

BIO 114L Populations, Community and Biosphere Lab (for Science Majors) SYLLABUS

Fall Semester 2024

A syllabus is not a contract between instructor and student, but rather a guide to course procedures. The instructor reserves the right to amend the syllabus when conflicts, emergencies or circumstances dictate. Students will be duly notified.

INSTRUCTORS: Dr. Dwann Davenport, Room 307, Nabrit-Mapp-McBay
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Office Hours: W 4-6, TH 10-11, F 9-10 all via Microsoft Teams

Dr. Terrence Gardner, Room 115 Hope Hall
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Dr. Ian Krout, Room 301, Hope Hall
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Dr. Jada Hoyle-Gardner, Room 301, Hope Hall
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Office Hours: W 2:00-3:00 and by appointment

LABORATORY:

Laboratory Section 01 (CRN 50522), 311 Hope, M and W 10:00-11:50 (Gardner)

Laboratory Section 03 (CRN 50524), 206 Hope, M and W 10:00-11:50 (Davenport)

Laboratory Section 04 (CRN 50525), 311 Hope, M and W 1:00-2:50 (Gardner)

Laboratory Section 05 (CRN 50526), 311 Hope, T and TH 1:00-2:50 (Hoyle-Gardner)

Laboratory Section 06 (CRN 50527), 206 Hope, M and W 2:00-3:50 (Krout)

You must attend the laboratory section in which you are registered. Class meetings will begin promptly at the top of the hour. Late arrivals will receive partial or zero credit for attendance. **Class attendance counts** (see Evaluation page 6).

COURSE TEXTS:

On-line tutorial **Understanding Experimental Design** (see page 7)

<https://www.simutext.com/student/register.html#/key/UCVL-jp22-zA4c-vTq-LRVD>

Bean Beetle Microbiome student protocols. (pdfs on BlackBoard)

A Student Handbook for Writing in Biology, 3rd edition (2009) or 4th edition (2013) by Karin Knisely; Sinauer and Freeman Publishers

Readings and worksheets will be posted to BlackBoard.

Thumb drive (flash drive) to save all handouts and written work.

Bound composition notebook (laboratory notebook) and 3-ring binder for handouts

CREDIT HOURS: This laboratory course will count toward 60% of your grade in BIO 114.

DESCRIPTION AND ORGANIZATION

In this course, you will be conducting original research on the microbial communities found in the digestive tract of bean beetles, *Callosobruchus maculatus*. The course-based research experience (CURE) that we will share is a different method of learning and teaching in a laboratory course than you may have experienced in the past. CUREs have been found to yield significant improvements in the learning and performance of students compared to control groups. We look forward to starting each of you on a very successful academic program.

COURSE OBJECTIVES

1. Read and interpret scientific publications and suggest new research questions.
2. Describe the importance of microbial communities in and on animals including humans.
3. Design a new experiment to test alternative hypotheses and predictions
4. Determine appropriate controls for the experiment.
5. Keep detailed and accurate laboratory notes.
6. Evaluate bioinformatics data to address the question posed by your new experiment.
7. Write a Laboratory Research Paper.
8. Interpret data to create tables and graphs to describe experimental results.
9. Prepare and present research seminar using PowerPoint or Google slides.

Laboratory Pre-test

Please take the laboratory pre-test on-line at:

https://emorycollege.co1.qualtrics.com/jfe/form/SV_b9lmkKUD7iKmKiy

This link also is located on the BlackBoard site for the course.

Week	Activities	Readings and work PRIOR to class
1 21-Aug	Laboratory Safety and Pre-Course Assessments Introduction to insect microbiomes, bean beetles, experimental design, & culturing of microbes Units of measure and using a micro-pipetter (Demo) Aseptic technique (Demo) Laboratory Notebook protocol	Introduction, Lab Basics Preventing Contamination and Aseptic Technique, and Notebook Protocols (BlackBoard) SimUText online tutorial: Understanding Experimental Design (This is a quiz score due by 25 August 11:59pm)
2 26-Aug	Discuss research papers Design and Start Experiment Review microbiome biology Review scientific method Notebook check (Journal in BlackBoard) Microbiome quiz (submit via BlackBoard) Pronouncing important names	Read research papers and submit worksheet (BlackBoard) Visit Woodruff Library, find 3 Microbiome research studies, and submit worksheets (BlackBoard) Scientific Method Readings (BlackBoard) Take practice Microbiome Biology quiz
3 No lab meetings 2-3-Sep	Surface sterile and isolate beetles from experiment Practice Micropipetter Use (Micropipetter Quiz) Review DNA extraction protocol Microbiome Culturing Review Research Report format	DNA Extraction Protocol (BlackBoard) Microbiome Culturing Protocol (BlackBoard) Report Draft 1, Introduction (submit via BlackBoard) by Friday 6-Sep 11:50pm

Week	Activities	Readings and work PRIOR to class
4 9-Sep	<p>DNA extraction for microbial community sequencing</p> <p>Review Research Report rubric and outline (BlackBoard)</p> <p>View media plates of bacteria from whole beetle microbiome culturing</p> <p>Bacterial Colony Phenotype results scoring (as time permits)</p> <p>Notebook check</p>	<p>DNA Extraction Protocol (BlackBoard)</p> <p>Microbiome Culturing Protocol (BlackBoard)</p> <p>Colony Phenotype Traits (BlackBoard)</p>
5 16-Sep	<p>DNA extraction for microbial community sequencing (as necessary)</p> <p>View media plates of bacteria from whole beetle microbiome culturing</p> <p>Bacterial Colony Phenotype assessment (data entry)</p> <p>Identify colonies to pick for PCR (one per student).</p> <p>Prepare Colony-based PCR (PCR is run after class)</p>	<p>Colony Phenotype Traits (BlackBoard)</p> <p>Colony PCR protocol (BlackBoard)</p>
6 23-Sep	<p>Community Ecology using bacterial phenotypes</p> <p>Electrophoresis of PCR products (identify samples to be submitted for colony sequencing – Sanger sequencing)</p> <p>Notebook check</p>	<p>Microbial Community Analysis Using Colony Phenotypes (BlackBoard)</p> <p>Colony PCR protocol (BlackBoard)</p> <p>Report Draft 2, Introduction and Phenotype Results (submit via BlackBoard) by Friday 27-Sep 11:50pm</p>
7 30-Sep	<p>Introduction to Community Ecology</p> <p>Community Ecology using bacterial phenotypes</p> <p>Introduction to bioinformatics</p>	<p>Microbial Community Analysis Using Colony Phenotypes (BlackBoard)</p> <p>Colony PCR protocol (BlackBoard)</p>

Week	Activities	Readings and work PRIOR to class
<p>8 No lab meetings 7-8 Oct</p>	<p>Discuss colony sequence (Sanger sequence) data</p> <p>Identify bacterial taxa using colony sequence data and create taxonomy table</p> <p>Introduction to bioinformatics</p> <p>Community Ecology using Sanger sequence taxonomy data</p> <p>MID-SEMESTER EVALUATIONS (Oct 9 - 14)</p>	<p>nBLAST protocol (BlackBoard)</p> <p>Colony-based Sanger Sequencing Analysis (BlackBoard)</p> <p>Community Ecology protocol (BlackBoard)</p>
<p>9 14-Oct</p>	<p>Community Ecology Revisited</p> <p>Evaluating Diversity and Comparing Communities</p> <p>Notebook check</p> <p>Introduction to DNA Subway and analysis of microbial community sequencing data</p>	<p>Report Draft 3, Introduction Results and Discussion, Final Draft. (submit via BlackBoard by 18 Oct 11:50pm)</p> <p>Taxonomic classification worksheet (BlackBoard)</p> <p>Community Ecology protocol (BlackBoard)</p> <p>DNA Subway video guide and protocol (BlackBoard)</p> <p>Preparing Files for Analyses (BlackBoard)</p>
<p>10 21-Oct</p>	<p>Introduction to DNA Subway and analysis of microbial community sequencing data</p> <p>Prepare a Taxonomy Bar Graph (using rarified data) using BeanBeetleMicrobiome app</p>	<p>Community Analysis with BeanBeetleMicrobiome app (BlackBoard)</p>

Week	Activities	Readings and work PRIOR to class
11 28-Oct	Discuss alpha and beta diversity metrics Discuss interpretation of community ecology analyses Statistical analyses and extracting images from the BeanBeetleMicrobiome app	Community Analysis with BeanBeetleMicrobiome app (BlackBoard)
12 4-Nov	Bioinformatic analysis of microbial community sequencing data Discuss Report Format Role of Figures and Tables in Results Use of Literature References Submit Alpha Diversity Graph (using rarified data) Notebook check	Community Analysis with BeanBeetleMicrobiome app (BlackBoard) Review Research Report rubric and outline (BlackBoard) Research Seminar rubric (BlackBoard) Preparing graphs and tables (BlackBoard)
13 11-Nov	Bioinformatic analysis of microbial community sequencing data Preparation for Research Seminars Pronouncing scientific names with confidence	Research Seminar rubric (BlackBoard) Preparing graphs and tables (BlackBoard)
14 18-Nov	Preparation for Research Seminars Notebook check	Research Seminar rubric (BlackBoard) Submit draft slide set (ten slides) for seminar feedback via BlackBoard (Friday 22-Nov 11:59pm) Resubmissions of Final Report via BlackBoard (Friday 22-Nov 11:59pm)
15 25-Nov No lab meetings 27&28 Nov	Preparation for Research Seminars Research Seminar Presentations Everyone must be ready to present on Monday 2 Dec, presenters will be by random draw.	Your seminar slides (in PowerPoint format) must be submitted via BlackBoard prior to class on Monday 2-December

Week	Activities	Readings and work PRIOR to class
16 2-Dec	Wednesday, 4-December Last day of classes Research Seminar Presentations Everyone must be ready to present on Monday 2 December, presenters will be by random draw.	Your final seminar slides (in PowerPoint format) must be submitted via BlackBoard prior to class on Monday 2-December.

EVALUATION

Your laboratory score will consist of the following parts:

- 30% - Class Attendance (300 pts)
- 15% - Laboratory Notebook (150 pts)
- 20% - Research Seminar presentation (200 pts)
- 15% - Writing Assignments, Homework and Quizzes (150 pts)
- 20% - Final Research Report (200 pts)

GRADING

There is no grade for the laboratory part of BIO 114. Your work in the laboratory will contribute to 60% of the grade you receive in the whole BIO 114 course, lecture and laboratory combined. Your laboratory assignments will be graded and all scores will be posted on BlackBoard.

CLASS MEETINGS and ATTENDANCE

Our regular lab class meeting will be held in-person in 206 or 311 Hope Hall or 328 Nabrit-Mapp-McBay Hall. You must attend the laboratory section in which you are officially enrolled and may not switch between laboratory sections. **If you are unable to regularly attend the scheduled meetings of the laboratory, you should not take this course.** Absences to that you schedule such as meeting with other faculty, doctor appointments, financial aid appointments, athletic team activities, glee club activities, and work commitments will not be excused absences. Success in this course requires regular interactions with the instructor and the materials and a very substantial part of your score in the laboratory depends on attendance.

WRITING ASSIGNMENTS

All written assignments must be typed and will be submitted via the BlackBoard website for our course.

SIMBIO SimUText ON-LINE TUTORIAL

It is important that you review the information below *before* you subscribe to the SimUText for **Populations, Communities and Biosphere** at **Morehouse College**. **To avoid possible problems, do not wait until the last minute.**

1. CHECK YOUR TECH!

Visit <https://simutext.zendesk.com/hc/en-us/categories/200170134-Check-Your-Tech-> to

confirm that the SimUText application will work on your computer, and/or to explore your options if there is a problem.

2. **SimUText Voucher Code (optional)**

If you purchased a SimUText Voucher from your bookstore, be sure to have it with you when subscribing, as you will need to enter your voucher code.

3. **Registration Link**

When you are ready to subscribe and download installers, follow this link to initiate the process: <https://www.simutext.com/student/register.html#/key/UCVL-jp22-zA4c-vVTg-LRVD>

4. **SimUText Application Installers**

After you have completed the subscription process, if you need to download the SimUText application installers again, you will be able to access them by logging into the [SimUText Student Portal](https://www.simutext.com/student/) (<https://www.simutext.com/student/>).

Save this email! Should you encounter problems, you may need your course-specific Access Key. It is: **UCVL-jp22-zA4c-vVTg-LRVD**

Problems or questions? Visit [SimUText Support](http://simbio.com/support/simutext) (<http://simbio.com/support/simutext>)

REASONABLE ACCOMODATIONS

Morehouse College is committed to removing barriers and providing equal access for students in course instruction or design. If you have been diagnosed with a documented disability and reasonable accommodations are necessary to provide equal access, please contact the Office of Educational Accessibility (OEA) at sas@morehouse.edu. You should request accommodations as early as possible since they make take time to implement. If adjustments to their communicated accommodation plan are needed, you should notify OEA at any time during the semester.

ACADEMIC HONESTY

Morehouse College students are expected to conduct themselves with the highest level of ethics and academic honesty at all times and abide by the terms set forth in the Student Handbook and Code of Conduct. Instances of academic dishonesty, including, but not limited to plagiarism and cheating on examinations and assignments, are taken seriously and may result in a failing grade for the assignment or course and may be reported to the Honor and Conduct Review Board for disciplinary action.

Although much of the work we do in this course will require that we pool data and construct a single class data set, each of you is expected to do your own work on all assignments, in-class quizzes, take-home quizzes, and all writing assignments. You will be expected to make your own figures and tables and write your own prose for these assignments.

Copying or paraphrasing someone else's prose (from a fellow student or a published reference), using someone else's figure or table (even if it is based on the same data as a figure or table you could make) or submitting someone else's work as your own is plagiarism. Giving a literature citation is not sufficient. We require that you submit work that you have written yourself in your own words. Sentence-long quotations (even if fully referenced) will not be accepted. Sharing your written work with fellow students will very likely result in you receiving a zero grade as it will be impossible to tell who copied whom. Allowing others to freely copy your work will result in accusations of plagiarism against both the honest and dishonest students. At a minimum, plagiarism will result in a failing grade and a report to the Dean of Students.

BIO 114L Final Seminar Rubric

The Final Seminar evaluation rubric is a modified version of the rubric for Senior Seminar in Biology. This rubric will be posted to BlackBoard and will be distributed in hard copy with this syllabus.

Academic Honesty

If any one of the following is true, the score for the entire assignment is **ZERO**. If you obtain **two** assignments with a score of ZERO for violations of academic honesty you will get an F in the course and will be reported to the Dean of Students.

Copying and pasting text directly from the laboratory handout to your paper, with or without attribution.

Direct quotations from another student or a published source without quotation marks or without attribution.

Direct quotations (with minor editing) presented without quotation marks or without attribution.

Extensive use (more than one sentence) of direct quotations with quotation marks and attribution.

Reprinting graphs or tables prepared by another student.

Reprinting graphs or tables from published source without attribution.

Introduction (_____ out of 40 points possible)

Statement of question addressed and context using scientific literature for the current study provided: 40 points

Statement of context or question missing: 24 points

Statement of question missing and context insufficient: 8 points

Results text (_____ out of 40 points possible) with a brief description of how you collected your results

Description and statistical summary of findings (average values, total counts for each treatment) in prose: 40 points

Description but not statistical summary of findings in prose: 32 points

Statistical summary of findings but not description of results in prose: 24 points

Raw data presented without statistical summaries: 8 points

Results prose missing: no points

Results figures and tables (_____ out of 40 points possible)

Description and statistical summary of findings (average values, total counts for each treatment) in graphs or tables: 40 points

Description but not statistical summary of findings in graphs or tables: 32 points

Statistical summary of findings but not description of results in graphs or tables: 24 points

Raw data presented in graphs and tables: 8 points

Results in graphs and tables missing: no points

Discussion (_____ out of 40 points possible)

Interpretation of results to reject hypotheses and address the question posed in the Introduction, **and** provide a broader context on the meaning of the findings: 40 points

Interpretation of results to reject hypotheses and address the question posed in the Introduction, but no context on the meaning of the findings provided: 32 points

Interpretation of results to reject hypotheses provided but the question posed in the Introduction not addressed: 24 points

Interpretation of results to reject hypotheses and address the question posed in the Introduction not provided: 8 points

Discussion missing: no points

Literature Cited (_____ out of 40 points possible)

Scientific literature (3 - 5 SCIENTIFIC journal articles) cited in both the Introduction and the Discussion to provide context. In text, citations use Author, year method and full citation provided in Literature Cited: 40 points

Scientific literature cited in both the Introduction and the Discussion to provide context. In text, citations use Author, year method, Literature Cited provided but contains references not cited in the prose: 36 points

Scientific literature cited in both the Introduction and the Discussion to provide context. In text, citations use Author, year method, but only two scientific articles cited: 32 points

Scientific literature cited in both the Introduction and the Discussion to provide context. In text, citations use Author, year method, but only one scientific article cited: 28 points

Scientific literature not cited in prose, but a Literature Cited or References list provided: 24 points

Scientific literature not cited and Literature Cited or References missing: no points