SMU-IN-TAOS
Biol1310 - Aquatic Biology

Instructor: Dr. Peter Phillips, Associate Professor, Winthrop University, South Carolina
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Prerequisites: Minimum sophomore status.
Credits Hours: 3
Required text: Streams: Their Ecology and Life, CE Cushing and JD Allan. 2001. Academic Press, ISBN-13: 978-0120503407. Additional readings will be provided.

Description: An introduction to the biology of lakes and streams of the Southern Rocky Mountains. Lectures and labs will be conducted at Fort Burgwin, SMU-in-Taos, New Mexico. The course will include lectures by the instructor, identification of key streams at Fort Burgwin for demonstration of basic water quality and biological monitoring principles. Study sites will also include beaver dams on campus as well as high mountain lakes. Off-site field trips will illustrate the varied and unique water resources of the region such as high-altitude oligotrophic lakes, and will cover environmental impacts on regional surface waters, visits with, or by, local watershed environmental advocacy organizations. Field work requires that students have footwear allowing for walking in streams and for hiking in the mountains. Hiking may be strenuous.

Student Learning Outcomes:
- Understand aquatic ecosystems from biological, chemical and geological perspectives.
- Understand the hydrologic cycle.
- Understand the basics of the ecology of streams/rivers and ponds/lakes; including abiotic and biotic factors.
- Learn basic methods of water quality analysis in surface waters.
- Learn basic methods of biological monitoring in surface waters.
- In general, gain a comprehensive understanding of the complexity of managing water resources with an overlay of humans' footprints as well as an understanding of the individual's role in impacting water resources.
- Delve deeper into the unique challenges and history of managing scarce water resources in the arid southwest, highlighting the Upper Rio Grande watershed of New Mexico.

Grading:
- 20% - Pre-lecture quizzes (4).
- 20% - Mid-term test.
- 10% - Oral presentation (in teams)
- 30% - Research paper (individual) on stream sampling.
- 20% - Final test. Essay questions will be based on lectures, readings and excursions.
- Letter grades and percentage scores correlate as follows:

93-100=A	83-86=B	73-76=C	63-66=D
90-92=A-	80-82=B-	70-72=C-	60-62=D-
87-89=B+	77-79=C+	67-69=D+	00-59=F

Daily Schedule:

- June 4-June 7, 2013:
    - June 4 (Tues) – 7 - 8 pm – Students arrive at 5 pm. Meet with students at 7 pm for orientation.
    - June 5 (Wed) – 10.30 am – 12.35 pm - Introduction and orientation continued. DVD film "Flow – How Did a Handful of Corporations Steal Our Water". Walk Fort Burgwin campus streams and beaver dam. Show laboratory and library.
    - June 6 (Thurs) -– 10.30 am – 12.35 pm – Hydrologic cycle.
    - June 7 (Fri) – 10.30 am – 12.35 pm – Basics of aquatic ecology: streams and rivers.
- June 10-14, 2013:
    - June 10 (Mon) – 10.30am – 12.35 pm – Learn techniques for analysis of physical/chemical parameters in Fort Burgwin streams.
    - June 11 (Tues) – 10.30 am – 12.35 pm – Quiz 1. Teams analyze water quality in their Fort Burgwin stream sites. Global water resources/supply scenario.
    - June 12 (Wed) – 10.30 am – 12.35 pm – Teams conduct macroinvertebrate sampling in their Fort Burgwin stream sites.
    - June 13 (Thurs) – 10.30 am – 12.35 pm – Basics of aquatic ecology: ponds and lakes.
    - June 14 (Fri) – 10.30 am – 12.35 pm – Field trip to Taos Wastewater Treatment Plant.
- June 17-21, 2013:
    - June 17 (Mon) – 10.30 am – 12.35 pm – Quiz 2. Basics of water chemistry analysis: dissolved oxygen, conductivity, pH, temperature, turbidity using data collected from Fort Burgwin streams.
    - June 18 (Tues) – 10.30 am – 12.35 pm - Basics of water chemistry analysis: nitrogen and phosphorus nutrients using data collected from Fort Burgwin streams.
    - June 19 (Wed) – 10.30 am – 12.35 pm - Midterm test
    - June 20 (Thurs) – 10.30 am – 12.35 pm – Basics of biomonitoring of surface waters: aquatic macroinvertebrate sampling and identification of samples from Fort Burgwin streams.
    - June 21 (Fri) – 10.30 am – 12.35 pm – Teams analyze water quality and conduct macroinvertebrate sampling in their Fort Burgwin stream sites. Abiotic factors in aquatic ecosystems: Energy resources in aquatic ecosystems.
- June 24-28, 2013:
    - June 24 (Mon) – 10.30 am – 12.35 pm – Quiz 3. More on biota of aquatic ecosystems: Algae, plants, fishes and amphibians. Data analysis and basic statistical analysis for water quality parameters and macroinvertebrates collected at Fort Burgwin.
    - June 25 (Tues) – 10.30 am – 12.35 pm – Teams analyze water quality in their Fort Burgwin stream sites. Pesticide impact on surface waters: Focus on endocrine disruptors.
    - June 26 (Wed) – 10.30 am – 12.35 pm – Presentation by Amigos Bravos, Taos environmental advocacy organization.
    - June 27 (Thurs) – 10.30 am – 12.35 pm – Quiz 4 – Teams conduct macroinvertebrate sampling in their Fort Burgwin stream sites. Role of surface water and conservation biology; focus on biodiversity and sustainability. Consideration of water as a scarce commodity and consideration of water as a basic human right.
    - June 28 (Fri) – 10.30 am – 12.35 pm - Mining impact on surface waters; focus on western USA. Field trip to Chevron Mining, Inc., Questa, NM.

- July 1-3, 2013:
    - July 1 (Mon) – 10.30 am – 12.35 pm – Student oral presentations on water quality and macroinvertebrates in their Fort Burgwin stream sites.
    - July 2 (Tues) – 10.30 am – 12.35 pm – Final exam.
    - July 3 (Wed) – Departure.

Attendance:

- Lecture and laboratory attendance is mandatory and will be taken at the beginning of each class.
    - Students who miss more than 3 classes/labs will receive an administrative drop and will not be allowed to continue in the course.
    - If you arrive late, you must request an attendance change from "absent" to "late" immediately after class that day.
    - Students who are habitually late (50% or higher) will receive a warning that their next tardiness will result in an administrative drop and will not be allowed to continue in the course.
- Attendance on all field trips away from Fort Burgwin and on sampling work in surface waters at Fort Burgwin is also mandatory.

Students with Disabilities: Students with disabilities can be accommodated because field work will be conducted in teams. Sampling at remote locations will not be possible. Religiously observant students will be able to be accommodated during the course.

Academic Honesty: All work undertaken and submitted in this course is governed by the University's Honor Code. The relevant section of the Code, taken from the preamble to its constitution, is as follows: "All academic work undertaken at the University shall be subject to the guidelines of the Honor Code." The Honor Pledge is: "on my honor, I have neither given nor received unauthorized aid on this work." A violation of the Code may result in an "F" for the course, and the student may be taken before the Honor Council for disciplinary action. If you are unclear about this policy, please see the instructor immediately.

Syllabus Change Policy: Student will be informed of changes to the course syllabus in a timely manner.

SMU-in-Taos - Aquatic Biology Reading List – P Phillips – May/June 2013

Reading List:

Required text: Streams: Their Ecology and Life, CE Cushing and JD Allan. 2001. Academic Press, ISBN-13: 978-0120503407.

Additional readings:

Bush, MB. 1997. Ecology of a Changing Planet. ISBN0133729621. Chapter: 6.

Jackson, RB et al., 2001. Water in a changing world. Ecological Applications 11(4): 1027-1045. [.pdf available]

Miscellaneous materials on the Chevron Questa Molybdenum Mine

New Mexico Environment Department, Surface Water Quality Bureau. 2012. Water quality summary for the Upper Rio Grande Watershed (Cochiti Reservoir to the Colorado border), 2009.

Palmer, T. 1998. America by Rivers, Island Press. ISBN155963264X. Chapter: 7

Price, VB. 2011. The orphaned land: New Mexico's environment since the Manhattan Project. ISBN9780826350497. Selected chapters.

Schmitz, RJ. 1996. Introduction to Water Pollution Biology. ISBN0884159272. Chapters: 1, 8, 10, 11