ELEMENTAL ECOLOGY – FALL 2023
BIOLOGY 419/519

Primary Instructors

Dr. Seth Newsome
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Lab Coordinator

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Guest Lecturers

Dr. Geraldine Busquets (Marine Mammal Ecology), Conner Mertz (Microbial Ecology)
Nadia Neff (Archaeology and Human Nutrition), Dr. Jon Dombrosky (Historical Ecology)

Course Meeting Times and Locations

Monday	Tuesday	Wednesday	Thursday	Friday
	Lecture 9:30–10:45 AM PAÍS 2120	*Lab* 2:00–4:00 PM PAÍS 2120 Castetter 235/237 or CSI	*Lecture* 9:30–10:45 AM PAÍS 2120	
	Newsome Office Hours 11:00 AM–12:00 PM PAÍS 1318	*Elliott Smith Office Hours* 1:00–2:00 PM Castetter Hall 190	*Robinson Office Hours* 11:00 AM–12:00 PM CSI Living Room	

Course Website (https://sethnewsome.org/elemental-ecology/)

Check the course website regularly for an up-to-date schedule, required/optional readings, assignments, and additional resources.

Course Overview

This course will help you develop the background knowledge and technical skills needed to implement a widely-used technique in the biological, anthropological, and environmental sciences – stable isotope analysis. Lectures will address the theory underlying the application of stable isotopes as tracers and integrators of important ecological, physiological, and environmental processes. Labs will focus on practical skills including chemical preparation, sample weighing, instrumentation, and statistical analyses.

Student Learning Outcomes

- *Quantitative Skills*. Become competent with quantitative evaluation of isotopic data, including procedures for correction and expression of stable isotope values, associated fractionation/discrimination effects, and statistical tools (mixing models and spatial metrics) used to interpret isotope data.
- *Oral and Written Communication*. Establish fundamental knowledge of concepts and vocabulary needed to properly and accurately communicate an understanding of stable isotope data.
- *Critical Evaluation of the Scientific Literature*. Gain necessary background and knowledge of theories and concepts in isotope ecology to properly evaluate the published literature in the field.
- *Laboratory and Field Techniques*. Become acquainted with basic laboratory skills and field sampling techniques and become familiar with state-of-the-art instrumentation used in isotope ecology.

Attendance Policy

We all learn more when we actively engage with course materials and our fellow peers. To encourage your participation in class, 10% of your grade is dependent on attendance and in-class discussion participation. To earn these points, all you need to do is prepare for discussions prior to class by reading the assigned articles and completing the accompanying reading report forms and then show up to class and participate in discussion of the paper(s). We are here to help students of all abilities succeed and will make any reasonable attempt to accommodate students with different needs and abilities. For further information, please do not hesitate to reach out to us or contact the UNM Accessibility Resource Center (https://arc.unm.edu).

Required and Optional Readings

All required and some optional readings will be posted as PDFs on the course website. The following books are also great resources for the course and can be purchased online:

- Lajtha, K. and Michener, R.H. 1994. *Stable Isotopes in Ecology and Environmental Science*. Blackwell.
- Sterner, R.W. and Elser, J.J. 2002. *Ecological Stoichiometry*. Princeton University Press.
- Fry, B. 2008. *Stable Isotope Ecology*. Springer Verlag.
- Sharp, Z. 2006. *Principles of Stable Isotope Geochemistry*. Pearson Prentice Hall. Free online: (https://digitalrepository.unm.edu/unm_oer/1/)

Assignments and Grading (Grand Total: 500 Points)

There are three main components that factor into your grade: (1) attendance and participation in paper discussions, (2) problem sets designed to help you develop quantitative isotope skills, and (3) a semester-long field- and lab-based group project. Materials and resources for these components, including required readings, assignments, examples, and protocols are posted on the course website. Letter grades will be assigned as: A: 450–500 points; B: 400–450 points; C: 350–400 points; D: 300–350 points; F: <300 points.

Course Attendance & Participation in Paper Discussions = **50 Points**

- Reading report forms (12 total, ~4 points each) must be handed in in-person during class; a PDF of the reading report form is available on the course website.
- You can make up a missed reading report or receive up to 4 extra credit points by attending a CSI Brown Bag seminar (Mondays at 12:00 PM) and completing a report form about the presentation. You can only receive credit for attending and completing forms for **three** brown bag seminars (12 possible points).
- Please contact us if you will be missing lecture or lab. We know that some professional and personal obligations (e.g., family, scientific conferences, fieldwork) may require you to miss several class periods. Please let us know in advance and we will work with you to ensure you have the resources you need to stay on track.

Problem Sets = **100 points**

- Linear Mixing Models Assignment (20 points):
- SIMMR Assignment (30 Points)
- SIBER Assignment (30 points)
- LDA Assignment (20 points)

Collaborative Class Project = **350 Points**

- Ideas for Group Project (10 points)
- Project Description and Reference List (40 points)
- Experimental Plan and Methods (50 points)
- Peer Review (20 points)
- Pre-Proposal (150 points)
- Project Presentation (80 points)
- Anonymous Group Member Feedback (5 extra credit points)

Late and Missed Work Policy

Please try your best to turn in assignments on time. Reading reports and group work for the collaborative course project may not be turned in late, unless you have received prior approval or have extenuating circumstances that are communicated to us. You may turn in **one** of the problem sets up to three days after the assignment is due and still receive full credit.

Respectful and Responsible Learning

We all have shared responsibility for ensuring that learning occurs safely, honestly, and equitably. Submitting material as your own work that has been generated on a website, in a publication, by an artificial intelligence algorithm, by another person, or by breaking the rules of an assignment constitutes academic dishonesty. It is a student code of conduct violation that can lead to a disciplinary procedure. *Please ask me for help in finding the resources you need to be successful in this course. I can help you use study resources responsibly and effectively.* Off-campus paper writing services, problem-checkers and services, websites, and AIs can produce incorrect or misleading results. Learning the course material depends on completing and submitting your own work. UNM preserves and protects the integrity of the academic community through multiple policies including policies on student grievances (Faculty Handbook D175 and D176), academic dishonesty (FH D100), and respectful campus (FH CO9). These are in the *Student Pathfinder* (https://pathfinder.unm.edu) and the *Faculty Handbook* (https://handbook.unm.edu).

Accommodations

UNM is committed to providing equitable access to learning opportunities for students with documented disabilities. As your instructor, it is my objective to facilitate an inclusive classroom setting, in which students have full access and opportunity to participate. To engage in a confidential conversation about the process for requesting reasonable accommodations for this class and/or program, please contact Accessibility Resource Center at arcsrvs@unm.edu or by phone at 505-277-3506.

Student Resources on Campus

Accessibility Resource Center (https://arc.unm.edu)
University Libraries (https://library.unm.edu)
Center for Academic Program Support (http://caps.unm.edu)
Graduate Resource Center (https://unmgrc.unm.edu)
LoboRESPECT Advocacy Center (https://loborespect.unm.edu)
Student Health and Counseling (http://shac.unm.edu)

Title IX Statement

Our classroom and our university should always be spaces of mutual respect, kindness, and support, without fear of discrimination, harassment, or violence. Should you ever need assistance or have concerns about incidents that violate this principle, please access the resources available to you on campus, especially the LoboRESPECT Advocacy Center and the support services listed on its website (http://loborespect.unm.edu/). Please note that, because UNM faculty, TAs, and GAs are considered "responsible employees" by the Department of Education, any disclosure of gender discrimination (including sexual harassment, sexual misconduct, and sexual violence) made to a faculty member, TA, or GA must be reported by that faculty member, TA, or GA to the university's Title IX coordinator at the Office of Compliance, Ethics, and Equal Opportunity. For more information on the campus policy regarding sexual misconduct, please see: https://policy.unm.edu/university-policies/2000/2740.html.

Citizenship and/or Immigration Status

All students are welcome in this class regardless of citizenship, residency, or immigration status. Your professor will respect your privacy if you choose to disclose your status. As for all students in the class, family emergency-related absences are normally excused with reasonable notice to the professor, as noted in the attendance guidelines above. UNM as an institution has made a core commitment to the success of all our students, including members of our undocumented community. The Administration's welcome is found on our website: http://undocumented.unm.edu/.

Land Acknowledgement

Founded in 1889, the University of New Mexico sits on the traditional homelands of the Pueblo of Sandia. The original peoples of New Mexico Pueblo, Navajo, and Apache since time immemorial, have deep connections to the land and have made significant contributions to the broader community statewide. We honor the land itself and those who remain stewards of this land throughout the generations and acknowledge our committed relationship to Indigenous peoples. We gratefully recognize our history.