



## SYLLABUS

### BSGP 7030

## Introduction to Data Science in Biomedical Science Research

College of Medicine  
Biomedical Science Graduate Program

Summer 2023 – Online  
Credit Hours 2

Instructor: Michael A. Freitas  
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Phone number: 614-688-8432  
Office Hours: Arranged by appointment

#### **Days and Times:**

Second Term Summer 2022  
June 20, 2022 - July 28, 2022  
Tuesday / Thursday 11:00am-1:00pm\*

\*(time subject to change to accommodate student schedules, check with the instructor if time overlaps with other required courses)

#### **Course Policies:**

All College and Program course policies apply to this course.  
See OSU BSGP Handbook for Related Policies and Procedure.  
This syllabus, the course elements, policies, and schedule are subject to change.

#### **Course description**

BSGP 7030 is a course that teaches how to apply principles of data science to the analysis of biomedical data. The goal of the course is to introduce students to tools that are used by data scientists, build skills in quantitative data analytics, and to promote rigor and reproducibility in data analysis.

#### **Course learning outcomes**

By the end of this course, students should successfully be able to:

- Develop familiarity with scripting languages: R, Python, Bash
- Develop proficiency in building and using container-based software environments
- Develop proficiency in building and using scientific workflows
- Develop proficiency using data science notebooks

## HOW THIS COURSE WORKS

**Mode of delivery:** This course is taught as a 100% synchronous online course.

**Credit hours and work expectations:** BSGP 7030 is a 2-credit hour course. We will meet every Tuesday and Thursday for two hours. It is expected that each student will work 4-6 h per week outside of class in order to pass. Each student enrolled in BSGP 7030 will participate in small group assignments focused on developing the necessary skills to apply data science to biomedical and biological research problems. To demonstrate these skills students will perform and independent project during the class where they will build and test an end-to-end analysis pipeline for a project of their choice. Students are allowed to work in groups, share ideas and collaborate freely on problems but the final graded project must demonstrate the students' individual work. Any students that turn in duplicated work will receive zero credit for duplicated portions of the assignment.

**Attendance and participation requirements:** Because this is an online course, your attendance is required for every class. Class participation is encouraged.

**Missed Class:** Students unable to make class must schedule a makeup session with instructor in advance. All sessions will be recorded. Students will be required to watch the recorded sessions and complete a makeup assignment in addition to other work. Students can only makeup 1 missed class. Missing more than two classes will result in an incomplete grade for the class.

**Online Structure:** This course will be conducted in a distance-learning, online format. All materials will be provided via Carmen and all assignments will be completed via Canvas file upload. All necessary materials will be provided in the content section of Carmen. A tutorial is available at <https://ocio.osu.edu/audience/students>.

Notices about this course will be sent to your [name.#@buckeyemail.osu.edu](mailto:name.#@buckeyemail.osu.edu) or [firstname.lastname@osumc.edu](mailto:firstname.lastname@osumc.edu) account. All students must have an active OSU email account and remain electronically connected to OSU. Please contact the Help Desk for more information.

**Safety and health requirements:** All teaching staff and students are required to comply with and stay up to date on all University safety and health guidance, which includes wearing a facemask in any indoor space and maintaining a safe physical distance at all times. Non-compliance will be warned first and disciplinary actions will be taken for repeated offenses.

**Group Discussion:** One class every four weeks will be dedicated to critically reviewing and reflecting on the prior week's seminars. Students will update their IDP and discuss with the class their short term (predoc), medium term (postdoc) and long-term career goals.

**Biomedical Workforce Topics:** These sessions will be dedicated to presentation by OSU faculty, visiting faculty, alumni or other external speakers. The topics will vary but will be cover biomedical careers in academia, medicine, industry, and entrepreneurship. There will be evaluations after each presentation that must be completed to receive credit for attending the class.

## COURSE MATERIALS AND TECHNOLOGIES

### Course Materials

#### Learning Resources:

- **RECCOMENDED BUT OPTIONAL** The Biostar Handbook: 2nd Edition (<https://www.biostarhandbook.com/>) Student Edition is \$25 for a subscription that covers the term of the course (Bulk subscriptions can be purchased for less provided multiple students coordinate purchase)
- DataCamp (access provided for enrolled students for no cost)

### Course technology

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at [ocio.osu.edu/help/hours](https://ocio.osu.edu/help/hours), and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** [ocio.osu.edu/help](https://ocio.osu.edu/help)
- **Phone:** 614-688-4357(HELP)
- **Email:** [servicedesk@osu.edu](mailto:servicedesk@osu.edu)
- **TDD:** 614-688-8743

### BASELINE TECHNICAL SKILLS FOR ONLINE COURSES

- Basic computer and web-browsing skills
- Navigating Carmen: for questions about specific functionality, see the [Canvas Student Guide](#).

### REQUIRED TECHNOLOGY SKILLS SPECIFIC TO THIS COURSE

- [CarmenZoom virtual meetings](#)
- [Recording a slide presentation with audio narration](#)
- [Recording, editing, and uploading video](#)

### REQUIRED EQUIPMENT

- Computer: current Mac (OS X) or PC (Windows 7+) 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
- Other: a mobile device (smartphone or tablet) or landline to use for BuckeyePass authentication

### REQUIRED SOFTWARE

- [Microsoft Office 365](#): All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Full instructions for downloading and installation can be found at [go.osu.edu/office365help](https://go.osu.edu/office365help).

### 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 IT support staff will work out a solution with you.

### **GRADING AND FACULTY RESPONSE**

This course will be graded from A-E, based 75% on assigned problems and 25% on the independent study assignment.

Incomplete: An **Incomplete** grade indicates specific requirements of the Seminar Series Course are not yet met. Examples of requirements not met are:

- Class is not attended.
- Assignments are not completed.

Late Assignments: the max points available for Late assignments will be reduced by 10%. Any assignment not turned in by the end of class will be given zero.

The Graduate School requires graduate students to maintain a graduate cumulative point-hour ratio (CPHR) of 3.0 or better in all graduate credit courses. **Any student receiving a B- [82.9%], or lower, in any course, may be required to complete remedial work as assigned by the program.** The decision regarding whether repetition or remediation is required is at the discretion of the course director(s) with input and final approval from the BSGP Leadership.

**Grievances and Solving Problems**: Please see the BSGP Handbook for Policy and Procedures. In general, a student should meet with the instructor of record for the course first and then, should then take any problem or grievance to the BSGP Director(s).

### **Instructor feedback and response time**

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

- **Grading and feedback**: You can generally expect grading rubric feedback within **7 days**.
- **Email**: I will reply to emails within **24 hours on days when class is in session at the university**.

### **OTHER COURSE POLICIES**

#### **Discussion and communication guidelines**

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 online.

### **Academic integrity policy**

#### **POLICIES FOR THIS ONLINE COURSE**

In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.

#### **OHIO STATE'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.** 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 ([COAM Home](#))
- *Ten Suggestions for Preserving Academic Integrity* ([Ten Suggestions](#))
- *Eight Cardinal Rules of Academic Integrity* ([www.northwestern.edu/uacc/8cards.htm](http://www.northwestern.edu/uacc/8cards.htm))

### **Diversity:**

*"The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each*

*individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited."*

### **Statement on Title IX**

All students and employees at Ohio State have the right to work and learn in an environment free from harassment and discrimination based on sex or gender, and the university can arrange interim measures, provide support resources, and explain investigation options, including referral to confidential resources.

If you or someone you know has been harassed or discriminated against based on your sex or gender, including sexual harassment, sexual assault, relationship violence, stalking, or sexual exploitation, you may find information about your rights and options at [titleix.osu.edu](http://titleix.osu.edu) or by contacting the Ohio State Title IX Coordinator at [titleix@osu.edu](mailto:titleix@osu.edu). Title IX is part of the Office of Institutional Equity (OIE) at Ohio State, which responds to all bias-motivated incidents of harassment and discrimination, such as race, religion, national origin and disability. For more information on OIE, visit [equity.osu.edu](http://equity.osu.edu) or email [equity@osu.edu](mailto:equity@osu.edu).

### **Counseling and Consultation Services – Your 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 find yourself feeling isolated, anxious or overwhelmed, please know that there are resources to help: [ccs.osu.edu](http://ccs.osu.edu). 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 [suicidepreventionlifeline.org](http://suicidepreventionlifeline.org). The Ohio State Wellness app is also a great resource available at [go.osu.edu/wellnessapp](http://go.osu.edu/wellnessapp).

## **ACCESSIBILITY ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES**

### **Requesting accommodations**

The university strives to make all learning experiences as accessible as possible. 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](mailto:slds@osu.edu); 614-292-3307; 098 Baker Hall, 113 W. 12<sup>th</sup> 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. If you need additional services to use these technologies, please request accommodations with your instructor.

- [CarmenCanvas accessibility](#)

- Streaming audio and video
- CarmenZoom accessibility
- Collaborative course tools

## COURSE SCHEDULE

Date	Topics
<b>Week 1</b>	Data science notebooks Scripting R, Python, Bash
<b>Week 2</b>	Basic Algorithms
<b>Week 3</b>	Software environments Docker / Singularity
<b>Week 4</b>	Scientific workflows Bioconductor
<b>Week 5</b>	Data Science Dashboards
<b>Week 6</b>	Independent Study Project

### 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.