

Stable Isotope Ecology

ZOO6927 Special Topics

Spring 2020

3 credits

Class meeting times and locations

W | Period 4-5 (10:40 AM – 12:35 PM) Carr 222

F | Period 4 (10:40 AM – 11:30 AM) Carr 222

Professor: Hannah Vander Zanden

Office: Carr 420

Phone: 352-294-0438

Email: hvz@ufl.edu

Office hours: W | 1:30 PM -2:30 PM and by appointment

Textbook

There is no required textbook. Required readings will be from journal articles or other readings that you can download for free and will be posted to Canvas as PDF files.

Course reserves

The following texts are available through Course Reserves. The electronic versions are linked directly through eLearning. Hard copies (indicated with *) are available in the Marson Science Library for two hour-overnight checkout. If you want a good reference for background reading on your own, a recommended text is Michener and Lajtha (2007)*. Other good compilations focus on isoscapes: West et al. (2010) or ecological change: Dawson and Siegwolf (2007). For a more specialized focus on animal migration: Hobson and Wassenaar (2019) or hydrology: Clark and Fritz (1997)*.

Course objectives

This course is intended to expose students to the fundamentals of stable isotope ecology and biogeochemistry. We will examine carbon, nitrogen, hydrogen, and oxygen isotope systematics and how they operate in various systems. By the end of the course, students should be able to:

- Explain fundamental isotopic principles that pertain to individual organisms, population, communities, ecosystems, and the globe
- How various techniques in stable isotope ecology can be used to address ecological questions
- How to interpret and manipulate isotopic data
- Critically evaluate the scientific literature

Format

- We will read and discuss approximately three full-length articles per week.
- Some journal article discussions will be led by students and some will be instructor-led.
- Each discussion will begin with a brief presentation by the discussion leader(s) followed by question/answer. The goals of the presentation are to provide background that is useful to understand the isotopic system or process in the paper. Discussion leaders

should not feel pressure to be able to answer every question or to understand all the technical details of the paper, and it is okay for discussion leaders to bring their own question to the class. Following the Q/A, we will have a group discussion to explore the article(s) more deeply, including a critical evaluation of the conclusions and thinking about the importance of the paper more broadly.

- Some days, we will have in class activities that will require you to bring a personal laptop. I will note that on Canvas and provide reminders for those days that will require the use of a computer.

Reading assignments

Carefully read each assigned paper. Expect to spend at least one hour per paper of careful reading and thinking. You are not expected to understand every detail, but you should aim to grasp the context.

Reading homework (due one hour prior to class)

For each assigned paper, you will need to upload a written assignment to Canvas with four sections labeled as follows:

1. **Main points.** Write a couple sentences summarizing the main points. (Or if you feel as if you did not understand the main points, explain why you got stuck.)
2. **Key figure.** Identify which figure is essential to summarizing the results of the paper and why you picked this figure.
3. **Understanding.** Are there any details or topics that you would like to learn more about or need help understanding?
4. **Class discussion.** Describe a topic or question related to the paper that you would like to discuss with the class.

Use your own words to write up the reading homework, and please do not quote any sources. Feel free to discuss the readings with other students outside of class, but the homework should represent your own thoughts.

Other homework

Some activities that will be related to course topics but are not reading assignments will be assigned throughout the semester. Follow the Canvas webpage for more details on directions and due dates.

Grades

- **20% leading discussions**
- **25% participation** (attendance and contributions to discussion)
- **45% reading homework assignments** (drop lowest two scores)
- **10% other assignments**

You can drop two of the lowest grades from reading assignments for the semester, no explanations needed.

Grade scale

A \geq 92.5%; A- \geq 89.5%; B+ \geq 86.5%; B \geq 82.5%; B- \geq 79.5%; C+ \geq 76.5%; C \geq 72.5%; C- \geq 69.5%; D+ \geq 66.5%; D \geq 59.5%; D- \geq 56.5%; E < 56.5%

Grades will not be rounded; e.g., 89.50 is an A-, and 89.49 is a B+

Schedule of topics

Week	Date	Topic	Isotopic system	Discussion Leader
1	8 Jan	Welcome		Hannah
	10 Jan	Introduction to isotopes, notation and measurement		Hannah
2	15 Jan	Hydrological cycle	H, O	Hannah
	17 Jan	Water sample planning	H, O	Hannah
3	22 Jan	Tap water sampling I	H, O	N/A
	24 Jan	Isoscapes and IsoMAP activity	H, O	Hannah
4	29 Jan	Tap water sampling II	H, O	N/A
	31 Jan	Plant water	H, O	1
5	5 Feb	Stable Isotope Lab Tour	All	Jason Curtis
	7 Feb	Plant carbon	C	2
6	12 Feb	Carbonates and climate reconstruction	C	3
	14 Feb	Turnover	All	4
7	19 Feb	Marine food webs	C, N	5
	21 Feb	Marine isoscapes	C, N	6
8	26 Feb	Water in animals/humans	H, O	7
	28 Feb	Tap water results	H, O	Group
	4 Mar	Spring break		
	6 Mar			
9	11 Mar	Animal migration	H	8
	13 Mar	Animal migration	H	9
10	18 Mar	Migration assignment activity	H	Hannah
	20 Mar	Food web H	H	10
11	25 Mar	Niche metrics	C, N	11
	27 Mar	Mixing models	C, N	12
12	1 Apr	Compound-specific	N	Amy Wallace
	3 Apr	Compound-specific	C	13
13	8 Apr	Paleoecology	C, N	14
	10 Apr	Paleoecology	C, N	15
14	15 Apr	Nutrient transport	C, N	Amanda Subalusky
	17 Apr	TBD		16
15	22 Apr	TBD		17

Attendance policy

You are expected to attend class every day. Given the small class size, I will worry if you are not here! In general, acceptable reasons for absence from or failure to participate in class include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military obligation, severe weather conditions, religious holidays, and participation in official university activities such as music performances, athletic competition or debate. Absences from class for court-imposed legal obligations (e.g., jury duty or subpoena) will be excused. Please contact me as soon as you realize you may be absent so that we can plan accordingly.

Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with me and discuss their access needs as early as possible in the semester.

Course evaluations

The evaluation period for this course will be open from April 11-24, 2020. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals or in their Canvas course menu under GatorEvals. Summaries of course evaluation results are available to students at <https://atgatorevals.aa.ufl.edu/public-results/> or <https://gatorevals.aa.ufl.edu/instructors/instructor-reports/>.

Honesty policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor.

Campus resources

Asking for help is a sign of strength. Your well-being is important. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. The 24/7 crisis counselor is available at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that. In case of emergency, call 9-1-1.

Other resources available on-campus include:

- *Counseling & Wellness Center* (<http://www.counseling.ufl.edu/cwc/>, 352-392-1575) offers counseling services for depression, anxiety, and other mental health concerns. For Emergency Assistance, please see <https://counseling.ufl.edu/services/crisis/>.
- Many students experience stress and anxiety related to academic performance and college life. In addition to counseling services, the UF Counseling & Wellness Center provides self-help resources that you may find helpful: <https://counseling.ufl.edu/resources/online/>.
- *Student Health Care Center* Call 352-392-1161 for 24/7 information to help you find the care you need, or visit <http://shcc.ufl.edu/>.
- *Career Resource Center* (<http://www.crc.ufl.edu/>, Reitz Union, Suit 1300, 352-392-1601) offers career and job search services.
- *The Pantry* is a resource to visit for any student who has food insecurity: <https://pantry.fieldandfork.ufl.edu/>
- Any student who lacks a safe and stable place to live, and believes this may affect their performance in the course is urged to contact the Dean of Students for support. Furthermore, please notify the professor if you are comfortable doing so that we can provide any resources that we are able to.

References

- Clark ID, Fritz P (1997) *Environmental Isotopes in Hydrogeology*. CRC Press, London
- Dawson TE, Seigwolf R (2007) *Stable Isotopes as Indicators of Ecological Change*, 1st edition. Elsevier Academic Press, San Diego, CA
- Hobson KA, Wassenaar LI (2019) *Tracking Animal Migration with Stable Isotopes*, 2nd Edition. Academic Press, London
- Michener R, Lajtha K (eds) (2007) *Stable Isotopes in Ecology and Environmental Science*, Second edition. Blackwell Scientific, Oxford, England
- West JB, Bowen GJ, Dawson TE, Tu KP (eds) (2010) *Isoscapes: Understanding Movement, Pattern, and Process on Earth Through Isotope Mapping*. Springer, New York