FOREST AND RANGELAND STEWARDSHIP
COLORADO STATE UNIVERSITY

NR 502 Intro to Natural Resource Research
COURSE SYLLABUS
Department of Forest and
Rangeland Stewardship
Warner College of Natural Resources

	Instructor
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Office Hours:	Wednesday, 1-3 pm

Term:	Fall 2025
Class Meeting Days:	Tu/Th
Class Meeting Hours:	10:00-10:50 am
Class Location:	Walnut 115
Course Credits:	2

Course Overview

This course provides graduate students in research-oriented natural resource degrees an introduction to scientific research and graduate study from an interdisciplinary perspective. Students learn to critically read, analyze and synthesize published research, frame problems, and ask research questions within and across biological, physical and social science disciplines. Students articulate an individual philosophy of science and positionality statement, develop science writing and communication skills, and learn about the responsible research conduct.

Course Goals and Objectives

This course aims to provide beginning graduate students with foundational research, communication and professional skills to launch a successful graduate program and professional career, while building relationships with fellow students and faculty across disciplines within our department and college.

By the end of the semester, students will be able to:
1) Exercise judgement related to scientific ethics and the interpretation of the philosophy of science, including responsible conduct of research
2) Summarize the requirements for their degree program and produce a draft plan of completion
3) Systematically search for and critically evaluate scientific literature
4) Synthesize the results of systematic review into a literature review
5) Articulate a positionality and philosophy of science

Course Prerequisites

Graduate standing

CSU's Land Acknowledgment Statement

Colorado State University acknowledges, with respect, that the land we are on today is the traditional and ancestral homelands of the Arapaho, Cheyenne, and Ute Nations and peoples. This was also a site of trade, gathering, and healing for numerous other Native tribes. We recognize the Indigenous peoples as original stewards of this land and all the relatives within it. As these words of acknowledgment are spoken and heard, the ties Nations have to their traditional homelands are renewed and reaffirmed.

CSU is founded as a land-grant institution, and we accept that our mission must encompass access to education and inclusion. And, significantly, that our founding came at a dire cost to Native Nations and peoples whose land this University was built upon. This acknowledgment is the education and inclusion we must practice in recognizing our institutional history, responsibility, and commitment.

https://landacknowledgment.colostate.edu

This is an Inclusive Classroom

Inclusive teaching involves deliberately cultivating a learning environment where all students are treated equitably, have equitable access to learning, and feel valued and supported in their learning. Such teaching attends to social identities and seeks to change the ways systemic inequities shape dynamics in teaching-learning spaces, affect individuals' experiences of those spaces, and influence course and curriculum design.

– Adapted from http://crlt.umich.edu/node/90467

CSU's Principles of Community

- **Inclusion:** We create and nurture inclusive environments and welcome, value and affirm all members of our community, including their various identities, skills, ideas, talents and contributions.
- **Integrity:** We are accountable for our actions and will act ethically and honestly in all our interactions.
- **Respect:** We honor the inherent dignity of all people within an environment where we are committed to freedom of expression, critical discourse, and the advancement of knowledge.
- **Service:** We are responsible, individually and collectively, to give of our time, talents, and resources to promote the well-being of each other and the development of our local, regional, and global communities.
- **Social Justice:** We have the right to be treated and the responsibility to treat others with fairness and equity, the duty to challenge prejudice, and to uphold the laws, policies and procedures that promote justice in all respects.

https://diversity.colostate.edu/resources/principles-of-community/

Required Texts and Materials

All required and supplementary texts and materials will be provided via Canvas. Full citations to assigned readings and materials are provided below in the course schedule. Additional optional resources will also be posted on Canvas.

Library & Research Help
The CSU Libraries Help Desk provides basic research and technical assistance either in person at Morgan Library or by phone at 970-491-1841. Virtual assistance is also available via the Libraries' Ask Us chat and email services (http://lib.colostate.edu/help/ask-us).

Important Dates to Remember
Last Day to Add/Drop Classes without an Instructor Override: Sep 1
Registration Closes: Sep 10
End course withdrawal period: Nov 14
Fall Recess: Nov 22 – Dec 1
Last Day to Process a University Withdrawal: Dec 12

Useful websites with important dates to remember
https://calendar.colostate.edu/academic/
https://www.online.colostate.edu/faqs/important-dates.dot

Course weekly schedule on following page.

Weekly course schedule:

week	topic	Reading	Assignment due
1 Aug 26	Course introduction	Syllabus, Introductions and course expectations	
Aug 28	FRS Graduate Orientation (Guest: Sonya Lefebre)		
2 Sep 2	Research ethics and society	Ethics and society handout Crozier and Schulte-Hostedde 2015 (doi:10.1007/s11948-014-9558-4)	RCR module #1 (5 %)
Sep 4	Reproducibility and research results	Research reproducibility handout Cassey and Blackburn 2006 (doi:10.1641/0006-3568(2006)56[958:RARIE]2.0.CO;2) Fraser et al. 2018 (doi:10.1371/journal.pone.0200303)	RCR module #2 (5 %)
3 Sept 9	Intro to GS-forms and degree map (Guest: Sonya Lefebre)	FRS Graduate Student Handbook	GS-6 form and written justification (5 %)
Sep 11	Data management and data ownership	Data management handout Gotelli and Ellison, Chapter 8 "Managing and curating data"	RCR module #3 (5 %)
4 Sep 16	Research misconduct	Research misconduct handout Parker et al. 2016 (doi:10.1016/j.tree.2016.07.002)	RCR module #4 (5 %)
Sep 18	Plagiarism	Clark et al. 2016 (doi:10.1016/j.tree.2016.09.006)	RCR module #5 (5 %)
5 Sep 23	Creating a safe research environment	Video: Preventing and responding to harassment and bullying in Academia	RCR module #6 (5 %)
Sep 25	The use of AI in ecology	Haghighi et al. 2023 (doi:10.1002/bes2.2097)	

6 Sep 30	Beginning your research: how to find scientific papers (guest: Library)	Agger et al. 2017 (doi:10.1007/978-3-319-63582-8_5) Website: Web of Science (login through CSU library)	Critique of ChatGPT (5 %)
Oct 2	The systematic review process		
7 Oct 7	Reference manager software and annotated bibliography	Website: Zotero, Mendeley, etc.	
Oct 9	Beginning your research: how to critically read scientific papers	Website: http://prisma-statement.org/ Carey et al. 2020 (doi:10.1371/journal.pcbi.1008032) Subramanyam 2013 (doi:10.4103/0973-029X.110733)	
8 Oct 14	Pillars of the scientific method	Website: https://www.wired.com/2014/01/what-kind-of-science-is-computational-science/ https://tamest.org/news/newscomputational-science-the-third-pillar-of-science/ https://www.siam.org/publications/siam-news/articles/what-kind-of-science-is-computational-science-a-rebuttal	Annotated bibliography (5 %)
Oct 16	What is (good) science? How does who we are and how we know affect what and how we research?	Creswell, Chapter 2 "Philosophical assumptions and interpretive frameworks" Jafar 2018 (doi:10.1136/emermed-2017-207158)	
9 Oct 21	Discussion of positionality statements	Cheng and Randall-Parker 2017 (doi:10.1080/08941920.2017.1295493)	
Oct 23	Types of natural resources studies	Diamond 1983 (doi:304586a0) Peck 2004 (doi:10.1016/j.tree.2004.07.019) Davies and Gray 2015 (doi:10.1002/ece3.1782)	Positionality statement (5 %)

10 Oct 28	What is applied vs. basic science?	Pielke Jr. and Byerly Jr. 1998 (doi:10.1063/1.882141)	PRISMA diagram (10%)
Oct 30	Inference and significance in research	Stephens et al. 2007 (doi:10.1016/j.tree.2006.12.003)	
		Amrhein et al. 2019 (doi:10.1038/d41586-019-00857-9)	
		Wasserstein et al. 2019 (doi: 10.1080/00031305.2019.1583913)	
11 Nov 4	Diagramming a research paper: the title, abstract, and introduction	Kallestinova 2011 (doi: PMC3178846)	
Nov 6	Diagramming a research paper: the methods, results, and discussion		
12 Nov 11	NO CLASS		Working on mini-reviews
Nov 13	NO CLASS		
13 Nov 18	The publication process: where to begin		
Nov 20	Writing and responding to peer reviews and critiques	Ayres 2009 "How to peer review"	Draft mini-reviews (10 %)
14 Nov 25	FALL RECESS		
Nov 27	FALL RECESS		
15 Dec 2	Presenting your research: poster formatting		Peer reviews (5 %)
Dec 4	Presenting your research: components of the oral presentation		
16 Dec 9	Presentations: mini-reviews		Final literature review presentations (5 %)
Dec 11	Presentations: mini-reviews		Final mini-reviews and responses to peer-review (15%)

Grading:

Assignment	Proportion of grade
Responsible conduct of research training modules	5% each, 30% of total grade
GS-6 and written justification	5%
Critique of chatGPT	5%
Annotated bibliography	5%
PRISMA diagram	10%
Positionality statement	5 %
Draft mini-reviews	10%
Peer reviews	5%
Presentations	5%
Final mini-reviews and response to comments	15%
Class participation	5%
Extra credit: completion of entire RCR training	5%

Grading scale: A 90-100%
                B 80-89.9%
                C 70-79.9%
                D 60-69.9%
                F <60%

Assignment descriptions:
Responsible conduct of research training modules: Early in the course we will focus on the basics of scientific ethics using a combination of literature and discussion, as well as training modules required for researchers and PI's funded by federal agencies such as the USDA and NSF. Students will be required to complete at least 6 specific modules in the 'Basic RCR' training and provide evidence of this. Completion of the entire training will be awarded 5% extra credit.

GS-6 and written justification: A completed GS-6 form that includes all relevant proposed courses needed to complete your program of study. This should be accompanied by a short written justification that describes how each selected course (and the timing of the course within your graduate program) will meet your desired learning objectives and future goals as a researcher. The justification should also include a list of potential committee members.

Critique of ChatGPT: Students will produce a written description of the use of AI to gather and summarize references and other specific information for them that relates to their field of study (e.g., species lists, occurrence records, etc.). How well did the program do? How accurate was the program? What mistakes did it make, and was it able to correct them? How should AI be used (or not used) within your specific field of study? What are the risks and advantages to using this technology?

Annotated bibliography: An annotated bibliography that details at least 20 papers that students have critically read and recorded notes for (i.e., annotated) into a literature matrix. The matrix needs to include additional fields for data collection that relates systematically

PRISMA diagram: To display the process of systematically including papers in a review, students will create a PRISMA diagram (http://prisma-statement.org/). In addition to building a critical skill, this

assignment is designed to help students explore an area of research they may want to pursue and to identify where the critical gaps and uncertainties lie that call for additional research.

Positionality statement: Part of becoming a researcher is developing an understanding of the context of our research, including the history of our discipline(s) and our context as a researcher. This context includes our own (and our discipline's) assumptions about the nature of the reality, and how we can know it. It also includes reflecting on our personal identity and life history, and how these shape and are shaped by our research. There are no right or wrong answers to these questions. Rather, an important part of our formation as researchers is to develop awareness of our own beliefs and subjectivities, and how these affect what we study and how we do our research. To facilitate this process each student will develop an individual statement of their philosophy of science (our beliefs about the nature of reality and how we can know it) and positionality (a reflection on how our individual identity and history affect what and how we research, and our relationship to other researchers and/or research participants).

Draft mini-review: A drafty-stage 3,000 – 4,000 word 'mini-review' following the format of the Journal of Ecology (https://besjournals.onlinelibrary.wiley.com/hub/journal/13652745/homepage/Reviews). Document formatting should adhere as closely as possible to the author guidelines (https://besjournals.onlinelibrary.wiley.com/hub/journal/13652745/author-guidelines), and text limits *do not* include the references section of the review.

Peer-reviews: To develop the skills of giving, receiving and responding to constructive feedback, each student will conduct a peer review of another student's draft literature review and concept map. Reviews should include both general and specific comments, as well as line-by-line edits to consider or respond to. We will model our peer-review work after the guidelines provided in the Ayres 2009 document.

Presentations: Depending on the size of our class, each student will give a 10-15 minute presentation at the end of the course that describes the main subject and findings of their systematic mini-reviews. The subjects addressed in the presentation should include: 1) an introduction to the problem or scientific question to be addressed and it's importance in the field; 2) a discussion of the methodologies applied in the systematic review process; 3) at least one original synthetic figure or finding resulting from the review process; 4) a set of conclusions; and 5) further plans for integrating the systematic mini-review into their graduate program or plan of work.

Final mini-review and response to reviewer comments: A revised version of the draft mini-review in a final-draft that more comprehensively addresses the research topic and provides a clear introduction, methodology, and integrated results and discussion section. **The final version should include at least one original image, figure, or table that relates to the synthesis and findings of the systematic review process.**

Class participation: Since this is a small class that relies on frequent interactions between students and the instructor, as well as the critical interpretation of ideas and philosophies in science, a small percentage of the grade will be assigned for participation. Regular interaction and participation in the classroom environment in the form of discussion and idea sharing will receive full credit (5%). Infrequent or occasional participation will receive half credit (2.5%), and almost never verbally participating will receive no credit (0%).

Course Policies
Late Work Policy
Assignments turned in late will be assessed a penalty: a half-letter grade if it is one day late, or a full-letter grade for 2-7 days late. If you anticipate that you will not be able to meet a deadline, please contact me in advance to request an extension.

Extra Credit Policy
The only extra credit option available in this course is completion of the Responsible Conduct of Research (RCR) training.

Grades of "Incomplete"
Per university policy, an instructor may assign temporary grade of Incomplete to a student who demonstrates that he or she could not complete the requirements of the course due to circumstances beyond the student's control and not reasonably foreseeable. A student must be passing a course at the time that an Incomplete is requested unless the instructor determines that there are extenuating circumstances to assign an Incomplete to a student who is not passing the course. When an instructor assigns an Incomplete, he or she shall specify in writing using the Department Incomplete Grade Form the requirements the student shall fulfill to complete the course as well as the reasons for granting an Incomplete when the student is not passing the course. The instructor shall retain a copy of this statement in his or her grade records and provide copies to the student and the department head or his or her designee. (Section I.6 of the Academic Faculty and Administrative Professional Manual). For more information: https://registrar.colostate.edu/incomplete-grades/

Disability Access
Colorado State University is committed to providing reasonable accommodations for all persons with disabilities. Students with disabilities who need accommodations must first contact the Student Disability Center before requesting accommodations from the professor. The Student Disability Center (SDC; https://disabilitycenter.colostate.edu/) is located in room 121 of The Institute for Learning and Teaching (TILT) building. Their phone is (970) 491-6385 (V/TDD). Students who need accommodations in this course must contact the professor at the beginning of the semester to discuss needed accommodations.

Attendance Policy
This class will be delivered primarily in-person but may have some instances where remote (synchronous) attendance is more convenient or appropriate. Attendance at both in-person and synchronous online sessions is encouraged but attendance will not be recorded. Student should make an effort to attend and interact in order to receive full marks for 'participation'.

University Policy Statement:
Students who will miss class due to participation in University-sanctioned extracurricular/co-curricular activities must inform their instructors prior to the anticipated absence and take the initiative to make up missed work in a timely fashion. Instructors must make reasonable efforts to enable students to make up work which must be accomplished under the instructor's supervision (e.g., examinations, laboratories). In the event of a conflict in regard to this policy, individuals may appeal using established University procedures.

For the purposes of this regulation, University-sanctioned activities include competitions, events and professional meetings in which students are officially representing the institution. Appropriate sanctioned activities include:

a.   Intercollegiate athletics;
b.   Collegiate club sports and competitions;
c.   Conferences and workshops recognized by the University not related to academics;
d.   Commitments on behalf of the University (ASCSU, band, etc.); and
e.   Professional activities recognized by the University related to academics.
f.   Department heads or their designated representatives must approve sanctioned professional and departmental activities. Other sanctioned activities must be approved by the appropriate program director on record with the Division of Student Affairs offices or the Department of Athletics.

Religious Accommodation
Participation in official University activities, e.g., an out-of-town athletic event, or special religious observances may provide a legitimate reason for an excused absence. The student is responsible for discussing this with the instructor at the beginning of the semester.

Academic Integrity
The Department of Forest and Rangeland Stewardship takes academic integrity seriously. At minimum, academic integrity means that no one will use another's work as their own. You can find an overview and CSU's definition of plagiarism on the CSU Writing Center website found here: https://writing.colostate.edu/guides/page.cfm?pageid=311&guideid=17.

If you plagiarize in your work you could lose credit for the plagiarized work, fail the assignment, or fail the course. Each instance of plagiarism, classroom cheating, and other types of academic dishonesty will be addressed according to the principles published in the CSU General Catalog (under "Academic Integrity/Misconduct": http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/)

This course will adhere to the CSU Academic Integrity Policies and Guiding Principles as found in the General Catalog and the Student Conduct Code.

Academic integrity lies at the core of our common goal: to create an intellectually honest and rigorous community. Because academic integrity, and the personal and social integrity of which academic integrity is an integral part, is so central to our mission as students, teachers, scholars, and citizens, I will ask that you affirm the CSU Honor Pledge as part of completing your work in this course.

Further information about Academic Integrity is available at CSU's Practicing Academic Integrity: https://tilt.colostate.edu/Integrity/StudentResources

Title IX Information
CSU's Student Sexual Harassment and Violence policy, following national guidance from the Office of Civil Rights, requires that faculty follow CSU policy as a "mandatory reporter" of any personal disclosure of sexual harassment, abuse, and/or violence related experiences or incidents shared with the faculty member in person, via email, and/or in classroom papers or homework exercises. These disclosures include but are not limited to reports of personal relational abuse, relational/domestic violence, and stalking. While faculty are often able to help students locate appropriate channels of assistance on

campus (e.g., see the CSU Health Network link below), disclosure by the student to the faculty member requires that the faculty member inform appropriate CSU channels to help ensure that the student's safety and welfare is being addressed, even if the student requests that the disclosure not be shared.

For counseling support and assistance, please see the CSU Health Network, which includes a variety of counseling services that can be accessed at: http://www.health.colostate.edu/. And, the Sexual Assault Victim Assistance Team is a confidential resource for students that does not have a reporting requirement and that can be of great help to students who have experienced sexual assault. Some helpful websites:
https://safety.colostate.edu/sexual-assault-information/
https://wgac.colostate.edu/support/sexual-assault/

Non-Discrimination Statement
Colorado State University does not discriminate on the basis of race, age, creed, color, religion, national origin or ancestry, sex, gender, disability, veteran status, genetic information, sexual orientation, gender identity or expression, or pregnancy. The University complies with the Civil Rights Act of 1964, as amended, related Executive Orders 11246 and 11375, Title IX of the Education Amendments Act of 1972, Sections 503 and 504 of the Rehabilitation Act of 1973, Section 402 of the Vietnam Era Veterans' Readjustment Assistance Act of 1974, as amended, the Age Discrimination in Employment Act of 1967, as amended, The Pregnancy Discrimination Act of 1978, Americans with Disabilities Act of 1990, the Civil Rights Act of 1991, the ADA Amendments Act of 2008, the Genetic Information Nondiscrimination Act of 2008, and all civil rights laws of the State of Colorado. Accordingly, equal opportunity of employment and admission shall be extended to all persons. The University shall promote equal opportunity and treatment in employment through a positive and continuing affirmative action program for ethnic minorities, women, persons with disabilities, and veterans. The Office of Equal Opportunity is located in 101 Student Services. Source: http://oeo.colostate.edu/non-discrimination-statement