Syllabus: Biophysical Ecology (4h), Fall 2018, BIOL 5495
(meets with ATMOS 5495 and GEO 5495)
This course meets undergraduate Quantitative Intensive requirements.

Credit Hours: 4 hours, both the lecture and the lab are required

Meeting Time and Location:
Lecture: M-W, 1:25-2:45, Crocker Science 12 (CSC 12)
Lab: F 1-4 (likely 1-3-ish) pm in South Biology SB150

Faculty Instructor: Dr. Dave Bowling, Prof. of Biology
Aline Skaggs Biology (ASB) room 442
Office Hrs. M 3-5 pm, Th 10:30-12, or by appointment
email: david.bowling@utah.edu

Teaching Assistant:
Yujie Wang, yujie.wang@utah.edu, office hours (SB 229) Th 3-5 pm, Fri 10-12 pm

Pre-requisites (important!):
Required: MATH 1180, 1220, 1260 or 1320
Recommended: PHYCS 2010, 2110, or 2210 (Physics 1)

Content Overview:
This lecture and laboratory course will examine the physical environment (light, wind, temperature, humidity) in which plants, animals, and soil organisms live, how the physical environment affects their physiological function, and how organisms in turn affect their physical environment. The course will focus on theory and methods relevant to examination of biological and ecological processes. It will be taught from an interdisciplinary perspective, including aspects of biology, physics, chemistry, and meteorology. Topics will include radiative, heat, and energy balance of plants, animals, soils, and ecosystems, convection, evaporation, transpiration, water transport through plants and soils, gas transport from leaves, boundary-layer phenomena, atmospheric structure and stability, atmospheric composition, atmospheric transport of biological trace gases, and climate change. The laboratory portion will focus on learning and using the Matlab programming language to investigate topics covered in the lecture.

Course Objectives: After taking this course, students will be able to
• use biological, physical, chemical, and mathematical approaches to understand and investigate aspects of biophysical ecology (nature!)
• use the Matlab programming language as a quantitative analysis and graphing tool

Teaching and Learning Methods: lecture, discussion, data analysis, graphing, equations, computer programming

Evaluation Methods: weekly homework, application and solution of mathematical equations, evaluation of graphs and data, computer programming and usage
Grading: Grades will be assigned in the usual fashion (90-100 A, 80-89 B, 70-79 C, 60-69 D, 0-59 E) with exact breakdown based on distribution of students, weighted as follows:

- 11 homework assignments (weekly): 55%
- 4 discussion-preparation assignments: 20%
- Individual data analysis project/report: 25%

| Lecture topics and dates are just a guide and will almost certainly change a bit. This provides us with some flexibility. |
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| Week of | Lecture (M) | Lecture (W) | HW due |
| 8/20 | Introduction | Radiation | no lab |
| 8/27 | Radiation | Atmosphere | 1 | Matlab Basics - Programming Environment and Intro |
| 9/3 | Labor Day holiday | Climate Change | 2 | Matlab Basics - Reading a Data File, Basic Plotting |
| 9/10 | Disc - Climate Change | Gas Laws | 3 | Matlab Basics - Plotting, Logical Expressions, Reshape |
| 9/17 | Gas Laws | Water | 4 | Matlab Basics - Plotting, Looping, Conditional Statements |
| 9/24 | Wind | Temperature | 5 | Review of Basics |
| 10/1 | Temperature | Dams | 6 | Data Types, Data Input/Output |
| 10/8 | Fall break | Fall break | no lab |
| 10/15 | Disc - Dams | Heat/Mass Transport | 7 | Merging Data Files with Different Time Bases |
| 11/5 | Disc - Pikas | Soil/Plant Water Transport | 10 | Functions |
| 11/12 | Soil/Plant Water Transport | SPWT, Evap/Transpiration | 11 | Advanced Plotting |
| 11/19 | Evaporation/Transpiration | Thanksgiving | no lab |
| 12/6 | Evaporation/Transpiration | Disc - Aspen Death | help with projects in lab |
| 12/10 | Projects due final exam period (Dec 12 1 pm) | | help with projects in lab |

Homework: Homework will be assigned weekly with a few weeks requiring two assignments. Homework will consist of short answer and short essay questions, math problems, Matlab programming, graphing, diagrams, etc. Some questions will be designed to encourage you to think critically about a topic, expecting you to build on concepts taught in class.

Homework is due by 1 pm on the Friday due date (the time our computer lab starts). Late homework will not be accepted unless arrangements have been made well in advance or there is verifiable emergency. Discussion-prep assignments are due by midnight on the day before the class discussion (via Canvas). NOTE: skipping just one of these assignments will lower your final grade by 5% (see grading above). Do your homework!

Matlab programming: You will learn basic Matlab programming in this class, and will be required to use it for assignments and for your project. You don’t need to know Matlab to begin with, and you don’t need to buy a copy of the software. These labs will be taught in South Biology 150. The Biology department computing facility in South Biology 106 provides Matlab access. If you wish you may buy your own copy (either Mac or PC) – the student edition is $49-$99 and is available on the internet. Matlab has extensive on-line help, and we will teach you what you need to know for class, so a Matlab book is not necessary.

Textbook (required, a copy is on reserve in the library)
Attendance and lecture notes: Come to class! It’s the only way to learn. You are expected to attend all lectures and labs, and you are responsible for taking your own notes during lecture. If you skip a lecture, obtain lecture notes from someone else in the class. Lecture notes will not be provided by the professor or teaching assistant. Handouts are available on the website as described below.

Reading: Readings from the textbook or handouts are assigned for each of the lecture topics. To get the most out of lecture, you should read the assigned material before class. We can’t possibly cover all the material in the book in class – if you want to learn this topic you need to read the book and other materials!

Professor and TA office hours: We will set aside several hours each week to meet with you to discuss concepts from class, help with homework, projects, etc. Take advantage of this time. Don’t be intimidated or afraid to ask questions – we are here to help and we want you to come to us with your questions. We’ll meet with you individually, in groups, whatever. If you come outside regular office hours, we will usually ask you to come back another time (we have other university duties beyond teaching). We’re happy to make an appointment if you need one.

Canvas: Electronic copies of all handouts from class, homework, and keys will be made available on this site (as well as hardcopies of some of these in class). Data sets for use in homework problems will also be made available on this site. All assignments must be turned in via Canvas.

Cell phone usage is not allowed in class. Humans were learning just fine for a very long time without these devices – they have no place in the classroom. Students who use a phone in class (for any reason) will be asked to leave. Phones are ok during instructor-initiated breaks.

Regrade request policy: Questions regarding grading will be considered only if received in writing (give to the TA), within one week of the day on which material is returned in class. Don’t wait until the semester ends or you will be disappointed when we turn you down.

ADA statement:
The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability Services.

Academic Conduct
In order to ensure that the highest standards of academic conduct are promoted and supported at the University, students must adhere to generally accepted standards of academic honesty. Acts of academic misconduct include cheating, plagiarizing, research misconduct, misrepresenting one’s work, and inappropriately collaborating.
Suspected cases of academic misconduct are dealt with according to the rules found in the Student Code, University Policy 6-400(V):

http://www.regulations.utah.edu/academics/6-400.html.

All instances of academic misconduct are recorded in a University database, which is shared by all academic units on campus.

“Offensive material” statement:
This instructor does not grant accommodations to course content. Please review the syllabus carefully to see if the course is one that you are committed to taking.