PLNTPTH 8300

Current Topics in Plant Pathology:
Practical Computing Skills for Biologists

Spring 2021

2 credit hours

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Instructor Information

Instructor

Dr. Jelmer Poelstra

Department: Molecular and Cellular Imaging Center (MCIC)

Office: Selby Hall 017, Wooster Campus

Phone:
Email: poelstra.1@osu.edu (preferred method of contact)

Office hours: Monday and Friday 12 - 1pm via Zoom. Please email me in advance to coordinate times among students within office hours, or to arrange a meeting at a different time.

Zoom office hour link:

Teaching Assistant

Zachary Konkel

Department: Plant Pathology; Translational Plant Sciences Graduate Program

Email: konkel.8@buckeyemail.osu.edu

Office hours: Friday 9 - 10 am, exercise recitation Monday 4 - 5 pm, via Zoom

Course Organization

Class Meeting Pattern

This is a 2-credit-hour course covering 14 weeks, which means that students should expect around 2 hours per week of time spent on direct instruction (live Zoom sessions) in addition to 4 hours of homework (readings, assignment preparation). Meetings are synchronous: students are required to connect live during this period (see the "Attendance" sub-heading under "Course Policies" for further details).

This course is divided into weekly modules with two live Zoom sessions each. Generally, the first Zoom session of a module will start with a brief lecture but otherwise we will mostly be doing participatory live-coding (or "code-along"). We will also discuss homework exercises and assignments, and occasionally have short student presentations.

Class Meeting Schedule

Tuesday and Thursday, 3:55 – 4:50 pm, on Zoom.

Course Format

Distance Learning (DL; 100% online)

Course Description

As datasets have rapidly grown larger in biology, coding has been recognized as an increasingly important skill for biologists. Yet in fact, basic coding skills and "computational thinking" are highly beneficial for any scientist, paving the way for more efficient and reproducible research.

In this course, students will gain hands-on experience with a set of general and versatile tools for day-to-day work with data sets small and large alike. The course's focus is on foundational skills such as working in the Unix shell, coding in Python, organizing, documenting, version-controlling and sharing research, submitting jobs to a compute cluster, and building flexible workflows. Taken together, this will allow students to reproduce their own work, and have others reproduce their work, with as little as a single command.

Prerequisites / co-requisites / exclusions

None.

No prior coding experience is needed for this course. If you have never opened a terminal before, or never coded in any language, I recommend but do not require that you start reading or practicing a bit before the course starts. The textbooks (see below) are a good place to start, and feel free to contact me for further recommendations.

Other Fees and/or Requirements

None

Course Materials

This course is divided into weekly modules for which materials are released one week ahead of time. All materials will be in screen reader accessible formats and available in the weekly modules on Carmen Canvas as well as on a GitHub website for the course: https://mcic-osu.github.io/pracs-sp21.

- Slides for all lectures and documents for all exercises and assignments hands-on sessions will be made available on the GitHub website, and linked to from Carmen Canvas.

- All Zoom sessions will be recorded and made available on Carmen Canvas. If you miss a session (see "Attendance" sub-header under "Course Policies"), you are expected to watch the recording as soon as possible.

Textbooks / Readings

Textbooks

Both textbooks are freely available online through the OSU library, but if you have the funds, consider buying a paper copy of one or both of them. We will be using *Computing Skills for Biologists* more than *Bioinformatics Data Skills* (see Schedule below for details).

- Allesina S, Wilmes M (2019). *Computing Skills for Biologists.* Princeton UP.
  → Available online through the OSU library at
  https://library.ohio-state.edu/record=b8624007~S7.

- Buffalo V (2015). *Bioinformatics Data Skills: Reproducible and Robust Research with Open Source Tools.* O'Reilly Media, Inc.
  → Available online through the OSU library at
  https://library.ohio-state.edu/record=b8538907~S7.

Specific chapters from these textbooks will be assigned reading during the course; see the Course Schedule for details.

Other required readings

- Perkel, JM (2019). Workflow systems turn raw data into scientific knowledge. *Nature*, 573(7772), 149-150.
  → Can be accessed and downloaded with OSU login credentials at
  https://www.nature.com.proxy.lib.ohio-state.edu/articles/d41586-019-02619-z
  and will also be posted on Carmen.

- Mölder F, Jablonski KP, Brice L, Hall MB, Tomkins-Tinch CH, Sochat V, … Köster J. (2020, October 2). Sustainable data analysis with Snakemake. *Zenodo*.

→ *Can be accessed and downloaded for free at*
http://doi.org/10.5281/zenodo.4067137 and will also be posted on Carmen.

- Sections of the Ohio Supercomputer Center (OSC) Getting Started documentation at https://www.osc.edu/resources/getting_started.

Software

Contact the instructor if you have any questions or concerns about software and software installation.

Required software

- Operating System*:* A Windows (7+), Mac, or Linux operating system.

- Browser: A recently updated version of Chrome/Chromium, Firefox, or Microsoft Edge.

Optional software

Since we can mostly work at the Ohio Supercomputer Center (OSC; see below), you will be able to follow this course without the following software. However, if you want to keep using these tools in your day-to-day work, and want to be able to experiment with them more than you could at OSC, install the following software, all of which are available for free. This can also be done during the course, when additional installation instructions will be provided.

- ***VS Code*** (Visual Studio Code, a text editor) – Available at https://code.visualstudio.com/download for Windows, Mac, and Linux. *If you would like to use a different text editor, please contact the instructor.*

- ***Python 3.x****.* (i.e., any Python version with 3 in it). Follow the installation instructions at http://computingskillsforbiologists.com/setup/basic-programming/.

For Windows users only:

- ***Access to Linux*** – If you have Windows 10, I would recommend installing Windows Subsystem for Linux (***WSL***). If you have an older version of Windows, you may want to consider installing Ubuntu Linux in dual-boot mode.

- ***git*** (version control software) – Download from https://git-scm.com/download/win, and install it using all the default settings for the installation, ***except***:

  ○ In "*Adjusting Your PATH Environment*", select "*Use Git from Git Bash Only*".

  ○ In the prompt "*Configuring the Line Ending Conversions*", choose "*Checkout as-is, commit as-is*".

Computer setup during synchronous Zoom sessions

During hands-on coding in class ("participatory live coding"), which we will do in most of our synchronous sessions, it will be beneficial to either have a very large monitor or two monitors. This way, you can see what the instructor is doing *and* also do this yourself.

If you don't have multiple monitors set up with a single device, you're welcome to connect to the Zoom sessions with two devices; e.g., a laptop and a computer or two laptops (but a phone is not likely to have a large enough screen to be useful). If you have neither a large screen nor multiple devices, you'll have to decide if you will put the Zoom window and your own coding window side-by-side, or if you can effectively switch between windows. The latter will work best by using "Alt + Tab" (Windows/Linux) or "Command + Tab" (Mac) and having as few windows as possible open in your workspace.

You may be asked to share your screen, so try to have a setup where this is possible. For example, if you watch the Zoom session on your iPad, but code on your computer, do also connect to the Zoom session with your computer, which will allow you to share your screen.

Additional details about the computing infrastructure for this course

- We will be regularly working at the Ohio Supercomputer Center (OSC, https://www.osc.edu/) during this course, which we can access through our web browsers. **Prior to the start of the course, you will be asked to create an account at OSC** and will be granted access to the OSC Classroom Project associated with this course. You will then have storage space and compute hours available at OSC.

- We will not be working with large amounts of data in this course, and any compute-intensive work can be done at OSC. **Therefore, you will not need a particularly powerful computer or a large amount of hard drive space.** On the other extreme, if your computer is very slow or nearly out of storage space, please do contact the instructor to make sure we will not run into problems.

Other technology requirements

Baseline technical skills for online courses

- Basic computer and web-browsing skills
- Navigating Carmen: for questions about specific functionality, see the Canvas Student Guide.
- Zoom for text, audio, and video chat. For help with OSU Zoom, please visit: https://resourcecenter.odee.osu.edu/carmenzoom.

Required equipment

- Computer with high-speed internet connection.
- Webcam: built-in or external webcam, fully installed and tested.

- Microphone: built-in laptop or tablet mic or external microphone.
- A mobile device (smartphone or tablet) or landline to use for BuckeyePass authentication.

Carmen Access

You will need to use BuckeyePass multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click "Enter a Passcode" and then click the "Text me new codes" button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the Duo Mobile application to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and the IT support staff will work out a solution with you.

IT Support

For help with your password, university e-mail, Carmen (http://carmen.osu.edu/), or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at OCIO Help Hours (https://ocio.osu.edu/help/hours), and support for urgent issues is available 24x7.

- Self-Service and Chat support: (http://ocio.osu.edu/selfservice)
- Phone: 614-688-HELP (4357)
- Email: 8help@osu.edu
- TDD: 614-688-8743

Goals and Objectives

Goals

At the end of this course, students will be be able to start applying several foundational computational tools in their own research. Students will also have a firm understanding of how using these tools makes their research more efficient, robust and reproducible.

Learning Outcomes

This course is designed to provide students with foundational training in computing skills for reproducible research. Upon successful completion, students should be able to:

- L1: Use the bash shell for a variety of data management and analysis tasks.
- L2: Write basic scripts in bash and Python, and submit them to a remote supercomputer (in our case, OSC) using the SLURM workload manager.
- L3: Understand & apply principles of effective coding.
- L4: Use Git and GitHub for version control, collaboration, and code sharing.
- L5: Use a workflow system to reproducibly automate analysis pipelines.
- L6: Understand how the above-mentioned tools can be used to improve project and data organization, and to make research more reproducible and shareable.

How Students Meet the Outcomes

Synchronous Zoom meetings will mostly consist of participatory live-coding, with slide decks showing all code and providing background and context. It is crucial for students to actively participate during synchronous meetings and also to practice extensively outside of Zoom hours during lab assignments and project work. This material is best learned by doing, and simply becoming comfortable with working with these tools is often half the battle.

Grading and Evaluation

Evaluation Criteria

Students will be evaluated based on activities and assignments as follows:

- In-class questions: 20 points (= % of grade)
- Lab assignments: 30 points
- Final project: 50 points

In-class questions (20 points)

Points for submission of answers to one or more weekly questions via Zoom polls.

Lab assignments (30 points total – 15 points for each of 2 assignments)

Both assignments are due on Tuesdays before class – see the schedule below for the weeks in which you have to submit an assignment. Lab assignments will be made available at least a week before they are due.

Final project (50 points)

In your final project, you will be asked to combine the skills you have learned during this course into a small but well-documented and fully reproducible data analysis project.

I will give you several small datasets that you could work with, but you are encouraged to use your own dataset. This could be a downloaded, publicly available dataset, as long as it is not a "standard" dataset with many example analyses available – consult your dataset of choice with me). Even better, it could be data you are working on in your own research.

You will be encouraged to gradually build up your project during the latter part of the course. Components of the final project are due on Tuesdays – see the schedule and the bullet points below. More details about these projects and expectations for each component will be provided at the start of the course.

- Project proposal as a Git repository – week 11 *[10 pts]*
- Markdown draft (project outline, documented code) – week 13 *[10 pts]*
- Lightning presentation – week 14 *[10 pts]*
- Completed project – Fri, Apr 23th, 5 pm *[20 pts]*

Grading Scale

Grading is done according to the standard grading scale, reproduced below:

PERCENTAGE	GRADE
93-100	A
90-92.9	A-
87-89.9	B+
83-86.9	B
80-82.9	B-
77-79.9	C+
73-76.9	C
70-72.9	C-
67-69.9	D+
60-66.9	D
<60	E

Course Schedule

"CSB" = *Computing Skills for Biologists*, "Buffalo" = *Bioinformatics Data Skills*. Optional readings are between square brackets "[...]". With instructional breaks on Feb 23 and Apr 1, modules 7 and 12 will be "half-modules".

MODULE	SESSION	CONTENT	
1	Jan 12 & 14	Course Intro & Shell I: Basics	
	Readings | due	*CSB Ch. 0-0.1 & Ch. 1*	
2	Jan 19 & 21	Project organization and Markdown	
	Readings | due	*Buffalo Ch. 2 [Buffalo Ch. 3]*	
3	Jan 26 & 28	Version control with Git and GitHub	
	Readings | due	*CSB Ch. 2 [Buffalo Ch. 5]*	
4	Feb 2 & 4	Shell II: Unix data tools	
	Readings | due	*Buffalo Ch. 7*	*Assignment I: Markdown+git*
5	Feb 9 & 11	Shell III: Shell scripting	
	Readings | due	*Buffalo Ch. 12*	
6	Feb 16 & 18	Shell IV: OSC, SLURM, and Conda	
	Readings | due	*OSC docs [Buffalo Ch. 4]*	
7 (half)	Feb 25	Shell V: Data transfer and integrity	
	Readings | due	*Buffalo Ch. 6*	*Assignment II: shell scripts*
8	Mar 2 & 4	Python I: Introduction and first steps	
	Readings | due	*CSB Ch. 3.1-3.4*	
9	Mar 9 & 11	Python II: Control flow and file in/output	
	Readings | due	*CSB Ch. 3.5-3.9*	
10	Mar 16 & 18	Python III: Writing good code	
	Readings | due	*CSB Ch. 4*	
11	Mar 23 & 25	Python IV: Scientific computing	
	Readings | due	*CSB Ch. 6.1-6.3*	*Project: proposal*
12 (half)	Mar 30	Python V: Regular expressions	
	Readings | due	*CSB Ch. 5*	
13	Apr 6 & 8	Reproducible workflows with Snakemake	
	Readings | due	*Perkel '19, Mölder et al. '20*	
14	Apr 13 & 15	Putting it all together & next steps	
	Readings | due	*CSB Ch. 11, Buffalo Ch. 1*	Project: draft
15	Apr 20 & 22	Student project presentations	
	Readings | due		*Project: submit (Apr 30)*

Course Policies

Attendance

Student attendance and participation will be monitored through the individual Zoom sessions and the delivery of assignments. Attendance to live Zoom sessions is required. However, in the case of scheduling conflicts, emergencies, or illnesses, live presentations and discussions will be recorded and posted in Carmen, available for anyone to watch later. If scheduling conflicts arise for attendance of live sessions, contact me and we can discuss alternatives. Similarly, in case of emergencies or illness, please contact me as soon as possible to make appropriate arrangements.

Office hours are optional and will not affect your grade.

Communication

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

Tone and civility: Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across.

Tardiness: Tardiness policy applies to live events. It is the student's responsibility to be familiar with any content missed, and student is encouraged to contact the instructor for this purpose.

Etiquette during synchronous Zoom sessions

- Please keep your *camera turned on* during the entire session. This will very helpful for the instructor, and probably for your fellow students too, in creating an engaging environment that resembles an in-person class meeting as much as possible. If you prefer not to have your camera on, or have bandwidth problems, I would appreciate it if you could let me know.

- Please have your *microphone on mute* by default, but feel free to *unmute yourself* whenever you would like to say something.

- Please take into account that you may be asked to *share your screen* during interactive sessions.

- Notifications:
  - Please *turn off notification sounds* for your computer and phone.

- ○ Consider turning your ***phone face down*** to also avoid blinking-light distractions from incoming notifications.

- ○ Consider setting your computer to a "Do Not Disturb" mode so that you won't get notifications, which will both help prevent distractions and possible awkwardness when you're sharing your screen.

- Refrain from activities on your computer and phone that are not related to the class, such as checking your email.

Instructor feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course.

- **Grading and feedback**: For weekly assignments, you can generally expect feedback within 7 days.

- **E-mail**: I will reply to e-mails within 24 hours on weekdays.

Late Assignments

Late submissions are only accepted in cases of emergency (illness or injury, family emergency) and students should communicate as soon as possible with the instructor when situations arise. Late submissions without prior communication with the instructor, will have 20% of the total points deducted for each day its late (five days late will receive zero points). Since all assignments are submitted through Carmen or Github, time stamps at these sites will be used to determine tardiness. If a conflict arises for the day of the presentation, please communicate with the instructor directly. Only in case of emergency will presentation date be rescheduled, or an alternative option could be provided (e.g. pre-recorded video and discussion board).

Academic Integrity During Assignments and Projects

Your written assignments and final project should be your own original work, and collaborating, or completing the assignment with others, is not permitted. Open-book research is permitted and encouraged. You are also permitted and encouraged ***to search the internet for answers***, because it will train you in finding useful coding answers on the web, which is often the fastest way to solve a problem or error that you encounter.

However, whenever you end up copying code from the web into the code that is part of your assignment, ***please include a footnote or other quick reference that refers to this source***. Additionally, if you copy a full line or even multiple lines of code that do exactly what you needed to do, make sure that you not only refer to your source, but also that you understand what the code does. Are there commands or options to commands in the line that

we never touched upon in class? Be doubly sure you know what those do! ***I will ask you to present some of your work in class, and I will especially ask about particularly fancy lines of code*** – if you have no idea how your commands work or fit together, this will not look good.

You are generally prohibited in university courses to reuse ***your own past work***, that is, from turning in work from a past class to your current class, even if you modify it. If you want to build on work you've explored in previous courses, please discuss the situation with the instructor.

For more general information, see the "Academic Integrity / Misconduct" sub-section under "University Policies" directly below.

University Policies

See https://ugeducation.osu.edu/faculty-and-staff-resources for current versions.

Academic Integrity / Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct at Student Life at http://studentconduct.osu.edu.

OSU's academic integrity policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct and this syllabus may constitute "Academic Misconduct."

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an "excuse" for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct (COAM). If COAM determines that you have violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- The Committee on Academic Misconduct web pages (http://oaa.osu.edu/coam.html)
- Ten Suggestions for Preserving Academic Integrity (http://oaa.osu.edu/coamtensuggestions.html)
- Eight Cardinal Rules of Academic Integrity (www.northwestern.edu/uacc/8cards.htm)

Counseling and Consultation Services / Mental Health

As a student, you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life Counseling and Consultation Services (CCS) by visiting http://ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center, and the 10th Floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766 and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 1-(800)-273-TALK or at http://suicidepreventionlifeline.org.

Embedded mental health counselor

David Wirt, wirt.9@osu.edu, is the College of Food, Agricultural, and Environmental Sciences (CFAES) embedded mental health counselor. He is available for new consultations and to establish routine care. To schedule an appointment with David, please call 614-292-5766. Students should mention their affiliation with CFAES when setting up a phone screening.

Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also

have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Office of Institutional Equity:

- Online reporting form at http://equity.osu.edu

- Call 614-247-5838 or TTY 614-688-8605

- Email equity@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.

- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

For additional information on Diversity, Equity, and Inclusion in CFAES, contact the CFAES Office for Diversity, Equity, and Inclusion (https://equityandinclusion.cfaes.ohio-state.edu/).

If you have been a victim of or a witness to a bias incident, you can report it online and anonymously (if you choose) at https://studentlife.osu.edu/bias/report-a-bias-incident.aspx.

CFAES Principles of Community Statement

This course adheres to The Principles of Community adopted by CFAES. These principles can be found at https://go.osu.edu/principlesofcommunity.

Safe and Healthy Buckeyes

Health and safety requirements: All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (https://safeandhealthy.osu.edu), which includes wearing a face mask in any indoor space and maintaining a safe physical distance at all times. Non-compliance will result in a warning first, and disciplinary actions will be taken for repeated offenses.

Copyright Disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course. Intellectual Property (covered by copyright) includes course materials (Text, Audio, Video, Multimedia, Sims, Apps, etc.), and student-generated materials.

Disability Accommodations

The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services. *If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options.* To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

SLDS contact information

slds@osu.edu; 614-292-3307; http://slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of Course Technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools (see the section "Course Technology"). If you need additional services to use these technologies, please request accommodations with your instructor.

- Carmen (Canvas) accessibility (https://community.canvaslms.com/docs/DOC-2061)
- OSU Digital Accessibility Center: https://accessibility.osu.edu/