

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 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 course topics.

The course is part of a TTU-wide *Creating Livable Futures* initiative. The purpose of the initiative is to create opportunities for students to hear and disseminate information related to global sustainability. More information on the initiative is listed below.

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 (*Meetings by appointment*)

806-834-7363

nick.smith@ttu.edu

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. Note that broad course objectives meet the objectives of the *Creating Livable Futures* initiative (more information below).

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 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 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.

Discussion leads will be done in groups of 2-3 students, subject to enrollment. Paper suggestions will be provided by Dr. Smith, but substitutions can be made if approved beforehand.

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.

5.5 *Literature review*

The primary semester project will be to produce a literature review on a topic of the student's choice. Broadly, the review should address a question or problem related to ecosystem ecology. The review should be forward thinking, in that it forms the basis for understanding ecosystem processes, including responses and/or feedbacks, moving forward.

Students will first present their idea for their review to the class. The class will provide feedback. Students will then produce and present their review to the class at the end of the semester. This project must 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 review 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%

Review idea proposal: 10%

Review idea feedback: 5%

Final review presentation: 10%

Final review: 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 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/tttd/>. 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.

13 Creating Livable Futures

This class is part of a campus-wide initiative called Creating Livable Futures, which is sponsored in part by the Texas Tech Center for Global Communication. As such, one of our objectives is to prepare you to communicate, in a fully interdisciplinary and global way, the challenges posed by pressing issues that speak to our collective wellbeing and sustainability. You will be asked to translate and communicate the work of leading thinkers on sustainability, and to expand discussing those materials through research experience and experiential learning. These objectives will be met through discussion leads and the review paper.

Your progress in communicating about global issues will be evaluated according to the Center for Global Communication rubric, so you will be invited to participate in one or more Creating Livable Futures activities outside of class that will complement class content. Planned Creating Livable Futures activities include participating in and attending speaker events and conferences, edit-a-thons, blogging and publication opportunities, student organizations, a book club, and even small scholarship opportunities for research.

You'll be informed of relevant opportunities and activities as they arise over the course of the semester.

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 – **No class Tuesday**; Ecosystem Concept continued (Ch. 1)

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

09/16/19 – Water and Energy Balance (Ch. 4)

09/23/19 – Carbon (Ch. 5, 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.