Microbiomes of Animals and Ecosystems

PCB4917

Class Periods (Please note, times will vary throughout the five weeks depending on lab work):

- Monday, Period 3 – 4 (9:35 AM – 12:35 PM)
- Tuesday, Period 3 – 5 (9:35 AM – 12:35 PM)
- Wednesday, Period 3 – 5 (9:35 AM – 12:35 PM)
- Thursday, Period 3 – 4 (9:35 AM – 12:35 PM)

Location: Classroom: Carr 611, Lab: Bartram 611
Academic Term: Spring 2026, First Immersion Session

Instructor: Christopher Dutton
Research Areas: Microbiomes, low-cost open source technologies, environmental monitoring, aquatic ecosystem ecology, biogeochemistry, microbial community dynamics, conservation
Email: duttonc@ufl.edu (please contact me through Canvas for course related emails)
Telephone: (352) 392-1175
Office Hours: Anytime, by appointment (typically within a few hours of notice)
Office: Bartram Hall, 611
Course Website: Canvas (https://elearning.uf.edu/)

Teaching Assistant: Tavis Goldwire
Email: tgoldwire@ufl.edu (please contact me through Canvas for course related emails)
Telephone: (352) 392-1175
Office Hours: Anytime, by appointment (typically within a few hours of notice)
Office: Bartram Hall 610

Course Description

We will learn about how to conduct a basic microbiome study using captive Zoo animals of conservation concern. As part of this, we will work with Zoo Keepers to identify interesting questions related to captive animal microbiomes, collect samples, extract DNA, prepare sequencing libraries, then sequence the samples to reconstruct the microbiomes of the animals and their immediate environment. This course will involve the use of HiPerGator and the R statistical programming language. The final project of the course will be a full workflow documented in R markdown and a brief presentation to the Zoo staff. This course will involve several trips to a Zoo and developing a working relationship with the Zoo keepers. **The overarching goal of this course is to inspire you and to have fun exploring microbial ecology.** 4 Credit Hours.

Course Objectives

These are my top 7 course objectives. We'll approach each of these objectives through readings, lectures, discussions, and hands-on practice.

1. Understanding Microbiomes: Gain a foundational understanding of what microbiomes are, including their composition, diversity, and functions in different animal species.

2. Animal-Microbiome Interactions: Explore the intricate relationships between animals and their microbiomes, focusing on how these interactions affect animal health, behavior, and evolution.

3. Microbiome Diversity Across Species: Study the variation of microbiomes across different animal species, including terrestrial and aquatic animals, and understand how these differences are shaped by environmental factors.

4. Impact on Health and Disease: Investigate how microbiomes influence animal health, including their role in disease resistance, digestion, and nutrient absorption, and how disruptions in microbiomes can lead to health issues.

5. Methodologies in Microbiome Research: Learn about the techniques and methodologies used in microbiome research, such as DNA sequencing and computational biology.

6. Conservation and Microbiomes: Understand the role of microbiomes in wildlife conservation efforts, including how microbiomes can be used as biomarkers for ecosystem health and species conservation.

7. Hands-On Experience: Provide practical experience through laboratory work, field trips, or research projects to apply theoretical knowledge to real-world situations.

Format

- This course is not your typical course. I have structured it as an investigative choose-your-own-adventure. We will learn about microbiomes, by actually working with Zoo keepers to investigate several current mysteries involving their animals.
- I anticipate that we will have three or four groups, with each group focusing on a separate mystery at a different facility (Disney's Animal Kingdom, Santa Fe Zoo, and Carlson Springs Wildlife Conservancy).
- There will be a final project and class presentation for each group. This will involve:
    1. Developing a hypothesis in related to a captive animal of conservation concern,
    2. Collect samples, extract DNA and do quality control,
    3. Sequence DNA on a Nanopore Minion,
    4. Analyze data using R,
    5. Give a short presentation to the class and Zoo staff on your project.

Course Pre-Requisites / Co-Requisites

None. No prior knowledge necessary.

Materials and Supply Fees

Approximately 500 USD per person.

Required Textbooks and Software

There are no required textbooks for this course. It is recommended that each person in this course brings a laptop computer with them during each class. At a minimum, each group will need a laptop computer during class. We will be using the following FREE software packages during this class:

- R Programming Language
    - https://cran.r-project.org/
- R Studio
    - https://rstudio.com/

Recommended Materials
Recommended readings, videos and material will be posted on the Canvas site.

How to do well in this course?
Show up and actively participate in your group. Ask questions when you don't understand something. There are no dumb questions! Reach out to me early for any problems, issues, or questions.

Course Schedule
This is a **preliminary outline** of the course schedule. The course will evolve throughout the five weeks depending on how the investigation proceeds.

Week 1: Introduction to Microbiomes
- Day 1 – Introduction to the course and material, Microbiomes of Animals and Ecosystems
- Day 2 – Equipment and Workflow Introduction
- Day 3 – DNA Extractions
- Day 4 – DNA Extractions

Week 2: Extractions
- Day 5 – **Holiday. No Class.**
- Day 6 – DNA Extractions
- Day 7 – Cleaning and Contingencies
- Day 8 – Trip to Disney's Animal Kingdom (ALL DAY TRIP)

Week 3: Sequencing
- Day 9 – Library Prep and Sequencing
- Day 10 – Library Prep and Sequencing
- Day 11 – Library Prep and Sequencing
- Day 12 – Library Prep and Sequencing

Week 4: Bioinformatics
- Day 13 – Bioinformatics
- Day 14 – Bioinformatics
- Day 15 – Bioinformatics
- Day 16 – Bioinformatics – Draft Presentation

Week 5: Presentations and Wrap-up
- Day 17 – Draft Presentation to Class
- Day 18 – Group Work Refining Presentations
- Day 19 – Trip to Disney's Animal Kingdom (ALL DAY TRIP)
- Day 20 – Class Wrap-up

Attendance Policy, Class Expectations, and Make-Up Policy
Attendance and participation are mandatory and will be a large part of your final grade. Due to the fast-paced nature of this course, it is very important to attend all classes. Of course, I understand that things come up and that's OK too. You will need to meet with me as soon as possible after a missed class so that I can bring you up to speed with what you missed. If you know that you will miss a class, please notify me ahead of time so that we can plan to make it up. Excused absences must be consistent with university policies and require appropriate documentation. Additional information can be found here: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade

Attendance	60	60%
Final Project	30	30%
Presentation	10	10%
	TOTAL:	100%

Grading Policy

Percent	**Grade**	**Grade Points**
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 – 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 – 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:
http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://gatorevals.aa.ufl.edu/. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://gatorevals.aa.ufl.edu/.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report

any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

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. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:
http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

Campus Resources:

Health and Wellness

U Matter, We Care:
If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. https://www.crc.ufl.edu/.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall*,* 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus*:* https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints*:* http://www.distance.ufl.edu/student-complaint-process.

University Academic Policies and Resources
https://go.ufl.edu/syllabuspolicies