

Syllabus for MCB Microbiology Lab

MCB2000L/MCB3020L

Summer 2024

Contact Information - Course Coordinator

Monika W. Oli, PhD

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Office: RM 1049, MCS Building

Office Hours: TBA

Website: <http://microcell.ufl.edu/directory/faculty/monika-oli/>

Instructors for each section will be announced on the first day of class.

Please contact your Instructor for any section specific questions! Contact me any time if you have unresolvable problem with your instructor!

Course time and location

Labs will be held in the Microbiology and Cell Science Building, Museum Drive, Room 1030 and 1026 (teaching labs). On the first day **please make sure you are in the right section in the correct room**. Please check on One.UF and CANVAS for your correct section before you come to the first lab. Make sure you know who your instructor is.

Labs start during the week of May 13th.

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Welcome!

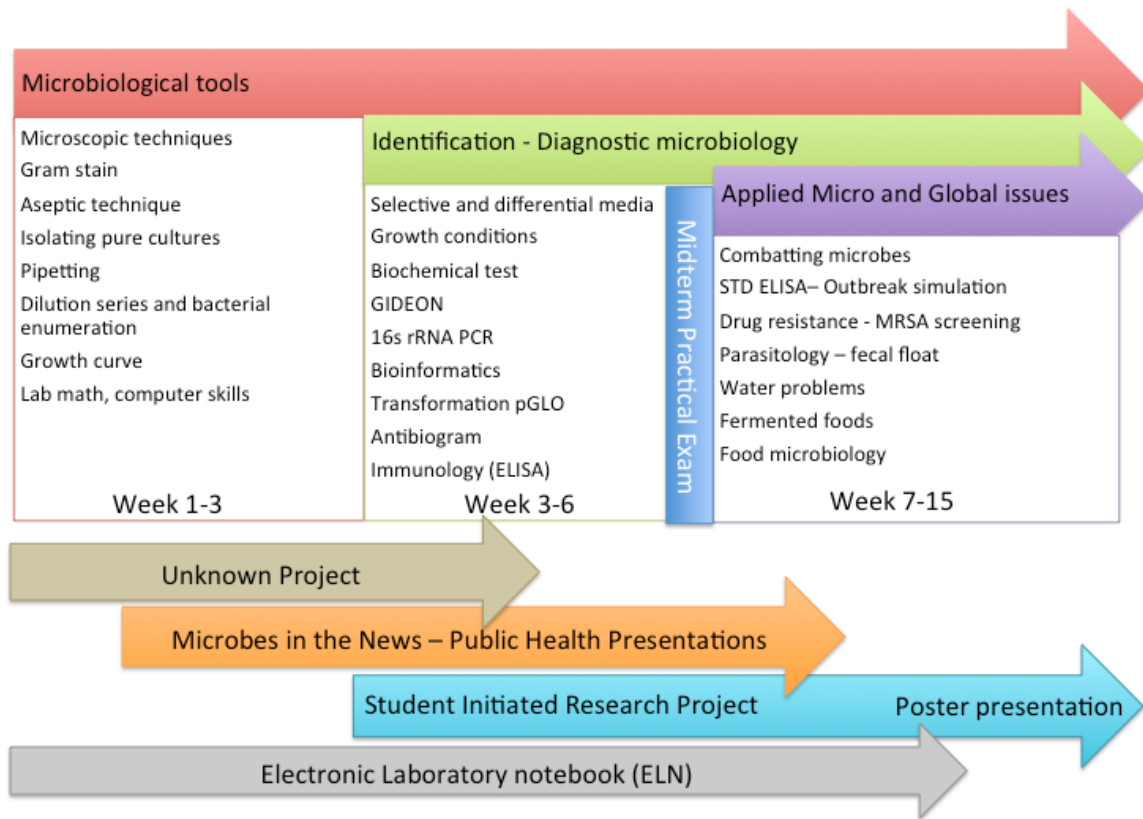
Welcome to the Microbiology Laboratory. In this course, you will learn techniques used in (micro)biology labs and you will realize how microbes affect all aspects of our lives, every day. Many of you will be familiar with some of the topics covered in the lab exercises, but hands-on experience is invaluable to really understand many of the techniques taught. Your Instructor and I will work closely with you to ensure that you have a good grasp of the topics and methods covered.

We have incorporated several projects and student-initiated activities into the syllabus as well as student presentations to provide you with a variety of learning experiences. Our goal is for you to complete the semester with the feeling that microbes are important in every aspect of our lives – and with the notion that you have learned something you can use for the rest of your life and not just to get an A!

I would like to emphasize that we are here to help you. Your Instructor and I hope to see you all during open lab or our office hours (or by appointment), especially if you have questions or need assistance.

Course Overview

This is an undergraduate laboratory course to learn and explore a variety of microbiological techniques, skills, and concepts. Topics that will be covered include visualization and enumeration of microbes, traditional, molecular, and immunological diagnostic techniques, basic techniques used in parasitology, virology, and mycology. Students will generate, analyze, and interpret data, design, and conduct a small research project and gain experience in technical writing and presentation skills. You will gain awareness about the ubiquity and diversity of microbes and the good and bad roles they play in your everyday life.



What you will know at the end of the course

A student successfully completing basic microbiology lab course will demonstrate ability to use, explain and practice.

Laboratory Safety

1. **Microbiological procedure**, including, proper lab etiquette (hand washing, disinfecting lab benches and equipment), follow methods for aseptic transfer, reporting all spills, understanding OSHA's Blood borne Pathogen Standard, proper disposal of different types of waste, following good lab practice, including returning materials to proper locations, proper care, and handling of equipment.
2. **Protective procedures**, including tying long hair back, wearing personal protective equipment (lab coats, gloves when needed, closed toed shoes); No eating or drinking in the laboratory
3. **Emergency procedures**, including, locating, and properly using emergency equipment, reporting all injuries immediately to the instructor

Laboratory Skills

1. **Use a bright field light microscope** to view and interpret slides, properly prepare slides and various stains to visualize microbes. Use standard microbiology **laboratory equipment** correctly (including, incubators, centrifuges, vortex, spectrophotometer, PCR machine, imaging system) and follow experimental protocols.
2. **Use micropipettes** and understand the correct volume and pipette tips to use for each experiment, comprehend accuracy and precision to have a good pipetting technique
3. Properly **use aseptic techniques**, to obtain and maintain a pure culture
4. **Identify unknown organisms** by using appropriate microbiological media and test systems, and molecular methods
5. **Estimate the number of microbes** using dilution techniques, spectrophotometer, and a hemocytometer; predict how various growth conditions affect the number of life cells
6. Perform and interpret a **disk diffusion assay** and understand how to test for the effectiveness of a variety antimicrobial agents
7. Perform and interpret an **ELISA assay** and know techniques how to determine antibody prevalence in a patient's immune response to pathogens
8. Be able to describe the problem of **global water contamination**, and understand the prevalence of **global occurrence of parasites**, perform and interpret a **fecal float** and conduct water purification methods to prevent water born infections
9. Get a taste how **microbes contribute to the production of various foods and drinks** and be aware of the importance of a **healthy microbiome**

Laboratory Thinking Skills

1. **Understand and apply the scientific method**, including formulation of a clear, answerable question and hypothesis; research of peer reviewed scientific literature, conduct and execute appropriate experiments with correct controls, evaluate, analyze, and interpret results
2. **Analytical skills**, including collection and organizing data in a spreadsheet, analyze and presenting data in an appropriate form (graphs, tables, figures, or descriptive paragraphs), assessing the validity of the data (means, standard deviation, significance) and drawing appropriate conclusions based on the results
3. **Communication skills**, including preparation of presentations of current topics in microbiology, developing educational materials and presenting lab results or findings to your peers
4. **"Big picture" skills**, including understanding how microbes play a beneficial and detrimental role in our lives and the environment. Students should be able to read and interpret current

news and popular literature relating to microbiology and evaluate the scientific merit of the information presented. All students should comprehend that science is not “black and white” and that new scientific findings may alter the interpretation of older dogmas. Finally, students should get a glimpse of how microbes have always shaped history and affect our everyday life in a myriad of ways.

Textbooks and Required reading

NO LABMANUAL is required. All information will be posted in CANVAS.

Vimeo Video Channel

Over the years we created numerous videos in house that will help you significantly to perform the techniques you are learning in the lab. The UF Microbiology channel is a collection of tutorials, visual aids, and educational videos to help spark the interest in microbiology and to teach students the basic skills. All videos were produced in house and are copy-written by Dr. Monika Oli, faculty at UF.

The videos are used to teach MCB2000L, 3020L and 3023L in the Department of Microbiology and Cell Science at UF.

<https://vimeo.com/channels/859405>

Quizlet Flash Cards

To help you learn this new language of “microbiology” we created a Quizlet for each module.

<https://quizlet.com/join/4SDKvWjQn>

<https://quizlet.com/class/2282683/>

You will be prompted for each set of definitions in the different modules. We hope that helps you learn!

Getting started

Course Correspondence as well as lab exercises, assignments and exams will be available via eLearning Canvas Website <http://lss.at.ufl.edu/>. If you need any help with the eLearning system, please visit the eLearning Help page at <https://lss.at.ufl.edu/help.shtml>. You may also contact the UF help desk at 352-392-HELP, Option 2.

Your section specific site is maintained and administered by your Instructor. You are responsible for the material posted in your section. I do not check email in the individual sections!

Furthermore:

1. Like the UF Microbiology and Cell Science & ASM Gators [@UFMicrobiology](#) page for interesting news and current updates; the postings can be part of the class material! <http://www.facebook.com/UFMicrobiology> you can use the topics for your public health projects.
2. All students should **sign up for “Science Daily – Infectious Disease”** (automatic email update) http://www.sciencedaily.com/news/health_medicine/infectious_diseases/ Some class

discussions will be based on current news and you can use the topics for your public health projects

3. Please Remember to check the **Announcements** and **Mail** each day in Canvas. “I did not know about the assignment, deadline...” is NOT an accepted excuse. For this course there are two Canvas sites for the course. Your instructor will have his/her own Canvas webpage where section specific information will be posted.
4. Please **bring your laptop computer or tablet to each lab**. We often will do computer-based exercises. Bring a camera, cell phone or tablet to take pictures of your lab results.
5. All assignments, projects and reports are expected to be submitted electronically through Canvas. Each assignment is processed through **Turnitin.com** and as such is checked for plagiarism.
6. **Attendance is mandatory**. Each day new techniques are taught, and it is easy to fall behind! Arriving late and not coming to class without an excused absence will affect your attendance and participation and lab etiquette grade (up to 10%)
7. Got a Question? Please come see us - we are here to help!

Expectations of the students

- Read the **Syllabus** to know your deadlines and exam schedules. Your Instructor however will announce specific days for your own section so **PAY ATTENTION!**
- **As student, you are expected to fully engage yourself in all aspects of the class.**
- You are expected to **COME PREPARED** to class and have read the assigned reading material and especially watched the introductory videos.
- You are expected to **always FOLLOW OUR LAB ETIQUETTE** (see next chapter). You have to respect the potential pathogens we are working with.
- Most importantly: **ENJOY THE LAB!**

Student evaluation

Student grades are composed through a multitude of activities, including quizzes, exams, presentations, projects, attendance, and participation. FOLLOWING INSTRUCTIONS IS A MUST as well as CREATIVITY WILL BE REWARDED.

Please check with your instructor; the % value of each category is adjusted by individual instructor.

Attendance and Participation (5%)

Attendance to all laboratory sessions is **mandatory** and your instructor will record attendance. Should a conflict arise, notify your lab instructor in advance if possible and find arrangements to make up the missed material and quizzes. Unexcused absences will result in a zero for that day's attendance. You must e-mail your instructor within 24h before/after the missed lab to qualify for makeup opportunity and provide valid written excuse.

No cheating and plagiarism are allowed. You will receive an automatic 0 without warning if caught for a particular assignment, project, or exam. You will be reported to the Dean of Student office (DSO) for cheating!

Items Graded	% Value
Participation, Attendance	20
Lab etiquette	5
Quizzes	10
Midterm Exam	20
Assignment/project	20
Projects, talks	10
ELN	15
Total	100
Extra credit	variable

Lab Etiquette (5%)

Lab etiquette is a class-based grade. All the students together are responsible to leave the lab clean and to use the equipment with care – EVERY WEEK

This includes, but is not restricted to:

- Emptying your benchtop trash container (without throwing away the bag)
- Cleaning bench before and after lab
- Making sure all items are in your lab bin when you arrive and when you leave.
 - No broken, damaged, or stained pipettes
 - 4 pipettes per pair of students
 - No strikers in the bin....
- Making sure that all items on your bench are present and in order.
- Maintain the microscope: Wiping oil of the 100X oil lens, put cover on the scope, secure the cable.
- Obtain refill tip boxes and Eppendorf tubes, microscope slides and coverslips from Instructor when you are out.
- Putting the trash in the appropriate and correct container (regular trash, biohazard trash)

Please check with your instructor for details

Quizzes (10%)

Quizzes will either be given in the lab or assigned to be completed in Canvas. This will be up to your individual Instructor. Quizzes will contain material from the upcoming lab and from any previous module. Quizzes can also contain the videos to be watched before class and the vocabulary and definitions in Quizlet. Quizzes can include material from required readings and student presentations and the following week's material. All quizzes are cumulative. The lowest quiz grade will be dropped.

Midterm Exam (25%)

Exams are designed to test your knowledge of practical skills learned in class and determine comprehension of the learned material. **For the exam but you can make your own "cheat sheet" to help you with procedures etc.** Your cheat sheet can contain procedures, examples, explanations, images, formulas, or anything else that helps you to be successful during the exam.

Practical component: a large part of the midterm is comprised of a practical exam where you have to perform the skills and techniques learned over the first weeks of class. Final exam could be a take home or practical exam. Details for each examination will be explained and discussed by your instructor. Cheating will automatically result in 0 points without warning and may lead to a report to the Dean of Students Office (DSO).

A **typical midterm** will test you on: microscopy (parts and how to use it), wet mount, identification of organisms, streak for isolation, Gram stain (and other stains), pipetting, graphing (mean + STDEV), growth curve/calculations, enumeration, lab math, identification of microbes using GIDEON and molecular techniques (bioinformatics - BLAST). Make sure you UNDERSTAND the techniques, the instruments (+microscope), the purpose and the importance of each module.

Be prepared, this is a challenging and hard exam, make sure you know how to do each technique and lab math, EVERYTHING you have learned up to that point.

Final Exam (10%)

Your final exam is determined by your instructor.

Projects, talks (10%)

Your instructor will assign various projects. Please follow the instructions of your instructor exactly. Projects can include public health projects with role play, presentations, diagnostic project, etc.

Please note, since summer classes are shorter there is unfortunately less time for projects.

Electronic lab notebook (10%)

You will keep an electronic lab notebook (ELN), which contains all your results, answers to questions, projects, observations, etc. This will help you to understand the material better. You can add any information into the ELN. Depending on your Instructor you may be asked to comply with a particular format. In general, your ELN should include the following.

- Detailed explanation of the concepts being learned that day
- Key terms/Vocabulary

- A proper protocol
- Data in the form of pictures, graphs, tables, etc.
- Results
- Conclusion
- Answer to end of chapter questions and other material as directed by your instructor

Make sure you also know the definitions and terminology as well as answering the end of module questions!!!!

Student Initiated Research Project (20%)

For the summer semester this maybe an abbreviated version due to time constraints

Each student can work on an independent research project as part of the class. You can work in groups and the project has to be approved by your instructor. Your approach has to follow the principles of scientific method. You have to submit a small research proposal and include current papers from the literature as well as a budget for your research. It is possible to conduct a bioinformatics study using existing databases. The final project will be presented as a poster during the last week of class.

Project submissions

1. Submissions after the deadline will be treated as late submissions, and 10% of the total assignment points will be deducted for each day after the deadline for 5 days; submission will not be accepted after that.
2. If you experience any problem with e-Learning system or while uploading assignments, contact the helpdesk immediately (352) 392-4357 (select option 2) or e-mail: learning-support@ufl.edu. Retain your e-mail or helpdesk ticket number as documentation of your problem.

Extra credit (no more than 5%)

With the discretion of your instructor, you may get some extra credit which can include.

- Participation in online discussion
- Bringing/sharing environmental samples for wet mount examination
- Bringing/sharing fecal samples with potential parasite eggs for the fecal float (parasitology) lab
- Bringing/sharing fermented food products for the food lab
- Sharing interesting news and articles about microbiology with your class

Extra Credit Opportunities will be available throughout the semester at the discretion of your instructor. Such Extra Credit Opportunities may include: Attending Open Lab, Presentation of current topic in class and posting it to Wiki, Wiki postings, contribution to discussion board.

Grading and final grades

We don't curve and the grading scale will not be adjusted based on class performance. After ISIS allows you to view your final grade. You have 2 weeks

A	92
A-	90
B+	87
B	82
B-	80
C+	77
C	72
C-	70
D+	67
D	62
D-	60
E	<60

to challenge your grade and request a change of grade by contacting Dr. Oli (moli@ufl.edu)

Makeup Policy

We will work with you if you provide us with a UF accepted excuse for your absence during labs or the exam. <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

We do accept school and career interviews and tests (MCAT, GRE, DAT) as excused absence - if you provide a written note or invitation to BEFORE your absence. You will work with your instructor to make up missed work. Remember: open lab is NOT intended for makeup as there will be no actual instructor. Do NOT miss your midterm exam.

Seating

Please take the same seat in each class period. We will make notice of your location in the room, and you will work with your lab partner on several projects.

Biosafety in the Microbiology Laboratory

We are regulated and inspected annually by the UF Environmental Health and Safety Department. We follow their guidelines - and you follow our instructions - to prevent any accidents and problems with contaminations. For more information about the regulations go to: <http://www.ehs.ufl.edu/Lab/EHSintro.htm>

To comply with the University of Florida biosafety requirements **closed toed shoes are mandatory** in the laboratory. You can leave a pair in your locker, so you don't forget. **Disposable lab coats will be provided to you** on the first day of class. It is mandatory to always wear them. Write your names on your coats and keep them in your lockers. Do not take them home. Do not take anyone else's' coat. Lab coats will be autoclaved and disposed according to UF regulations on the last day of the semester.

Underlying medical conditions

If you have any underlying medical conditions which can affect your **immune system** or make you more susceptible to infectious disease, you must inform your instructor and consult with your physician before working in the microbiology laboratory.

For students and Instructor with preexisting conditions, including pregnancy, taking immunosuppressive drugs, or who have other medical conditions (e.g., diabetes, immune system disorder) that might necessitate special precautions and it is recommended that they get medical clearance from the infirmary.

<http://shcc.ufl.edu/>

If you notice any unusual symptoms or of any spills or accidents occur, contact your instructor immediately.

Please come and see Dr. Oli if you have any concerns (moli@ufl.edu)

Future teaching assistants for micro labs and Letter of recommendation

You may request a letter of recommendation only if you attend the section I am teaching. I will also write recommendation letters for most students who sign up to be Instructor the microbiology laboratories. To sign up to Instructor after you have taken the class, fill out the

information in the online app http://microcell.ufl.edu/Instructor_app/ . The spots for Instructor are limited and will be filled on a first come first served basis.

Other UF policies

Academic Honesty

In 1995 the UF student body enacted an honor code and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students.

The Honor Pledge: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

On all work submitted for credit by students at the university, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean, Student Honor Council, or Student Conduct and Conflict Resolution in the Dean of Students Office. It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor. This policy will be vigorously always upheld in this course.

<http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php>

(Source: 2011-2012 Undergraduate Catalog)

Software Use

All faculty, staff and students at 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 require for each student to have MS Office (Mac or PC) installed on their/a computers. Similar graphing programs are available for iPads and tablets.

Microsoft Software for UF students

<http://www.software.ufl.edu/>

The Office of Information Technology has great news for University of Florida students! If you want to upgrade your operating system or need Microsoft Office Suite, this media will be available in the Spring 2011 semester. The different media available are: Windows 7 operating system Upgrade, Microsoft Office Professional Plus 2010 (32-bit/64-bit) for PC or Microsoft Office for Mac 2011. **Software is free for UF students.**

To check for availability of the media and technical requirements, contact the UF Computing Help Desk at (352)392-HELP(4357). Once the media is available, you can get it at the UF Computing Help Desk or at the UF Bookstore.

Other software training opportunities are available. For examples through Lynda.com

<http://www.lynda.com/member.aspx>

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness

Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575,
www.counseling.ufl.edu/cwc/

Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/

Services for Students with Disabilities

Please come and talk to your instructor at the beginning of the semester about any accommodations required. We will make sure that the student's needs are met to the best of our abilities in the laboratory setting.

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services, and mediating faculty-student disability related issues.

0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drcStudents with Disabilities
www.dso.ufl.edu/drc/

Students requesting classroom accommodation must first register with the Dean of Students Office in Peabody Hall. The Dean of Student Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation at the beginning of the semester.

We take your wellbeing VERY serious, so please don't hesitate to meet with your instructor or see me (Dr. Oli moli@ufl.edu) any time with problems or difficulties you may encounter during your time at UF.

Generic weekly schedule

Module	Exercises
Welcome, Intro & 1	Intro - syllabus, canvas, lab safety, Art of microscopy, Life in a drop of water, taxonomy/phylogeny, eukaryote - prokaryote
Bioterrorism & 2	Introduction to your unknown project, Microorganisms in the environment and on you, Gram stain, simple stain, negative stain, aseptic technique, pipetting
Lab math & 3	Introduction to Lambeth, Streak for isolation, scientific method, enumeration of bacterial populations CFU/ml, growth curve, isolation of colonies from a mixed culture,
Microbes in the News & 4	Chose & present your public health topic; Diagnostic microbiology - selective and differential media, biochemical tests, growth characteristics.
5	Gideon database, DNA isolation, 16s RNA PCR & gel electrophoresis
6	Bioinformatics & review, Student research project proposals
	Midterm practical and visual exam
7	Antibiotic disk diffusion susceptibility test & the post antibiotic aera, disinfectants and other antimicrobials, ELISA, MRSA screen
8	Fecal float and water lab

9	Microbe art, mycology
10	Fermented + rotten foods prebiotics, probiotics, food sample,
	Finish student projects & Presentations

Databases you will use

Virtual pond dip – for wet mount identification

<http://www.microscopy-uk.org.uk/index.html?http://www.microscopy-uk.org.uk/ponddip/>

NCBI Taxonomy (no password)

<http://www.ncbi.nlm.nih.gov/taxonomy>

Gideon – to determine your unknown and for public health project

<https://www.gideononline.com/>

If you are not on campus, you must use VPN to connect to the database

BLAST – for sequence alignment

<http://blast.ncbi.nlm.nih.gov/Blast.cgi>

Food Safety First – for growth curve simulation

<https://pmp.errc.ars.usda.gov/default.aspx>

Optional software and database

Endnote Web Reference management program

<http://web.uflib.ufl.edu/endnoteweb.html>

other programs like Mendeley or Zotero can also be used

HealthMap

<http://healthmap.org/en/>

Microbiology Videos

Your instructor will let you know when you have to watch each video for which module! You may have quizzes about the content of the videos.

Check out the UF MICROBIOLOGY video channel in Vimeo

<https://vimeo.com/channels/859405>

Please note all the videos are produced at the Department of Microbiology and Cell Science and many of them were actually made as part of the independent student project!!!! *Thanks to all our amazing students!*

Thanks to some of our amazing students we have two new tutorials, one for using Endnote reference management

<https://vimeo.com/114244854>

and a great overview of bioinformatics!

<https://vimeo.com/116163972>

Microbiology intro

Lab Safety Rules

<https://vimeo.com/46094533>

Daily Routines

<https://vimeo.com/46094085>

Aseptic Techniques

<https://vimeo.com/41315162>

Basic Methods

Art of Microscopy

<https://vimeo.com/166713949>

Basic Anatomy of a Microscope

<https://vimeo.com/44820192>

Wet Mount

<https://vimeo.com/48160779>

Streak for isolation

<https://vimeo.com/48162797>

Pipetting

<https://vimeo.com/44820191>

Computer Tutorials

Graphing with Excel

<https://vimeo.com/49518570>

Growth curve and growth rate calculation

<https://vimeo.com/52150245>

Visualizing Microbes

Gram Stain

<https://vimeo.com/44820193>

Negative Stain

<https://vimeo.com/73670001>

Capsule Stain

<https://vimeo.com/73672899>

Flagella Stain

<https://vimeo.com/73666368>

Traditional Diagnostic Methods

SIM

<https://vimeo.com/73671768>

Phenol Red Broth

<https://vimeo.com/73671112>

Blood Agar

<https://vimeo.com/73656591>

Mannitol Salt Agar

<https://vimeo.com/73668944>

MacConkey agar

<https://vimeo.com/73668126>

DNase Agar

<https://vimeo.com/73662034>

Citrate Agar

<https://vimeo.com/73661148>

Catalase Test

<https://vimeo.com/73659734>

Anaerobe Jar

<https://vimeo.com/73655513>

Molecular Diagnostic test

PCR 1

<https://vimeo.com/49327264>

PCR 2

<https://vimeo.com/49520521>

PCR 3

<https://vimeo.com/49520034>

Bioinformatics

Sequence retrieval and Blast

<https://vimeo.com/50079545>

Blast tutorial and phylogenetic tree

<https://vimeo.com/51947843>

Basic Bioinformatics Tutorial

<https://vimeo.com/116163972>

Diagnostic tests

ELISA

<https://vimeo.com/73662873>

Parasites

Fecal float

<https://vimeo.com/73664907>

Other Software

Endnote reference management

<https://vimeo.com/114244854>

<http://web.uflib.ufl.edu/endnoteweb.html>

Virtual Field Trips

Diagnostic lab UF Vet School

<https://vimeo.com/41315011>

Documentaries – student projects

Lyme documentary

<https://vimeo.com/54990581>

Cholera outbreak in Haiti (public health)

<https://vimeo.com/48172281>

Cool Stuff

Microbes did you know.....

<https://vimeo.com/51246086>

<https://vimeo.com/63859256>

Why microbiology?

<https://vimeo.com/41315163>

Meet the MCS faculty

<https://vimeo.com/41315161>

Microbiology @ UF Lab Terminology: Quizlet Vocabulary Sets

All study sets

<https://quizlet.com/class/2282683/>

Modules

Biosafety

<https://quizlet.com/118956260/biosafety-flash-cards/>

Microscopy

<https://quizlet.com/118956966/microscopy-flash-cards/>

Life in a drop of water

<https://quizlet.com/118960595/life-in-a-drop-of-water-flash-cards/>

Microbiome

<https://quizlet.com/145781826/microbiome-flash-cards/>

Bioterrorism

<https://quizlet.com/121416442/bioterrorism-flash-cards/>

Visualizing bacteria

<https://quizlet.com/118964990/visualizing-bacteria-flash-cards/>

Isolation of microbes

<https://quizlet.com/118974444/isolation-of-microbes-flash-cards/>

Pipetting

<https://quizlet.com/118965384/pipetting-flash-cards/>

lab math and Graphing

<https://quizlet.com/118963031/labmath-and-graphing-flash-cards/>

Enumeration of microbes

<https://quizlet.com/118975469/enumeration-of-microbes-flash-cards/>

Growing microbes

<https://quizlet.com/118971694/growing-microbes-flash-cards/>

Traditional diagnostics

<https://quizlet.com/118969630/traditional-diagnostics-flash-cards/>

Molecular diagnostics

<https://quizlet.com/118977597/molecular-diagnostics-flash-cards/>

Combating microbes

<https://quizlet.com/118985037/combating-microbes-flash-cards/>

Antibiogram and Antibiotics

<https://quizlet.com/112849756/antibiogram-and-antibiotics-flash-cards/>

MRSA screen

<https://quizlet.com/118986660/mrsa-screen-flash-cards/>

Immunological methods & STDs

<https://quizlet.com/118982561/immunological-methods-stds-flash-cards/>

Global Traveler – water crisis

<https://quizlet.com/118987142/global-traveler-water-crisis-flash-cards/>

Fungi

<https://quizlet.com/112850493/fungi-flash-cards/>

Microbes, food, and fermentation

<https://quizlet.com/118990517/microbes-food-and-fermentation-flash-cards/>

Mini modules

<https://quizlet.com/118981521/biofilm-flash-cards/>

Meet the microbes

Pathogens - Bacteria

<https://quizlet.com/112850007/pathogens-bacteria-flash-cards/>

Pathogens – Parasites

<https://quizlet.com/112848889/pathogens-parasites-flash-cards/>

Other sets

Definitions MO (summary of key terms)

<https://quizlet.com/110252546/definitions-mo-flash-cards/>

Etymology – word origins

<https://quizlet.com/110251306/etymology-word-origins-flash-cards/>

Famous microbiologists

<https://quizlet.com/112845093/famous-microbiologists-flash-cards/>