BIOL 4395 SPATIAL ECOLOGY
CRN 12636
Fall 2024, 3 credits, MW 9:00-10:20 AM, LART 405A.

A. INSTRUCTOR AND CONTACT
Professor: Dr. Elizabeth LaRue, E-mail: ealarue@utep.edu, Office: B-404
Office hours by appointment (3 days of notice requested)
* Emails will be responded to within 48 hours on the next business day (M-F).

B. COURSE DESCRIPTION
Spatial Ecology Concepts and State-of-the-Field. 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.

Course-Based Research Experience with NEON and Drylands Data. Students will learn how to use common spatial analytical methods and will apply these to answer a novel scientific question in a team setting with classmates through a course-based research experience. Students will learn a basic proficiency with the R programming language and GIS by analyzing real data from the National Ecological Observation Network (NEON).

C. LEARNING OBJECTIVES
• Understand the principles of spatial ecology, including historical and current advances described in the primarily literature.
• Address questions on land use change, species distributions, ecosystem functioning, and global change from the perspective of spatial ecology.
• Demonstrate a proficiency in communicating spatial ecology principles and analytical approaches in written, discussion, and presentation formats.
• Learn basic GIS and spatial analysis skills for ecological applications in the R programming language.
• Learn how to obtain and use open-source data in spatial ecology analyses from the National Ecological Observatory Network (www.neonscience.org) to answer a novel research question in a course-based research experience with classmates.

D. FORMAT OF INSTRUCTION
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 MW 9:00-10:20 AM in LART 405A. There will be no recordings. Although the class periods are intended to be delivered in person, course content such as required readings and assignment submission is delivered through Blackboard.

E. COURSE COMMUNICATION:
a) Email: UTEP e-mail is the best way to contact me. When e-mailing me, be sure to email from your UTEP email or Blackboard with spatial ecology included in the subject.
b) Announcements: Check the Blackboard announcements frequently for updates/deadlines.

This syllabus is subject to change. The most recent version will be on Blackboard.
F. REQUIRED MATERIALS
There is no textbook. Required readings will be provided on Blackboard. You will need to have access to a computer with R and R Studio. Approximately half the time spent in class will be working through computational spatial ecology exercises and team NEON data analysis for addressing a common, novel research question 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) or use the lab computers in LART 405A. Assignments using R will require access to a computer with the course software outside of formal class time. Students should backup their assignments whether using a personal or campus computer.

IMPORTANT: If you encounter technical difficulties with your UTEP account or UTEP owned computers, please contact the UTEP Help Desk. You should contact me with difficulties running R code assigned as part of this course.

G. COURSE ASSIGNMENTS AND GRAADING:
a. Grades will be based upon the following assignments (points earned / 100 points total):
   b. 10% (10 pts) – Questions and participation for literature discussion (1 pt/discussion, 2 dropped out of 12 possible). These must be submitted at the beginning of class on the day the discuss is assigned to occur. Failure to submit at the beginning of class (i.e. don’t be late) or to attend the whole discussion will result in a loss of points.
   c. 10% (10 pts) -- Present and lead one paper discussion (partner activity)
   d. 20% (20 pts) -- Midterm take-home written assignment
   e. 40% (40 pts) -- Weekly spatial analysis lab (4 pt/lab with 2 out of 12 dropped)
   f. 20% (20 pts) – Small group presentation on CURE class research project. Groups assigned by instructor.
   g. Participation and attendance: Students are expected to attend class and participate. A student’s grade will suffer from poor attendance. Attendance is required to earn points for paper discussions on that day.
   h. Preparation for class: Students will lose points on assignments due to a lack of preparation for class periods. This includes reading assigned papers, downloading data and/or installing R packages.
   i. Make-up and late work policy: A zero will be given for any late assignments except in the case of a university or instructor approved absence. Documentation is needed for extensions and make-up work (e.g., emergency, official UTEP business). Please contact the instructor to discuss any absences and extensions (you don’t know if you don’t ask).
   j. A student may miss 2 literature discussions and 2 labs without penalty (does not include final presentation, midterm, or leading one paper discussion). This is to accommodate for short-term illness not documented by a doctor’s note or personal emergencies. At the end of the semester, 2 literature discussions and 2 labs will be dropped for all students, such that no one can earn more than 10 pts for literature discussions and 40 pts for lab assignments.
   k. Precautions when ill: Please stay home and send me an email before class if you have been diagnosed with or are experiencing symptoms of a contagious illness (COVID-19, flu). *** Students are still responsible for turning in assignments on Blackboard by the due date even if missing class due to illness. Short-term illness such as the flu typically only happen once or twice a semester and should be covered by the 2 dropped literature questions and lab assignments. Long-term
illness that goes beyond a couple of missed class periods will require appropriate documentation; students are encouraged to contact CASS (see K. below).

l. Group work policy: All course assignments are to be a student’s own work and completed individually unless otherwise instructed. It is expected that each submission is written in the student(s)’s own words. Students may work on solutions for the R lab assignments with others but must turn in their own work.

m. The course grade will be derived as points earned / 100 points total from the assignments:
   A (0.900 -1.00), B+ (0.800 – 0.899), C (0.700 – 0.799), D (0.600 – 0.699), F (< 0.600)

H. ALTERNATE MEANS OF SUBMITTING WORK IF TECHNICAL ISSUES
Frequently save copies of your work. It is your responsibility to give yourself enough time to submit assignments by the deadline. If you are experiencing difficulties submitting through Blackboard, contact the UTEP Help Desk. You can email me your back-up document as a last resort, but it must be emailed to me within 10 minutes of the deadline. You are not allowed to use email to submit assignments more than a couple of times. You may not submit your discussion questions electronically; they must be submitted in-person the day of the discussion.

I. COURSE DROP POLICY
The Fall 2024 Drop/Withdrawal Deadline is Friday Nov. 1; you cannot drop after this date. 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. You must initiate the request to be dropped from the course; if you do not, you are at risk of receiving an “F”.

J. INCOMPLETE GRADE POLICY
Incomplete grades may be requested only in exceptional circumstances after you have completed most of the course requirements. Talk to me immediately if you believe an incomplete is warranted. Students will still need to complete all assignments to earn a grade.

K. 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, or apply for accommodations online via the CASS portal.

L. 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. In this course, any work not written and prepared by the student is considered academic
misconduct. Unless otherwise instructed on an assignment, copying material generated from an AI, such as ChatGPT, or another student, and claiming it as your own work, is plagiarism. Student must always cite their references when using another’s work with an appropriate bibliography and in-text citations. Any act of academic dishonesty attempted by a UTEP student will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso will 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.

M. 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.

N. COURSE RESOURCES
- **Help Desk**: Students experiencing technology challenges (email, Blackboard, software, etc.).
- **UTEP Library**: Access a wide range of written and technology resources.
- **University Writing Center (UWC)**: Submit papers here for assistance with writing.
- **RefWorks**: A bibliographic citation tool.
- **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.
### O. FALL 2024, WEEKLY SCHEDULE (SUBJECT TO CHANGE)

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday: Lecture/discussion topic</th>
<th>Readings (Paper copy of questions due 9 AM on the day assigned)</th>
<th>Wednesday: Spatial analysis lab topic (Labs are due 8:59 AM the following Wednesday)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/26 Course intro, what is spatial ecology?</td>
<td>---</td>
<td>8/28 Intro to R, R Studio, and R Markdown</td>
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<tr>
<td>2</td>
<td>9/2 Labor Day (no class)</td>
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<td>9/4 R skill building 1</td>
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<tr>
<td>3</td>
<td>9/9 Pattern and scale</td>
<td>Mata Silva et al. 2017</td>
<td>9/11 Intro to CURE question/data</td>
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<tr>
<td>4</td>
<td>9/16 Causes of landscape pattern</td>
<td>Bradley and Mustard 2006</td>
<td>9/18 Introduction to NEON open-source data</td>
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<tr>
<td>5</td>
<td>9/23 Outline CURE analysis</td>
<td>LaRue et al. 2023</td>
<td>9/25 Making NEON site maps in R with shapefiles</td>
</tr>
<tr>
<td>6</td>
<td>9/30 Geographic coordinate systems</td>
<td>McCullough et al. 2019</td>
<td>10/2 Introduction to rasters with NEON AOP data</td>
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<tr>
<td>7</td>
<td>10/7 Quantifying landscape pattern</td>
<td>Wang et al. 2014</td>
<td>10/9 Landscape patch metrics w/NLCD landcover</td>
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<tr>
<td>8</td>
<td>10/14 Outline CURE presentation</td>
<td>Whitesides 2004</td>
<td>10/16 CURE analysis: raster structural diversity</td>
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<td></td>
<td><em>Mid-term due 8:59 AM</em></td>
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<tr>
<td>9</td>
<td>10/21 Macrosystems ecology</td>
<td>Heffernan et al. 2014</td>
<td>10/23 Nonstationarity in macrosystems datasets</td>
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<tr>
<td>10</td>
<td>10/28 Landscape models</td>
<td>Gardner et al. 1987</td>
<td>10/30 --- No class ---</td>
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<tr>
<td>11</td>
<td>11/4 Species distribution models</td>
<td>Zacarias-Correa et al. 2020</td>
<td>11/6 CURE analysis: Plant biodiversity</td>
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<tr>
<td>12</td>
<td>11/11 CURE development</td>
<td>Gamez and Harris 2022</td>
<td>11/13 CURE analysis: Small mammal biodiversity</td>
</tr>
<tr>
<td>13</td>
<td>11/18 Climate change, telecoupling</td>
<td>Liu et al. 2015</td>
<td>11/20 CURE analysis: Statistics and data visualization</td>
</tr>
<tr>
<td>14</td>
<td>11/25 Urban landscapes</td>
<td>Groffman et al. 2014</td>
<td>11/27 --- No class ---</td>
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<tr>
<td>15</td>
<td>12/2 CURE group presentations</td>
<td>---</td>
<td>12/4 CURE group presentations</td>
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</tbody>
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