, to experience our lushest desert—the Sonoran—at Saguaro National Park. Next we head to southern California and Mojave National Preserve, to hike amongst Joshua Trees. From there we continue to southern Utah to see the spectacular geological monuments and Great Basin desert at Canyonlands and Arches National Park. En route to Utah, we stop to experience the Grand Canyon and Monument Valley. The trip culminates with a visit to Mesa Verde National Park, to learn about relationships between people and the desert, and to appreciate the great people who continue to call this land their home. Each of the four North American deserts will be visited for three full days, and their ecological communities—their plants and animals—are fully explored.

During the field trip students apply the information learned from the online modules. We hike one or two short (2-4 mile) trails during the cool of the morning and late afternoon, and students inventory the plant species observed at points along the trail. This develops mastery of plant identification, topographic map orientéering, basic trail navigation, and skills in desert fieldwork and survival. During the heat of the day we hole up in park visitor centers where students develop skills identifying plants and animals using dichotomous keys and field guides. Short lectures and demonstrations are frequent on the trail and in our temporary classrooms. Each evening we camp in cooler, higher elevations to avoid the heat of the low desert. Therefore, the course also gives the student experience observing the effects of elevation on plant communities, and we visit lush and scenic sky islands of Texas, Arizona, and California.

Recommended Books:

1. *The Deserts of the Southwest*. Peggy Larson. Sierra Club Books
2. *A Field Guide to Southwestern and Rocky Mountain Forests*.
John C. Kricher. Boston: Houghton-Mifflin. (**Highly recommended! Buy it used online for 1\$**)

Exams & Grading: The table below illustrated the grading for this course. I do not give comprehensive exams.

1 lecture exam	100
1 plant identification exam	100
Online quizzes x 4 @ 25 pts ea	100
Participation (online, field course, field course behavior & conduct)	200
Field course identification spot checks @ 25 pts ea	100
<u>Field Notebook</u>	<u>200</u>
Total Credit	800 points

A 90 — 100% B 80 — 89% C 70 — 79% D 60 — 69% F 0 — 60%

Participation is mandatory. I will not waste my time checking roll because you are all adults. However, this will be a small class and I will notice when you are not downloading assignments. So, I'll deduct points from your class participation total if/when it becomes a problem. I don't want to hear about your excuse for not being in class and I don't want to hear about it every time you're gone. If you tell me about being missing, I will probably deduct points; if you don't, I probably won't notice. **HOWEVER, DO NOT MISS EXAMS** unless you have a documented, university-approved excuse (hospitalization, etc.), and I need to hear about this **BEFORE THE DAY OF THE EXAM**. Otherwise you're out of luck.

Online Modules will be posted every day from the first day of class till June 19. These include power point lectures, power point plant identification modules, and readings. The modules are available for download at 8am each day (**Monday through Friday**) until midnight the following day. After that they will disappear. Therefore it is imperative that students **download and save them each day**. Work through the slideshows slowly and take notes. Repeat the plant identification modules at least 5 times, or until you can identify the plant without the hints. For the tutorials and test I want you to **know only the common name**. However, the latin name is also provided. Blank tutorials will be provided for practice. Each student will also develop their own identification tutorial for animals of each community we will visit; these will be turned in by June 15 and also given by the students at camp during the field trip.

Field Trip is mandatory. It is the laboratory portion of this class. The dates are June 22-July 7 2015. We will spend three full days (and overnight camping) at a location typical of each of the four North American deserts, and there will be a scenic day of driving between each where students can relax and/or study. The trip will leave Alpine on June 22 and travel to Big Bend National Park for three days (Chihuahuan Desert). We will then return briefly to Alpine for supplies and drive to Tucson, Arizona and camp three days in Coronado National Forest, visiting Saguaro National Park and the Sonoran Desert Museum (Sonoran Desert). We will then resupply and drive to Kelso, California and camp three days in the Mojave National Preserve (Mojave Desert). Finally, we will stop by the Grand Canyon and Monument Valley for brief visits on our way to Canyonlands, Arches, and Mesa Verde National Parks in Utah and Colorado (Great Basin Desert). We will return to Alpine late (~ 10pm to midnight) on July 7. Each day of the field trip we will typically hike a separate 2-4 mile trail twice per day, one early in the morning and one late in the evening, to avoid the heat of the day. During the heat of the day we will relax, have brief lectures about plant and animal adaptations, and spend time identifying plants and animals seen on trails. A field notebook will be kept by each student and this will be used in large part by the professor to determine the student's mastery of the material.

Camp duties and etiquette. I am a huge proponent of requiring young men and women to develop into self-reliant, functional members of society. You will develop these skills on this trip. Each student will have their own personal duties as a member of the camp crew; they will be responsible for setting up and breaking down camp (packing up their own gear), they will have to share a tent with a buddy (helping the buddy put up and take down the

tent), and they will be part of a cook and clean crew. **Lack of participation or a bad attitude** about any of these duties will result in deduction of points and could lead to trip forfeiture (see below). Students will also be responsible for planning the camp meals and doing the shopping. Conditions will be hot and sweaty; showers will only be intermittently available (as few as once per four days), although toilets will be available at each campsite. Above all else, your behavior and conduct in this area will be important for a smooth trip; patience with others is probably the most important thing. Whining, complaining, backtalk, or being a jerk will not be tolerated. Dr. Graham is the team leader and students are expected to follow his lead and keep up a good attitude for the 16 day trip. Your safety, the safety of others, and the success of the field trip depend on this, so I am taking this very seriously.

Trip forfeiture. Dr. Graham will immediately drop and fail a student who becomes completely unmanageable. Major offenses (e.g., physical confrontations, constant verbal or emotional abuse toward another student or myself) will result in the student being left at the closest airport, bus, or train station (professor's choice, whichever is most convenient and on our route) to make their own way back to Alpine at their own expense. Students who have a history of bad or criminal behavior should consider the need to bring a credit card for this purpose. Students who commit a crime or are found with drugs during the trip will be turned over to the police. Students who end up in jail during the trip will not be bailed out by me; they forfeit the class and will be left to their own devices.

Drug and Alcohol Policy. Sul Ross State University does not allow possession of alcohol or drugs in university vehicles. Therefore, this will be a dry field trip. Also, drinking alcohol can seriously impair your judgment and dehydrate you, two factors that are often associated with accidents and death in the desert. Therefore, alcohol found in camp or in vehicles will be immediately confiscated and will result in deduction of participation points. More serious offenses (e.g., students found drunk or seriously impeded with a hangover during class time) may result in trip forfeiture. Drugs found anywhere near this trip will result in immediate trip forfeiture for the student in possession and they will be turned over to the authorities. We will be driving all over the borderlands during this trip, subject to checks by border patrol and other law enforcement agencies, and I do not want them to find anything! Students will sign an alcohol and drug use agreement before we leave.

Course Objectives. At the end of the semester, students should be able to:

1. Sight-recognize the common plants of the Chihuahuan, Sonoran, Mojave, and Great Basin Deserts.
2. Learn animal collection and preservation techniques as well as tissue collection and curation for DNA analyses.
3. Understand factors that produce deserts around the world.
4. Understand basic ecological principles and how they relate specifically to desert environments.
5. List plant and animal adaptations for heat loss and water conservation.
6. Have an intimate appreciation for the similarities and differences among our North American deserts.
7. Develop skills in orienteering, map reading, trail navigation, camping, and desert survival.
8. Develop collaborative, communicative, and living skills in difficult group conditions.
9. Develop general field skills and a better appreciation for the natural world.
10. Attempt to formulate your own answer to the question: "are the North American desert communities real?"

Schedule		week of
Week	Topic	
1	Introduction: The Desert Biome, Ecology basics	1-Jun
1	Plant and animal adaptations	
2	World Deserts	8-Jun
2	North American Deserts	
3	Topo maps and desert survival	15-Jun

	Test Thursday June 18 covers lecture material (open notes)	
3	Test Friday June 19 covers plant identification (open notes)	
4	Field trip leaves 8am from WSB parking lot, Big Bend National Park; PM hike	22-Jun
4	BBNP; AM hike, PM hike	23-Jun
4	BBNP; AM hike, PM hike; plant quiz	24-Jun
4	Drive to AZ; PM hike	25-Jun
4	AM hike, PM hike	26-Jun
4	Desert Museum, life zone drive, plant quiz	27-Jun
4	Free day in Tucson	28-Jun
5	Drive to CA; PM hike	29-Jun
5	AM hike, PM hike	30-Jun
5	AM hike, PM hike, plant quiz	1-Jul
5	Drive to UT; Grand Canyon and Monument Valley	2-Jul
5	AM big hike; PM Great Basin drive	3-Jul
5	AM hike and plant quiz , PM to Arches NP; PM hike	4-Jul
6	Drive to CO; Mesa Verde PM hike	5-Jul
6	Cliff dwelling tour; PM free night in Durango	6-Jul
6	Drive back to Alpine, stop at White Sands NP along way. Return by 10pm. Turn in field notebooks.	7-Jul
	I will turn in grades on this day by noon.	8-Jul

Students with any learning disabilities will be provided with accommodations. If you would like to request such accommodation because of a physical, mental, or learning disability, please contact the ADA coordinator at 837-8203, FH 112.

Program Learning Outcomes.

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

- 1) Demonstrate an understanding of evolution by natural selection.
- 2) Demonstrate an integration of environmental awareness into everyday modern life.
- 3) Understanding how to incorporate molecular biology into the study of the whole organism.
- 4) Demonstrate utilization of various field techniques toward addressing scientific questions in the discipline.
- 5) Conduct basic laboratory experiments utilizing standard observation strategies.

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

- 6) Understanding and implementation of scientific methodology.
- 7) Utilization of field techniques toward addressing scientific questions.
- 8) Be able to utilize statistics toward the analysis of data within the discipline.
- 9) Be able to effectively disseminate scientific findings using both written and oral communication.