

BIOL-1200. Explorations in Biological Chemistry Summer 2023

Class time: Monday-Thursday 1-3pm

Office hours: Monday-Thursday 12-1pm

GUSS: TBD

Locations: Regents 361 and 371

Faculty (contact info):

Prof. Heidi Elmendorf (hge@georgetown.edu)

Prof. Jeanetta Floyd (jf1605@georgetown.edu)

And we'll be joined by:

Prof. MC Chan (mc2198@georgetown.edu)

Prof. Allie DeCandia (ald86@georgetown.edu)

Prof. Manus Patten (mmp64@georgetown.edu)

SAA (contact info):

TBD

TBD

Enrollment: Limited to students in the Regents STEM Scholars/Community Scholars Program.

Required-ish text:

Biology: How Life Works. Morris, James, et al. 3rd edition. ISBN:9781319017637.

- It's perfectly fine to use an earlier edition.
- This is the same text used in BIOL-1203/1204.
- You do not need to bring this to class.

Course materials:

- Laptop/tablet
- Notebook for notes (we'll provide printouts of slides, lab materials, etc)
- Lab notebook and pens (we'll provide)
- You do need to bring these to class.

Course description:

This is a hands-on research-intensive course in which students undertake an authentic research project as part of a scientific team. Through the course, students undertake the design, execution, and analysis of a series of experiments studying the microbiomes important to our local agriculture, specifically the microbes involved in the winemaking process. It is well known that brewer's yeast, *Saccharomyces cerevisiae*, is chiefly responsible for converting grape sugars into alcohol, but we don't yet fully understand how the thousands of other microbes in the soil, on the grapes, and in the barrels contribute to the "microbial terroir" of wine. Students will be exposed to principles and techniques of cell culture, genomics, molecular biology, and microbial ecology and will develop skills in writing, computation, and scientific research. The course culminates with a public research presentation.

Belonging in our Community

We are committed to the creation of a just and equitable community that welcomes and includes a diverse population of individuals. We want each of you to bring your whole self and feel that you belong here with, bring value to, and are held in esteem by this community. We ask that each of you pause and consider these community goals. As members of our community, each of us – including professors and students – has a responsibility to build and nurture the full community and the individuals in it. Enrolling in this course means that you are committing to these values and will act in accordance with them.

There are scientific, educational, and moral grounds to support our commitment.

- Increasing diversity in STEM increases the pace of discovery and advancement in the field. Discoveries are made by those who think differently from ones who came before them. Science happens because of diversity.
- Diverse communities that practice inclusion – in business, in science, and in schools – have been shown again and again in studies to benefit every member of the diverse team and to result in better outcomes. You will learn more and thrive in a more diverse and inclusive course.
- Higher education is the key to social mobility – the American Dream – and upward social mobility is essential for a thriving economy and democracy. Yet higher education is inherently, however, an inequitable system. Changing that system and increasing diversity and opportunity in STEM is the right thing to do for individuals and for society.
- We are Georgetown, an institution of higher education that because of its Jesuit identity and fraught history with slavery, brings a special obligation to holding ourselves to the highest standards of diversity, equity, and inclusivity. Striving to be better tomorrow than we are today is a promise we owe to ourselves and to you.

Within the context of this course, it is important that all students have a reasonable chance to learn and succeed. You each come with different strengths and have areas where you need help. Our hope is that we will build a class culture where each of you feel confident enough to share your strengths and help one another where appropriate. It is also important that you feel safe and have a sense of belonging in the community we will build together, such that you can bravely share your vulnerabilities and learn to correct and improve on your weaknesses.

If during the course of this semester, you face external or internal challenges and factors that affect your ability to succeed in the course, please tell us. We will try to help – ourselves or by reaching out to the broader Georgetown ecosystem. Of course, you are also welcome to reach out to your dean or health professionals. Remember that we are here to help you succeed. Every one of us, every one of you.

Thank you.

Course Structure:

1. Students are expected to attend and actively participate in class/lab. Absences need to be excused. The class is designed to provide ample time to DO science and to LEARN/TALK about science. You will need to be actively engaged – with the material and with each other – each and every day in class to get the most out of this educational experience.
3. To be prepared, you will need to complete the assigned readings before class. All readings are either from your textbook OR are articles from the scientific literature. We will work with you on learning to become an active reader.
4. Homework is important and there will be three each week! They are intended to help you reflect on your understanding of the completed class and be prepared for the next class. We hope that will serve as a motivator for attendance at office hours and GUSS! These will appear as “quizzes” on Canvas – don’t worry about the language... they are Homeworks and you can use all of your materials, your brain, the resources of the GUSS, etc). The Homeworks are due by midnight.
6. There will be three exams in weeks 2, 3 and 4 of the course. These will be based on the previous week’s material and will be short answer questions. The first part of the exam will take place on Tuesday. You’ll need to study for this, and you’ll take it solo. On Thursday, we’ll hand back your graded exam, give you time to talk with a few of your classmates and look up information, and then you’ll answer two more “push” questions with those same classmates.

Overall, we will be structuring our research efforts into three interwoven threads of research, each focused on an analysis of the microbiome: (1) using biotechnology techniques that focus on molecular aspects, (2) using classical microbiological techniques that focus on cellular and biochemical aspects, and (3) using bioinformatics techniques that focus on community ecology and evolutionary aspects. Everyone will have the opportunity to engage in all three approaches.

Learning Goals:

1. Live life for 5 weeks as a scientist
 - a. Note that this isn’t about being a science student. It’s about being a legit scientist.
 - b. Embrace the creative opportunities of research. Science rewards a good imagination.
 - c. Commit to persevere through the challenges of research. Doing something for the first time means a high rate of failure. Embrace it and learn from it.
 - d. Know that the success of your research depends on you and on your research community. Investing in them is investing in yourself.
2. Adjust to the college STEM ecosystem
 - a. Recalibrate to college-level academic expectations and learn how to find out what those expectations are.
 - b. Develop new study and work habits that help you meet these expectations.
 - c. Understand the roles and responsibilities of students, professors, and TAs.
 - d. Learn about the academic safety net and how to build your own support group.

3. Gain comfort with foundational concepts and skills of natural and computational science that ground this project
 - a. microbiology - the basics of bacteria and fungi
 - b. biochemistry - the basics of metabolism especially fermentation!
 - c. molecular biology - DNA structure and replication
 - d. ecology - biodiversity and its quantification
4. Develop scientific communication skills
 - a. Embrace the idea that the best way to learn a new conversation is just to try speaking it!
 - b. Recognize the ways that scientists construct arguments in their communications
 - c. Gain familiarity with the basic genres of scientific communication
 - d. Gain comfort reading and interpreting scientific papers
 - e. Write clear and concise scientific lab write-ups
 - f. Speak about science clearly and effectively

Grading:

Homework (~4/week)	56%
In Class Participation	15%
Exams	21%
<u>Final Presentation</u>	<u>8%</u>
Total	100%

The course will total to 100 points. You can readily keep track of your course grade this way. The following scheme is used to calculate end-of-semester grades. We do not round up.

$A \geq 93.0\%$; $90.0\% \leq A- < 93.0\%$; $87.0\% \leq B+ < 90.0\%$; $83.0\% \leq B < 87.0\%$; $80.0\% \leq B- < 83.0\%$; $77.0\% \leq C+ < 80.0\%$; $73.0\% \leq C < 77.0\%$; $70.0\% \leq C- < 73.0\%$; $65.0\% \leq D < 70.0\%$

Campus Resources:

Faculty

We are a vitally important resource. Make strong connections with your faculty early and often. A prominent study conducted at Harvard several years ago found that one of graduates' greatest regrets was not forging stronger connections with faculty. And a nationwide study from 2014 (and replicated in the years since) found that lifelong well-being (professional and personal) were highly correlated with 6 factors of an undergraduate experience: two of the six relied on intellectually and emotionally supportive relationships with faculty. Invest in your lifelong well-being and connect with us now! That's one reason why we are giving you the opportunity to get to know five science professors in the course (the other reason is that we're each going to teach you our area of expertise). And we'll have other professors stop by as guests during the summer.

SAAs and the GUSS

The GUSS (pronounced “Goose”) is staffed by the course SAAs and is a great, great, great resource. It will be open nightly Sunday-Wednesday; hours TBD.

Community Scholars Program (CSP) and Center for Multicultural Equity and Access (CMEA)

Of course!

Georgetown Scholars Program (GSP)

You are all automatically GSPers (in addition to being RSSPers and CSPers). They have great complementary resources to CSP, so connect there early!

Lauinger, Blommer, and Dahlgren Science Libraries

Georgetown librarians are an awesome resource! You can often contact them online or just drop by the front desk of any library. Make an appointment and get to know the librarian, too. It can be a low-key 5 minute thing!

Writing Center

The Writing Center is a great resource for everyone to get an extra set of eyes on their writing during the developmental process. Check it out: writingcenter.georgetown.edu

Academic Resource Center (ARC)

If you believe you have a learning challenge that will affect your ability to succeed academically, you should contact the Academic Resource Center (arc@georgetown.edu) to register as a student with a disability or for an evaluation referral. MANY students have these challenges, and it's important to take them seriously and get the help you need to do your best work. You can access the ARC website at <http://ldss.georgetown.edu/>.

Counseling and Psychiatric Services (CAPS)

CAPS self-describes its mission as “CAPS is dedicated to helping students develop greater self-understanding, identify and solve problems, and improve academic performance through the alleviation of psychological, emotional, and cognitive barriers.” Check them out at (<https://studenthealth.georgetown.edu/mental-health/>) to see their services and summer hours; during the regular academic year they have offices in Darnall and staff in CMEA and GSP, too.

Policies:

Absences

Class attendance is very important for your success - not the least because this is a lab-based course. But we know that absences will happen (illness, family emergency, religious observance, etc). If you need to miss class, please do the following:

- Email the professors ahead of class to explain your absence.
- Be sure to get notes from a peer and check in with a professor when you return so we can help you catch up!

Academic Integrity

As signatories to the Georgetown University Honor Pledge, and indeed simply as good scholars and citizens, *you are required to uphold academic honesty in all aspects of this course*. You are expected to be familiar with the letter and spirit of the Standards of Good Conduct outlined in the Georgetown Honor System and the Honor Council Website. *As faculty, we too are obligated to uphold the Honor System, and will report all suspected cases of academic dishonesty*. Written work submitted by students for credit may be subject to www.turnitin.com, a web-based plagiarism detection service at the discretion of the faculty. Please carefully cite all sources (web, textbook, etc) in your written assignments. The tip sheet for scholarly research is helpful to all students and can be found at <http://www.library.georgetown.edu/tutorial/tipsheet>. Please refer to http://gervaseprograms.georgetown.edu/hc/honor_system.html for more information.

Late Policy

We expect assignments to be completed on time. If you find yourself running behind on deadlines, please reach out to us for help managing your schedule. This summer is an important opportunity to find a study system that works for you in college - and to get comfortable talking with faculty when you are struggling.

Religious Observances Policy

Georgetown University promotes respect for all religions. If you need to miss a class, assignment, or exam on a given day due to observance of a major holiday or related travel, please notify us ahead of time. And know that you are still responsible for that day's course content.

Sexual Misconduct

Please know that as faculty members we are committed to supporting survivors of sexual misconduct, including relationship violence, sexual harassment and sexual assault. However, university policy also requires us to report any disclosures about sexual misconduct to the Title IX Coordinator, whose role is to coordinate the University's response to sexual misconduct. Georgetown has a number of fully confidential professional resources who can provide support and assistance to survivors of sexual assault and other forms of sexual misconduct. More information about campus resources and reporting sexual misconduct can be found at <http://sexualassault.georgetown.edu>

Week 1: July 8-12 Laying the Foundation	<ul style="list-style-type: none"> • Creating our community • Introducing wine, microbes, plants, and communities • Discussing experimental design and scientific communication • Glen Manor Field Trip and sample collection 	
Week 2: July 15-18 Molecular Biology, Community overview & Sample selection	<ul style="list-style-type: none"> • Isolate DNA from soil/grape samples and submit for sequencing • Culture and observe microbial communities from our samples • Select colonies for detailed identification • Perform PCR and gel electrophoresis to identify selected colony 	
Week 3 and Week 4: July 22-25 July 29 to August 1 In-depth research	Community Structure and Computational Biology <ul style="list-style-type: none"> • Bioinformatic analysis of sequence data • Quantitative analyses of microbiome diversity 	Microbiology and Biochemistry <ul style="list-style-type: none"> • Microscopy analyses • Metabolic analyses
Week 5: August 5-8 Wrap-up & Presentations	<ul style="list-style-type: none"> • Identifying final research foci • Creating a research presentation • Sharing with a broader campus and scientific community 	

WEEK ONE

Our focus is three-fold:

- Research
 - Discussing experimental design basics
 - Looking at the scientific literature as a representation of the scientific process
 - Applying these ideas to designing the research project.
 - TRIP TO GLEN MANOR ON FRIDAY.
- Learning the most basic foundational biology and applied context for the research project
 - Wine making
 - Microbes and Fermentation
 - (Microbes and) Botany
 - Communities and Diversity
- Belonging and succeeding in college
 - Introductions and forming our own community
 - Learning in class - taking notes and asking questions.
 - Learning outside of class - office hours, GUSS, and studying
 - Doing science makes you a scientist

Sunday July 7

- Homework due tomorrow: [Complete the class pre-survey](#)
- [Links to an external site.](#)
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Monday July 8

- Today's focus:
 - Welcome and ice breakers
 - Lecture: Project overview - wine production (Prof Elmendorf)
 - Lab notebooks
 - Mini-Experiment #1: "How to Collect a Quick Microbiome for Culturing and Analysis" (p.9) (Set up)
- Homework for tomorrow:
 - Read this page , the Syllabus, and the Lab Rules pages on the Canvas site carefully. Look around the rest of the Canvas site just to orient yourself.
 - Read [I Contain Multitudes Chapters 1 and 2](#)
 - Optional:
 - <https://www.youtube.com/watch?v=xoOBJPNnNEQ>
 - (growing the grapes)

- <https://www.youtube.com/watch?v=2PlvfUvIBvg>
 - (making the wine)
- [Homework #1](#) (submit by 11:59 p.m. tonight)

Tuesday July 9

- Today's focus:
 - More ice breakers
 - Lecture: Microbes and microbiomes (Prof. Floyd)
 - Mini-Experiment #1: "How to Collect a Quick Microbiome for Culturing and Analysis" (p.9) (first viewing)
 - Mini-Experiment #2: "Investigating and Observing Fermentation" (pp.11-12)
- Homework for tomorrow:
 - [Gilbert et al. \(2014\) "Microbial Terroir for Wine Grapes"](#)
 - [Homework #2](#) (submit by 11:59 p.m. tonight)

Wednesday July 10

- Today's focus:
 - Check in on note taking
 - Lecture: Communities, Diversity, and Botany (Prof. Elmendorf)
 - Mini-Experiment #3: "Strawberry DNA Isolation" (pp.13-14)
- Homework for tomorrow:
 - Just a quick peek at: [Cureau, et al. \(2021\) "Year, Location, and Variety Impact..."](#)
 - We will read it together in class tomorrow (and will hand out hard copies), but you want to at least see it before then!
 - [Homework #3](#) (submit by 11:59 p.m. tonight)

Thursday July 11

- Today's focus:
 - Lecture: Scientific design and communication
 - Planning the research project
- Homework:
 - To be done tonight: [Homework #4](#) (submit by 11:59 p.m. tonight)
 - To be done for Monday: Read the lab protocol for DNA isolation

Friday July 12

- FIELD TRIP TO GLEN MANOR VINEYARD
- 6:45am departure!!!

WEEK TWO

Our focus is three-fold:

- Research
 - Isolating and examining DNA from our vineyard samples
 - Culturing samples from our microbiome collections
- Learning
 - Molecular biology: DNA structure, PCR as a form of DNA replication, gel electrophoresis
- Belonging and succeeding in college
 - Making it through the first exam

Sunday July 15

- Work to do tonight:
 - Carefully read the two labs on pp. 17 and 21 of the Lab Manual (DNA extraction protocol; Microbial Community Plating).

Monday July 16

- Today's focus:
 - Lab - A mad scramble to isolate DNA from our vineyard samples. This will be a very full two hours!
 - Lab - initial culture of the microbiome samples from soil/grapes
- Work to do tonight:
 - STUDY for Exam #1a
 - We've provided a [study guide](#), and [last year's exam](#)
 - [Download last year's exam](#) and [answer key](#)
 - This exam will be closed notes, and you work on it alone.
 - GUSS, GUSS, GUSS!!!
 - Covers material from Monday-Thursday last week: microbes, botany, communities, diversity, experimental design, and scientific paper reading.

Tuesday July 17

- Today's focus:
 - Exam #1a - microbes, botany, communities, diversity, experimental design, and scientific paper reading.

- Lab - First data collection! Record microbiome appearances on the petri dishes; replica plate onto nutrient agar + CHX
- Class - DNA structure and function ([ppt](#) , [pdf](#))
- Work to do tonight:
 - [Chapter 2.5](#)
 - (the nucleic acid part) and Chapter 3.2. (pdfs on Canvas)
 - Also... if the textbook feels too meandering, don't hesitate to look things up in Khan Academy!
 - [Homework #5](#) (submit by 11:59 p.m. tonight)

Wednesday July 18 - Prof. Chan joins us!

- Today's focus:
 - Lab - Colony PCR and streak out your chosen 1 or 2 colonies onto a master plate.
 - Class - DNA replication as it is performed in PCR
 - A bit of review
- Work to do tonight:
 - [Homework #6](#) (submit by 11:59 p.m. tonight)
 - STUDY for Exam 1b!!!
 - We've provided [last year's exam](#) and [answer key](#)
 - Remember that on this version you can use your notes and lab partner.
 - Read: PCR Colony Lab pp. 29-32 in Lab Manual.
 - Readings/viewings: PCR can be confusing, so we're providing links to 4 different videos that help to explain it. Feel free to watch all - or just the one(s) that you find most helpful!
 - [A rather formal but brief explanation](#)
 - [A more detailed version](#)
 - [The Amoeba Sisters' rendition](#)
 - [Prof. E's Froot Loops hands-on demo!](#)

Thursday July 19 - Prof. Chan joins us!

- Today's focus:
 - Exam #1b
 - Lab - Gel electrophoresis
 - Class - Gel electrophoresis principles
- Work to do tonight:

- [Homework #7](#) (submit by 11:59 p.m. tonight)
- Read: Gel electrophoresis lab, pp. 32-34 in Lab Manual.
- Pick your readings/viewings: Again, a bit complicated, so we're providing a few possible videos and a reading.
 - [Review PCR: Quick overview of what happened last night.](#)
 - [The brief and formal version of gel electrophoresis.](#)
 - [Again, a bit more detail](#)
 - Oh... and Khan Academy is always a good read.

WEEK THREE

- Week 3 Group/Pair Assignments:
 - Group 1:TBD
 - Group 2:TBD
- With Prof. Elmendorf: Basic tools of sequence analysis
- With Prof. Floyd: Morphological and biochemical methods for microbiome analyses
- Exam #2 and 2b

Monday July 22

- Prof. E w/ Group 1- DNA Sequence Analysis (BLAST)
 - Lecture - [DNA Sequence Analysis \(BLAST\)](#)
 - Lab - BLAST w/ our sequences
- Prof. Floyd w/ Group 2- microbial identification and morphology
 - Lecture - [Microbial identification strategies; Microbial morphology](#)
 - Lab - Quantifying community diversity; Gram staining.
- Work to do tonight:
 - STUDY!!! [Practice exam](#) and [Answer Key](#) are in the Practice Exams folder

Tuesday July 23

- Exam #2a - DNA concepts and lab techniques
- Prof. E w/ Group 1 - evolutionary relationships
 - Lecture - [Phylogenies](#)

- Lab - Building a phylogeny
- Work to do tonight: Homework 8E
- Prof. Floyd w/ Group 2- microbial biochemistry
 - Lecture - Basics of metabolism
 - Lab - Microscopy and first round of biochemical test set-up
 - Work to do tonight: Homework 8F

Wednesday July 24

- Prof. E w/ Group 2 - DNA Sequence Analysis (BLAST)
 - Lecture - [DNA Sequence Analysis \(BLAST\)](#)
 - Lab - BLAST w/ our sequences
- Prof. Floyd w/ Group 1 - microbial identification and morphology
 - Lecture - Microbial identification strategies; Microbial morphology
 - Lab - Quantifying community diversity; Gram staining.
- Work to do tonight:
 - STUDY!!! [Practice exam](#) and [Answer Key](#)
 - are in the Practice Exams folder

Thursday July 25

- Exam #2b - DNA concepts and lab techniques
- Prof. E w/ Group 2 - evolutionary relationships
 - Lecture - [Phylogenies](#)
 - Lab - Building a phylogeny
 - Work to do tonight: Homework 8E
- Prof. Floyd w/ Group 1- microbial biochemistry
 - Lecture - Basics of metabolism
 - Lab - Microscopy and first round of biochemical test set-up
 - Work to do tonight: Homework 8F

WEEK FOUR

- Week 4 Group/Pair Assignments:
 - Group 1: TBD

- Group 2: TBD
- With Profs. DeCandia and Patten: Community analyses
- With Profs. Elmendorf and Floyd: Fermentation and the Nitrogen cycle
- Exam #3 and 3b

Monday July 29

- Group 1 (w/Prof DeCandia) - diversity measures, community ecology
 - Lecture - [Quantifying diversity](#)
 - Lab - analyzing 2021 data for practice
 - [Data Analysis Template](#)
 - - *be sure to make a copy and only edit the copy!!!*
- Group 2 (w/Prof. E) - microbial metabolism
 - Lecture - [Carbon Cycle and Fermentation](#)
 - Lab - Reading our nutrient agars. Catalase test. Setting up fermentation and nitrogen cycles agars.
- Work to do tonight:
 - STUDY!!! [Practice exam](#) and [Answer Key](#)
 - are in the Practice Exams folder

Tuesday July 30

- Exam #3a - Prof. F's half: Microbial morphology, basic metabolism, culture techniques; Prof. E's half: BLAST, phylogenetics
- Group 1 (w/Prof DeCandia) - diversity measures, community ecology
 - Lecture - [Quantifying diversity](#)
 - Lab - analyzing 2021 data for practice
 - [Data Analysis Template](#)
 - - *be sure to make a copy and only edit the copy!!!*
 - Work to do tonight: Homework 9 - DeCandia/Patten
- Group 2 (w/Prof. Floyd) - microbial metabolism
 - Lecture - [Nitrogen Cycle](#)
 - Lab - Reading&Recording our fermentation and nitrogen results; Perusing Bergey's Manual.
 - Work to do tonight: Homework 9 - Elmendorf/Floyd

Wednesday July 31

- Group 2 (w/Prof Patten) - diversity measures, community ecology
 - Lecture - [Quantifying diversity](#)
 - Lab - analyzing 2021 data
 - [Data Analysis Template](#)
 - - *be sure to make a copy and only edit the copy!!*
 - Work to do tonight: None
- Group 1 (w/Prof. E) - microbial metabolism
 - Lecture - [Carbon Cycle and Fermentation](#)
 - Lab - Reading our nutrient agars. Catalase test. Setting up fermentation and nitrogen cycles agars.
- Work to do tonight:
 - Go back to read the [paper from Week 1](#)
 - that we dipped our toes into. There are questions about this paper on the exam tomorrow!
 - STUDY!!!
 - READ the paper excerpts
 - [Practice exam](#) and [Answer Key](#)
 - are in the Practice Exams folder.

Thursday August 1

- Exam #3b - Prof. F's half: Microbial morphology, basic metabolism, culture techniques; Prof. E's half: BLAST, phylogenetics
- Group 2 (w/Prof Patten) - diversity measures, community ecology
 - Lecture - [Quantifying diversity](#)
 - Lab - analyzing 2021 data for practice
 - [Data Analysis Template](#)
 - - *be sure to make a copy and only edit the copy!!!*
 - Work to do tonight: Homework 9 - DeCandia/Patten
- Group 1 (w/Prof. Floyd) - microbial metabolism
 - Lecture - [Nitrogen Cycle](#)
 - Lab - Reading&Recording our fermentation and nitrogen results; Perusing Bergey's Manual.
 - Work to do tonight: Homework 9 - Elmendorf/Floyd

WEEK FIVE

- Monday-Wednesday: All together again to finalize analysis of our data and plan our presentation
- Thursday: Presentation day!!!
- NO EXAMS!

BEFORE MONDAY'S CLASS:

- Look through the class presentations from [2021](#) and [2022](#) and [2023](#).
- Your presentation will be unique to this cohort, but hopefully seeing two of the previous classes' presentations will give you ideas.
- Re-fresh your understanding about how to conduct the Microbial Community Analyses you did last week with Profs. DeCandia and Patten on the 2021 samples. We will be repeating these on Monday with the BRAND NEW 2024 data! *You NEED to come to class ready to do the analyses!*

Monday August 5

- Today's focus: Molecular Analysis of the Communities
 - Overview of our 2024 community-level sequence data (from the DNA we isolated from samples all the way back on Monday in Week 2).
 - Collectively brainstorm possible analyses / comparisons of our DNA sequence data.
 - In pairs, we'll perform these analyses and generate three appropriate graphs for each comparison:
 - Shannon Diversity
 - Stacked Bar Graph
 - Principal Component Analysis
- Work to do tonight:
 - [Homework #10](#): this homework will ask you to create slide(s) in a shared powerpoint. Your slide(s) will include the question you asked, the graphs that you created from your work today, AND will include a quality title, caption, and conclusion.

Tuesday August 6

- Today's focus: Morphological and Metabolic Analyses of Representative Populations
 - Review of our morphology and metabolic analysis results
 - Collectively brainstorm possible morphological & biochemical analyses / comparisons.

- In pairs, we'll perform these analyses and generate the appropriate figures.
- Work to do tonight:
 - [Homework #11](#): this homework will ask you to create slide(s) in a shared powerpoint. Your slide(s) will include the question you asked, the graphs that you created from your work today, AND will include a quality title, caption, and conclusion.

Wednesday August 7

- Today's focus:
 - Plan and assemble the presentation from the data slides we made over the past two days and from other slides we want to include that help us to tell the story of our research. Each pair of students will be assigned two slides to create and present.
 - Practice presenting each slide
- Work to do tonight:
 - [Homework #12](#):
 - This homework will ask you to create a slide in a shared powerpoint. Your slide will be your part of the shared presentation.
 - You should also look at and add comments - in the Notes section below the slides - on other slides to help polish the presentation. Do NOT edit anyone else's slide - just make suggestions!
 - Keep practicing your part of the presentation!!!

Thursday August 8

- Final Presentations
 - Lunch at noon for us and a dress rehearsal presentation!
 - Guests will join at 1pm for lunch
 - The presentation will go from 1:30-2:30pm
 - Guests may stay afterward to chat.