BIOL 1073 General Microbiology

Instructor: Dr. Sangita Pal.

Email Address: sapal@pvamu.edu
I will always respond back within 24 hours - 48 hours

Office / Phone / Office Hours: Office Room 430 J / Office Phone 9362613170 / Th 7.30-9.30 PM, S 2-4 PM or by appointment. Please email me before the meeting to avoid any overlap.

Mode of Instruction: Internet / Online

Course Location: O'Banion Science – Lab Room Lec Room: Internet/ Online / Synchronous
Z5 / 26904 MW 1410 – 1450
Z65 / 26927 W 1015 - 1200

Catalog Description: Morphology and physiology of microorganisms related to health and sanitation; disinfection, growth, and control of those organisms causing common infectious diseases. Laboratory fee required.

Prerequisites: None
Co-requisites: None

Required Texts: Lecture Textbook/ Lab book:
BIOL 1073 Lecture /Lab– Cowan 6e: Connect DPF ISBN – 9781264717637 $60.80 Net to bookstore Students must purchase through the bookstore(online)-Mandatory

There is no way to pass this course without the purchase of this book on the first week of the term.

**Other Materials:** Blue / black pens, #2 lead pencils, notebook paper, access to computer (with LockDown Browser and Web Camera) and access to Connect/MCGrawHill website/ printer, color pencils – red, blue, green, purple.

**Course Objectives / Student Learning Outcomes:**

<table>
<thead>
<tr>
<th>Upon successful completion of this course, students will be able to:</th>
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<tbody>
<tr>
<td>1 Demonstrates knowledge of the basic principles and concepts of life at the microscopic level as it pertains to microbes.</td>
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<tr>
<td>2 Comprehends the theoretical concepts in microbiology so that they may use this as a basis for future studies other allied health fields.</td>
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<tr>
<td>3 Analyze the inter-relationships among the microorganisms and higher life forms.</td>
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<td>4 Demonstrate the proper techniques and procedures of handling microscopic living organisms, many of which are pathogenic.</td>
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<tr>
<td>5 Employ effective teamwork skills with emphasis on listening, responding, and creating a positive climate.</td>
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<tr>
<td>6 Demonstrate laboratory investigations using safe, environmentally appropriate and ethical practices.</td>
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**Major Course Requirements**

**Method of Determining Final Course Grade:**

**Evaluation Procedures:**

**GRADE EVALUATION:** Grades determined by performance, not needs or wants. Standard grading scale will be used: 100-90% = A; 89-80% = B; 79-70% = C; 69-60% = D

[This may change at the discretion of the instructor.]

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Value</th>
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<tbody>
<tr>
<td>4 lecture exams /100 pts each</td>
<td>=400 pts</td>
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Lecture/Lab Class quizzes / Participation =100 pts

Lab report / Participation =100 pts

Research project /Participation =50 pts
Quizzes / Homework = 50 pts
Lab Final exam = 150 pts
Final exam = 150 pts
Total: = 1000 pts

NOTES ABOUT GRADED MATERIALS:

LECTURE/LAB EXAMS: Exams should be taken as scheduled using LockDown Browser and Web camera on Canvas. No makeup exams! It will be only allowed except under documented emergencies and student must provide an officially documented excuse (See Student Handbook). If you miss the test, a grade of zero (0) will be entered on the grade sheet. It is your responsibility to notify your instructor when you miss an exam and to be present at the scheduled make-up time. All make-up exams will be essay exams and/or different set of questions will be on the make-up test. The final exam schedule is set by the University and will be given by the specified date. *Do not schedule any activity during the final exam period.

LECTURE/ LAB QUIZZES: The quiz will be usually administered every week on Wednesday. If you did not attend, you cannot turn in a quiz for it.

LAB REPORTS: You have to complete 10 lab reports on Connect (Web based). You have to attend the Lab class and then complete each week’s lab report by Sunday 11.59 PM. No late work is accepted.

PARTICIPATION: Includes individual in class quizzes/pop quizzes (based on reading assignments and the lecture) as well a group work during lecture. Thus, your active learning grade is a reflection of your effort to participate and attend class regularly. These cannot be made up if absent.

HOMEWORK: It is your responsibility to get the homework if you are absent from class. Failure to submit the homework at that time will result in points lost for the assignment. If your homework is not submitted by the due date, you will get a zero for that assignment.

RESEARCH PROJECT: Preparation 30 pts and quiz 20 points Prepare your powerpoint presentation on infectious diseases approved by your Instructor. Submit it by the due date (TBA in the class). No late work is accepted.

LAB FINAL: The lab final will be comprehensive. Date and time will be given in class.

FINAL EXAM: The final exam is comprehensive (labs and lectures included). It will consist of 50-100 multiple choice questions/true/ false and short answer type questions.
Course Procedures or Additional Instructor Policies

Taskstream

Taskstream is a tool that Prairie View A&M University uses for assessment purposes. One of your assignments may be considered an "artifact," an item of coursework that serves as evidence that course objectives are met. More information will be provided during the semester, but for general information, you can visit Taskstream via the link in eCourses.

Cell phone policy during exams

Cell phones must be secured within a backpack or purse during exams. The backpack or purse must be set aside, against a classroom wall and out-of-reach of any students. Any cell phones found on a person during an exam will result in an automatic “0” score on the exam.

Instructor Policies and Suggestions for Student Success:

1. Lecture will start promptly. If late by more than 5 minutes, please try to be as quiet as possible.
2. Turn off your mobile phone.
3. No use of headphones in the classroom.
4. Persistent talking among classmates during lecture will not be tolerated. A student may be asked to leave the classroom at the discretion of the instructor.
5. You are expected to take good care of all the equipment/materials provided to you in the lab. It is your responsibility to keep your working area and materials clean.
6. Consider this class as or more important than your job. It is not O.K. to leave lab early, or miss lab completely, because of work.

Letter Grade Assignment:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Final Average in Percent</th>
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<tbody>
<tr>
<td>A</td>
<td>89.5 - 100</td>
</tr>
<tr>
<td>B</td>
<td>79.5 - 89.4</td>
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<tr>
<td>C</td>
<td>69.5 – 79.4</td>
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<tr>
<td>D</td>
<td>59.5 – 69.4</td>
</tr>
<tr>
<td>F</td>
<td>0 – 59.4</td>
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**TENTATIVE LECTURE SCHEDULE: Syllabus subject to change/ LECTURES CONTINUE INTO LABORATORY TIME WHEN NECESSARY AND VICE VERSA**

<table>
<thead>
<tr>
<th>Week Of:</th>
<th>Chapter Title</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Pre-test, syllabus review, course materials review, introduction</td>
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<tr>
<td></td>
<td>Ch. 1 Main Themes of Microbiology</td>
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<tr>
<td>Week 2</td>
<td>Ch. 5 Eukaryotic cells and Microorganisms / Ch 8 Microbial metabolism / <strong>Class Quiz</strong></td>
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<tr>
<td>Week 3</td>
<td>Ch 8 Microbial metabolism / Ch 7 Microbial Nutrition and Growth / <strong>Class Quiz</strong></td>
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<tr>
<td>Week 4 -5-6</td>
<td>Ch 7 Microbial Nutrition and Growth / <strong>LECTURE EXAM 1 Chapters 1, 5 and 8</strong></td>
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<td>CH 11 Physical and Chemical Control of Microbes/</td>
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<tr>
<td>Week 7</td>
<td>CH 12: Antimicrobial treatment/ Quiz Ch. 6: Viruses &amp; Prions / <strong>Class Quiz</strong></td>
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<tr>
<td>Week 8</td>
<td>/ Ch 13 Microbe- Human Interaction ; health and Diseases / <strong>Class quiz</strong></td>
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<tr>
<td>Week 9</td>
<td>Ch. 6: Viruses &amp; Prions / / <strong>LECTURE EXAM 2: Chapters 7, 4, 11 and 12</strong></td>
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<tr>
<td>Week 10</td>
<td>CH 18. Infectious diseases affecting skin and eye</td>
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<td></td>
<td><strong>LECTURE EXAM 3: Chapters 6 and 18</strong></td>
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<tr>
<td>Week 11</td>
<td>CH 18. Infectious diseases affecting skin and eye / CH 22 Infections Diseases of gastro-intestinal tract. / <strong>Class quiz</strong></td>
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<tr>
<td>Week 12</td>
<td>CH 20/ Infectious Diseases of Cardiovascular system</td>
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<tr>
<td></td>
<td>CH 21 Infectious Diseases of GI tract System / Research project</td>
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<tr>
<td></td>
<td><strong>LECTURE EXAM 4 Chapters 22, 21 and 20</strong></td>
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<tr>
<td>Week 13</td>
<td>Research Project</td>
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<tr>
<td>Week 14-15</td>
<td>Review/Study day/Research Project</td>
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<td></td>
<td><strong>FINAL EXAM/ Comprehensive</strong></td>
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**Holiday:**

<table>
<thead>
<tr>
<th>Week 13</th>
<th>Research Project</th>
<th>Class quiz</th>
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| Week 14-15 | Review/Study day/Research Project |            |
|            | **FINAL EXAM/ Comprehensive** |            |

**Holiday:**
<table>
<thead>
<tr>
<th>Week Of:</th>
<th>Lab week</th>
<th><strong>Exercise(s) to perform</strong></th>
<th><strong>Note</strong></th>
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<tbody>
<tr>
<td>Week 1</td>
<td></td>
<td>Lab safety/Introduction</td>
<td>Forms must be signed Off</td>
<td>Biology Lab agreement Submit your lab safety agreement by Sunday 11.59PM</td>
</tr>
<tr>
<td>Week 2</td>
<td></td>
<td>Lab 1</td>
<td>Lab Safety / Hand washing lab</td>
<td>Submit this week’s lab report by Sunday 11.59PM</td>
</tr>
<tr>
<td>Week 3</td>
<td></td>
<td>Lab 2/Introduction</td>
<td>Introduction to microscope</td>
<td>Submit this week’s lab report by Sunday 11.59PM</td>
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<tr>
<td>Week 4</td>
<td></td>
<td>Lab 3</td>
<td>Aseptic Technique</td>
<td></td>
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<tr>
<td>Week 5</td>
<td></td>
<td>Lab 4</td>
<td>Scientific method</td>
<td></td>
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<tr>
<td>Week 6</td>
<td></td>
<td>Lab 5</td>
<td>Aseptic Technique 2</td>
<td></td>
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<tr>
<td>Week 7</td>
<td></td>
<td>Lab 6</td>
<td>Aseptic Technique 3</td>
<td>Submit lab reports by Sunday 11.59PM</td>
</tr>
<tr>
<td>Week 8</td>
<td></td>
<td>Lab 7</td>
<td>Colony Isolation method</td>
<td>Submit this week’s lab report by Sunday 11.59PM</td>
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<tr>
<td>Week 9</td>
<td></td>
<td>Lab 8</td>
<td>Preparation of a smear of a bacterial sample</td>
<td>Submit this week’s lab report by Sunday 11.59PM</td>
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<tr>
<td>Week 10</td>
<td></td>
<td>Lab 9</td>
<td>Gram Stain</td>
<td>Submit this</td>
</tr>
<tr>
<td>Week 11</td>
<td>Lab 10</td>
<td>Controlling Microbial Growth</td>
<td>Submit this week’s lab report by Sunday 11:59PM</td>
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<tr>
<td>Week 12</td>
<td>Research Project on Infectious Diseases</td>
<td>Research Project on Infectious Diseases</td>
<td>Submit your research project in the drop box on Canvas</td>
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</tr>
<tr>
<td>Week 13</td>
<td>Review for Final Exam</td>
<td></td>
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<tr>
<td>Week 14</td>
<td>Lab Final</td>
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**Student Support and Success**
John B. Coleman Library
The library and its partners have as their mission "to provide resources and instructional material in support of the evolving curriculum, as a partner in Prairie View A&M University's mission of teaching, research, and service" and to support the University's core values of "access and quality, diversity, leadership, relevance, and social responsibility" through emphasis on ten key areas of service. It maintains library collections and access both on campus, online, and through local agreements to further the educational goals of students and faculty.

Center for Academic Support
The Center for Academic Support (CAS) offers Tutoring via peer tutoring. The services include workshops (i.e., Save My Semester, Recalculate Your Route), seminars (i.e., Tools You Can Use: TI-84), group review sessions (i.e., College Algebra Topic Reviews, GRE Preparation), group study opportunities (i.e., TSIA, HESI, Study Break, Exam Cram), and test-taking strategies (How to take Notes, Study Buddy, 5 Day Study Guide). The Tutoring Center is a nationally certified tutoring program through the National Tutoring Association. The peer tutors are trained and certified by the coordinator each semester. Location: J.B. Coleman Library

COMPASS
The Center for the Oversight and Management of Personalized Academic Student Success (COMPASS) is designed to help Prairie View students in their second year and beyond navigate towards graduation by providing the following services: Academic Advisement, Targeted Tutorials for Personalized Learning, Campus- Wide Referrals, and Academic & Social Workshops. Location: J.B. Coleman Library.

Writing Center
The Writing Center provides student consultants on all aspects of the writing process and a variety of writing assignments. Writing Center consultations assist students in such areas as prewriting, brainstorming, audience awareness, organization, research, and citation. Location: Hilliard Hall 121

University Rules and Procedures

Disability statement (See Student Handbook):
Students with disabilities, including learning disabilities, who wish to request accommodations in class should register with the Services for Students with Disabilities (SSD) early in the semester so that appropriate arrangements may be made. In accordance with federal laws, a student requesting special accommodations must provide documentation of their disability to the SSD coordinator.

Academic misconduct (See Student Handbook):
You are expected to practice academic honesty in every aspect of this course and all other courses. Make sure you are familiar with your Student Handbook, especially the section on academic misconduct. Students who engage in academic misconduct are subject to university disciplinary procedures.
**Forms of academic dishonesty:**

1. Cheating: deception in which a student misrepresents that he/she has mastered information on an academic exercise that he/she has not mastered; giving or receiving aid unauthorized by the instructor on assignments or examinations.

2. Academic misconduct: tampering with grades or taking part in obtaining or distributing any part of a scheduled test.

3. Fabrication: use of invented information or falsified research.

4. Plagiarism: unacknowledged quotation and/or paraphrase of someone else’s words, ideas, or data as one’s own in work submitted for credit. Failure to identify information or essays from the Internet and submitting them as one’s own work also constitutes plagiarism.

**Nonacademic misconduct (See Student Handbook)**
The university respects the rights of instructors to teach and students to learn. Maintenance of these rights requires campus conditions that do not impede their exercise. Campus behavior that interferes with either (1) the instructor’s ability to conduct the class, (2) the inability of other students to profit from the instructional program, or (3) campus behavior that interferes with the rights of others will not be tolerated. An individual engaging in such disruptive behavior may be subject to disciplinary action. Such incidents will be adjudicated by the Dean of Students under nonacademic procedures.

**Sexual misconduct (See Student Handbook):**
Sexual harassment of students and employers at Prairie View A&M University is unacceptable and will not be tolerated. Any member of the university community violating this policy will be subject to disciplinary action.

**Attendance Policy**
Prairie View A&M University requires regular class attendance. Excessive absences will result in lowered grades. Excessive absenteeism, whether excused or unexcused, may result in a student’s course grade being reduced or in assignment of a grade of “F”. Absences are accumulated beginning with the first day of class.

**Student Academic Appeals Process**
Authority and responsibility for assigning grades to students rests with the faculty. However, in those instances where students believe that miscommunication, errors, or unfairness of any kind may have adversely affected the instructor's assessment of their academic performance, the student has a right to appeal by the procedure listed in the Undergraduate Catalog and by doing so within thirty days of receiving the grade or experiencing any other problematic academic
event that prompted the complaint.

**Disability statement (See Student Handbook):**
Students with disabilities, including learning disabilities, who wish to request accommodations in class should register with the Services for Students with Disabilities (SSD) early in the semester so that appropriate arrangements may be made. In accordance with federal laws, a student requesting special accommodations must provide documentation of their disability to the SSD coordinator.

**TECHNICAL CONSIDERATIONS**

**Minimum Recommended Hardware and Software:**
- Intel PC or Laptop with Windows 7; Mac with OS X; Smartphone or iPad/Tablet with Wi-Fi
- High speed Internet access
- 8 GB Memory
- Hard drive with 320 GB storage space
- 15” monitor, 800x600, color or 16 bits
- Sound card w/speakers
- Microphone and recording software
- Keyboard & mouse
- Most current version of Google Chrome, Safari, Internet Explorer or Firefox

**Note:** Be sure to enable Java & pop-ups

You should be able to access “CONNECT website for your Quizzes/ Homework/ Labs - Mandatory

Participants should have a basic proficiency of the following computer skills:
- Sending and receiving email
- A working knowledge of the Internet
- Proficiency in Microsoft Word (or a program convertible to Word)
- Proficiency in the Acrobat PDF Reader
- Basic knowledge of Windows or Mac O.S.

**Netiquette (online etiquette):**
Students are expected to participate in all discussions and virtual classroom chats as directed. Students are to be respectful and courteous to others on discussions boards. Foul or abusive language will not be tolerated.

**Technical Support:**
Students should go to https://mypassword.pvamu.edu/ if they have password issues. The page will provide instructions for resetting passwords and contact information if login issues persist. For other technical questions regarding eCourses, call the Office of Distance Learning / the Center for Instructional Innovation and Technology Services (CIITS) at 936-261-3283 or email at ciits@pvamu.edu
**Communication Expectations and Standards:**

Emails or discussion postings will receive a response from the instructor, usually in less than 48 hours. Urgent emails should be marked as such. Check regularly for responses.

**Discussion Requirement:**

Online courses often require minimal to no face-to-face meetings. However, conversations about the readings, lectures, materials, and other aspects of the course can take place in a seminar fashion. This will be accomplished by the use of the discussion board. The exact use of discussion will be determined by the instructor.

*It is strongly suggested* that students type their discussion postings in a word processing application and save it to their PC or a removable drive before posting to the discussion board. This is important for two reasons: 1) If for some reason your discussion responses are lost in your online course, you will have another copy; 2) Grammatical errors can be greatly minimized by the use of the spell-and-grammar check functions in word processing applications. Once the post(s) have been typed and corrected in the word processing application, it should be copied and pasted to the discussion board.
Biosafety Level 1
Standard Operating Procedures

(Lab Room O’Banion Science 308)
I. Lab Practices and Safety Rules

1. Wash your hands with disinfectant soap when you arrive at the lab, after working with any potentially hazardous materials, and again before you leave.

2. Absolutely no food, drinks, chewing gum, application of cosmetics or contacts is allowed in the lab. Absolutely no smoking is allowed in the laboratory. Do not put anything in your mouth such as pencils, pens, labels, or fingers. Do not store food in areas where microorganisms are stored.

3. Purchase a lab coat and safety glasses, bring them to lab, and use them. Alternatively, a long-sleeved shirt that buttons or snaps closed is acceptable protective clothing. This garment must cover your arms and be able to be removed without pulling it over your head. Leave protective clothing in the lab and do not wear it to other non-lab areas.

4. Avoid loose fitting items of clothing. Wear appropriate shoes (sandals are not allowed) in the laboratory.

5. Keep your workspace free of all unnecessary materials. Backpacks, purses, and coats should be placed in the cubbyholes by the front door of the lab. Place needed items on the floor near your feet, but not in the aisle.

6. Disinfect work areas before and after use with 70% ethanol or fresh 10% bleach. Laboratory equipment and work surfaces should be decontaminated with an appropriate disinfectant on a routine basis, and especially after spills, splashes, or other contamination.

7. Label everything clearly.

8. Replace caps on reagents, solution bottles, and bacterial cultures. Do not open Petri dishes in the lab unless necessary.

9. Inoculating loops should be flame sterilized in a Bunsen burner before you lay them down.

10. Turn off Bunsen burners when not in use. Long hair must be restrained if Bunsen burners are in use.

11. Treat all microorganisms as potential pathogens. Use appropriate care and do not take cultures out of the laboratory.

12. Wear disposable gloves when working with potentially infectious microbes or samples (e.g. sewage). If you are working with a sample that may contain a pathogen, then be extremely careful to use good bacteriological technique. Do not wash or reuse gloves. Dispose of used gloves in the appropriate biosafety bag.

13. Sterilize equipment and materials.


15. Consider everything a biohazard. Do not pour anything down the sink. Autoclave liquids and broth cultures to sterilize them before discarding.

16. Dispose of all solid waste material in a biohazard bag and autoclave it before discarding in the regular trash.
17. Familiarize yourself with the location of safety equipment in the lab (e.g., eye-
wash station, shower, sinks, fire extinguisher, biological safety cabinet, first aid kit, emergency gas valve).

18. Dispose of broken glass in the broken glass container.

19. No razor blades, syringe needles, or sharp metal objects will be used in this laboratory.

20. Report spills and accidents immediately to your instructor. Clean small spills with care (see instructions below). Seek help for large spills.

21. Report all injuries or accidents immediately to the instructor, no matter how small they seem.

Cleaning Spills

When a spill occurs, first, contact your instructor. If it is a small spill of a low hazard microorganism or sample, then you should clean the spill yourself.

The proper procedures for cleaning small spills of microorganisms or samples (BSL1):

1. Wear a lab coat, disposable gloves, safety glasses or a face shield, and if needed, approved respiratory equipment.

2. Soak a paper towel(s) in an appropriate disinfectant (70% ethanol or fresh 10% bleach solution) and place around the spill area.

3. Working from the outer edges into the center clean the spill area with fresh towels soaked in the disinfectant. Be sure to decontaminate any areas or surfaces that you suspect may have been affected by the spill. Allow 10 minutes contact time.

4. Place the paper towels and gloves into a biohazard bag and autoclave these materials to sterilize them.

5. Dispose of any contaminated clothing properly.

6. Wash your hands with a soap.

If it is a large spill and your instructor is not available, then call Risk Management and Safety (RMS). Each lab should come equipped with a spill response kit.

II. Laboratory Specific Biosafety Policies

Biosafety Level 1 (BLI)

Good Microbial Practices:

1. All bacteria and chemicals in the laboratory are to be considered dangerous. Do not touch, taste or smell any bacterial culture or chemical unless specifically told to do so.

2. For bacteria or chemicals ingested, see the lab instructor immediately.

3. Check the label on cultures and chemical bottles twice before removing any of the contents. Take only as much of the bacterial culture or chemical as you need.
4. Never return unused chemicals to their original containers.

5. Never use mouth suction to fill a pipet. Use a rubber bulb or pipet pump. Always keep the pipet pointed away from your body.

6. Never dispense flammable liquids such as ethanol anywhere near an open flame or source of heat.

7. Perform all procedures to minimize the creation of splashes and/or aerosols.

8. Never remove bacteria, chemicals or other equipment from the laboratory.

9. Take great care when transporting cultures and chemicals from one part of the laboratory to other. Hold them securely and walk carefully. All cultures should be in a test tube rack.

Spill Response and Decontamination Procedures:

Use the guidelines below for response to spills of biological materials outside of the biosafety cabinet. The laboratory will be equipped with a spill kit containing necessary materials for cleaning up a spill. All lab personnel will know where it is stored so that it can be retrieved quickly. Spill kit components will be replaced as they are used to prepare for the next incident.

Spill kit contents:

- Gloves
- Safety glasses or goggles
- Paper towels or pads to absorb contaminated liquids
- Biohazard waste bag
- Outline of the spill response SOP

Surface contamination:

1. Notify everyone else working in the room that there has been a spill and not to walk through the contaminated area. Notify your Principal Investigator (PI) as soon as possible.

2. Put on necessary protective equipment: gloves and lab coat at a minimum.

3. Cover the spill with paper towels and pour 10% freshly diluted bleach or other effective disinfectant over spill. Do not spray.

4. Allow to sit for at least 10 minutes or the recommended contact time depending on the disinfectant.

5. Wipe with paper towels, and discard towels into autoclave bag.

6. Decontaminate surrounding floor and work surface areas where splashes or larger aerosols may have settled around the spill.

7. Repeat the decontamination procedure.

8. Remove contaminated clothing and place in autoclave bag.
9. Remove gloves and put in autoclave bag.

10. Wash your hands thoroughly.

**Personal contamination:**

1. Notify everyone else who is working in the room of the exposure. Notify your Principal Investigator (PI) as soon as possible.
2. Flush the exposed surface (eyes, mouth, nose or skin) with water for 15 minutes
3. Apply first aid if necessary and treat as an emergency
4. Notify supervisor or Police/RMS if after hours
5. Report to a medical clinic for treatment or counseling

**Waste Disposal Procedures:**

All personnel are responsible for maintaining a clean work area. Only trained individuals should operate the autoclave.

1. **Solid materials**

   **Solid infectious** materials (used pipettes, flasks, Petri dishes, etc.) must be disposed of in autoclave waste bags. Waste should be placed in a plastic or metal pan to contain any leaks. The autoclave should be run for one hour or sufficient time to fully decontaminate the waste. To request a biological indicator to test the autoclave's effectiveness, contact the biosafety officer.

2. **Liquid waste**

   Liquid infectious wastes, such as spent media, can be autoclaved and poured down the sink or decontaminated by adding household bleach to a final concentration of 10%, allowed to sit for at least 30 minutes, then poured down the sink in the laboratory.

3. **Uncontaminated waste**

   Uncontaminated non-sharp waste should be disposed of in the general lab waste stream. Uncontaminated broken glass is disposed of in a sturdy cardboard box, preferably lined with a plastic bag. When full, the box should be taped closed and disposed of in the dumpster. Housekeeping will not dispose of broken glass.

4. **Sharps disposal**

   Sharps are items which pose a puncture or cutting hazard, such as glass, needles, and razors. No sharps will be used in this lab.

5. **Disposal of waste into dumpsters**

   Lab staff is responsible for transporting autoclaved waste to the dumpsters in a timely manner. Waste bags should not be left sitting in the laboratory or autoclave room for more than a few hours. If the dumpster is full, trash bags may NOT be discarded outside the dumpster. Bags must be returned to the lab and disposed of when the dumpster has been emptied.
III. Use of the Centrifuge

Aerosol containment for procedures done outside of the BSC is important. Centrifugation is a common type of lab procedures with a risk of generating aerosols. Aerosols may be generated if liquid leaks from the tube or container while the centrifuge is running, since this liquid will get splattered around the rotor and/or chamber. Leaks often happen if a tube or container cracks or breaks during the run. They can also happen if the cap is not secured to the container properly. Unfortunately, there is no way to know if such accidents have occurred during the run, until after you open the centrifuge and see the leaks. At that point, exposure to infectious aerosols has already occurred. To prevent exposures to infectious aerosols, it is expected that lab personnel use the following precautions:

- Always use a sealed rotor lid with fixed-angle rotors. These are typically screw-on lids, rather than Snap-on lids, and they have an O-ring to ensure an airtight seal on the rotor. Note, the centrifuge lid is not the same as the rotor lid and does not provide the necessary personal protection from aerosols.
- For swinging bucket rotors, use safety cups or buckets. These are the same type of tube holder or multi-well plate holder that are typically used in tabletop centrifuges, except they have lids fitted with O-rings to ensure an airtight seal.
- Always inspect the O-rings for integrity prior to use. Replace any that are showing signs of wear.
- Whenever possible, use tubes with screw-on caps. Those with O-rings are an even better option.
- Never overfill the containers, and always be sure to balance your samples before starting the centrifuge.

Vortexing will be done with a capped or closed container.

Accidental Spills in the Centrifuge:

Spills or breakage of containers inside of an operating centrifuge poses a serious potential for exposure due to the creation of aerosols. If a primary container has broken in a centrifuge without a closed rotor or bucket, immediately suspend use, notify lab staff and Instructor.

For suspected or confirmed spills/breakage in any centrifuge, wait at least 30 minutes after the centrifuge has stopped operating to initiate clean up.

1. Put on lab coat and gloves prior to opening centrifuge. Open carefully to assess the damage.

2. If the spill is contained within a closed cup, bucket or rotor, spray the exterior with disinfectant (bleach) and allow at least 10 minutes of contact time. Remove the carrier to the nearest biosafety cabinet (BSC). If a biosafety cabinet is not available, close the centrifuge, post a sign to indicate it cannot be used. Notify the Instructor.
3. If a BSC is available, gather supplies needed, such as a sharps container for broken glass and bins filled with disinfectant and place into the BSC. Use forceps to remove broken glass and place directly into sharps container. Carefully remove any unbroken tubes and place into a bin filled with disinfectant for 20 minutes. Wipe carrier/bucket with disinfectant.

4. After disinfection, carrier, bucket or rotor should be washed with a mild soap and water.

5. Spray the interior of the centrifuge chamber with a disinfectant, let sit for 20 minutes and then wipe down

6. Remove protective clothing and wash hands.

IV. Emergency Procedures

1. Fire evacuation procedures
   During a fire emergency, lab staff should prioritize life safety. Walk to the nearest exit. Pull the fire alarm if necessary and call 911 once outside the building.

2. Power outage
   In the event of a power outage, put away cultures. Remove PPE and exit the lab normally. Emergency lighting within the buildings should provide adequate visibility to exit the building. Notify the PI immediately.

3. Medical emergency
   In the event of a medical emergency in the lab, follow appropriate procedures depending on the hazards present. If the emergency involves a spill of hazardous materials onto the clothing or body, assist the victim to the shower or eyewash station. If the victim requires medical attention, call 911.

4. Accidental exposure
   For splashes to the eyes, rinse the eyes under the eyewash for 15 minutes. If the victim requires medical attention, call 911. Report to Risk Management Safety and follow up by contacting Occupational Health Partners.

5. Potential Health Risks
   Personnel must receive annual updates or additional training when procedural or policy changes occur. Personal health status may impact an individual’s susceptibility to infection, ability to receive immunizations or prophylactic interventions. Therefore, all laboratory personnel and particularly women of child-bearing age should be provided with information regarding immune competence and conditions that may predispose them to infection. Individuals having these conditions should be encouraged to self-identify to their healthcare provider for appropriate counseling and guidance.
35. **Immune-compromised students can be infected by the agents used in this class and these individuals should consult their doctors.**

List of the (possible) biological agents being used in the teaching laboratory activities in the chart below:

<table>
<thead>
<tr>
<th>Name of Biological Material¹</th>
<th>Type of Biological Material ²</th>
<th>Original Source ³</th>
<th>Strain (if applicable)</th>
<th>Risk Group (RG)⁴</th>
<th>Biosafety Level (BSL)⁴</th>
<th>Where will the agent be handled and/or stored?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacillus subtilissus</td>
<td>Bacteria</td>
<td>Carolina Biological</td>
<td>RG-1</td>
<td>BSL-1</td>
<td>Room 308/Room 405</td>
<td></td>
</tr>
<tr>
<td>Micrococcus luteus</td>
<td>Bacteria</td>
<td>Carolina Biological</td>
<td>RG-1</td>
<td>BSL-1</td>
<td>Room 308/Room 405</td>
<td></td>
</tr>
<tr>
<td>Staphylococcus epidermidis</td>
<td>Bacteria</td>
<td>Carolina Biological</td>
<td>RG-1</td>
<td>BSL-1</td>
<td>Room 308/Room 405</td>
<td></td>
</tr>
<tr>
<td>Rhodospirillum rubrum</td>
<td>Bacteria</td>
<td>Carolina Biological</td>
<td>RG-1</td>
<td>BSL-1</td>
<td>Room 308/Room 405</td>
<td></td>
</tr>
<tr>
<td>Escherichia coli K12</td>
<td>Bacteria</td>
<td>Carolina Biological</td>
<td>RG-1</td>
<td>BSL-1</td>
<td>Room 308/Room 405</td>
<td></td>
</tr>
<tr>
<td>Pseudomonas fluorescens</td>
<td>Bacteria</td>
<td>Carolina Biological</td>
<td>RG-1</td>
<td>BSL-1</td>
<td>Room 308/Room 405</td>
<td></td>
</tr>
<tr>
<td>Lactobacillus acidophilus</td>
<td>Bacteria</td>
<td>Carolina Biological</td>
<td>RG-1</td>
<td>BSL-1</td>
<td>Room 308/Room 405</td>
<td></td>
</tr>
<tr>
<td>Bacillus thuringiensis</td>
<td>Bacteria</td>
<td>Carolina Biological</td>
<td>RG-1</td>
<td>BSL-1</td>
<td>Room 308/Room 405</td>
<td></td>
</tr>
</tbody>
</table>

¹ Name of Biological Material
² Type of Biological Material
³ Original Source
⁴ Risk Group (RG) and Biosafety Level (BSL)