

Open Data and Open Science in Biology (Bio 521)

Spring 2023

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Instructor info:



Dr. Megan Fork
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Office hours by appointment:
Mon 1-3 pm, Wed 4-5:30 pm &
Thu 8:30-10 am;
on Zoom or in person (SSN 380)

At-a-glance Class meets: Tuesdays, 6-8:45 pm (SSN 179)

Broad topics:

- What is "open science" and what are the benefits & difficulties?
- Peer review and scientific publishing
- Finding and accessing openly available biological/ecological datasets
- Exploratory data analysis with R and R Studio

Work outside of class:

You'll notice that our schedule (pgs 10-11) includes a lot of in-class time set aside for work on your project. Still, there is work you'll need to complete outside of class time, including:

- Reading
- Preparing to lead in-class discussion
- Written reflection assignments
- Working on your project

Please review the schedule, set yourself reminders, and reserve the time necessary to thoughtfully engage with your work.

Assessment:

You will earn your grade in this course based on a "contract grading" model.

This is designed to free you from worrying about grades for individual assignments and instead allow you focus on learning from and incorporating feedback to improve your writing and scientific work.

See "Contract grading agreement" on pages 4-5 for more information

Course description and learning outcomes

The overarching theme of this course, open data and open science in biology, was chosen with the intention of cutting across all areas of biology. My hope is that each of you in this course will engage with the material and apply, explore, and expand it into your own biological area(s) of interest. No matter your sub-field in biology, students who intentionally and meaningfully engage with the course will be able to:

- Find, analyze, and interpret publicly available data
- Describe the process of scientific publishing and differentiate among types of access
- Give and act on kind, constructive peer review
- Understand potential benefits and difficulties of open science
- Develop skills with open-access data analysis software (R and R Studio)

In this course, you will be asked to find, explore, interpret, visualize, and analyze publicly available biological or environmental data to build knowledge. Data literacy is important in every field of biology, and you will practice and deepen these skills in the context of data sets that you choose.

In this course, we will rely on diverse viewpoints from a variety of readings and resources, the instructor, and one another. As your instructor, I have put a great deal of thought into the course design and I strive to lead the course using evidence-based techniques and principles. If it is not clear why or how we are doing something, please always feel free to ask!

Norms, values, and expectations

In this class, we will be working together to achieve the learning goals described above. We need to collaborate to create a classroom community in which all of us feel safe to learn and share knowledge.

Each of us learn differently. If there are aspects of this course that prevent you from learning or exclude you, please let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course.

People of all ethnicities, genders, religions, ages, sexual orientations, disability statuses, socioeconomic backgrounds, immigration statuses, regions, and nationalities are welcomed and safe here.

What you can expect from me

- Respect
- Constructive feedback on your work
 - You can expect the feedback I give you to help you learn how you can improve your work.
- Timely answers and feedback
 - You can expect a response to your email within one business day.
 - You can expect feedback on work submitted on or before the deadline within one week of the posted deadline.
- Reasonable accommodations
 - Life happens. If you are experiencing a major life disruption, please let the instructor know as soon as you can. We will work together to come up with modifications and accommodations.
 - If you have a disability that requires accommodations, please contact the instructor as early as you can so that I can support your success.
 - For more information, please see the policy section that begins on pg 6.
- Connection to the tools and resources you need
 - One of my roles as instructor is to curate and provide you what you need to learn and be successful.

What I expect of you

- Respect
- Academic integrity
 - Engaging in your work with integrity is vital to your success in this course and in your future. If you cheat, you rob yourself of the opportunity to learn skills and knowledge designed to help you in your coursework and future career.
 - For more information, please see the policy section that begins on pg 6.
- Attendance, preparation, and engagement in class
 - Science is a team endeavor. Not only does your own success depend on you being prepared and engaged, your classmates will rely on you to work with and teach them.
 - If you cannot attend class because of a religious observance or university event, please contact the instructor as soon as possible so we can work together to find a fair alternative. If you have a full schedule of such events, please submit it at the beginning of the semester. If you miss class for whatever reason, remember that you are responsible for meeting the academic requirements of the course.
- Communication
 - I expect you to take an active role in your own learning. Part of this requires you to communicate with me about concerns or problems you have. There are a variety of ways to contact the instructor (email, office hours, phone, after class). Please take advantage of them.

Contract grading agreement

Contract grading is a type of assessment that is designed to free students (and the instructor!) from the stress and “bean counting” of graded assignments so that we can instead focus on meaningful learning and feedback. It is different from traditional grading schemes in that you earn your grade through your effort rather than based on the subjective, instructor-assessed quality of your work. This model has also been shown to reduce student anxiety about writing, which can facilitate creativity.

Basic agreement

You will earn your grade by completing tasks designed to support the central topics of the course. More information about each of these assignments will be available in D2L. Students who complete all the following tasks will earn a “B” for the semester:

- ✓ Attend for the full duration of 12 of our 14 class meetings (86%), excepting any excused and made-up absences.
- ✓ Complete at least 3 of the first four reflection assignments to the specified length and topic (all students must complete reflection assignment 5).
- ✓ As part of a pair, complete a presentation and lead discussion of a scientific paper that uses open data.
- ✓ With input and help from Dr. Fork, find a publicly available data set, complete an exploratory analysis using R, and write a brief journal-style report of your findings. To fully complete this task, students will meet the following milestones:
 - Submit a half-page proposal that identifies the topic you will work on for your project (week 3).
 - Find, download, and submit a publicly available dataset(s) about your topic, together with a half-page description of why you chose this dataset and what question(s) you hope to investigate with your analysis (week 5).
 - Write an annotated bibliography that summarizes at least 10 scientific papers on your topic (week 7).
 - Complete an exploratory analysis of your data, including summary statistics and at least two figures for inclusion in your report (week 10).
 - Create an outline for your report (week 11).
 - Write a report using your annotated bibliography, outline, and data analysis (week 13).
 - Give a final oral presentation of your work in class (week 15).
- ✓ Complete a substantive, constructive peer-review of two peers' reports.
- ✓ Complete at least one revision that incorporates formative feedback on your analysis and report.
- ✓ Meet at least a “very good” score on the final report according to a mutually developed and agreed upon grading rubric.
- ✓ Submit all assignments no later than 5 days after the posted due date.

For this approach to be successful, students and the instructor must have mutual trust and an understanding of the contract. PLEASE come to class ready to voice any questions, concerns, or confusion you have about this system so that we can work out any issues and start the semester on solid footing.

What if I don't meet all the requirements?

For students that do not complete all of the tasks required for a B, they will earn a lower grade based on the percentage of the tasks they complete:

- 13 out of 14 tasks successfully completed = B-
- 12 out of 14 tasks successfully completed = C+
- 11 out of 14 tasks successfully completed = C
- 10 out of 14 tasks successfully completed = C-
- 8-9 out of 14 tasks successfully completed = D
- 7 or fewer out of 14 tasks successfully completed = F

How do I earn an "A"?

Completing the required assignments will earn you a B; to earn an A for the semester, you must go above and beyond. Students that want to earn an A should develop a one-page written proposal of how they do more or go deeper. This could involve writing a more in-depth report, synthesizing additional datasets, leading a class session of a related topic, etc. This is specifically undefined because the goal is for you to be creative and play to your strengths. Feel free to discuss your ideas with the instructor; we'll work together to find a mutually agreed set of tasks for you to earn an A.

If you complete a mutually-agreed proposal but don't complete all the tasks to earn a B, your successful completion of the proposed work will bump your course grade by one full grade. For example, if you complete 12 out of the 14 tasks plus your proposed additional work, you will earn a B+ for the semester.

I understand the terms of the contract grading agreement and confirm that I have had my questions and concerns addressed.

Print name

Sign name

Date

Policies

Safety

The safety, health, and well-being of our colleagues and neighbors are our primary concern. We must work together with respect, responsibility, and care for one another mitigate risks to ourselves and those around us. There are long-term risks associated with the ongoing global COVID-19 pandemic and other transmissible diseases. You are strongly encouraged to get vaccinated against COVID-19 and wear a mask in crowded indoor spaces, like classrooms. Vaccines are widely available without an appointment. More information about the vaccine can be found here:

<https://www.chesco.org/4822/COVID19Vaccine>

Attendance

I recognize that health needs or family responsibilities may sometimes prevent you from attending class. Please do not attend class or other on-campus events in person if you are ill. Instead, email me about your absence as soon as you are able so that we can find appropriate arrangements for you to meet the expectations (e.g., remote participation or an alternative assignment). However, please note participation in group discussions and active learning activities are important aspects of this course, so it is expected you will attend if you are healthy and able.

Due dates

The due dates listed in the course schedule below are designed to keep you on track and ensure the instructor will be able to provide timely feedback in advance of subsequent submissions. I recognize that things come up and you may not always be able to submit work on time. **Unless otherwise noted**, you may submit any written assignment up to 5 days after the listed due date, no questions asked. Additional extensions may be granted on a case-by-case basis, but only if you **communicate with me before the end of the grace period**.

Statements common to all WCU syllabi

Academic & personal integrity

It is the responsibility of each student to adhere to the university's standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another's work and/or using ideas of another and presenting them as one's own without giving proper credit to the source; selling, purchasing, or exchanging of term papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Academic misconduct can result in the automatic failure and removal from this course. For questions regarding Academic Integrity at West Chester University of PA, students are

encouraged to refer to the [Department Undergraduate Handbook](#), the [Undergraduate Catalog](#), the [Ram's Eye View](#), and the University website at www.wcupa.edu.

Students with disabilities

If you have a disability that requires accommodations under the Americans with Disabilities Act (ADA), please present your letter of accommodations and meet with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively. If you would like to know more about West Chester University's Services for Students with Disabilities (OSSD), please visit them at 223 Lawrence Center. Their phone number is 610-436-2564, their fax number is 610-436-2600, their email address is ossd@wcupa.edu, and their website is at <https://www.wcupa.edu/universityCollege/ossd/>. In an effort to assist students who either receive or may believe they are entitled to receive accommodations under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, the University has appointed a student advocate to be a contact for students who have questions regarding the provision of their accommodations or their right to accommodations. The advocate will assist any student who may have questions regarding these rights. The Director for Equity and Compliance/Title IX Coordinator has been designated in this role. Students who need assistance with their rights to accommodations should contact them at 610-436-2433.

University excused absences policy

Students are advised to carefully read and comply with the excused absences policy, including absences for university-sanctioned events, contained in the WCU Undergraduate Catalog. In particular, please note that the "responsibility for meeting academic requirements rests with the student," that this policy does not excuse students from completing required academic work, and that professors can require a "fair alternative" to attendance on those days that students must be absent from class in order to participate in a University-Sanctioned Event.

Reporting incidents of sexual violence

West Chester University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to comply with the requirements of Title IX of the Education Amendments of 1972 and the University's commitment to offering supportive measures in accordance with the new regulations issued under Title IX, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. The only exceptions to the faculty member's reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University Protection of Minors Policy. Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at:

<https://www.wcupa.edu/admin/diversityEquityInclusion/sexualMisconduct/default.aspx>

Inclusive learning environment & anti-racist statement

Diversity, equity, and inclusion are central to West Chester University's mission as reflected in our Mission Statement, Values Statement, Vision Statement and Strategic Plan: Pathways to Student Success. We disavow racism and all actions that silence, threaten, or degrade historically marginalized groups in the U.S. We acknowledge that all members of this learning community may experience harm stemming from forms of oppression including but not limited to classism, ableism, heterosexism, sexism, Islamophobia, anti-Semitism, and xenophobia, and recognize that these forms of oppression are compounded by racism.

Our core commitment as an institution of higher education shapes our expectation for behavior within this learning community, which represents diverse individual beliefs, backgrounds, and experiences. Courteous

and respectful behavior, interactions, and responses are expected from all members of the University. We must work together to make this a safe and productive learning environment for everyone. Part of this work is recognizing how race and other aspects of who we are shape our beliefs and our experiences as individuals. It is not enough to condemn acts of racism. For real, sustainable change, we must stand together as a diverse coalition against racism and oppression of any form, anywhere, at any time.

Resources for education and action are available through WCU's Office for Diversity, Equity, and Inclusion (ODEI), DEI committees within departments or colleges, the student ombudsperson, and centers on campus committed to doing this work (e.g., Dowdy Multicultural Center, Center for Women and Gender Equity, and the Center for Trans and Queer Advocacy).

Guidance on how to report incidents of discrimination and harassment is available at the University's Office of Diversity, Equity and Inclusion.

Emergency preparedness

All students are encouraged to sign up for the University's free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information, visit www.wcupa.edu/wcualert. To report an emergency, call the Department of Public Safety at 610-436-3311.

Email policy

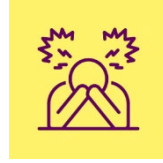
It is expected that faculty, staff, and students activate and maintain regular access to University provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.

Resources

WCU has resources available to help you be happy, healthy, and successful.



If you or someone you know has been a victim of sexual misconduct, there are [several resources available](#) to help.



If you are struggling with mental health, there are confidential [counseling and psychological services](#) available.



[Student Health Services](#) are available for a wide range of clinical care, with in-person and telehealth appointments.



The [Office of Services for Students with Disabilities](#) can help provide resources to ensure equity and accessibility in the classroom, housing, etc.



The [Learning Assistance & Resource Center](#) provides tutoring, coaching, workshops, and other resources to help you achieve academic success.



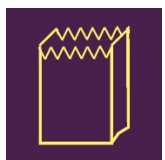
WCU's [Writing Center](#) can help you with writing, editing, and using citations in your written work.



The [WCU student Ombuds](#) can help you make informed decisions and handle conflicts in a variety of issues and concerns.



The [Center for Trans and Queer Advocacy](#) is here to make WCU a place where people with trans and queer identities are safe and supported.



For students facing financial difficulties, [the Resource Pantry](#) helps provide food, clothing, school supplies, and other resources.



The [Dowdy Multicultural Center](#) provides a safe space for and promotes the success of Students of Color.



Find additional resources in the [Rams' Guide to Success](#)

Course schedule

This schedule is a living document and will be updated throughout the semester – the most up-to-date version will be posted on D2L and you will be notified of updates. If you have any questions or confusion, please contact the instructor!

In general, our class meetings will be divided into two halves with a 10-minute break in the middle.

Unless otherwise noted, you should complete readings and submit assignments before the start of class on the date that they are listed.

*Items in the “What’s due?” column marked with a star are exempt from the late work policy and MUST be submitted on the listed due date to earn credit toward the final course grade.

Week	Date	Topic(s)	Readings and preparation	What’s due?
1	Jan 24	1. Course introduction and contract grading discussion 2. Intro to open science	Read syllabus and bring any questions about contract grading system	
2	Jan 31	1. Open science as practice, ethic, and conceptual framework 2. Intro to project & brainstorm activity	Read at least two of the posted articles	Reflection assignment 1
3	Feb 7	1. Discussion about reading 2. Optional: open discussion/work time	Read excerpt from <i>Data Feminism</i>	Project proposal
4	Feb 14	1. Fork et al. paper discussion 2. Open datasets: how and where to find them	Fork et al. 2021	Optional: proposal for “A” grade Reflection assignment 2 *Discussion leaders: submit your paper
5	Feb 21	1. Paper discussion 1: Sharlene, Victoria, and Seth 2. Data management, tidy data, and metadata	Read discussion paper Read posted resources about data management and metadata	Data set submission

6	Feb 28	1. Guest lecture: Dr. Lauren Koenig 2. Mid-term check-in	Anonymous mid-term survey	Reflection assignment 3
7	Mar 7	Exploratory data analysis in R	Prepare for work in R: install R and R Studio and complete the first lesson in data carpentry	Annotated bibliography
(8)	Mar 14	Spring Break – no class		
9	Mar 21	In-class work on data analysis	nothing to read/prepare for today – come ready to work independently on your data analysis	
10	Mar 28	In-class project work and help	Nothing to read for today	Data analysis *Discussion leaders: submit your paper
11	Apr 4	1. Project work time 2. Paper discussion 2: Christine and Ana	Read chapters from “Writing Science” Read discussion paper	Outline
12	Apr 11	1. Paper discussion 3: Sofia and Jeremy 2. Co-develop presentation and report rubrics	Read Wu et al. 2018 Review success conditions and rubrics in preparation for making our own	
13	Apr 18	1. Peer review how-to and overview 2. Complete peer reviews	Read peer review guide	*Full draft
14	Apr 25	1. The scientific publication process 2. “A” grade extra presentations	Nothing to read for today	Reflection assignment 4
15	May 2	Project presentations		1. Final report 2. Reflection assignment 5