IDS 2935: Is Animal Migration Disappearing?
Quest 2

I. General Information

Class Meetings

- Fall 2024
- 100% in person, 35 students
- Tuesdays Period 4 (10:40am-11:30am) Mechanical and Aerospace Engineering B 0229
  Thursdays Periods 4-5 (10:40am-12:35pm) Little Hall 0125

Instructor

- Dr. Hannah Vander Zanden (she/her)
- Office location: Carr 420
- Office hours: Tuesdays/Thursdays 9:15-10:15am and by appointment (or message me for a Zoom link)
- Email: Please use Canvas mail, Phone: 352-294-0438

Course Description

Animal migration is a fascinating and inspiring natural phenomenon, yet around the world, many migrations are in decline, and this rate has accelerated in recent years. Therefore, the pressing questions that this course addresses are: "Is animal migration disappearing? And "Is this a significant issue?" We will focus on a diversity of organisms that journey by air, land, and water to explore the ecological properties and services associated with migrating animals. We will explore the scientific, social, and political challenges to ensure that these migrations do not go extinct. We will learn about the methods used to study migration, cues for migration, variation in migratory life histories and their evolution, and assess how humans affect migrating animals. We will view this pressing question through a scientific lens and multi-disciplinary inquiry, with assignments that employ writing, presentation, data analysis, experiential learning, class discussion, and group work.

Quest and General Education Credit

- Quest 2
- Biological Sciences
- Writing Requirement (WR) 2000 words

This course accomplishes the Quest and General Education objectives of the subject areas listed above. A minimum grade of C is required for Quest and General Education credit. Courses intended to satisfy Quest and General Education requirements cannot be taken S-U.

Required Readings and Works

There are two required books, and both are available in PDF format from the UF Libraries. There should be no cost to you, unless you prefer to purchase a hard copy. Note that you may need to use a proxy or VPN to access them from off campus.

Dingle, Hugh. (2014) *Migration: The Biology of Life on the Move*. Oxford University Press. 2nd edition. https://academic.oup.com/book/5806

Wilcove, David S. (2008) *No Way Home: The Decline of the World's Great Animal Migrations*. Island Press, Washington, DC. https://link.springer.com/content/pdf/10.5822/978-1-59726-377-1.pdf

All other readings are available in Canvas.

Recommended: Greene, Anne E. (2013). *Writing Science in Plain English*. University of Chicago University Press, Chicago, IL

Packback requirement

Packback Deep Dives will be used to assess independent research skills and improve academic communication through long-form writing assignments such as essays, papers, and case studies. While completing the summative writing prompts on Deep Dives, you will interact with a Research Assistant that will help you gather your notes and cite your sources, and Digital Writing Assistant for in-the-moment feedback and guidance on your writing.

Packback Questions platform will also be used for online discussion about class topics. Packback Questions is an online community where you can be fearlessly curious and ask open-ended questions to build on top of what we are covering in class. For a brief introduction to Packback Questions and why we are using it in class, watch this video.

How to Register on Packback:

Note: **Only access Packback through Canvas to ensure your grades sync properly.**

1. Click "Packback" within Canvas to access the community.
2. Follow the instructions on your screen to finish your registration.
3. **In order for your grade to be visible in Canvas**, make sure to only access Packback via **Canvas**.

The Packback Bundle (Questions and Deep Dives) costs $49 for the course. Packback must be purchased separately for each course that requires it.

How to Get Help from the Packback Team:
If you have any questions or concerns about Packback throughout the semester, please read their FAQ at help.packback.co. If you need more help, contact their customer support team directly at help@packback.co.

II. Graded Work

Description of Graded Work

Assignment	Description	Requirements	Points
Attendance	Attendance in person is required for this course. After add-drop, two unexcused absences will be dropped from your grade. Any additional absences will result in a one point reduction per day in the attendance category.		25
Experiential learning attendance	Attend class outing to the FLMNH Butterfly Rainforest. (Students can attend on their own time for excused absences.) An optional (ungraded) outing to see migratory sandhill cranes will occur late in the semester outside of class time.		5
Participation	Many classes will include discussion. Come prepared to listen actively and contribute to the conversation.		25 (rubric)
Reading responses	Carefully read each assigned paper. You are not expected to understand every detail, but a brief response to writing prompts will be graded for completeness and will ensure you are prepared to participate in discussion. Two scores will be dropped from your grade.	Brief response to prompts	42 (rubric)
Jamboard activities	Groups of 5-7 students will work together to apply their knowledge and explore the readings more deeply by collaborating on responses to questions in a Jamboard format.	Complete responses per group	15 (rubric)
Migratory data analysis	Two of our in-class activities will use case study data complete a series of analyses on animal movement and connectivity.	Complete responses to activity guide	20 (rubric)
Meet-a-Migrator presentation	A brief presentation will cover the natural history, migratory patterns, and threats to a species of your choosing.	5-minute presentation	14 (rubric)
Meet-a-Migrator paper	A written paper will cover the natural history, migratory patterns, and threats to a species of your choosing.	500 words*	20 (rubric)
Migratory threat paper	You will write about a single anthropogenic threat (of your choosing) to migratory organisms, why it is problematic (scientifically, economically, socially), what mitigation efforts exist, and what future directions might change this problem.	1000-1250 words*	40 (rubric)

Migration film reflection	After selecting a migration-related film of your choice, view it, and response to a series of questions.	Complete responses to activity guide	10 (rubric)
Not-test	In lieu of a traditional test to assess your understanding of the course material, you will complete a "not-test". In this free-form assignment, you can select a topic that we have covered or that relates to animal migration. Design and produce any product that explains the topic(s). Past projects have varied from original songs, a series of memes, a children's story, original art, and an infographic.	Final product in a pre-approved format	25 (rubric)
Course reflection	Summarize and reflect on your experiences in this course, how do you now answer the pressing question in this course? Document what you think, why you think it, and what are the implications for yourself and others.	500 words*	10 (writing rubric)

*Assignments that count towards the Writing Requirement

Grading Scale

For information on how UF assigns grade points, visit: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

A	94 – 100%		C	74 – 76%
A-	90 – 93%		C-	70 – 73%
B+	87 – 89%		D+	67 – 69%
B	84 – 86%		D	64 – 66%
B-	80 – 83%		D-	60 – 63%
C+	77 – 79%		E	<60

Grading Rubric(s)

Writing Assessment Rubric and Statements

	SATISFACTORY (Y)	UNSATISFACTORY (N)
CONTENT	Papers exhibit at least some evidence of ideas that respond to the topic with complexity, critically evaluating and synthesizing sources, and provide at least an adequate discussion with basic understanding of sources.	Papers either include a central idea(s) that is unclear or off-topic or provide only minimal or inadequate discussion of ideas. Papers may also lack sufficient or appropriate sources.
ORGANIZATION AND COHERENCE	Documents and paragraphs exhibit at least some identifiable structure for topics, including a clear thesis statement but may require readers to work to follow progression of ideas.	Documents and paragraphs lack clearly identifiable organization, may lack any coherent sense of logic in associating and organizing ideas, and may also lack

		transitions and coherence to guide the reader.
ARGUMENT AND SUPPORT	Documents use persuasive and confident presentation of ideas, strongly supported with evidence and appropriate references. At the weak end of the Satisfactory range, documents may provide only generalized discussion of ideas or may provide adequate discussion but rely on weak support for arguments.	Documents make only weak generalizations, providing little or no support, as in summaries or narratives that fail to provide critical analysis.
FLOW & STRUCTURE	Documents use a writing style with word choice appropriate to the context, genre, and discipline. Sentences should display complexity and logical sentence structure. At a minimum, documents will display a less precise use of vocabulary and an uneven use of sentence structure or a writing style that occasionally veers away from word choice or tone appropriate to the context, genre, and discipline.	Documents rely on word usage that is inappropriate for the context, genre, or discipline. Sentences may be overly long or short with awkward construction. Documents may also use words incorrectly.
GRAMMAR & MECHANICS	Papers will feature correct or error-free presentation of ideas. At the weak end of the Satisfactory range, papers may contain some spelling, punctuation, or grammatical errors that remain unobtrusive so they do not muddy the paper's argument or points.	Papers contain so many mechanical or grammatical errors that they impede the reader's understanding or severely undermine the writer's credibility.

- The Writing Requirement (WR) ensures students both maintain their fluency in writing and use writing as a tool to facilitate learning.
- The instructor will evaluate and provide feedback before the end of the course on all of the student's written assignments with respect to grammar, punctuation, clarity, coherence, and organization.
- WR course grades have two components. To receive writing requirement credit, a student must receive a grade of C or higher and a satisfactory completion of the writing component of the course.

Participation Rubric (25 pts)

	High Quality	**Average**	**Needs Improvement**
Knowledgeable: Shows evidence of having done the assigned work.	Has grasped all the essential material needed for discussions and participation	Has grasped the basic material but shows some important lapses or superficial attention to materials	Shows little to no evidence of having read appropriate materials
Thoughtful: Evaluates carefully issues raised in assigned work.	Has given thought and anticipated how to contribute to the discussions and activities	Is thoughtful of responses to questions and discussions	Shows little interest in the issues raised
Considerate: Takes the perspective of others into account and listens attentively.	Engages actively, creatively and respectfully in participating in the class	Is tolerant of the perspectives of others but doesn't show much	Is disrespectful of the views of others

		interest or engagement in other points of view	

Reading Response Rubric (3 pts)

	Good (1)	**Average (0.5)**	**Absent (0)**
Key figure. Identify which figure is essential to summarizing the results of the paper and why you picked this figure. If there are no figures, instead write about something that surprised you about the reading.	At least one figure is identified with justification.	Justification is missing.	No response.
Understanding. Are there any details or topics that you would like to learn more about or need help understanding?	Students have identified at least one area for expanding their learning.	Response is limited.	No response.
Class discussion. Describe a topic or question related to the paper that you would like to discuss with the class.	Thoughtful topics/questions are posed that relate to the reading.	Questions are posed without clear thought.	No response.

Jamboard Rubric (5 pts)

	Good (1)	**Average (0.5)**	**Absent (0)**
Answer each question that probes the reading material and applies the concepts to new settings. (1 pt / question)	Response is correct and justification is provided.	Justification is provided, but response is incorrect.	No response.

Data Analysis & Migration Film Rubric (10 pts)

	Good (9-10)	**Average (6-8)**	**Needs improvement (0-5)**
Effort and completeness	Responses are complete and it was clear students applied a good faith effort to complete the assignment.	Some effort was applied, but responses are incomplete or missing.	Work was incomplete or absent.

Meet a Migrator Presentation Rubric (14 pts)

	High Quality	**Needs improvement**
Natural history (3 pts)	Has covered at least three aspects of natural history. such as habitat, ecology, feeding, life history, reproduction, and behavior.	Has covered at least two or fewer aspects of natural history.
Migratory patterns (3 pts)	Has researched migratory patterns and found maps/figures to illustrate what is known.	Migratory pattern information is lacking detail or incomplete.
Threats (2 pts)	Includes examples of natural and/or anthropogenic threats and how they may contribute to a disappearing migration.	Information on threats is limited or absent.
Presentation (3 pts)	Presentation is clear, cohesive, and speech is prepared. Slide aesthetics are professional and do not distract from understanding.	Presentation organization or coherence could be improved. Speech is difficult to understand. Slides are unprofessional or distracting.
Answering questions (1 pt)	Is able to respond logically to questions proposed by peers.	Cannot respond to questions logically.

Meet a Migrator Paper Rubric (20 pts)

	High Quality	**Needs improvement**
Natural history (6 pts)	Has covered at least three aspects of natural history. such as habitat, ecology, feeding, life history, reproduction, and behavior.	Has covered at least two or fewer aspects of natural history.
Migratory patterns (3 pts)	Has researched migratory patterns and includes appropriately cited maps/figures with descriptions.	Migratory pattern information is lacking detail or incomplete.
Threats (3 pts)	Includes examples of natural and/or anthropogenic threats and how they may contribute to a disappearing migration.	Information on threats is limited or absent.
Flow and structure (2 pts)	Paragraphs are focused with transitions. There is a logical flow to the paper.	Paragraphs lack focus or a logical flow.
Research quality (2 pts)	Minimum number of sources is met and are appropriate.	Citations are incomplete
Citation formatting (2 pts)	Sources are cited in appropriate format.	Citations are either incomplete or inappropriate.

Grammar and mechanics (2 pts)	Scientific writing style is applied with appropriate language. Grammar and punctation are correct.	Scientific writing style is lacking or language is informal. Grammar and punctuation need improvement.

Migratory Threat Paper Rubric (40 pts)

	Great	Good	Average	Poor	Absent
Topic (5 pts)	Topic is compelling, focused, and well defined.	Topic is interesting but may lack focus or a well-defined scope.	The topic is present but not well-developed.	The topic is unclear or wanders off topic.	The topic is not defined.
Evidence (15 pts)	A variety of support for every claim, and it is strong, concrete, and appropriate.	Support is provided for all claims, but it is not as strong or complete in some areas.	Supporting evidence for most of the claims, but some evidence may be unrelated or vague.	Some evidence, but in key places evidence is vague or missing.	Almost no detailed evidence to support the topic.
Flow and structure (9 pts)	Paragraphs are focused with logical transitions. Introduction and conclusion are complementary.	The paper is engaging, but transitions/flow could be improved.	Paragraphs may need more focus or improved transitions.	Paragraphs are not focused or do not follow a logical order. Introduction or conclusions are missing.	Little or no organization.
Research quality (4 pts)	At least four appropriate sources are used.	At least three appropriate sources are used	At least two appropriate sources are used		
Citation formatting (2 pts)	All evidence is well cited in correct format.	All evidence is cited but with minor format errors.	Good citations but not enough of them.	Some citations but either incomplete or inappropriate.	No citations.
Grammar and mechanics (5 pts)	Strong scientific writing style with appropriate language. Grammar and punctation are correct.	The language is clear by scientific style could be improved. Minimal grammar and punctuation errors.	Writing is clear, but structure is simple or repetitive; repeated grammatical errors.	Grammatical mistakes or style begins to interfere with understanding. Informal or inappropriate style.	Frequent and serious formatting and style issues make the meaning unclear

Not-test Product Rubric (25 pts)

	High quality	Needs improvement
Topic (5 pts)	It is clear what animal migration topic is being addressed.	Topic is lacks focus or a well-defined scope.
Evidence (5 pts)	Important points about the topic are conveyed and demonstrate knowledge/mastery of the topic.	Student does not demonstrate knowledge/mastery of the topic.
Theme (5 pts)	Product has a coherent theme: all topics/points are logically connected.	The theme is unclear.
Creativity (5 pts)	Product demonstrates creativity, thinking outside the box.	Original thought is not evident.
Time and effort (5 pts)	Product demonstrates an appropriate amount of time and effort.	The product appears as if it was hastily finished without sufficient time.

Late Work Policy

Assignments can be accepted up to 7 days late with a 10% deduction for each day after the deadline.

III. Annotated Weekly Schedule

Note: Starting in week 3, each day of class will begin with two Meet-a-Migrator presentations. Sign-up for a slot in week 1.

Week	Day	Module	Meet a migrator	Topic/Summary	Homework and Assignments
Week 1	Aug 22	–	HVZ	• **Topic: Welcome and course overview** • **Summary:** We will meet each other, pose the questions that form the basis for this course, and prepare for the next class meeting.	• **Required Readings/Works**: The course syllabus • **Assignment:** Sign up for Meet-a-Migrator presentation date
Week 2	Aug 23	**Air**	–	• **Topic: What is migration?** • **Summary:** Movement is a nearly universal characteristic of living organisms, but not all movements are migration. We will explore the taxonomy of movement and learn how migration is different, defining the scope and characteristics of animal movement that constitute migration.	• **Required Readings/Works**: ○ Dingle, H. (2014) "Migration: definition and scope" in *Migration: The Biology of Life on the Move*. Oxford University Press. 2nd edition. pp. 3-23. ○ Wilcove, D. S. (2008) "Introduction" in *No Way Home: The Decline of the World's Great Animal Migrations*. Island Press, Washington, DC. pp. 1-12. • **Assignment**: Register for Packback
	Aug 25	**Air**	–		• **Required Readings/Works**: ○ Wilcove, D. S., & Wikelski, M. (2008). Going, going, gone: is animal migration disappearing? *PLoS Biology*, *6*(7), e188 (4 pages). ○ Carey, M. A., Steiner, K. L., & Petri Jr, W. A. (2020). Ten simple rules for reading a scientific paper. *PLoS Computational Biology*, *16*(7), e1008032.

Week	Day	Module	Meet a migrator	Topic/Summary	Homework and Assignments
					• **Assignment:** Reading response 1
Week 3	Aug 30	**Air**	1	• **Topic: Patterns of migration** • **Summary:** The pathways animals take on migration may be a function of the ecology, lifespan, and physiological capabilities. We explore the spatial and temporal elements of the patterns generated by migratory movements.	• **Required Readings/Works**: ○ Wilcove, D. S. (2008) "Empty Skies" in *No Way Home: The Decline of the World's Great Animal Migrations*. Island Press, Washington, DC. pp. 15-50. ○ Holpuch, A. (2023). Nearly 1,000 birds die after striking Chicago building. *The New York Times* (https://www.nytimes.com/2023/10/08/us/birds-dead-chicago-building.html). 2 pages. • **Assignment:** Reading response 2
	Sep 1	**Air**	2, 3		• **Required Readings/Works**: ○ Smith R. B., Meehan T. D., Wolf B. O. (2003) Assessing migration patterns of sharp-shinned hawks *Accipiter striatus* using stable-isotope and band encounter analysis. *Journal of Avian Biology*, 34:387–392. ○ *Optional:* Dingle, H. (2014) "Patterns in migratory journeys" in *Migration: The Biology of Life on the Move*. Oxford University Press. 2nd edition. pp. 24-45. • **Assignment:** Reading response 3, In class Jamboard activity for Smith et al. 2003
Week 4	Sep 3	**Air**	4	• **Topic: Winged migration** • **Summary:** Many migratory insects are mysterious, as the technology limitations hinder our ability to tag and track	• **Required Readings/Works**: ○ Wilcove, D. S. (2008) "A Mountain of Butterflies and a Cloud of Grasshoppers" in *No Way Home: The Decline of the World's Great Animal Migrations*. Island Press, Washington, DC. pp. 51-76.

Week	Day	Module	Meet a migrator	Topic/Summary	Homework and Assignments
				individuals. We will meet **Jaret Daniels**, Assistant Professor and Curator of the McGuire Center for Lepidoptera and Biodiversity.	• **Assignment:** Reading response 4
	Sep 5	**Air**			*Note: Please meet at the Florida Museum of Natural History, Powell Hall, McGuire Center Conference Room, 3215 Hull Rd* • **Required experiential learning activity:** This week, we will meet at the Florida Museum of Natural History to view the Butterfly Rainforest and learn more about monarch butterfly migration. • **Assignment:** Meet-a-Migrator paper due
Week 5	Sep 10	**Air**	5	• **Topic: Methods for studying migration** • **Summary:** We have moved from counts and simple marking techniques to increasingly sophisticated natural markers (such as genetics and isotopes) and miniaturization of devices that can be attached to migrants. We will explore some of the methods to maximize the information from migratory organisms, and we will work with a case study with raptor movement data available in Movebank.org.	• **Required Readings/Works**: ○ Fox, A. (2020) The international space station just became a powerful tool for tracking animal migration. *Smithsonian Magazine* (https://www.smithsonianmag.com/smart-news/internet-animals-comes-online-180975072/). 5 pages. ○ Job, J. (2023). Artificial Intelligence is Helping Us 'See' Some of the Billions of Birds Migrating at Night. *Scientific American Science Quickly podcast*. (https://www.scientificamerican.com/podcast/episode/they-tap-into-the-magical-hidden-pulse-of-the-planet-but-what-is-the-nighttime-bird-surveillance-network/) 12:52 minutes ○ Job, J. (2023). Migratory Birds are in Peril, but Knowing Where they are at Night Could Help Save Them. *Scientific American Science Quickly podcast*. (https://www.scientificamerican.com/podcast/episode/migratory-birds-are-in-peril-but-knowing-

Week	Day	Module	Meet a migrator	Topic/Summary	Homework and Assignments
					where-they-are-at-night-could-help-save-them/) 14:42 minutes • **Assignment:** Reading response 5
	Sep 12	**Air**	6, 7		• **Required Readings/Works**: ○ *Optional:* Dingle, H. (2014) "Methos for studying migration" in *Migration: The Biology of Life on the Move*. Oxford University Press. 2nd edition. pp. 46-69. • **Assignment:** Movebank data analysis activity
Week 6	Sep 17	**Air**	8	• **Topic: Winds and currents** • **Summary:** To fully understand migration it is necessary to examine how migratory behavior may be influenced by conditions in the atmosphere or the oceans as they fly, swim, or drift between locations. Both short- and long-term behaviors may allow organisms to adjust to these conditions. We will also transition into the land module to discuss the dynamics of some of the largest migrations on land.	• **Required Readings/Works**: ○ Stefanescu, C., Alarcón, M., Àvila, A. (2007) Migration of the painted lady butterfly, *Vanessa cardui*, to north-Eastern Spain is aided by African wind currents. *Journal of Animal Ecology*, 76:888–898. • **Assignment:** In class Jamboard activity for Stefanescu et al. 2007
	Sep 19	**Land**	9, 10, 11		• **Required Readings/Works**: ○ Wilcove, D. S. (2008) "In search of greener pastures" in *No Way Home: The Decline of the World's Great Animal Migrations*. Island Press, Washington, DC. pp. 79-103. ○ *Optional:* Dingle, H. (2014) "Migration, winds, and currents" in *Migration: The Biology of Life on the Move*. Oxford University Press. 2nd edition. pp. 73-95. • **Assignment:** Reading response 6
Week 7	Sep 24	**Land**	12, 13	• **Topic: Seasonality**	○ **Required Readings/Works**:

Week	Day	Module	Meet a migrator	Topic/Summary	Homework and Assignments
				• **Summary:** Many migrations involve movements between areas that are occupied in different seasons, and often, one of these locations is for breeding. We will also be joined by a guest lecturer, **Amanda Subalusky** from the Department of Biology to speak about the seasonal migration patterns (and mass drownings) of wildebeest in the Serengeti.	○ Wilcove, D. S. (2008) "In search of greener pastures" in *No Way Home: The Decline of the World's Great Animal Migrations*. Island Press, Washington, DC. pp. 79-103. ○ **Assignment:** Reading response 7
	Sep 26	**Land**	14, 15		• **Required Readings/Works**: ○ Subalusky, A. L., Dutton, C. L., Rosi, E. J., Post, D. M. (2017) Annual mass drownings of the Serengeti wildebeest migration influence nutrient cycling and storage in the Mara River. *Proceedings of the National Academy of Sciences* 114:7647–7652. ○ *Optional:* Dingle, H. (2014) "Seasonal migration patterns" in *Migration: The Biology of Life on the Move*. Oxford University Press. 2nd edition. pp. 163-182. • **Assignment:** Reading response 8
Week 8	Oct 1	**Land**	16, 17	• **Topic: Migration to special habitats** • **Summary:** Habitats that provide specific resources or conditions may be the motivation for many migratory organisms to undertake their regular journeys, for example marine organisms that breed on land or terrestrial amphibians that require aquatic habitat for their young. We will explore the movements that might be	○ **Required Readings/Works**: ○ Wilcove, D. S. (2008) "Where the buffalo roamed" in *No Way Home: The Decline of the World's Great Animal Migrations*. Island Press, Washington, DC. pp. 104-126. ○ **Assignment:** Reading response 9
	Oct 3	**Land**	18, 19		• **Required Readings/Works**: ○ Rittenhouse, T. A., Semlitsch, R. D., & Thompson III, F. R. (2009). Survival costs associated with wood frog breeding migrations: effects of timber harvest and drought. *Ecology*, *90*(6), 1620-1630. ○ *Optional:* Dingle, H. (2014) "Migration to special habitats" in *Migration: The Biology of Life on the*

Week	Day	Module	Meet a migrator	Topic/Summary	Homework and Assignments
				different from traditional seasonal movement to supply needs for animals that cannot be easily met elsewhere.	*Move*. Oxford University Press. 2nd edition. pp. 183-194. • **Assignment:** In class Jamboard activity for Rittenhouse et al. 2009
Week 9	Oct 8	**Air**	–	• **Topic: Physiology of migration** • **Summary:** Migration places high energetic demands on organisms and many hormonal and metabolic pathways support the regulation and mobilization of resources. We will welcome our third guest lecturer, to speak about the cost and modes of fueling migration. We will also compare studies that examine one of the longest terrestrial migrations (in caribou) with a jigsaw discussion activity.	• **Required Readings/Works**: ○ Johnson, K. (2021). Five incredible ways birds change their bodies for spring and fall migration. *Audubon Magazine*. (https://www.audubon.org/news/five-incredible-ways-birds-change-their-bodies-spring-and-fall-migration). 5 pages. ○ *Optional:* Dingle, H. (2014) "Physiology of migration" in *Migration: The Biology of Life on the Move*. Oxford University Press. 2nd edition. pp. 96-116. ○ Reading from guest lecturer TBD
	Oct 10	**Land**	20, 21, 22		• **Required Readings/Works**: Read one of three for a jigsaw discussion: ○ Mahoney, S. P., Schaefer, J. A. (2002) Hydroelectric development and the disruption of migration in caribou. *Biological Conservation* 107:147–153. ○ Wilson, R. R., Parrett, L. S., Joly, K., & Dau, J. R. (2016). Effects of roads on individual caribou movements during migration. *Biological Conservation*, *195*, 2-8. ○ Nicholson, K. L., Arthur, S. M., Horne, J. S., Garton, E. O., & Del Vecchio, P. A. (2016). Modeling caribou movements: seasonal ranges

Week	Day	Module	Meet a migrator	Topic/Summary	Homework and Assignments
					and migration routes of the Central Arctic Herd. *PloS One*, *11*(4), e0150333. • **Assignment:** Reading response 10
Week 10	Oct 15	**Water**	23	• **Topic: Orientation and navigation** • **Summary:** The ways in which animals perceive their world may be vastly different than what we experience as humans. Migrants use several cues to orient and navigate, and we will explore the diversity of these capabilities. We will dive deeper into one the perceptual abilities in animals that can track echoes, electric fields, and magnetic fields via a jigsaw discussion.	• **Required Readings/Works**: ○ Wilcove, D. S. (2008) "Lost at Sea" in *No Way Home: The Decline of the World's Great Animal Migrations*. Island Press, Washington, DC. pp. 129-165. • **Assignment:** Reading response 11 • **Extra credit opportunity:** Sonia Altizer Oct 15 9:30-10:30am Reitz Union Grand Ballroom
	Oct 17	**Water**	24, 25		• **Required Readings/Works**: <u>Read one of three for a jigsaw discussion:</u> ○ Yong, E. (2022) "A silent world shouts back: echoes" in *An Immense World: How Animal Senses Reveal the Hidden Realms Around Us.* Random House, New York. pp. 243-275. ○ Yong, E. (2022) "Living batteries: electric fields" in *An Immense World: How Animal Senses Reveal the Hidden Realms Around Us.* Random House, New York. pp. 276-299. ○ Yong, E. (2022) "They know the way: magnetic fields" in *An Immense World: How Animal Senses Reveal the Hidden Realms Around Us.* Random House, New York. pp. 300-319. ○ *Optional:* Dingle, H. (2014) "Orientation and navigation" in *Migration: The Biology of Life on the Move*. Oxford University Press. 2nd edition. pp. 135-160. • **Assignment:** Reading response 12

Week	Day	Module	Meet a migrator	Topic/Summary	Homework and Assignments
Week 11	Oct 22	**Water**	26	• **Topic: Human interactions** • **Summary:** We have encountered many ways in which humans interact with migratory animals, via the impact these species have on our lives, and vice versa. We evaluate both the tragedy and the hope we have in future conditions for migratory organisms in the light of anthropogenic threats.	• **Required Readings/Works**: ○ Wilcove, D. S. (2008) "Against the flow" in *No Way Home: The Decline of the World's Great Animal Migrations*. Island Press, Washington, DC. pp. 167-196. • **Assignment:** Reading response 13
	Oct 24	**All**	27, 28, 29		• **Required Readings/Works**: ○ Wilcove, D. S. (2008) "No way home?" in *No Way Home: The Decline of the World's Great Animal Migrations*. Island Press, Washington, DC. pp. 197-210. ○ *Optional:* Dingle, H. (2014) "Human interactions with migration" in *Migration: The Biology of Life on the Move*. Oxford University Press. 2nd edition. pp. 272-282. • **Assignment:** Reading response 14
Week 12	Oct 29	**Water**	30	• **Topic: Migratory connectivity** • **Summary:** The linking of individuals across the different stages of the annual cycle is known as migratory connectivity. We will explore the degree of linkages in with online tool called MiCO (Migratory Connectivity in the Ocean) and consider how migratory connectivity can be included in the design of	• **Required Readings/Works**: ○ Dunn, D. C., Harrison, A. L., Curtice, C., DeLand, S., Donnelly, B., Fujioka, E. I., ... & Halpin, P. N. (2019). The importance of migratory connectivity for global ocean policy. *Proceedings of the Royal Society B*, *286*(1911), 20191472. ○ Courage K.H., (2022). Greatest migration on earth happens under darkness every day. *Scientific American*. (https://www.scientificamerican.com/article/greatest-migration-on-earth-happens-under-darkness-every-day/). • **Assignment:** Reading response 14

Week	Day	Module	Meet a migrator	Topic/Summary	Homework and Assignments
	Oct 31	**Water**		conservation and management measures.	• **Required Readings/Works**: • **Assignment:** MiCO data analysis activity in-class, Migratory threat paper due
Week 13	Nov 5	**Water**		• **Topic: Life history variability** • **Summary:** Migration can vary among and within species, but partial migration occurs when some individuals of a species are migratory while others are resident. We will discuss how decisions to migrate may be condition dependent. In addition, we will welcome guest lecturer, **Stephen Kajiura**, from Florida Atlantic University to speak about shark migration.	• **Required Readings/Works**: ○ Reading from Kajiura TBD
	Nov 7	**Water**	31, 32,33		• **Required Readings/Works**: ○ Brodersen J, Nilsson PA, Hansson L-A, Skov C, Brönmark C (2008) Condition-dependent individual decision-making determines cyprinid partial migration. Ecology 89:1195–1200. ○ *Optional:* Dingle, H. (2014) "Behavioral and life-history variability in migration" in *Migration: The Biology of Life on the Move*. Oxford University Press. 2nd edition. pp. 211-230. • **Assignment:** Reading response 15 • **Extra credit experiential learning activity:** Weekend outing to observe migratory sandhill cranes in Gainesville.
Week 14	Nov 12	**All**	34	• **Topic: Nutrient transport and ephemeral conditions** • **Summary:** Animals moving between habitats may act as biological vectors to move nutrients. We will explore the role migratory organisms may play in ecosystem subsidies through multiple examples in a	• **Required Readings/Works**: <u>Read one of three for a jigsaw discussion:</u> ○ Merz, J. E., & Moyle, P. B. (2006). Salmon, wildlife, and wine: marine-derived nutrients in human-dominated ecosystems of central California. *Ecological Applications*, *16*(3), 999-1009. ○ Vander Zanden, H. B., Bjorndal, K. A., Inglett, P. W., & Bolten, A. B. (2012). Marine-derived nutrients from green turtle nests subsidize

Week	Day	Module	Meet a migrator	Topic/Summary	Homework and Assignments
				jigsaw discussion. Ephemeral conditions occur when habitats are not constant over space and time. Despite the costs and risks, there are many migratory organisms that exploit ephemeral but rich resources, and we will explore under what conditions natural selection might favor migration.	terrestrial beach ecosystems. *Biotropica*, *44*(3), 294-301. ○ Doughty, C. E., Roman, J., Faurby, S., Wolf, A., Haque, A., Bakker, E. S., ... & Svenning, J. C. (2016). Global nutrient transport in a world of giants. *Proceedings of the National Academy of Sciences*, *113*(4), 868-873. • **Assignment:** Reading response 16
	Nov 14	**Water**	35, makeups		• **Required Readings/Works**: ○ Roshier D, Asmus M, Klaassen M (2008) What drives long-distance movements in the nomadic Grey Teal Anas gracilis in Australia? Ibis 150:474–484. ○ *Optional:* Dingle, H. (2014) "Migration under ephemeral conditions" in *Migration: The Biology of Life on the Move*. Oxford University Press. 2nd edition. pp. 195-210. • **Assignment:** Reading response 17
Week 15	Nov 19	**All**		• **Topic: Migration on film** • **Summary:** Many documentaries have been made about migrating animals. View a film of your choice, and then reflect on how this species is depicted as well as how it relates to topics we have covered so far this semester.	• **Required Readings/Works**: View approved animal migration documentary (length may vary from 60-120 minutes). • **Assignment:** Migration film reflection
	Nov 21	**All**			• **Required Readings/Works**: Makeup day if there are any storm cancellations • **Assignment:** Not-test due
Week 16	Dec 3	**All**			• **Topic:** Wrap-up

Week	Day	Module	Meet a migrator	Topic/Summary	Homework and Assignments
					• **Summary:** As the semester draws to a close, this period is dedicated to showcasing student not-test products. • **Required Readings/Works**: None • **Assignment:** Course reflection due

IV. Student Learning Outcomes (SLOs)

Biological Sciences (B): Biological science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the life sciences. Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern biological systems. Students will formulate empirically-testable hypotheses derived from the study of living things, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.

At the end of this course, students will be expected to have achieved the Quest and General Education learning outcomes as follows:

Content*: Students demonstrate competence in the terminology, concepts, theories and methodologies used within the discipline(s)*.

- Identify, describe, and explain the different methodological approaches used to study migratory animals (**Quest 2, B**). **Assessments**: Readings, class discussion and activities, experiential learning activities, Meet-a-Migrator presentation and paper.
- Identify, describe, and explain the proximate factors that affect migration plus the life history and evolutionary factors that may have influenced migratory strategies (**Quest 2, B**). **Assessments**: Readings, class discussion and activities, Meet-a-Migrator presentation and paper.

Critical Thinking: *Students carefully and logically analyze information from multiple perspectives and develop reasoned solutions to problems within the discipline(s).*

- Analyze and evaluate animal tracking data. (**Quest 2, B**). **Assessments**: Data analysis activities.
- Critically evaluate and assess anthropogenic threats to migratory species. (**Quest 2, B**). **Assessments**: Readings, class discussions, migratory threat paper.
- Apply logical reasoning skills and scientific reasoning to evaluate evidence in animal migration research. (**Quest 2, B**). **Assessments**: Readings, class discussions, Jamboard activities, migratory threat paper.
- Critically evaluate the scientific, social, and political challenges to ensure that migrations do not go extinct. (**Quest 2, B**). **Assessments**: Readings, class discussions, migratory threat paper.

Communication: *Students communicate knowledge, ideas and reasoning clearly and effectively in written and oral forms appropriate to the discipline(s).*

- Communicate research on a migratory species orally and in writing. (**Quest 2, B**). **Assessments**: Meet-a-migrator presentation and paper
- Write about the pressing scientific, economic, and social challenges associated with protecting migratory species. (**Quest 2, B**). **Assessments**: Migratory threat paper
- Communicate your knowledge on the phenomenon of animal migration via a non-traditional modality. (**Quest 2, B**). **Assessments**: Not-test

Connection: *Students connect course content with meaningful critical reflection on their intellectual, personal, and professional development at UF and beyond.*

- Connect the ways in which animal migration is linked to aspects of our human biology, social needs, and political realities, and the state of our planet. (**Quest 2**). **Assessments**: Readings, class discussions.
- Reflect on the course content and your individual learning experience over the semester. (**Quest 2**). **Assessments**: Reading responses, not-test project, course reflection.

V. Quest Learning Experiences

1. Details of Experiential Learning Component

We will have two opportunities for experiential learning. The first will occur during class time, when we will visit the Florida Museum of Natural History Butterfly Rainforest exhibit to learn more about insect migration (with a focus on monarchs) and observe live butterflies in the exhibit. The second opportunity is an optional field trip to that will take outside of normal class hours to observe the migratory Sandhill cranes that winter at Payne's Prairie Preserve State Park.

2. Details of Self-Reflection Component

Students will reflect on their relationship to the topic of animal migration through several exercises. First, the weekly reading responses will allow students to explore their understanding of the topics and identify weaknesses in comprehension as well as areas that interest them for further discussion or investigation. Second, students will explore their relationship to an aspect of the course material through the "not-test" project to creatively engage with a relevant topic through a modality of their choosing. Finally, the course reflection will allow them to look back over the semester in order to assess their perspective on the pressing question that has guided this course. They will be encouraged to examine what they think, why they think it, and what are the implications of their thoughts for themselves and others.

VI. Required Policies

Attendance Policy

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Students Requiring Accommodation

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 their instructor and discuss their access needs, as early as possible in the semester.

UF Evaluations Process

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 https://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, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

University 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 (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-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 or TAs in this class.

Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/ , 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

The Writing Studio

The writing studio is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio online at http://writing.ufl.edu/writing-studio/ or in 2215 Turlington Hall for one-on-one consultations and workshops.

In-Class Recordings

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation,

assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.