BIO 231: Enviornmental Topics and Analysis
Spring 2024

Dr. Mary Glover

Course information

Instructor: Dr. Mary Glover

Class times: Tuesday/Thursday, 9:55-11:40 AM, Pressly Room 203 and Flowe 312

Email: mmglover@peace.edu. Please allow 24 hours for a response.

Office hours: Tuesday and Thursday, 11:40-12:30, Pressley 100B (between 100 and 102), or by appointment, sign up here.

Course description

Global environmental problems are complex and interrelated. This course provides the groundwork necessary to understand these interactions. Students investigate and analyze natural and human-influenced ecosystems, gather and analyze data, and gain a broader appreciation for the intersection of science, nature, and human society as it relates to environmental issues. The course will include field-based experiences depending upon the focus of the course in a given semester. Offered spring of even numbered years. Prerequisite: "C" or better in BIO 131.

Course topic

This semester, students will be exploring the water quality of streams in Raleigh. We will use water quality as a case study while working on data analysis and scientific writing learning objectives. Students will:

- Evaluate and map water quality of streams in Raleigh
- Collect water quality measurements in local streams, including physical and chemical characteristics in the field and in the lab.
- Present and share results with City of Raleigh

Course learning objectives

By the end of the course, students can expect to successfully:

Analyze data in R

- Import data into R
- Manipulate data into a format that can be analyzed
- Calculate summary statistics
- Determine the best type of graph to display data and plot figures
- Test hypotheses with simple statistical tests

- Interpret results and form conclusions

Communicate research and findings

- Communicate results to a scientific audience in written and spoken format
- Design infographics of results to communicate with broad audiences
- Create a scientific poster summarizing overall class research project

Evaluate water quality

- Describe human activities that impact water quality in Wake County
- Measure water quality with field and lab tests (nutrients, dissolved oxygen, turbidity, pH)
- Identify aquatic invertebrate species and calculate a bioassessment index
- Interpret data to evaluate overall water quality in local streams

Course resources

Textbook

There is no required textbook for this course. Resources and readings will be provided to students throughout the semester.

R for Data Science is an excellent introduction and resource for using R software for data analysis. This is a free online textbook. åç ### Technological requirements

In order to be successful in this class, students should have access to a personal laptop computer with internet access. Students will use the computer for data analysis in class. *A tablet will not work for this class.* If you do not, please contact Dr. Glover ASAP.

Moodle

Moodle is the WPU course management system. Resources that students need will be linked through moodle, as well as an up-to-date schedule of topics and assignments. Grades will be continuously updated in the gradebook.

R and Rstudio

R is a coding language (think python, C++, etc.) commonly used for data science, environmental science, and ecology. Students will use R and the software Rstudio, a user-friendly interface for working in R, for data analysis in class.

To complete assignments, students will need to download R and Rstudio on their personal computer which they will bring to class. Installation details can be found here, and will be discussed in class. Both R and Rstudio are free. *Students should not purchase any Rstudio products.*

Google

WPU provides a google account with your WPU login. We will use the google applications for:

- Data management: Data files will be shared and organized using google drive.
- Presentation: Students will create a poster presentation using google slides.

Slack

Slack is a communication platform which can be accessed through an internet browser, desktop client, or mobile app. In this course, we will use slack for troubleshooting R code in class. **For information on how slack will be used in the course see here.**

Students are encouraged to ask questions and to engage in slack. Slack will provide a simpler and quicker way to share code during class data analysis activities.

Slack can be used as a web appliation or you can download a desktop app. To download the desktop app, go to http://www.slack.com. Students will receive a link for our class slack workspace the first week in class.

IMPORTANT NOTE: Confidential information should not be discussed in slack, as slack is not FERPA compliant. Please discuss sensitive information, via email.

Course components

Student grades will be calculated by using a percentage system. All grades will be recorded in Moodle including your current course grade.

Component	Percentage of grade
Project 1: Introduction to R, data, and scientific writing	25%
Project 2: Measuring water quality in the field and lab	15%
Project 3: Evaluating water quality project and presentation	30%
Data analysis exams (10% each)	20%
Participation	10%
Total	*100%*

Grading scale: A: 90 - 100%, B: 80 – 89.9%, C: 70 – 79.9%, D: 60 – 69.9%, F: < 60%

Assignment re-grading must be requested through email within 5 days of receiving your grade. Please email Dr. Glover with justification for your re-grade.

Project 1: Introduction to R, data, and scientific writing (25%)

In the first few weeks of class, students will learn the basics of data analysis using R programming and be introduced to reading and writing scientific literature. Students will work through class activities to learn data analysis skills which will be used for larger projects for the semester. At the end of this project, students will create an summary of what they have learned.

Project 2: Measuring water quality in the field and lab (15%)

Students will measure a variety of water quality metrics of local streams, both in the field and with lab tests. Students are expected to carefully and accurately collect data, record measurements, and make observations. Students will analyze the data they collect and create a scientific poster.

Students will be responsible for transportation to field locations, but carpooling will be discussed in class. Dates for field collections are tentatively scheduled as February 22, February 27, and April 25. Dates may change depending on weather conditions or class schedules. Students will be expected to go in the field if there is light rain, but field days will be rescheduled for major weather events.

Project 3: Evaluating water quality projet and presentation (30%)

We will work with water quality data from the City of Raleigh to assess the quality of local streams. Students will work in groups to develop research questions and perform a data analysis from start to finish with the data. In this project, students will be introduced to more advanced R skills, including creating maps. Specific assignments and due dates will be determined collabartively with students later in the semester.

Using results from student data projects and literature research, students will create a final project to present their results to the City of Raleigh.

Data analysis exams (20%)

To assess data analysis skills, students will have *two* in-class, open note, data analysis exams. Students will be given a dataset which they will analyze and report results. With the data, students may be asked to plot, calculate summary statistics, and write conclusions.

Participation (10%)

Students are expected to be engaged and actively participate during class and will be graded accordingly. Much of the student learning will happen through participation in in-class activities, including data analysis and coding, graphing, data collection, peer reviews, and writing assignments. Participation will be graded twice, once at the midterm and once at the end of the semester.

Students will be graded on:

- Regular class attendance
- Contribution to class discussions and activities
- Effective use of class time
- Completion of class activities

Course schedule

Full details of will be kept in Moodle and can be found here: **BIO 231 Schedule of Assignments.** The full schedule of topics will be a fluid document throughout the course to ensure that students have mastered course topics before moving on and to work around weather for field work. All changes will be communicated with students and students will have details for assignments at least one week before they are due.

Important semester dates

- 1/23: Last day to drop
- 2/15: **Exam 1**
- 2/22: Field collections @ Crabtree Creek
- 2/27: Field collections @ Prairie Ridge
- 3/27: Last day to withdraw with "W"
- 4/25: Field collection day (TBD)
- Presentations with City of Raleigh Stormwater Dept. Late April (TBD)
- 5/3: **Exam 2** 8:00 AM

Course policies

Student expectations

Students are expected to attend each class session and to actively participate during class. Students will be assigned background readings and writing assignments for homework, but much of the data analysis and R coding will be completed in class. Coding can be tricky (a missing comma can break your code!) so students should use class time effectively – in class students can use time to work together or get help from the instructor.

Attendance

Class attendance is necessary to be successful in this course. Many of the course assignments and activities will take place in class. Furthermore, it is the student's responsibility to obtain class notes when absent. Students must be present for most of the class period (90 minutes) to be considered present. When possible, please contact Dr. Glover *prior* to a missed class via email, to ensure that you remain on track in the course. Written documentation of excused absence (i.e. illness, court appearance, school approved athletic event) must be submitted to the professor within 3 business days from the missed date of class. Please be advised the University mandates that students attend 80% of the class meetings in order to pass the course.

For student athletes, it is the student's responsibility to communicate regarding approved absences (university sponsored events and competitions, but not practices) in a timely manner so that work can be completed in advance. Students will not be excused from assignments and will not receive extensions or make up exams unless discussed with the instructor at least one week in advance.

Late policy

Timely completion of assignments and activities is crucial for success in this course as tools and content will build on each other throughout the semester. For example, one week, we may learn how to import data into analysis software. This skill will be needed for all subsequent data activities. Students are required to complete and submit previous data assignments before they can continue with class assignments.

Assignments completed in class or in groups must be submitted on time to receive credit.

Due dates for assignments are provided on Moodle and on the course schedule. Students will also receive a reminder of assignments due before the start of the week. No assignments submitted after the last day of class will receive credit for a grade. *If a student consistently turns in class work late, they will be required to meet with the instructor to discuss.*

Code sharing

In addition to scientific writing, students will be writing R code. Students are expected to uphold the academic integrity policy in their code. Unless stated otherwise, all code written should be the student's own. Students are encouraged to work together and can use online resources (such as stack overflow) for issues, but should write their code independently. **Student's may not share R scripts.**

Additional policies

Academic Integrity Statement

William Peace University seeks to develop both the intellect and character of its students. All members of the University are expected to promote a culture of academic integrity, and all students are expected to inform themselves of the University's policies and procedures related to Academic Integrity.

All forms of academic misconduct are violations of the University's Honor Code. These include, but are not limited to:

- Cheating: Using or attempting to use unauthorized materials, information, or study aids in academic work or in working with others on academic assignments, tests, or other requirements
- Facilitating academic dishonesty: Helping or attempting to help another student to commit an act of academic misconduct

- Falsification: Falsifying or inventing any information or citation in academic work
- Lying: Misrepresenting information that is relevant to the classroom or academic performance
- Plagiarism: Representing the words or ideas of another as one's own in any academic work, whether intentional or not.

If a faculty member suspects academic misconduct has taken place, the faculty member will forward the Academic Integrity Violation Report and all relevant evidence to the Academic Affairs designees and apply the agreed upon grade penalty if the student accepts responsibility. If the student does not accept responsibility, the University Academic Integrity Board is notified and an Academic Integrity Board Hearing is scheduled to determine whether it is more or less likely that the student has violated the academic integrity policy and whether the recommended outcomes should be applied.

COVID Statement

In this class, students are required to wear masks in class when the community level risk for Wake County is high according to the CDC. Otherwise, mask use is optional. To determine the risk level at any time, visit the CDC website. WPU students should notify Health Services at HealthServices@peace.edu if they have a positive COVID-19 test and follow all WPU Community Health Guidelines in place. Students who require academic considerations due to symptoms of or exposure to COVID-19 should communicate directly with their instructors to make necessary arrangements.

Disability Services

Disability Support Services are available to all WPU students who require reasonable accommodations due to any cognitive, physical, or psychological disability, in order to provide equal access to the educational environment. Students will need to be certified with Disability Support Services and provide appropriate documentation to receive an Academic Accommodation Plan. For more information or to become certified, please contact the Disability Support Services Coordinator by sending an email to disability@peace.edu.

Tutorial Services

Peer Tutoring is available for all WPU students free of charge. Support is offered in many subjects, including anthropology, biology, business, chemistry, criminal justice, history, math, political science, psychology, simulation and game design, and writing. Free workshops on study skills and documentation styles like MLA and APA are also offered each semester. Students can sign up for individual appointments using WPUConnect or in person at the Center for Student Success, located on the 2nd floor of Finch Library. For more information, contact Dr. Deanna Rogers, Director of Academic Support, at drrogers@peace.edu or 919-508-2080.

NEED HELP? ADDITIONAL RESOURCES:

- For IT Issues, contact the IT Help Desk at helpdesk@peace.edu or 919.508.2417
- For on-campus counseling and support, please email Counseling@peace.edu

- For questions about your transcript, GPA, transferring-in classes from another institution, registration, etc., please contact the Registrar's office registrar@peace.edu
- To discuss career paths and internship, please contact Academic and Career Advising at Advising@peace.edu.
- For questions about library services and finding credible resources, please contact Mr. Nate Hellmers, Director of Library, NJHellmers@peace.edu
- For questions and support from Public Safety, please contact Mr. Michael John, Director of Public Safety MAJohn@peace.edu or call the 24-hour hotline: 919-833-2277.
- To anonymously report a crime, go to https://peace.edu/student-life/student-support-services/safety-security/report-anonymous-crimes/
- For support and programming requests around issues related to BIPOC, please email Ms. Leah Young, Director of Diversity, Equity, & Inclusion, at LNYoung@peace.edu