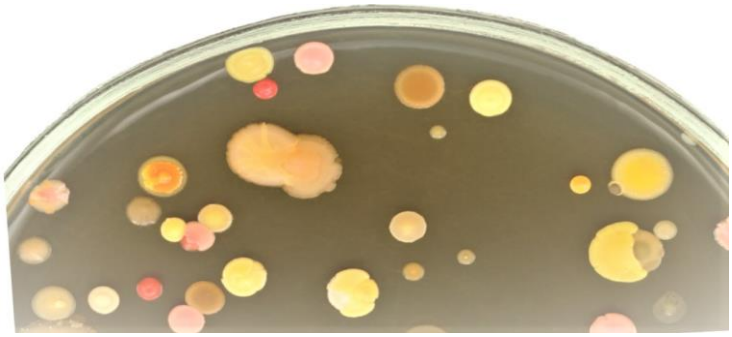

MIC 206 – Microbiology Laboratory **Fall Semester 2024**
Arizona State University **Syllabus**

Course Description and Overview

Welcome to the Microbiology Laboratory MIC 206 offered by the College of Integrative Sciences and Arts. As the laboratory companion to MIC 205 and MIC 220, this course provides one semester hour of laboratory credit that satisfies a portion of the prerequisite course requirements for various science and pre-professional degree programs (including nursing). Traditionally, this course has been taught independently of MIC 205 and MIC 220, so the same basic principles were provided to microbiology non-majors and majors. Though the majority of these principles have been retained in the current course, the curriculum has been redesigned to suit the predominantly health-oriented needs and unique resources of our campus's students and facilities. These changes were made in consultation with members of the microbiology faculty and staff at the Tempe Campus to preserve the high standards of instruction and student learning established in those existing programs. Such standards are reflected in the following objectives.

Course Objectives

Contextual

- Provide an overview of the morphological and physiological diversity of microorganisms.
- Demonstrate how specific microbial characteristics may be utilized for scientific and/or clinical differentiation and analysis.
- Relate microbiological principles to groups of pathogens that are responsible for human disease.

Practical

- Demonstrate proper applications of standard tools used for microbial handling, observation, and analysis.
- Show proper applications of safety practices appropriate for basic, healthcare, and research microbiological laboratory settings.

Personal

- Develop an intellectual awareness, understanding, and appreciation for general microbiological principles and their relevance to human health and disease in each student.
- Foster improvements in written and oral communication skills.
- Provide social development opportunities through cooperative group projects and peer-to-peer data exchange.

Laboratory Materials

Cappuccino: Microbiology Laboratory Manual 12th edition 2019 (IBSN:9780135188996) (Required). The form of the test book is your choice, Physical or e-text, but purchasing the physical form of the textbook is highly recommended.

Certified biological safety glasses with side shields or goggles approved for chemistry courses are ***absolutely required.***

Other

This course requires the following technologies:

- Web browsers (Chrome or Mozilla Firefox)
- Adobe Acrobat Reader (free for all currently enrolled ASU students)
- Adobe Flash Player (free for all currently enrolled ASU students))
- Webcam, microphone, headset/earbuds, and speaker
- Microsoft Office (Microsoft 365 is free for all currently enrolled ASU students)
- Conversion software for to PDF or JPEC files. (free for all currently enrolled ASU students)

Instructor Information

Instructor

Patrick M. Daydif, M.S.
UCENT 356
patrick.daydif@asu.edu
DO NOT E-MAIL via Canvas
Zoom Account:
https://asu.zoom.us/j/6628247708

Office Hours

ALL SECTIONS ARE WELCOME!
Refer to Canvas (or by appointment)

Instructional Aides

Please refer to Canvas for Instructional Aides contact information and office hours (or by appointment)

Office Hours and Location

Refer to Canvas for hours & locations (or by appointment)

*Please leave a voice message if you cannot reach us by telephone. If you need to speak with someone immediately, contact the College of Integrative Sciences and Arts at (602) 496-0658. PLEASE PLACE "MIC 206" IN THE SUBJECT LINE OF MESSAGES WHEN E-MAILING MR. DAYDIF.

Evaluation Procedures

Assignment	Points
Mid-term Exam	150
Final Exam	150
Homework Assignments	150
Pre-Lab Exercise	120
Lab reports/Data Sheets/ Quizzes/ In-class activities	180
Skill Demonstrations	50
Total Points	800

Grade Points	Letter
720-800	A
640-719	B
560-639	C
480-559	D
0-479	E

+/- Letter grades will be issued at the instructor's discretion.

Policies and Procedures

<u>If you have MISSED three (3) or more lab days, you may receive an "E" for the course grade</u>.

- The primary purpose of the Microbiology Laboratory is to provide students with hands-on opportunities for learning the microbiological principles that are applied routinely in real-world hospitals, crime labs, diagnostic clinics, and research facilities. The very nature of "hands-on" instruction means that ***student attendance is absolutely mandatory for satisfactory completion of the course.***
- Due to the University's safety protocols and the capacity limitations of the laboratory, ***you must attend the lab section for which you are registered.*** Under certain circumstances, a request to attend an alternative section can be granted, but these requests will be approved on a case-by-case basis. Please submit such requests to Mr. Daydif ***in writing (e-mail is sufficient) at least 72 hours in advance.***
- ***There are NO make-up labs.*** Make-up labs are very difficult to arrange in microbiology due to the time required for reagent and equipment preparations and culture incubations. Non-attendance will decrease ***the student's Attendance and pre-labs points*** for the course and reduce the likelihood of the student achieving full marks on any Data Sheets or Skill Demonstrations associated with the missed exercise(s).

<u>Please arrive at your scheduled lab section on time</u>

- If you arrive late, you may miss an opportunity to complete or receive credit for a graded assignment. The student's responsibility is to obtain all material missed due to absence.
- Pre-lab assignments will be administered periodically throughout the term. These assignments are designed to encourage you to pre-read the assigned lab exercises so that you arrive prepared and able to work safely and efficiently in the laboratory. ***Your instructor may not allow you to participate in lab exercises if you fail to complete the assigned pre-labs!*** It is your responsibility to obtain the pre-lab assignment from Canvas. **<u>Late assignments will NOT be accepted.</u>**
- **All homework assignments must be turned in by 11:59 pm on the date the assignment is due**.
  E-mail is an acceptable means for assignments to be submitted outside of class as long as the time stamp on the E-mail meets the deadline. ***If you submit an assignment via***

e-mail, please provide a paper copy of the assignment that was sent via e-mail at the next class meeting. Failure to submit a paper copy in a timely manner may result in a score of zero for the assignment. Note that this option is a privilege that may be rescinded at the sole discretion of the instructors.

- Pre-Lab and Datasheets must be submitted on paper from the PDF or laboratory manual printout. These assignments will be collected in class and will NOT be electronically submitted. The students are responsible for bringing the correct data sheets and completing the Pre-lab assignments according to the Canvas site.

Accommodation for religious practices

In compliance with ACD 304-04, students who need to be absent from class due to the observance of a religious holiday or participate in required religious functions must notify the faculty member in writing as far in advance of the holiday/obligation possible. Students must identify the specific holiday or obligatory function to the faculty member. Students will not be penalized for missing class due to religious obligations/holiday observance. The student should contact the class instructor to make arrangements for making up tests/assignments within a reasonable time.

Accommodation for university-sanctioned activities

In compliance with ACD 304-02, students who participate in university-sanctioned activities that require classes to be missed should be given opportunities to make up examinations and other graded in-class work. However, absence from class or assessments due to university-sanctioned activities does not relieve students from responsibility for any part of the coursework required during the period of absence.

Class Conduct

If appropriate, a notification will be sent to students warning them that some course content may be deemed offensive by some students and how to bring this to the instructor's attention or to the unit chair or director.

Inappropriate use of **cell phones** or **laptops** or reading other materials during class will be considered not participating, and you will lose participation points. Arriving late or leaving early from class will result in deductions from your participation.

Participation in laboratory exams and projects is mandatory.

Make-up exams are unavailable for students who fail to attend the Mid-term or Final Exam. Students who fail to attend the laboratory exams will receive a score of zero on those exams.
An alternative arrangement may be available if a student has a foreseen conflict. This arrangement MUST be approved by Mr. Daydif ***in writing (e-mail is sufficient) at least 72 hours before the exam date***.

Individuals that are Immunocompromised.

Due to the nature of the course and the presence of bio-level safety 1 and 2 organisms used in the laboratory, it is strongly advised that students with ***a lower state of immunity or a compromising immune system contact Mr. Daydif.***

Laboratory Attire and Safety

Even though this is an introductory microbiology course, this class employs potentially pathogenic cultures of Biosafety Level 1 and 2 status. A major goal of this course is to educate students on how to handle these types of cultures properly to prevent self-inoculation. Safety equipment, including personal protective equipment (PPE), is another element of BL1 and BL2 containment. PPE is clothing or equipment worn by workers to protect the body from injury by hazardous agents or materials. PPE may include foot, hand, eye, face, body, and respiratory protection.

- **Therefore, the following policies will be enforced strictly:**
  - ***You must wear biological-approved safety eye protection at all times. Eye protection is a safety device such as safety glasses with side shields or goggles worn over the eyes to prevent injury to the eye or exposure to biological agents.***
  - ***There is absolutely NO FOOD OR DRINK ALLOWED IN THE LAB at any time.***
  - ***The use of cellular phones, especially for hand and finger-intensive exercises like text messaging, is strongly discouraged.***
  - ***You must wear closed-toe shoes and long pants. Students who fail to wear closed-toe shoes and long pants are subject to removal from the lab.***
  - ***When using Biosafety level 2 organisms, you will provide PPE to protect street clothing. Please understand that PPE is NOT an option. Students who fail to comply will be REMOVED from the lab and could be subject to removal from the course.***

Though not required when using biosafety level 1 organisms, students are encouraged to wear a lab coat or smock (an old shirt is acceptable) to avoid contaminating street clothes with microbes and/or the dyes used for staining these organisms. Lab coats and safety glasses are available for purchase in the ASU Bookstores. Closed-toe shoes are required (even in Arizona!).

Hints for Success

- Read all of the scheduled lab exercises before coming to class to understand the materials to be used and the techniques to be performed. Pay particular attention to **bold words** and safety considerations.
- Complete all of the assignments.
- Review your lab exercises and rewrite your lab notes after class. This is important because it gives you time to solidify unclear or not fully understood information.
- Many students find note cards helpful study tools for microbiology lab terms and topics.
- Ask lots of questions and utilize our office hours!!! Feel free to stop in at any time.

Miscellaneous Information

General Studies Requirements

This course fulfills ASU's Scientific Thinking in Natural Sciences (SCIT) general studies requirement. Students completing an SCIT course will be able to 1) obtain and interpret qualitative or quantitative data and communicate the findings, 2) employ evidence to construct and test scientific hypotheses, 3) assess the validity of scientific claims using evidence from biological or physical science, 4) create models to explain observable phenomena and understand biological or physical processes in the natural world, and 5) communicate coherent arguments using evidence drawn from qualitative or quantitative sources.

Disability Accommodations for Students

Students who feel they may need a disability accommodation(s) in class must provide documentation from the Disability Resource Center or SAILS to the class instructor verifying the need for an accommodation and the appropriate type of accommodation. Students who desire accommodations for a disability should contact the SAILS office as early as possible (i.e., before the beginning of the semester) so that the appropriate accommodations can be provided. The student's responsibility is to contact the SAILS office first.

Academic Integrity

Academic honesty is expected of all students in all examinations, papers, laboratory work, academic transactions, and records. The possible sanctions include but are not limited to, appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course failure due to academic dishonesty (indicated on the transcript as a grade of XE), loss of registration privileges, disqualification, and dismissal. For more information, see http://provost.asu.edu/academicintegrity.

Suppose you fail to meet the standards of academic integrity in any of the criteria listed on the university policy website. In that case, sanctions will be imposed by the instructor, school, and/or dean. Academic dishonesty includes borrowing ideas without proper citation, copying others' work (including information posted on the internet), and failing to turn in your own work for group projects. Please be aware that if you follow an argument closely, even if it is not directly quoted, you must provide a citation to the publication, including the author, date, and page number. If you directly quote a source, you must use quotation marks and provide the same sort of citation for each quoted sentence or phrase. You may work with other students on assignments; however, all writing that you turn in must be done independently. If you have any doubt about whether the form of cooperation you contemplate is acceptable, ask the TA or the instructor in advance of turning in an assignment. Please be aware that the work of all students submitted electronically can be scanned using SafeAssignment or Turnitin, which compares them against everything posted on the internet, online article/paper databases, newspapers and magazines, and papers submitted by other students (including yourself if submitted for a previous class).

Turning in an assignment (all or in part) that you completed for a previous class is considered self-plagiarism and falls under these guidelines. Any infractions of self-plagiarism are subject to the same penalties as copying someone else's work without proper

citations. Students who have taken this class previously and would like to use the work from previous assignments should contact the instructor for permission to do so.

Prohibition of Commercial Note-Taking Services

Under ACD 304-06 Commercial Note-Taking Services, written permission must be secured from the official instructor of the class to sell the instructor's oral communication in the form of notes. Notes must have the note taker's name, the instructor's name, the course number, and the date.

Letter Grade Appeals

ASU has formal and informal channels to appeal a letter grade, which should be appealed at the end of the semester. If you wish to appeal any grading decisions, please see http://catalog.asu.edu/appeal. Please understand this process does not apply to individual assignments.

Incompletes

A mark of "I" (incomplete) is given by the instructor when you have completed most of the course and are otherwise doing acceptable work but are unable to complete the course because of illness or other conditions beyond your control. You are required to arrange with the instructor to complete the course requirements. The arrangement must be recorded on the Request for Grade of Incomplete form http://students.asu.edu/forms/incomplete-grade-request).

Drop and Add Dates/Withdrawals

Please refer to the academic calendar (https://students.asu.edu/academic-calendar) for the deadlines to drop/withdraw from this course. Consult with your advisor and notify your instructor if you are going to drop/withdraw from this course. If you are considering a withdrawal, review the following ASU policies: Withdrawal from Classes, Medical/Compassionate Withdrawal.

Please refer to the academic calendar for the deadlines to drop/withdraw from this course. Consult with your advisor and notify your instructor if you are going to drop/withdraw from this course. If you are considering a withdrawal, review the following ASU policies: Withdrawal from Classes, Medical/Compassionate Withdrawal.

Student Resources

If you would like additional assistance with course material, you are encouraged to visit, call (602-496-4ASU), or e-mail (askdpc@asu.edu) the Student Success Center on the first floor of the University Center building to schedule an appointment with a tutor or attend a MIC 206 review session. These friendly folks are ready to help and are a very valuable resource! If you have a disability that requires assistance in lectures, labs, or exams, please see me during the first week of classes to arrange appropriate accommodations.

Disability Accommodations for Students

Students who feel they may need a disability accommodation(s) in class must provide documentation from the Office of Student Accessibility and Inclusive Learning (formally DRC) to the class instructor to verify the need for an accommodation and the appropriate accommodation type. Students who desire accommodations for a disability should contact SAILS as early as possible (i.e., before the beginning of the semester) to ensure appropriate accommodations can be provided. The student's responsibility is to make the first contact with the SAILS. https://eoss.asu.edu/drc

Title IX

It is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Title IX and University policy clarify that sexual violence and harassment based on sex are prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support from the University, including counseling and academic support. If you or someone you know has been harassed on the basis of sex or sexual assault, you can find information and resources at http://sexualviolenceprevention.asu.edu/faqs/students.

Establishing a Safe Environment

Learning takes place best when a safe environment is established in the classroom. In accordance with SSM 104-02 of the Student Services Manual, students enrolled in this course have a responsibility to support an environment that nurtures individual and group differences and encourages engaged, honest discussions. The success of the course rests on your ability to create a safe environment where everyone feels comfortable sharing and exploring ideas. We must also be willing to take risks and ask critical questions. Doing so will effectively contribute to our own and others' intellectual and personal growth and development. We welcome disagreements in the spirit of critical academic exchange, but please remember to be respectful of others' viewpoints, whether you agree with them or not.

Disclaimer

The contents of this syllabus, particularly the lecture and laboratory schedules, may require revision during the semester due to unforeseen circumstances. If updates are necessary, they will be announced in class and posted to the course Canvas site. Please note that the University sets a date for the final exam to avoid scheduling conflicts during final exam week; thus, it cannot be changed. The instructor reserves the right to change the syllabus as deemed necessary. Students will be notified in a timely manner of any syllabus changes via e-mail or in the Announcements section on Canvas.

Student Conduct Statement

Students are required to adhere to the behavior standards listed below:

•Arizona Board of Regents Policy Manual Chapter V– Campus and Student Affairs: Code of Conduct
https://public.azregents.edu/Policy%20Manual/5-308-Student%20Code%20of%20Conduct.pdf

•ACD 125: Computer, Internet, and Electronic Communications
https://www.asu.edu/aad/manuals/acd/acd125.html, and

•the ASU Student Academic Integrity Policy
https://provost.asu.edu/academic-integrity

Students are entitled to receive instruction free from interference by other class members. If a student is disruptive, an instructor may ask the student to stop the disruptive behavior and warn the student that such disruptive behavior can result in withdrawal from the course. An instructor may withdraw a student from a course when the student's behavior disrupts the educational process under USI 201-10 http://www.asu.edu/aad/manuals/usi/usi201-10.html).

Course discussion messages should remain focused on the assigned discussion topics. Students must maintain a cordial atmosphere and use tact in expressing differences of opinion.

Inappropriate discussion board messages may be deleted if an instructor feels it necessary. Students will be notified privately that their posting was inappropriate. Student access to the course Send E-mail feature may be limited or removed if an instructor feels that students are sending inappropriate electronic messages to other students in the course.

Statement on Inclusion

ASU is a comprehensive public research university, measured not by whom we exclude but rather by whom we include and how they succeed. It advances research and discovery of public value and assumes fundamental responsibility for the economic, social, cultural, and overall health of the communities it serves.

Arizona State University is deeply committed to positioning itself as one of the great new universities by seeking to build excellence, enhance access, and impact our community, state, nation, and the world. To do that requires our faculty and staff to reflect the intellectual, ethnic, and cultural diversity of our nation and world so that our students learn from the broadest perspectives and we engage in the advancement of knowledge with the most inclusive understanding possible of the issues we are addressing through our scholarly activities. We recognize that race and gender historically have been markers of diversity in higher education institutions. However, at ASU, we believe that diversity includes additional categories such as socioeconomic background, religion, sexual orientation, gender identity, age, disability, veteran status, nationality, and intellectual perspective.

Campus Resources

As an ASU student, you have access to many resources on campus. This includes tutoring, academic success coaching, counseling services, financial Aid, disability resources, career and internship help, and many opportunities to participate in student clubs and organizations.

- Tutoring: http://studentsuccess.asu.edu/frontpage
- Counseling Services: http://students.asu.edu/counseling
- Financial Aid: http://students.asu.edu/financialaid
- Disability Resource Center: http://www.asu.edu/studentaffairs/ed/drc/
- Major/Career Exploration: http://uc.asu.edu/majorexploration/assessment
- Career Services: http://students.asu.edu/career
- Student Organizations: http://www.asu.edu/studentaffairs/mu/clubs/

E-mail Communications

All e-mail communication for this class needs to be done through your ASU e-mail account. You should check your ASU e-mail regularly as you will receive important information about your class (es) and other important university updates and information. You are solely responsible for reading and responding to any information communicated via e-mail if necessary.

LABORATORY SCHEDULE (TENTATIVE)

Date	Lab Exercise	Lab Topic
Aug. 22-27		**No Class**
(1) Aug. 28/29		Welcome to the Microbiology Laboratory
	ix	Laboratory Safety
	xi	Laboratory Protocol
Sept. 2/3		**Labor Day (No Class)**
(2) Sept. 4/5	Part 1	**READ:** Basic Laboratory Techniques: Isolation, Cultivation, and Cultural Characterization of Microorganisms
	13	Nutritional Requirements: Media for the Routine Cultivation of Bacteria
	14	Use of Differential, Selective, and Enriched Media
	2	Culture Transfer Techniques
	3	Technique for Isolation of Pure Cultures
(3) Sept. 9/10	3	**RESULTS:** Techniques for Isolation of Pure Cultures
	14	**RESULTS:** Use of Differential, Selective, and Enriched Media
	4	**RESULTS:** Cultural Characteristics of Microorganisms
	17	**READ:** Physical Factors: Atmospheric Oxygen Requirements
	18	Techniques for the Cultivation of Anaerobic Microorganisms
(4) Sept. 11/12	Part 4	**READ:** Cultivation of Microorganism: Nutritional & Physical Requirements, and Enumeration of Microbial Population
	17	**RESULTS:** Physical Factors: Atmospheric Oxygen Requirements
	18	**RESULTS:** Techniques for the Cultivation of Anaerobic Microorganisms
	15	Physical Factors: Temperature
	Sup	Physical Factors: Osmotic Pressure
(5) Sept. 16/17	13	**READ:** Nutritional Requirements: Measuring Turbidity
	15	**RESULTS:** Physical Factors: Temperature
	Sup	**RESULTS:** Physical Factors: Osmotic Pressure
	16	Physical Factors: pH of the Extracellular Environment
	20	**RESULTS:** The Bacterial Growth Curve
(6) Sept. 18/19	16	**RESULTS:** Physical Factors: pH of the Extracellular Environment
	19	Serial Dilution–Agar Plate Procedure to Quantitate Viable Cells
(7) Sept. 23/24	19	**RESULTS:** Serial Dilution–Agar Plate Procedure to Quantitate Viable Cells
	38	Cultivation and Enumeration of Bacteriophages
(8) Sept. 25/26	38	**RESULTS:** Cultivation and Enumeration of Bacteriophages
	Sup	Effects of UV light on control Growth
(9) Sept. 30/ Oct.1	Sup	**RESULTS:** Effects of UV light on control Growth
	42	Chemical Agents of Control: Chemotherapeutic Agents
	44	Chemical Agents of Control: Disinfectants and Antiseptics
(10) Oct. 2/3	42	**RESULTS:** Chemical Agents of Control: Chemotherapeutic Agents
	44	**RESULTS:** Chemical Agents of Control: Disinfectants and Antiseptics
	5	Microscopic Examination of Stained Cell Preparations
(11) Oct. 7/8	Sup	Microscopic Examination of Stained Cell Preparations
(12) Oct. 9/10	7	**RESULTS:** Preparation of Bacterial Smears (Simple Staining)
Oct. 14/15		**Fall Break (No Class)**
(AA) Oct. 16/17		**Mid-Term Laboratory Practical Exam**
(16) Oct. 21/22	12a	**RESULTS:** Spore Stain (Schaeffer-Fulton Method)
(13) Oct. 23/24	10	**RESULTS:** Gram Stain

(14) Oct. 28/29	11	**RESULTS:** Acid-Fast Stain
(15) Oct. 30/31	9	**RESULTS:** Negative Staining
	12b	**RESULTS:** Capsule Staining (Anthony Method)
(CC) Nov. 4/5		**Skill Demonstration (Proficiency using a Microscope)**
(17) Nov. 6/7	22	Carbohydrate Fermentation
	23	Triple Sugar–Iron Agar Test
	24	IMViC Test
	25	Hydrogen Sulfide Test
	Sup	Utilization of Malonate
	32	Genus Identification of Unknown Bacterial Cultures
Nov. 11		**Veterans Day (No Class)**
(18) Nov. 12/13	22	**RESULTS:** Carbohydrate Fermentation
	23	**RESULTS:** Triple Sugar–Iron Agar Test
	24	**RESULTS:** IMViC Test
	25	**RESULTS:** Hydrogen Sulfide Test
	Sup	**RESULTS:** Utilization of Malonate
(19) Nov. 14/18	21	Extracellular Enzymatic Activities of Microorganisms
	26	Urease Test
	28	Nitrate Reduction Test
	29	Catalase Test
	30	Oxidase Test
	31	Utilization of Amino Acids (Phenylalanine)
	70	Agglutination Reaction: The Febrile Antibody Test
(20) Nov. 19/20	21	**RESULTS:** Extracellular Enzymatic Activities of Microorganisms
	26	**RESULTS:** Urease Test
	28	**RESULTS:** Nitrate Reduction Test
	29	**RESULTS:** Catalase Test
	30	**RESULTS:** Oxidase Test
	31	**RESULTS:** Utilization of Amino Acids (Phenylalanine)
	70	**RESULTS:** Agglutination Reaction: The Febrile Antibody Test
(21,22,23) Nov. 21/25	49	Quantitative Analysis of Water: Membrane Filter Method
	Sup	Clinical Biofilms
	Sup	**RESULTS:** Winogradsky Column
(22,24) Nov. 26/27	49	**RESULTS:** Quantitative Analysis of Water: Membrane Filter Method
	35	**RESULTS:** Cultivation and Morphology of Molds
	37	**RESULTS:** Yeast Morphology, Cultural Characteristics, and Reproduction
Nov. 28		**Thanksgiving Day (No Class)**
(23,25) Dec. 2/3	Sup	**RESULTS:** Clinical Biofilms
	33	**RESULTS:** Free-Living Protozoa
	34	**RESULTS:** Parasitic Protozoa
(BB) Dec. 4/5		**Final Laboratory Practical Exam**