

WIS4934 / WIS6934 / ZOO4926 / ZOO6927

Community Science for Ecologists

Instructors: Robert Guralnick, Scott Robinson, Corey Callaghan

Office hours: By appointment

Description

In recent decades, public participation in ecological research—often termed "community science" or "citizen science"—has become an essential component of data collection, especially in biodiversity and ecology. This course provides a comprehensive exploration of community science from its historical roots to its modern applications and future potential in addressing ecological questions. With the rapid expansion of internet and mobile technologies, the potential for the public to contribute to ecological research has surged, reshaping how ecologists study biodiversity and environmental change. This course is divided into two main components to balance theoretical grounding with hands-on experience. The first component introduces students to the diverse landscape of community science initiatives, covering various project models and the key principles that contribute to successful, scalable public science initiatives. Emphasis is placed on understanding participation dynamics, data quality challenges, and how community science can both complement and expand traditional ecological research. In this section, students will undertake a small group project to conceptually design a citizen science initiative, focusing on inclusive design and accessibility for the targeted audience. The second component of the course turns to field-based community science, delving into the use of widely adopted platforms like eBird and iNaturalist, and discussing methods to ensure data accuracy, minimize bias, and maximize research applicability. Students will participate in a field data collection exercise, gaining practical experience with the tools and methods commonly used in large-scale participatory platforms. This component culminates in a final project, where students, working in small groups, will use community science data to investigate real-world ecological patterns, addressing questions on biodiversity, species distributions, or ecological change.

Schedule

Week 1 (January 16): Introduction to Community Science

- **Topics (1 hour, 15 minutes):**
 - Overview of the course structure, objectives, and assignments (Rob with Corey).
 - Introduction to community science and citizen science; differences and overlaps (Rob).
 - Historical context: origins and early examples, with a focus on Phenology (Rob).
 - Broad introduction and overview to modern CS platforms such as iNaturalist, eBird, Zooniverse (Corey with Rob)
- **In-Class Activity (45 minutes):**

- Students introduce themselves - 30 second introductions.
 - Name
 - Major
 - Favorite plant or animal
- Group discussion on initial perceptions of community science (15 minute discussion, 5 minute stand up)
- Discuss previous experiences with community science (15 minute discussion, 5 minute stand up)
- **Assignment Due Next Week:**
 - Reflective essay (1page): “What community science means to me and my field of interest.”
- **Reading for next week**
 - Inclusion in Citizen Science: <https://doi.org/10.1126/science.abi6487>
 - Citizen Science Terminology: <https://doi.org/10.5334/cstp.96>

Week 2 (January 23): Historical Perspectives and Types of Community Science Projects

- **Topics (1 hour):**
 - Evolution of citizen and community science in bird ecology. (Scott)
 - Initial overview of different models and monitoring structures of citizen science projects (Rob)
- **In-Class Activity (1 hour):**
 - Brainstorm potential strengths and weaknesses of public participation in science.
 - What is in a name? Are you pro or con the term ‘citizen science’? Why?
 - Small group discussion: Compare and contrast project models and their suitability for different ecological research questions.
- **Assignment Due Next Week:**
 - Summary of a community science project of choice, focusing on its methods, target audience, and data outputs (500 words).
- **Readings for next week:**
 - Studies on citizen science motivation, such as Larson et al. (2020) and Asingizwe et al. (2020), Thompson et al. (2023)
 - Foundations of CitSci for Ecology
 - Please read this one: [Fraisl et al. \(2022\) Nature Reviews Methods Primer](#)
 - Optional: [Dickinson et al. \(2010\) Annual Reviews.](#)

Week 3 (January 30): Motivation and Participation Dynamics

- **Topics:**
 - Understanding participant demographics: who contributes to community science and why? (Corey)
 - Psychological and social factors influencing participation.

- Theory of Planned Behavior (Corey)
- Biases introduced by varying motivations and backgrounds of participants. (Rob)
- **In-Class Activity:**
 - Case study analysis of a project with noted participation patterns; discussion on how these might impact data outcomes.
- **Assignment Due Next Week:**
 - One question we did not address is why organisations choose to launch citizen science initiatives. Based on the literature and your own thoughts, write a short (less than one page) overview of why organizations might want to get involved in community/citizen science.
- Reading for next week:
 - [Rivera et al. \(2024\): Optimizing Citizen Science Projects](#)

Week 4 (February 6): Media and Technology in Community Science

- **Topics:** Projects fundamentally focused on media: Ethical considerations: data licensing, open data, data privacy, inclusivity, and transparency. (Rob)
- **Guest Speaker:**
 - Michael Denslow on media-based community science.
- **In-Class Activity:**
 - Group brainstorming session for a media-based citizen science project.
- **Assignment Due Feb 10:**
 - Quick idea generation. Write up a short 1 page and one slide initial pitch for a media-based citizen science project. You can work in a group or individually. Explain why you think it is cool, and what science it could enable and how you might reach out about it and build a community.
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Week 5 (February 13): Designing Inclusive and Accessible Community Science Projects

- **Topics (15 minute vignettes from Corey, Rob and Scott):**
 - Key principles for inclusivity and accessibility in community science. (Corey)
 - Challenges and strategies for reaching diverse audiences. (Rob)
 - Examples of successful inclusive designs. (Scott)
- **Guest Speaker:**
 - Theresa Crimmins, National Phenology Network.
- **Readings:**
 - Case studies and articles on inclusivity in community science.
 - Hunter et al. (2023) *Frontiers in Eco and Environment*
 - Chesser et al. (2020) *International Journal of Social Research Methodology*
- **In-Class Activity (1 hour):**
 - Peer review of each other's idea. Focus on discussing how to also add in inclusivity and accessibility components. Informal ranking of project ideas and potential for picking one or two to continue forward.
- **Assignment Due Next Week:** Prepare stand-up 5 minute summary of media-based citizen science project

Week 6 (February 20): Citizen Science in Practice – Class Project Kickoff

- **Stand-up present 5 minute group “media project” summary**
- **Topics:**
 - Overview of the class project requirements, goals, and timeline. (Rob)
 - Assembling groups and initial brainstorming on project ideas.
 - Presentation of a ‘menu’ of potential project ideas, including (All of us):
 - iNaturalist project
 - Data comparisons among different platforms
 - User-analysis project
 - Ecological projects
 - Introduction to project management tools and techniques for collaborative work. (Corey)
- **Guest Speaker:**
 - [Diego Ellis Soto](#) on socio-ecological implications of biased community science data.
- **In-Class Activity (1 hour):**
 - Group planning session to outline initial ideas for the final class project, focusing on research questions, audience, and expected data types.
- **Assignment Due Next Week:**
 - Each group submits a 1-2 page preliminary project synthesis, including research questions, target audience, and a draft timeline for data assembly, collection and analysis.

Week 7 (February 27): Addressing Data Quality and Bias in Community Science

- **Topics:**
 - Methods for improving data quality in community science, such as expert verification, algorithms, and participant training. (Rob)
 - Sources and implications of bias in community science data (spatial, temporal, and sampling biases). (Scott)
 - Strategies for minimizing bias and improving data reliability in community science projects. (Corey)
- **Readings:**
 - Selected articles on data quality improvement techniques and bias mitigation strategies in community science.
- **In-Class Activity:**
 - Workshop: Identifying potential biases in sample datasets; brainstorming strategies to minimize these biases in the class project.
- **Assignment Due Next Week:**
 - None.

Week 8 (March 6):

OPTIONAL BIOBLITZ/FIELD TRIP

- Optional participation in the DeLuca Bioblitz (March 7), with an observation journal entry to reflect on the experience, noting any challenges and the benefits of bioblitzes for community science.
- <https://www.inaturalist.org/projects/2025-uf-deluca-bioblitz>

Week 9 (March 13): Data Analysis Techniques in Community Science

- **Topics:**
 - What does structured, semi-structured and unstructured monitoring and why is important for understanding how to derive insights. (Corey)
 - Examples of ecological insights gained from community science data.
 - Overview of analysis methods commonly used with community science data. (Rob/Corey)
 - Introduction to relevant approaches to analyze data.
- **Readings**
 - Kelling et al. Semistructured data. Cutting edge insights papers (Corey and I have a list we are developing).
- **In-Class Activity:**
 - Workshop: Hands-on introduction to data analysis techniques using a small dataset (e.g., from eBird, iNaturalist or National Phenology Network).
- **Assignment Due Next Week:**
 - Develop an idea individually for a data analysis focusing on field based citizen science data – the topic and citsci platform(s) are your choice. Your idea should be pithy – 250 words and then provide a 250 word synopsis of your general approach.

Week 10 (March 20): Spring Break

Week 11 (March 27): eBird/iNaturalist Field Trip and Data Collection Exercise

- **Topics:**
 - Field-based community science using iNaturalist and eBird: practical experience in collecting biodiversity observations.
 - Comparing eBird and iNaturalist as platforms for data collection and user engagement.
 - Reflecting on data accuracy, identification challenges, and observational bias.
- **In-Class Activity:**
 - Field trip to collect biodiversity data using iNaturalist. Discussion in the field on platform-specific challenges and advantages.
- **Assignment Due Next Week:**
 - Reflection (1 page) on differences between eBird and iNaturalist data collection experiences, including thoughts on data applicability and platform limitations for ecological research. Tied to theory of design.

Week 12 (April 3): Applying Community Science Data to Ecological Questions

- **Topics:**
 - Integrating community science data into ecological research questions, focusing on biodiversity patterns, species distributions, and ecological change.
 - Approaches for selecting data and framing research questions that are feasible with community science datasets.
- **In-Class Activity:**
 - Group brainstorming and planning session for final projects, with a focus on identifying realistic research questions and feasible data sources.
- **Guest speaker:**
 - Dr. Ben Freeman
- **Assignment Due Next Week:**
 - 2-3 page project proposal for final group project: include research question, proposed methods, data sources, and anticipated challenges.

Week 13 (April 10): Group Project Development – Analyzing and Interpreting Data

- **Topics:**
 - Practical data analysis: applying methods learned to analyze community science data.
 - Interpreting data within the context of the research question, addressing limitations and biases.
- **In-Class Activity:**
 - Group work session to begin data analysis for final projects, with instructor guidance on methodology and data interpretation.
- **Assignment Due Next Week:**
 - Continue working on group project development but no official assignments due.

Week 14 (April 17): Project Work and Peer Feedback

- **Topics:**
 - Preparing findings for presentation, including structuring results and visual aids.
 - Practicing constructive peer review and providing feedback to other groups.
 - The future of Citizen Science
 - Combining CitSci and AI to derive more insights at broader scales
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- **In-Class Activity:**
 - Peer review session: groups present preliminary findings to classmates, receive feedback, and discuss improvements or adjustments.
- **Assignment Due Next Week:**
 - Continue class project development outside class.

Week 15 (April 24): Final Presentations and Reflection on Community Science

- **Topics:**
 - Presentation of final projects, showcasing findings and discussing implications for ecological research.
 - Reflecting on the course's themes and takeaways, especially the role of community science in ecology.
- **In-Class Activity:**
 - Final project presentations by each group, followed by a class discussion on the challenges, benefits, and future potential of community science. Instructors bring food and libations.
- **Assignment:**
 - Final project write up – 3-6 pages maximum summarizing your questions, methods, results, and discussion and next steps.

Learning Objectives

This course is meant to provide a broad overview of citizen science for ecology and conservation. The course provides you a deep understanding of these topics through a mix of reading and hands on work. Citizen science involves a three way relationship between developers of citizen science projects, public participants who are engaged to take part in those projects, and analysts who are using the data generated. Because of this, we focus on all three groups and a key learning objective is to gather a pragmatic understanding of how those groups operate, how each group is enabled to do their tasks and the value propositions for each group and for science more generally. Our key objective is for each student to be enabled to work in any one of these three groups successfully and we are particularly focused on hands on experiences.

Reference material and reading

All needed readings (mostly papers) will be posted on Canvas. You may want to look into the small number of available books covering citizen science broadly as a topic or for ecology in particular, including “Citizen Science: How Ordinary People are Changing the Face of Discovery” by Caren Cooper and “Handbook of Citizen Science in Ecology and Conservation” by Christopher A. Lepczyk.

Assessment

Class assignments: 20%

Class participation: 50%

Final Class Project: 30%

Given the nature of this course, if you participate fully, we expect you will get a “A” grade in this course. We don’t mean to suggest it is a guarantee and if your assignments or final class projects are minimalist, it is certainly possible you could score worse than an “A” as a final grade.

Expected Behavior and Honor Code

I expect each class member to behave as is befitting a professional situation like attending a class. The simple rules are: attend class, participate, and know campus policy about expected classroom behavior. I will treat each member with all respect as long as we feel that is reciprocated. 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 honesty 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 Student Honor Code and 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 or TAs in this class.

The Student Honor Code and Student Conduct Code states that:

"A Student must not represent as the Student's own work all or any portion of the work of another. Plagiarism includes but is not limited to:

- Stealing, misquoting, insufficiently paraphrasing, or patch-writing.
- Self-plagiarism, which is the reuse of the Student's own submitted work, or the simultaneous submission of the Student's own work, without the full and clear acknowledgment and permission of the Faculty to whom it is submitted.
- Submitting materials from any source without proper attribution.
- Submitting a document, assignment, or material that, in whole or in part, is identical or substantially identical to a document or assignment the Student did not author."

Policy regarding Religious Observance:

Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, the instructors will discuss accommodations on a case by case basis. Reasonable requests will almost always be granted.

Policy regarding sexual harassment

The University of Florida policy on Discrimination and Harassment (<http://hr.ufl.edu/manager-resources/policies-2/sexual-harassment/>) will be adhered to strictly. Any student who believes s/he has been the subject of discrimination or harassment based upon race, color, national origin, sex, age, disability, religion, sexual orientation, or veteran status can make a formal complaint report to the Institutional Equity and Diversity officer and/or to the Dean of Students Office/Student Conduct and Conflict Resolution (DSO/SCCR). Resources and reporting options can be found online at <https://www.dso.ufl.edu/sccr/resources/victims>.

Policy regarding inclusion and diversity: Students from all diverse backgrounds and perspectives are welcomed and expression of diversity encouraged, especially in a course that covers so much diversity itself. The diversity that students bring to this class is viewed as a resource, strength and benefit.

U Matter, We Care

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:contactumatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone 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 asking for help is a sign of strength. In case of emergency, call 9-1-1.

Policy on Course Feedback

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/>.

Other Details

Hybrid format

This class will be run as a hybrid format since Corey Callaghan and other students will be joining in remotely. For work sessions, we suggest that remote participants all work together and with Corey and Scott and Rob will work with in person groups during the In Class Activities

Minimum Technical Skills

To complete your tasks in this course, you will need a basic understanding of operating a computer and using word processing software.

Getting Help

Technical Difficulties

For help with technical issues or difficulties with Canvas, please contact the UF Computing Help Desk at:

- <http://helpdesk.ufl.edu>

- Links to an external site.
- 352-392-HELP (4357)
- Walk-in: HUB 132

Any requests for make-ups (assignments, exams, etc.) due to technical issues should be accompanied by the ticket number received from the UF Computing Help Desk when the problem was reported to them. The ticket number will document the time and date of the problem. You should email your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

Academic and Student Support

- Career Connections Center: For career assistance and counseling services, visit the UF Career Connections Center. website or call 352-392-1601.
- Library Support: For various ways to receive assistance concerning using the libraries or finding resources, visit the UF George A. Smathers Libraries Ask-A-Librarian. website.
- Teaching Center: For general study skills and tutoring, visit the UF Teaching Center website or call 352-392-2010.
- Writing Studio: For help with brainstorming, formatting, and writing papers, visit the University Writing Program Writing Studio website or call 352-846-1138.

General Guidelines for Communications

When communicating online:

- Treat the instructor with respect, even via email or in any other online communication.
- Always use your professors' proper title: Dr. or Prof., or if you are unsure use Mr. or Ms.
- Unless specifically invited, don't refer to a professor by their first name.
- Use clear and concise language.
- Remember that all college-level communication should have correct spelling and grammar.
- Avoid slang terms such as "wassup?" and texting abbreviations such as "u" instead of "you."
- Use standard fonts such as Times New Roman and use a size 12 or 14 point font.
- Avoid using the caps lock feature AS IT CAN BE INTERPRETED AS YELLING.
- Limit and possibly avoid the use of emoticons like :) .
- Be cautious when using humor or sarcasm as tone is sometimes lost in an email or discussion post and your message might be taken seriously or be construed as being offensive.
- Be careful with personal information (both yours and others).
- Do not send confidential information via email.

Email

When you send an email to your instructor, teaching assistant, or classmates:

- Use a descriptive subject line.
- Be brief.
- Avoid attachments unless you are sure your recipients can open them.

- Avoid HTML in favor of plain text.
- Sign your message with your name and return email address.
- Think before you send the email to more than one person. Does everyone really need to see your message?
- Be sure you REALLY want everyone to receive your response when you click, "Reply All."
- Be sure that the message author intended for the information to be passed along before you click the "Forward" button.