

# **BINF2111 - Introduction to Bioinformatics**

## **Computing**

## **Course Introduction**



**Richard Allen White III, PhD**  
**RAW Lab**

**Lecture 1 - Tuesday Aug 24<sup>th</sup>, 2021**

# Learning Objectives

- Introduction Dr. White III and his RAW lab research
- Go through the Syllabus on Canvas
- Calendar and Schedule
- Computer set-up
- Introduce github page

# Introduction general

- Dr. Richard Allen White III & Jose Figueroa

Tell us a little about yourself?

- Name
- Major
- Why this course?
- Main career goal (currently)
- Favorite food

# What is bioinformatics?

Bioinformatics is an interdisciplinary field which harnesses computer science, mathematics, physics, and biology that **harnesses computation to understand biology**.

Computational biology = Bioinformatics

# Introduction - Term Experiment

- What are the key words when you think of bioinfomatics?
- Pick three words you know or have heard of.
- Link  
<https://docs.google.com/forms/d/10qCDySV757IfY51m1PUVpF8674stcIJQ3nNrHi3APbM/edit>
- Word cloud for next class

# Introduction – How many?

- How many people do you know in the class?
- Select one option (0, 1, 2, 3, >3)
- Link  
<https://docs.google.com/forms/d/1SK598CbJtZZMsnZ6KKMqZT8jANZ9y1O8FEhSFNcHRPU/edit>
- Results next class

# Introduction – What year?

- What year are you at UNCC?
- Select a single term
- Link  
<https://docs.google.com/forms/d/14IqA5lYwiM7EDjPQNwn7pFgBeUgiG8-oszfqsFAs0MU/edit>
- Results next class

# Introduction – What worries?

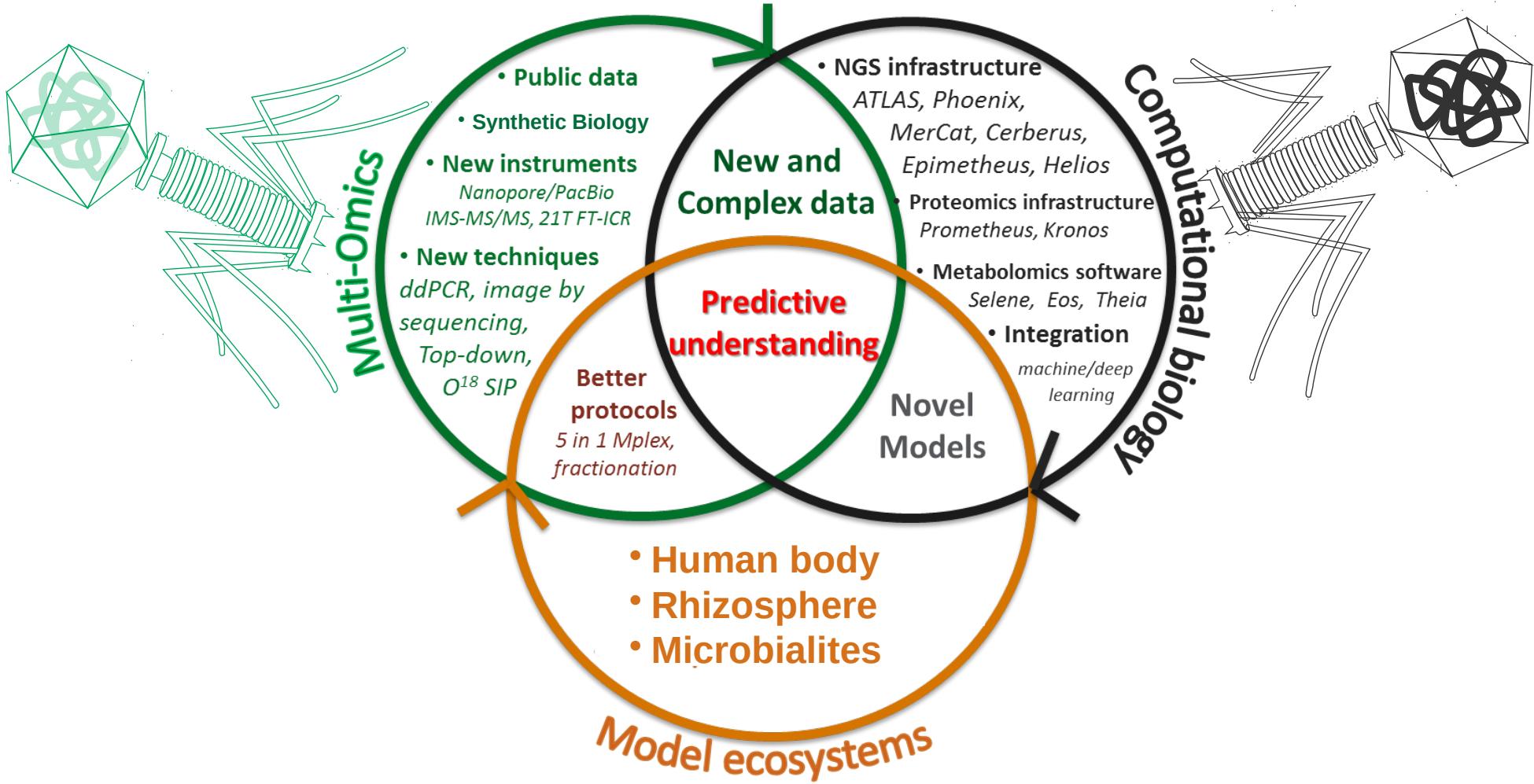
- What makes you worry the most about the course?
- Type a single term
- Link  
<https://docs.google.com/forms/d/1oVw-01LuG9JSQaAkS17cRdvsCD1XkkXJih29YBrrbfg/edit>
- Results next class

# RAW LAB

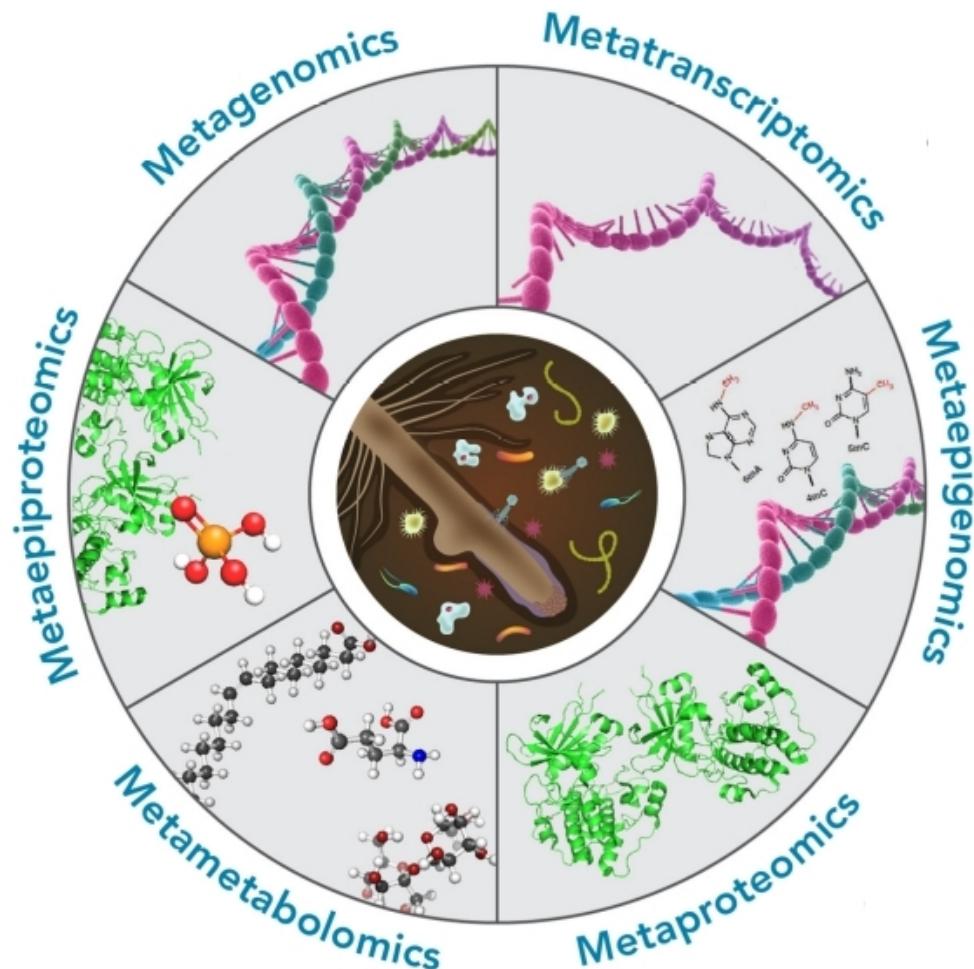
## Understanding the totality of the virome - from farm to gut

- Viral lifestyle influencing microbial-host interactions
  - Phages as therapies for human viruses
  - Phage therapy for antibiotic resistant microbes
- > Check us at [www.rawlab.org](http://www.rawlab.org)

# RAW LAB - Group Model

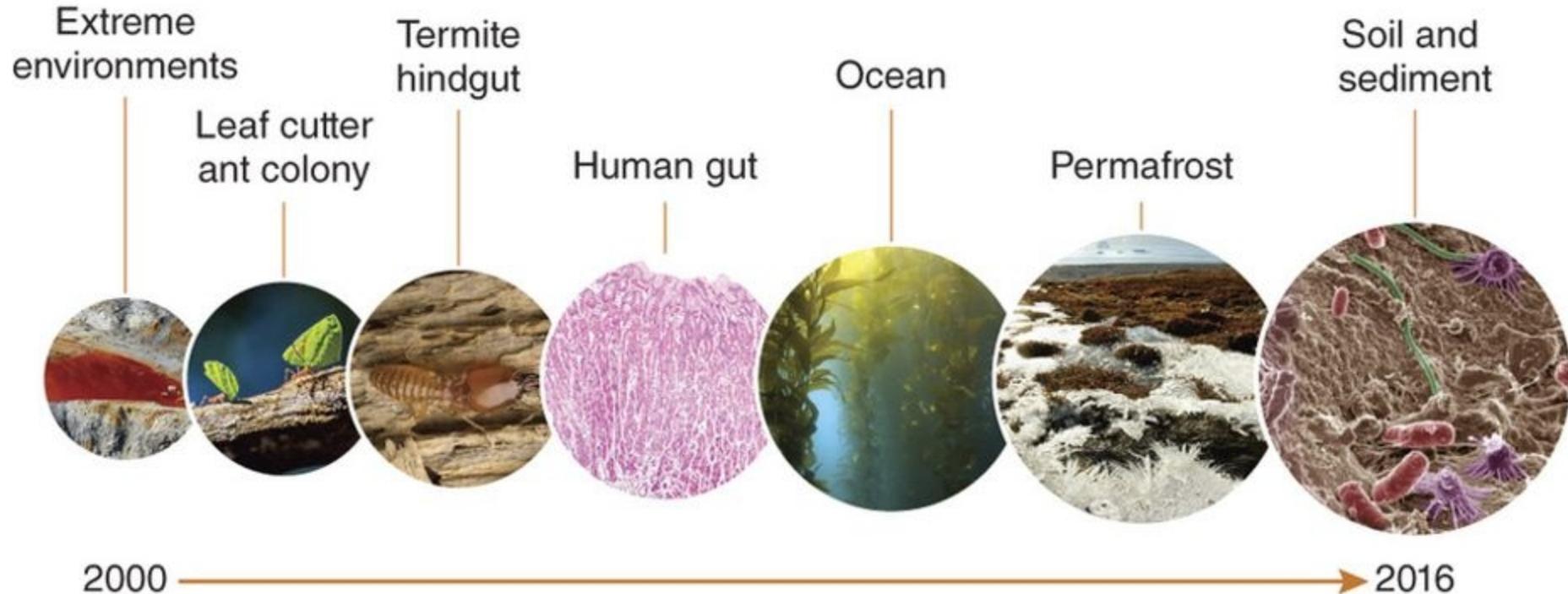


# RAW LAB – Omics terms (Wheel O' omics)

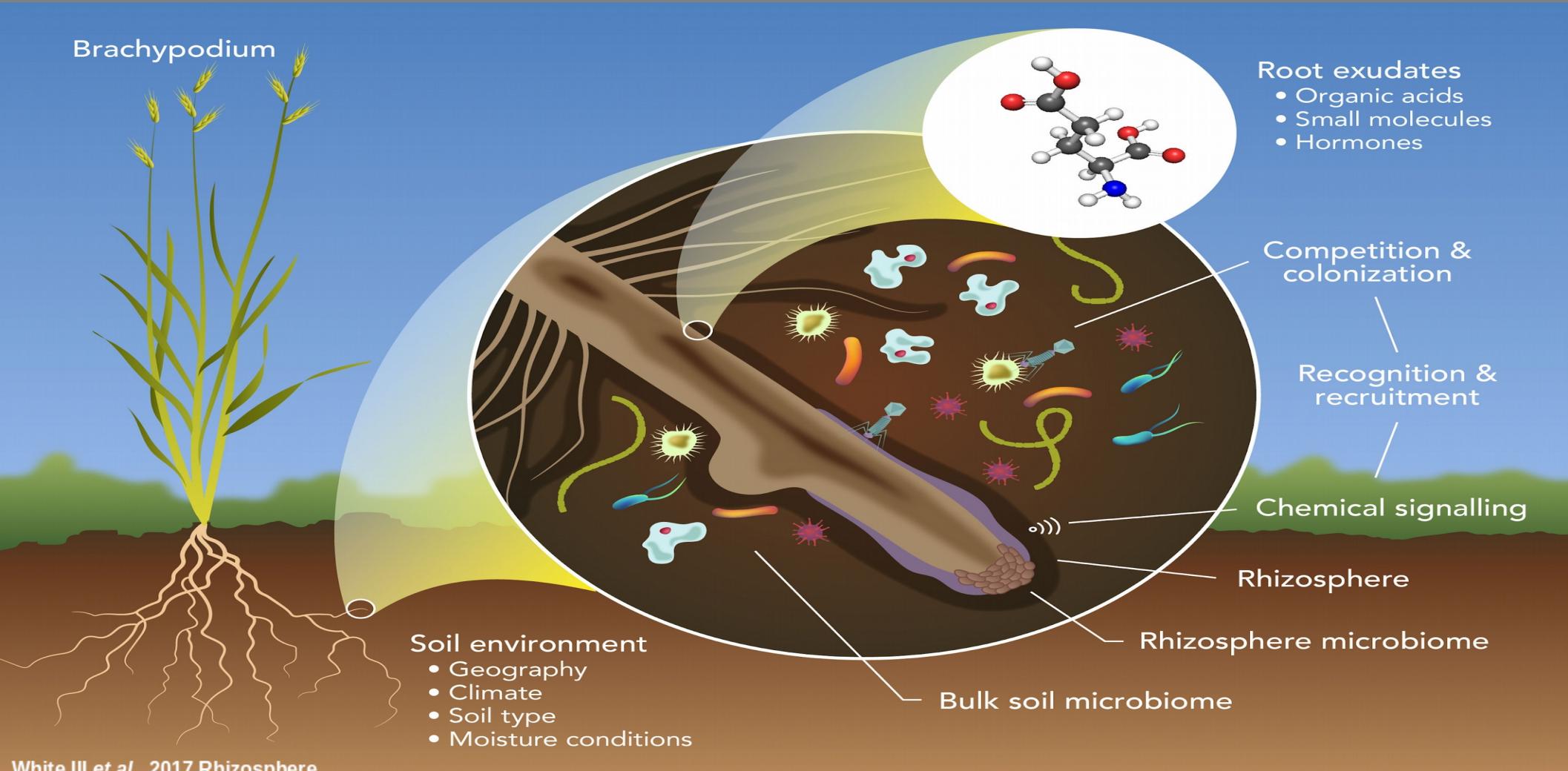


# RAW LAB - microbiomes

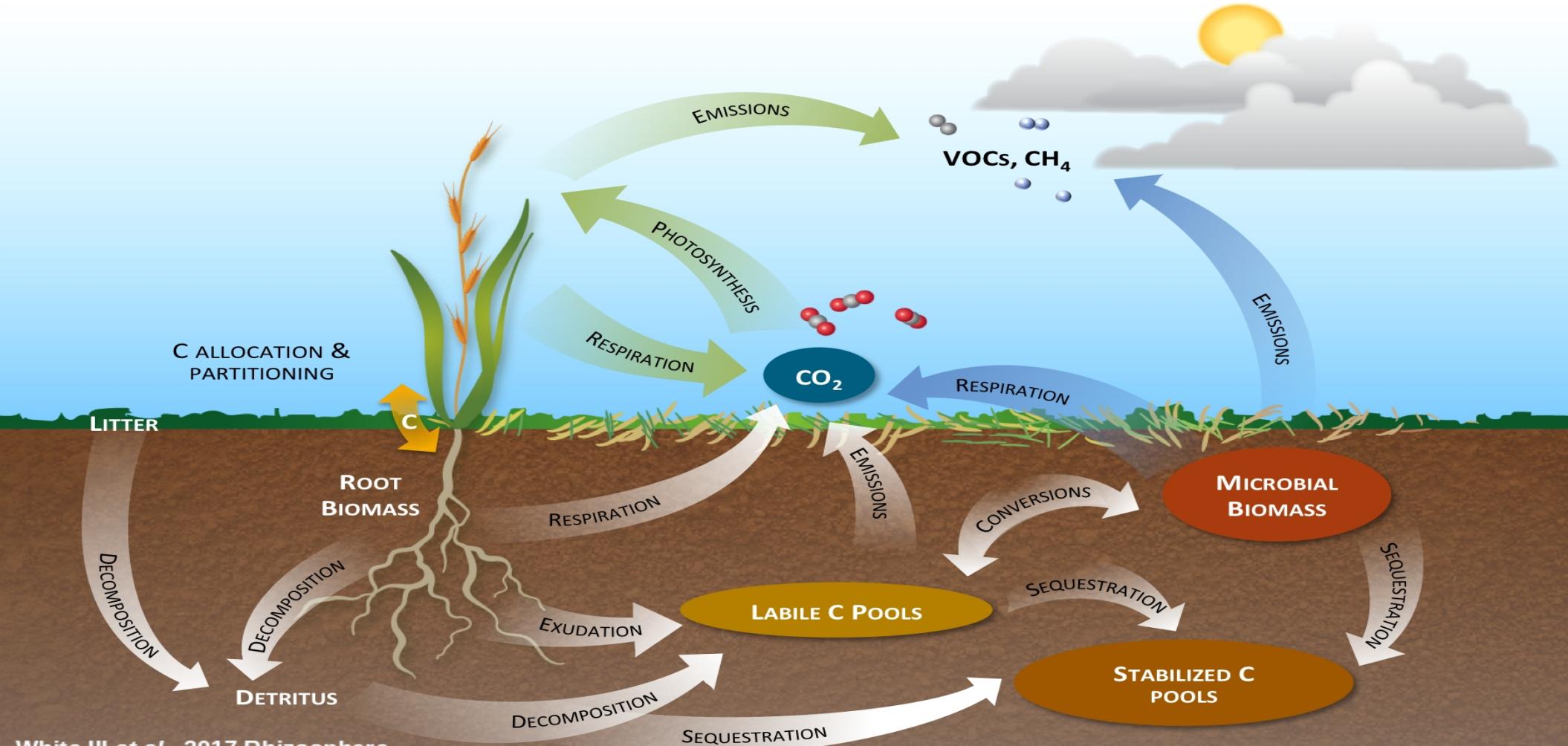
## Microbiome complexity and multi-omics analysis timeline



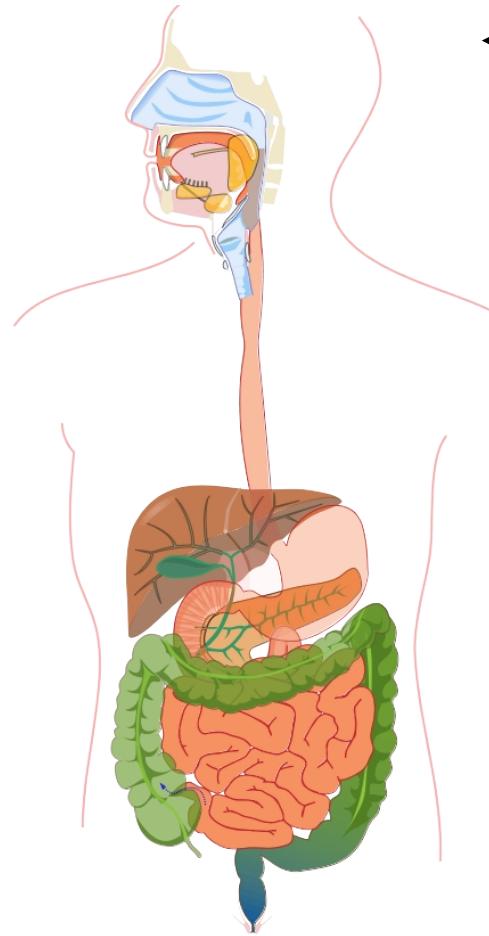
# RAW LAB - Rhizosphere impacting carbon cycling



# RAW LAB - Rhizosphere impacting carbon cycling



# RAW LAB - Human microbiome and virome



100 Trillion

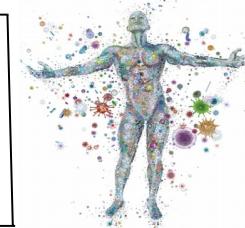
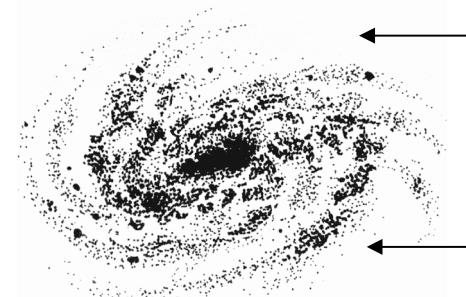
150:1 genes

5:1 viruses

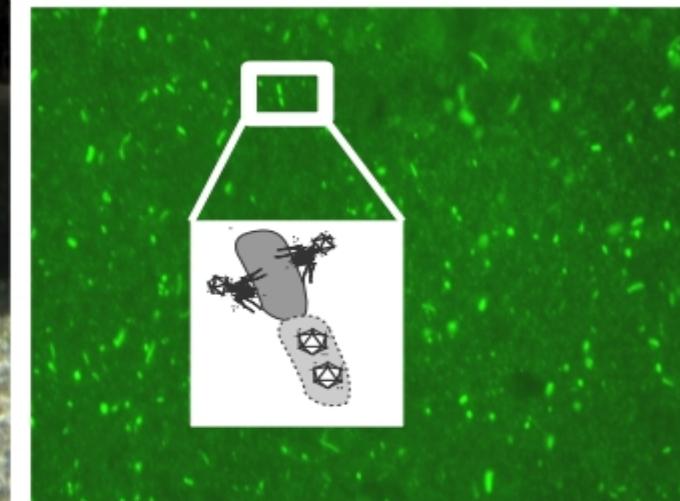
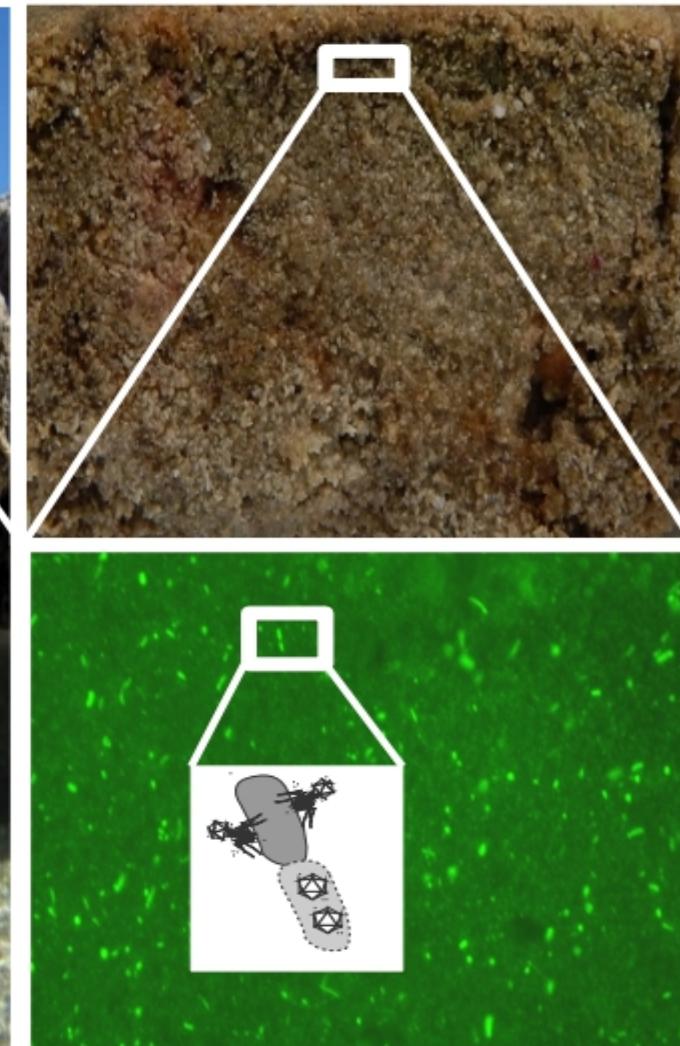
1.3x cells



2.5x  
12.5x



# RAW LAB - Modern microbialites/stromatolites



# Syllabus – essential course details

- Meeting time T/TH 11:30-12:45, TH lab 2:30-5:15 pm EST
- Office hours TH 5:15-6:15 pm or by appointment.
- Canvas
- No Slack
- Course github page (<https://github.com/raw-lab/BINF2111>)
- Bioinformatics building 217

# Syllabus – essential course details II

- Computer required (Linux or MacOX preferred, Windows possible)
- Taken BINF1101/1101L (let me know if you haven't)
- Textbooks: None required for this course
- Zero credit lab must be taken concurrently with the course
- One grade for both BINF 2111 and 2111L

# Syllabus: Objectives of the course

- Use and understand UNIX command line environment
- Use built-in UNIX commands to manipulate files and data
- Text and file manipulation (sed, grep, bioawk, python)
- Basic knowledge and use of github
- Use bash shell scripts to drive pipelines of bioinformatics programs
- Use of supercomputer for running bash shell scripts (basic slurm)
- Use python scripts to read, manipulate and write bioinformatics datafiles

# Syllabus: Grading

## ***Grading rubric***

- Lab assignments: 30% (12 Lab assignments, 2.5% each, late assignments will NOT be graded)
- Daily Quizzes: 40% (two lowest scores will be dropped)
- Mid-term Exam: 10% (5% lecture/lab)
- Final Exam: 10% (5% lecture/lab)

## ***Based on points for grading***

100-90% = A

89-80% = B

79-70% = C

69-60% = D

<59% = F or U

Any grade in-between will be rounded to the next highest grade.

While grades are important, and you should strive to get the highest marks.

The knowledge you take with you and gain will last a lifetime!!

# Syllabus: Sections Diversity, Mental health, Title IX

- Please read: An environment of non-discrimination and diversity section
- Please read: Mental healthcare and positive self-care
- Please read: Title XI reporting of sexual harassment or other related reporting
- Please read: Disability accommodations

**ANY Questions?**

# Syllabus: Course Schedule

## COURSE CALENDAR (Tentative Plan)

Week 1 (Aug 23 <sup>rd</sup> )	Introduction to UNIX and command line
Week 2 (Aug 30 <sup>th</sup> )	UNIX commands (cut, grep, etc)
Week 3 (Sep 6 <sup>th</sup> )	<u>Github</u> introduction and markdown
Week 4 (Sep 13 <sup>th</sup> )	<u>Sed/grep/bioawk</u> file manipulation, Regular expressions
Week 5 (Sep 20 <sup>th</sup> )	Bash shell scripting basics ( <b>No Class Sep 23<sup>rd</sup></b> )
Week 6 (Sep 27 <sup>th</sup> )	Bash shell/ <u>slurm</u> - <u>SuperCPU</u> operations
Week 7 (Oct 4 <sup>th</sup> )	Basic Python Commands (Part I)
Week 8 (Oct 11 <sup>th</sup> )	<b>No Classes - Student Recess</b>
Week 9 (Oct 18 <sup>th</sup> )	<b>Mid-term Exam</b>
Week 10 (Oct 25 <sup>th</sup> )	Basic Python Commands (Part II)
Week 11 (Nov 1 <sup>st</sup> )	Python loops, lists, and basic file methods
Week 12 (Nov 8 <sup>th</sup> )	Python functions, dictionaries, regular expressions
Week 13 (Nov 15 <sup>th</sup> )	Python introduction Pandas and <u>Seaborn</u>
Week 14 (Nov 22 <sup>nd</sup> )	No Classes - Thanksgiving
Week 15 (Nov 29 <sup>th</sup> )	Review of course
Week 16 (Dec 8 <sup>th</sup> )	<b>Final exam</b>

# Github page

- <https://github.com/raw-lab/BINF2111>

# Windows tutorial to install linux

- On canvas
- On our github in course materials

<https://github.com/raw-lab/BINF2111/blob/main/course-materials/Windows-Install-linux.pdf>

# Quiz 1

- On canvas now