

# BIOL 4395/5301 SPATIAL ECOLOGY

CRN 19625/15976

Fall 2022, 3 credits, MW 9:00-10:20 AM, Education Building 309

## A. INSTRUCTOR AND CONTACT

Professor: Dr. Elizabeth LaRue, e-mail: [ealarue@utep.edu](mailto:ealarue@utep.edu), Office: B-404

Office hours: Monday 4 – 5 PM and Wednesday 11:00 AM – 12:00 PM or by appointment

\* Emails are read 9 AM to 5 PM daily Monday - Friday and will be responded to within 24 hours. Emails received on weekends will be responded to within 48 hours. Please plan accordingly before deadlines for non-emergency situations.

## B. COURSE DESCRIPTION

Spatial ecology focuses on understanding ecological patterns and processes across space.

This course will introduce students to theory, analytical techniques, and applications from spatial ecology, including the current state of the field. Students will learn how to use common spatial analytical methods and will be expected to apply these to answer scientific questions. A basic proficiency with the R programming language and GIS is recommended, but motivated students without prior experience will have opportunities to learn these skills.

## C. LEARNING OBJECTIVES

- Understand the principles of spatial ecology, including historical and current advances described in the primary literature.
- Address questions on land use change, species distributions, ecosystem functioning, and global change from the perspective of spatial ecology.
- Learn basic GIS and spatial analysis skills for ecological applications in the R programming language.
- Demonstrate a proficiency in communicating spatial ecology principles and analytical approaches in written, discussion, and presentation formats.

## D. CLASS SCHEDULE AND FORMAT OF INSTRUCTION

*In-person lecture Monday, Wednesday 9:00-10:20 AM, Education Building 309*

Class time will focus on spatial ecology principles, literature discussions with classmates, and hands-on GIS and spatial analyses in R.

**\*Students are required to attend in-person class sessions; there will be no recordings provided for in-person classes given that the course is discussion/lab based.** Students needing semester disability accommodations should contact CASS ([Center for Accommodations and Support Services](#)).

## E. REQUIRED MATERIALS

**Required reading:** There is no textbook for this course. Required readings will be provided from the primary literature and will form the basis of weekly discussions on spatial ecology concepts and case studies.

## F. COURSE ASSIGNMENTS AND GRADING:

- a. Grades will be based upon the following types of assignments:
  - b. 15% -- Weekly literature questions for discussion participation and discussion participation (75 pts at 7 pts each with two lowest dropped)

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- c. 40% -- Weekly R GIS and spatial analysis assignment (200 pts at 17 pts each with one lowest dropped)
- d. 5% - R basics quiz (25 pts)
- e. 10% -- Midterm written assignment (50 pts)
- f. 10% -- Lead one paper discussion (with short summary presentation) (50 pts)
- g. 20% -- Final spatial analysis project (choose a dataset and perform a spatial analysis, additional requirements if registered for BIOL 5301) (100 pts)
- h. Participation and attendance: Students are expected to participate in weekly classroom literature discussions and R lab activities (and to attend class). A student's grade will suffer from poor attendance because a portion of grades are based upon participation and group work. Furthermore, group work will greatly enhance the individual problem solving and learning during the weekly interactive analysis activities.
- i. Late work policy: Late work will not be accepted and a zero will be given for any late assignment except in the case of a university or instructor approved absence. **Please contact the instructor to discuss any absences and extensions.** The two lowest weekly literature question assignment and the one lowest R lab exercise will be dropped at the end of the semester for final grade calculation (does not include final project, midterm, R basics quiz, or leading one paper discussion).
- j. Make-up work: Make-up work will be given only in the case of a documented emergency. Note that make-up work may be in a different format than the original work. It is important to reach out to me—in advance if at all possible—and explain with proper documentation why you missed a given course requirement.
- k. Group work policy: Students may work in groups for the R lab assignments; all other course assignments are to be completed individually. It is expected that each submission is written in the student(s)'s own words. Sharing small blocks of code to achieve a task in the lab assignment is allowed, but code should not be 100% copied and pasted for the entire assignment across group members.
- l. The course grade will be derived from the following chart and are based on the percent of the earned points on assignments and participation out of the total possible points:
  - i. A (90-100), B+ (80 - 89.9), C (70 - 79.9), D (60.0 – 69.9), F (< 60.0)

## **G. TECHNOLOGY AND SOFTWARE REQUIREMENTS:**

You will need to have access to a laptop for class periods. Approximately half the time spent in class will be working through computational spatial ecology exercises in the programming platform R. Students will need to bring a laptop to each class period with the most recent version of the required free software installed (R, R Studio – installation instructions will be given in week 1).

You will also need to download or update the following software: Microsoft Office, Zoom Adobe Acrobat Reader. You will need a webcam and a microphone for virtual office hours. Check that your computer hardware and software are up-to-date and able to access all parts of the course. If you do not have a word-processing software, you can download Word and other Microsoft Office programs (including Excel, PowerPoint, Outlook and more) for free via UTEP's Microsoft Office Portal. Click the following [link](#) for more information about Microsoft Office 365 and follow the instructions.

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Although the class periods are intended to be delivered in person, course content such as required readings and assignment submission is delivered via the Internet through the Blackboard learning management system. Ensure that your UTEP e-mail account is working and that you have access to the Web and a stable web browser. Google Chrome and Mozilla Firefox are the best browsers for Blackboard; other browsers may cause complications. When having technical difficulties, update your browser, clear your cache, or try switching to another browser. UTEP may change the format of course delivery from on-campus to online, in which case you will need access to the internet to participate in synchronous online classes.

**IMPORTANT:** If you encounter technical difficulties beyond your scope of troubleshooting, please contact the [UTEP Help Desk](#) as they are trained specifically in assisting with technological needs of students. Please do not contact me for this type of assistance with the exception of difficulties running R code as part of this course. The Help Desk is much better equipped than I am to assist you with general technology issues!

#### **H. COURSE COMMUNICATION:**

- a) Office hours: I will have office hours: Monday 4 – 5 PM, Wednesday 11 AM – 12 PM, or by appointment.
- b) Email: UTEP e-mail is the best way to contact me. I will make every attempt to respond to your e-mail within 24-48 hours of receipt. When e-mailing me, be sure to email from your UTEP student account and please put the course number in the subject line. In the body of your e-mail, clearly state your name and question.
- c) Announcements: Check the Blackboard announcements frequently for any updates, deadlines, or other important messages.

#### **I. COURSE DROP POLICY**

According to UTEP Curriculum and Classroom Policies, “When, in the judgment of the instructor, a student has been absent to such a degree as to impair his or her status relative to credit for the course, the instructor may drop the student from the class with a grade of “W” before the course drop deadline and with a grade of “F” after the course drop deadline.” See academic regulations in the UTEP Undergraduate Catalog for a list of excused absences. I will not drop you from the course if you do not initiate this request. However, if you feel that you are unable to complete the course successfully, please let me know and then contact the [Registrar’s Office](#) to initiate the drop process. If you do not, you are at risk of receiving an “F” for the course.

#### **J. ALTERNATE MEANS OF SUBMITTING WORK IN CASE OF TECHNICAL ISSUES**

It is recommended to frequently save copies of your work as backups. If you are experiencing difficulties submitting your work through the course website, please contact the UTEP Help Desk. It is your responsibility to give yourself enough time to submit the assignment by the deadline. You can email me your back-up document as a last resort by the submission deadline.

#### **K. INCOMPLETE GRADE POLICY**

Incomplete grades may be requested only in exceptional circumstances after you have completed at least half of the course requirements. Talk to me immediately if you believe an

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incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines.

#### **L. ACCOMMODATIONS POLICY**

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the [UTEP Center for Accommodations and Support Services](#) (CASS). Contact the Center for Accommodations and Support Services at 915-747-5148, or email them at [cass@utep.edu](mailto:cass@utep.edu), or apply for accommodations online via the [CASS portal](#).

#### **M. SCHOLASTIC INTEGRITY**

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the [Office of Student Conduct and Conflict Resolution \(OSCCR\)](#) for possible disciplinary action. To learn more, please visit [HOOP: Student Conduct and Discipline](#).

#### **N. COPYRIGHT STATEMENT FOR COURSE MATERIALS**

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated.

#### **O. COVID-19 PRECAUTIONS**

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to [covidaction@utep.edu](mailto:covidaction@utep.edu), so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID-19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still

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need the vaccine, it is widely available in the El Paso area. For more information about the current rates, testing, and vaccinations, please visit [epstrong.org](http://epstrong.org).

#### **P. COURSE RESOURCES**

- [Help Desk](#): Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.
- [UTEP Library](#): Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- [University Writing Center \(UWC\)](#): Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.
- [RefWorks](#): A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide. Individual Resources
- [Military Student Success Center](#): Assists personnel in any branch of service to reach their educational goals.
- [Center for Accommodations and Support Services](#): Assists students with ADA-related accommodations for coursework, housing, and internships.
- [Counseling and Psychological Services](#): Provides a variety of counseling services including individual, couples, and group sessions as well as career and disability assessments.

**Q. FALL 2022, WEEKLY SCHEDULE (SUBJECT TO CHANGE)**

*\*Literature questions for class discussion and R lab assignments are due on a weekly basis unless otherwise specified*

Week	Monday: Lecture/discussion topic		Readings (reading questions due 9:00 AM the day of discussion)	Wednesday: spatial analysis lab topic (lab assignment due 9:00 AM the next Wednesday)	
	1	8/22	Course intro, what is spatial ecology?		8/24
2	8/29	Pattern and scale	Wiens 1989, Mata Silva et al. 2017	8/31	R skill building 1
3	9/5	Labor Day: no class		9/7	R skill building 2
4	9/12	Causes of landscape pattern 1: bio-physical	Macek et al. 2019, Bradley and Mustard 2006	9/14	Intro to spatial data in R
5	9/19	Causes of landscape pattern 2: disturbance and land use legacies	Perzanowski et al. 2019, Pérez-Solano et al 2017	9/21	Making maps in R, <i>R basic skills quiz</i>
6	9/26	Quantifying landscape pattern 1	Wang et al. 2014 Costanza et al. 2019	9/28	Landscape patch metrics w/NLCD landcover
7	10/3	Quantifying landscape pattern 2	Wilson et al. 2004, D'Urban Jackson et al. 2020	10/5	Change in landscape pattern
8	10/10	Landscape models	Gardner et al. 1987, Forman and Godron 1981 <i>midterm assignment</i>	10/12	Neutral landscape models
9	10/17	Macrosystems ecology	Heffernan et al. 2014, Rollinson et al. 2021	10/19	Nonstationarity
10	10/24	Spatial configuration, networks, connectivity	McCullough et al. 2019, Ossola et al. 2019	10/26	Point pattern analysis

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11	10/31	Species distribution models	Elith and Leathwick 2009, Zacarias-Correa et al. 2020	11/2	Species distribution modeling
12	11/7	Landscape Management & Conservation Design	Yang et al. 2021, Gilby et al. 2018	11/9	Spatial autocorrelation
13	11/14	Climate change	McGuire et al. 2016, 2021 IPCC AR6 Summary for Policy Makers	11/16	3D scanning with handheld sensors
14	11/21	Processes & services	Liu et al. 2015, Rodríguez González et al. 2022	11/23	No class, work on projects independently
15	11/28	Urban landscapes	Kwiatkowski et al. 2008, Groffman et al. 2014	11/30	<b><i>Final project due midnight on Sunday 12/4</i></b> (individual projects)
16	12/5 – 12/9 Final exams				

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