RNR 620 - Working with Ecological Data in R
(2 units)
9-11 AM Tues, Main Library Data Studio

Course Description: R is increasingly becoming the software package of choice for manipulating, analyzing, and presenting data in ecological studies. This 2-credit graduate course will focus on fundamentals of the R language and introduce students to particular packages that are useful across a broad set of ecological applications. This course will emphasize tools for inputting, editing, checking, restructuring, and plotting of various data types (time series, counts, geographic layers, model output). This course will also include some discussion of general statistical approaches (hypothesis testing, parameter estimation and model selection) and their proper execution in R based on student projects

Course Prerequisites: Introductory Statistics

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Office Hours: By appointment

Course Format: Lecture, small group activities, experiential learning, web delivered content and assessment (flipped classroom)

Course Objectives:
During this course, students will

1) **Describe** how, why, and when data science tools inform research in general
2) **Demonstrate** how data science tools improve and enhance your research question
3) **Create** best practices for organizing, sharing, and archiving your data and code
4) **Evaluate** best practices for creating, disseminating, and archiving your code
5) **Assess** your proposed plan of work in relation in relation to your achieved work identifying challenges, opportunities, and next steps

Student Learning Outcomes:
By the end of this course, students will

1) **Define, differentiate,** and **explain** the nature and application of modern computational methods for handling and using data as it relates to real-world ecological scenarios; same verbs the nature and application of data to the real-world problems and questions
2) **Associate, examine,** and **compare** how to infer meaning and insight from data through written, visual, and verbal communication to both experts and non-experts;
3) **Summarize, implement,** and **appraise** data analytics as they relate to addressing real-world challenges;
4) **Practice, manage,** and **design** a personal toolbox of data skills useful for discipline specific courses and careers

Make Up Policy for Late Enrollment:
Students who enroll late for this course should contact the instructor immediately to negotiate a schedule to complete missed activities and assignments.

Course Communication:
Depending on how you are taking this class, class meetings will vary from face to face to entirely online. You are responsible for participating in these lectures and learning the material presented regardless of format. Interactions outside of face-to-face class time will take place via Brightspace Desire To Learn (D2L http://d2l.arizona.edu). Please check the course D2L site daily for any announcements related to this course. Students should anticipate spending ***135 hours*** (3 unit course) on activities related to this course. These hours break down as follows: 50 hours on lectures, reading materials, and videos; 50 hours on assignments and activities; 5 hours on exams; 20 hours on study questions; 10 hours on communication with the instructor and other students.

Required Texts, Readings, and Videos:
Students will not have to purchase additional texts, readings, or videos for this course. All material will be available on D2L as open source material (AKA free).

Required Materials:
Students are highly encouraged to have their own laptop they can bring to class. Many of the in class activities will involve a personal laptop. Students without access to a laptop should contact the instructor immediately to arrange one to borrow for the entire semester.

Topics and Activities:

Assignment	Topic	Learning Objective
Assignment 1	Letter of Inquiry	Demonstrate the utility of R based data science tools in your research program (proposed work for course)
Assignment 2	Data Science Tools Survey	Describe common R based data science tools in ecology
Assignment 3	Data Management Plan	Create best practices for data acquisition, organization, analysis, and dissemination
Assignment 4	Code Review	Evaluate best/good enough practices for code creation, sharing, and archiving
Assignment 5	Summary Report	Assess your proposed work in relation to your finished work

Assignments:
Assignments: There are 5 assignments for this course. These assignments will be based on student projects and professional skills development. The majority of the assignments are programming related in an integrated development environment using a common data science programming language (e.g. R or python).

Class Schedule:
Tuesdays 9-11 AM CATalyst Studios, Main Library
and/or zoom (zoom link posted on D2L)

Grade Scales and Policies:

Total Points *200 points*

Assignment	Points
Participation	50
Community and Collaboration	50
Assignments	100

Percent Score	Grade
90-100% (180-200 points)	A
80-89% (160-179 points)	B
70-79% (140-159 points)	C
60-69% (120-139 points)	D
Below 120 points	E

No extra credit will be given for this course. Please do the assignments in a timely and professional manner when they are assigned.

Any assignment turned in late will be reduced by 5% of its total value for every day it is late, including weekends.

There is no attendance policy. There are multiple ways for students to engage with each other and the instructor in lectures and outside of lectures.

Incomplete grades will be given only in special circumstances as outlined in university policy as stated in the University of Arizona General Catalog (http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete)

Course Behavior Policy:
To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Threatening Behavior Policy:
The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

Accessibility and Accommodations:
At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the *Disability Resource Center* (520-621-3268, https://drc.arizona.edu/) to establish reasonable accommodations.

Code of Academic Integrity:
Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

University standards for plagiarism will apply to grading. The UA Student Code of Conduct states: "All forms of student academic dishonesty, including but not limited

to cheating, fabrication, facilitating academic dishonesty, and plagiarism, are prohibited."

"Plagiarism" means representing the words or ideas of another as one's own. Check out U Arizona Libraries quick guide to help you discern between plagiarism and not plagiarism (http://new.library.arizona.edu/research/citing/plagiarism).

Any written assignment found to be previously or concurrently submitted for evaluation in another course will receive a failing grade. We use software which checks your work against a database. It's really easy for any instructor to figure out if your writing is actually someone else's, we mean ridiculously easy. **Please use your own words.**

Students are advised that all notes, lectures, study guides, and other course materials disseminated by the instructor to the students, whether in class or online, are original materials and as such reflect intellectual property of the instructor or author of those works. All readings, study guides, lecture notes, and handouts are intended for individual use by the student, not for commercial gain. Students may not distribute or reproduce these materials for commercial purposes without the express written consent of the instructor and university. Students who sell or distribute these materials for any use other than their own are in violation of the University's Intellectual Property Policy (available at http://www.ott.arizona.edu/uploads/ip_policy.pdf). Violations of the instructors copyright may result in course sanctions and violate the Code of Academic Integrity.

UA Non-Discrimination and Anti-Harassment Policy:
The University is committed to creating and maintaining an environment free of discrimination; see http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

Discrimination includes any form of unequal treatment such as denial of opportunities, harassment, and violence. Violence includes sex-based violence such as rape, sexual assault, unwanted touching, stalking, dating/interpersonal violence, and sexual exploitation.

If you experience discrimination by faculty or staff, you are encouraged (but not required) to report the incident to the Office of Institutional Equity (520-621-9449). If you experience discrimination by another undergraduate, graduate, or professional student, please feel free to report the incident to the Dean of Students (520-621-7057).

Learn more about your rights and options at http://equity.arizona.edu or call 520-621-9449 or email equity@email.arizona.edu. Students may also contact the Oasis Program (520-626-2051), the Tucson Rape Crisis Center (520-327-1171) and Campus Health Counseling and Psych Services (520-621-3334) as confidential resources for advocacy and other support related to power-based personal violence such as rape and sexual assault.

Confidentiality of Student Records:
Students should know the federal regulations regarding the privacy of their academic records http://www.registrar.arizona.edu/ferpa/default.htm

Subject to Change Statement:
Information contained in the course syllabus, other than the grade policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.