MCB 4794/6796

Analysis, interpretation, and visualization of microbiological data

Fall, 2025
Course Format Online Asynchronous, 3 Credits

Instructor

Microbiology and Cell Science Department – office #1247

telephone number 352-294-9136

email address: roesch@ufl.edu

Zoom or in-person office hours, by request via e-mail or phone. Office hours are difficult to schedule since our students have such varied schedules. I will always be available to answer questions by email or set up an individual phone or Zoom conversation. Just contact me to arrange it.

Teaching Assistant

Microbiology and Cell Science Department – office #1240

telephone number 352 3925431

email address: jessicaxhumari@ufl.edu

Zoom or in-person office hours, by request via e-mail or phone.

Course Description

This course will focus on the analysis and interpretation of microbiological data using the R language and other command-line tools, with a series of examples that range in complexity. Students will analyze various types of microbiological data, including 16S rRNA gene sequencing, direct and indirect microbial growth measurements, and microbial bioproducts, among others. Finally, students will use good practices for data reproducibility.

Course Learning Objectives

At the end of this course, each student will be able to:

1. Analyze microbiological data using state-of-the-art methods.
2. Select and apply the most appropriate analysis for various types of microbiological data.
3. Create and customize graphs using modern visualization tools to illustrate the variability and characteristics of microbiological data.
4. Use good practices for data reproducibility to document and share their work.
5. Write reports in HTML and PDF, combining the code and the data analysis.

Course Overview and Purpose

The course is structured as 15 lessons or modules, one each week of the semester. Each week will cover a different topic. The topics build on each other, so to understand a topic in week 2, you must understand the material from week 1. For each week's lesson, there will be several items to complete. On the canvas page, click on the link for each item. The first item will be the learning objectives for the week. Keep the learning objectives in mind as you learn the week's material. After reading the learning objectives, please review the week's material in the order presented. After you go through the material in the order presented, you are always free to return and visit any content. The introductory lecture will give an example of the types of course content and how it will be presented.

Course Prerequisites

There are no prerequisites

Textbooks, Learning Materials, and Supply Fees

There is no required text for the course. Online readings will be provided for each learning topic. A reading list is provided at the end of this document.

Technical Support

UF Computing Help Desk & Ticket Number: All technical issues require a UF Helpdesk Ticket Number. The UF Helpdesk is available 24 hours a day, 7 days a week. https://helpdesk.ufl.edu/ | 352-392-4357

Weekly Course Schedule

Week	Dates	Topic	Assessment	Due Dates
1	Aug. 21-29	Install R and RStudio. Navigate through RStudio. Load data into RStudio.	-	-
2	Sept. 2-5	Making boxplots with ggplot2 Microbiome data visualization, relative abundance, and data transformation.	-	-
3	Sept. 8-12	Evaluating biosurfactant production. Formatting data, normality test, power, and effect size.	Assignment 1	Open 09/10 Closes 09/17
4	Sept. 15-19	Carbon dioxide emissions. Filtering, grouping, and summarizing information.	Quiz 1	Open 09/17 Closes 09/24
5	Sept.22-26	Gene expression. Log2 fold change and FRD in volcano plots.	Assignment 2	Open 09/24 Closes 10/01
6	Sept.29-Oct.3	Writing reports to show data characteristics and variability.	Quiz 2	Open 10/01 Closes 10/08
7	Oct. 6-10	Testing pairwise differences with the t-test and more	Assignment 3	Open 10/08 Closes 10/15
8	Oct. 13-16	Visualizing microbial community structure with ordination approaches	Quiz 3	Open 10/15 Closes 10/22
9	Oct. 20-24	Testing microbial community differences with Multivariate Permutational Analysis of Variance	Assignment 4	Open 10/22 Closes 10/29
10	Oct. 27-31	Microbial diversity measurements	-	-
11	Nov. 3-7	Hierarchical clustering	Quiz 4	Open 11/05 Closes 11/12

Week	Dates	Topic	Assessment	Due Dates
12	Nov. 10-14	Microbial growth with scatter plots and line	Assignment 5	Open 11/12 Closes 11/19
13	Nov. 17-21	Correlations between microbes and environmental data Representing microbial communities with Heatmaps	-	-
14	Dec.1-5	Using web-based Galaxy toolkit. Wrapping up end of course	-	-

Assignments and quizzes will be available starting Wednesday and will remain open until the following Wednesday.

Grading Policy

Course grading is consistent with UF grading policies.

Course Grading Structure

Assignments (5 total; drop the one with the lowest score)

The lowest score of the five project assignments will be dropped. You will be notified in Canvas when each assignment is open.

Quizzes (4 Quizzes; drop the one with the lowest score)

The lowest score of the four quizzes will be dropped.

Assignment Type	Point Value	Percent of Final Grade
Assignments (MCB 6796)	100	80%
Quizzes (MCB 6796)	100	20%
Assignments (MCB 4794)	100	70%
Quizzes (MCB 4794)	100	30%

Grading Scale

Grade	Points	Percentage
A	90-100	90-100
A-	87-89.9	87-89.9
B+	84-86.9	84-86.9
B	80-83.9	80-83.9
B-	77-79.9	77-79.9
C+	74-76.9	74-76.9

Grade	Points	Percentage
C	70-73.9	70-73.9
C-	67-69.9	67-69.9
D+	64-66.9	64-66.9
D	60-63.9	60-63.9
D-	57-59.9	57-59.9
S	<=56.9	<=56.9

Academic Policies and Resources

Academic policies for this course are consistent with university policies. See https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/

Campus Health and Wellness Resources

Visit https://one.uf.edu/whole-gator/topics for resources that are designed to help you thrive physically, mentally, and emotionally at UF.

Please contact UMatterWeCare for additional and immediate support.

Software Use

All faculty, staff, and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Privacy and Accessibility Policies

- Instructure (Canvas)
  - Instructure Privacy Policy
  - Instructure Accessibility
- Zoom
  - Zoom Privacy Policy
  - Zoom Accessibility