BIOL 4301-029

Principles of Terrestrial Ecosystem Ecology
Fall 2019

1 Course Description

Students in this course will learn the fundamentals of ecosystem ecology. This will include interactions between biological organisms and themselves as well as their environment. Concepts taught will include water and energy cycling as well as carbon and nutrient flows in both natural and managed systems. This will include aboveground and belowground processes. As ecosystem ecology is the largest scale of ecology, the class will also cover necessary concepts of individual, population, and community ecology. Spatial extent of processes will extend to the globe. Temporal extent will extend to millenia. The class will consider applied aspects of global change and human decision making. Students will be evaluated on their ability to discuss and disseminate ecosystem ecology topics.

1.1 Class Time and Location

Tuesdays and Thursdays 9:30-10:50

Biology Building Room 102/103

1.2 Instructor

Dr. Nick Smith

Biology Building Rm. 215

806-834-7363

nick.smith@ttu.edu

Meetings by appointment

1.3 Text

Principles of Terrestrial Ecosystem Ecology (2nd Edition; 2011) by Chapin, Matson, and Vitousek

The book can be accessed from Springer here: `https://www.springer.com/us/book/9780387783406`. Click on "Access this title on SpringerLink." It can also be accessed through the TTU library.

2 Course Materials

All course materials, including lecture slides, readings, activities, and code will be posted to a GitHub repository for the course. The primary repository address is `https://github.com/SmithEcophysLab/ptee_fall2019`. The repository will include the syllabus, daily class notes, readings, and mini-quizzes. The repository will also include other miscellaneous class materials as the semester progresses. A README file will contain information on the repository, including links to different sections at `https://github.com/SmithEcophysLab/ptee_fall2019/README.md`.

3 Learning Objective

This course will broadly focus on understanding the interactions between biological organisms and their environment that drive cycles of energy, water, carbon, and nutrients at local to global scales. An emphasis will be placed on how these processes influence humanity in a changing world. Applied concepts will consider human decisions as a means to reduce the negative impact of global change. Class activities will be based on discussion and dissemination of ideas, including classic and recent scientific literature. Topics will be flexible and modified to match student interests where possible.

4 Attendance Policy

Attendance will not be taken, but is strongly recommended. In class activity points will only be granted if students are in class. Makeups will not be granted.

5 Course Assessment

5.1 *Participation and Engagement*

Being an active and engaged participant in the class will benefit your understanding of material as well as your peers'. Examples include asking questions, providing feedback, and facilitating discussion.

5.2 *Mini-quizzes*

Short "quizzes" will be given in class each week (typically on Thursdays). These quizzes will be used to stimulate discussion and to assess how well prior concepts were understood by the class. These will be graded for completion and participation in the ensuing class discussion.

5.3 *Reading feedback*

Each week students will be required to read a a section of the book and produce a short summary as well as two questions that arose during their reading.

5.4 *In-class discussion lead and feedback*

Each student will be required to lead one Thursday discussion on recent literature. This will involve choosing an article for the class to read, presenting the article, and leading a discussion related to the article. Students must read some of the cited literature integral to the study in order to answer relevant questions brought forth during the discussion. Students not leading the current week's discussion will be required to produce a summary and develop two questions

based on each week's article. Discussion leads will be done in groups of 2-3 students.

5.5 *Deliverable*

The primary semester project will be to produce a deliverable. Broadly, the deliverable should answer a question or solve a problem related to ecosystem ecology. This deliverable could be a literature review, a research project, a podcast, an outreach project, etc. Students will first present their idea for their deliverable to the class. The class will provide feedback. Students will then produce and present their deliverable to the class at the end of the semester. This project can be done in groups of up to 3 students. Students are encouraged to receive help and guidance from the instructor as well as the class at large.

The deliverable will be assessed for completeness, breadth, originality, and presentation. Students must have their project OKed by the instructor before beginning. Field, lab, or greenhouse space may be used, subject to availability.

6 Grading

Participation and Engagement: 15%

Mini-quizzes: 10%

Reading feedback: 5%

Recent literature lead: 15%

Recent literature feedback: 5%

Deliverable idea proposal: 10%

Deliverable idea feedback: 5%

Final deliverable presentation: 10%

Final deliverable: 25%

Grades will be made available on Blackboard. All grades posted at the end of the course will be final, unless an error has been made in their calculation. Please contact Dr. Smith if you feel your grade has been calculated incorrectly.

7 Grading Scale

A: $\geq$ 90%

B: 80 – 90%

C: 70 – 80%

D: 60 – 70%

F: $\leq$ 59.9%

8 Missing In-class Activities

Students will be required to be in class to receive in-class activity points. Please contact Dr. Smith if you plan to miss class for a university function *prior to class*. If class is missed due to an illness, please let Dr. Smith know as soon as possible and provide Dr. Smith with a signed doctor's note by the start of the next class period.

9 Special Considerations

9.1 Disabling Condition

Any student who, because of a disability, may require special arrangements in order to Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact Dr. Smith as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services. Please note instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, you may contact the Student Disability Services office at 335 West Hall or 806-742-2405.

9.2 Religious Holy Days

"Religious holy day" means a holy day observed by a religion whose places of worship are exempt from property taxation under Texas Tax Code §11.20. A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. A student who is excused may not be penalized for the absence; however, the instructor may respond appropriately if the student fails to complete the assignment satisfactorily.

10 Academic Integrity

As stated in the Texas Tech University catalog, “The attempt of any students to present as their own work that they have not honestly performed is regarded by the faculty and administration as a serious offense and renders the offenses liable to serious consequences, possibly suspension.” This statement applies to cheating in whatever manner, including plagiarism.

11 TTU Resources for Discrimination, Harassment, and Sexual Violence

Texas Tech University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from gender and/or sex discrimination of any kind. Sexual assault, discrimination, harassment, and other Title IX violations are not tolerated by the University. Report any incidents to the Office for Student Rights and Resolution, (806)-742-SAFE (7233) or file a report online at `titleix.ttu.edu/students`.

Faculty and staff members at TTU are committed to connecting you to resources on campus. Some of these available resources are:

- TTU Student Counseling Center, 806-742-3674, `https://www.depts.ttu.edu/scc`. Provides confidential support on campus.

- TTU 24-hour Crisis Helpline, 806-742-5555. Assists students who are experiencing a mental health or interpersonal violence crisis. If you call the helpline, you will speak with a mental health counselor.
- Voice of Hope Lubbock Rape Crisis Center, 806-763-7273, https://voiceofhopelubbock.org. 24-hour hotline that provides support for survivors of sexual violence.
- The Risk, Intervention, Safety and Education (RISE) Office, 806-742-2110, https://www.depts.ttu.edu/rise/. Provides a range of resources and support options focused on prevention education and student wellness.
- Texas Tech Police Department, 806-742-3931, http://www.depts.ttu.edu/ttpd/. To report criminal activity that occurs on or near Texas Tech campus.

12 LGBTQIA

I identify as an ally to the lesbian, gay, bisexual, transgender, queer, intersex, and asexual (LGBTQIA) community, and I am available to listen and support you in an affirming manner. I can assist in connecting you with resources on campus to address problems you may face pertaining to sexual orientation and/or gender identity that could interfere with your success at Texas Tech. Please note that additional resources are available through the Office of LGBTQIA within the Center for Campus Life, Student Union Building Room 201, www.lgbtqia.ttu.edu, 806.742.5433.

Schedule of Topics by Week

Note: Book chapters in parentheses

08/26/19 – Introductions, semester planning, and the Ecosystem Concept (Ch. 1)

09/02/19 – Climate and Soils (Ch. 2, 3)

09/09/19 – Water and Energy Balance (Ch. 4)

09/16/19 – Carbon Inputs (Ch. 5, 6)

09/23/19 – Carbon Outputs (Ch. 6, 7)

09/30/19 – No classes; **work on your deliverable idea**

10/07/19 – **Deliverable idea proposal presentation**

10/14/19 – Plant Nutrient Use and Nutrient Cycling (Ch. 8, 9)

10/21/19 – Species and Trophic Dynamics (Ch. 10, 11)

10/28/19 – Spatio-temporal heterogeneity (Ch. 12, 13)

11/04/19 – Changes in the Earth System (Ch. 14)

11/11/19 – **Deliverable presentations**

11/18/19 – **Deliverable presentations**

11/25/19 – No classes - Happy Thanksgiving!

12/02/19 – **Final deliverables due**

General Weekly Schedule

Generally, each Tuesday will consist of a lecture by Dr. Smith followed by a discussion of the reading. Students will turn in their reading feedback at the end of Tuesday's lecture. Thursdays will generally begin with an in-class mini-quiz and discussion. This will be followed by a discussion of a recent literature article and (time permitting) an in-class activity.