# MICROBIOLOGY and IMMUNOLOGY BIO204-01
# Fall 2020

**Class Time and Location:** M 2.30:00 PM – 4:300 AM, Room # Spencer 229
**Instructor:** Krishna Nath, Ph.D., M.Sc., B.Ed.
**Office and Contact Information:** Room # Spencer 238; Phone 394-7622 ext 1336
**Email:** knath@uarichmountain.edu
**Office Hours:** Posted on the office door

**RESOURCES**:

Lecture Text *Microbiology Fundamentals: A Clinical Approach,3rdrd ed*; by Marjorie Kelly Cowan.
ISBN: 978-0-07-802104-6

Laboratory Manual: *Laboratory Manual for Microbiology Fundamentals: A Clinical Approach3rd ed*; by Steven Obenauf and Susan Finazzo. ISBN-13:978125929863

**MASK POLICY:** As per the Executive order from the governor of Arkansas, all students are required to wear a proper face covering that completely covers the nose and mouth while on campus and in class. Masks with holes or masks that do not completely cover nose and mouth are not acceptable. Any student that does not have a proper mask will leave class and be referred to the Vice Chancellor for Student Affairs for possible disciplinary action.

**FOOD & DRINK:** Food and drinks, including water are not allowed in the classroom at any time.

**COURSE DESCRIPTION**: This is an introductory course in Microbiology, which includes microbiological concepts including the study of bacteria, viruses, fungi, and protozoa as they affect the human body. Designed for majors in health professions programs. Special course fees may apply. Laboratory is an integral part of this course and participation is required for successful completion of this course. **ACTS COURSE BIOL2004**

**PROGRAM OUTCOME and Rationale:** The purpose of the Associate of Arts Program is to provide students with the knowledge and critical thinking skills that will enable students to analyze problems, arrive at intelligent conclusions, and make reasoned choices in their professional and personal lives.

- Students will demonstrate an understanding of physical and biological principles.
- Students will apply technological and research skills to identify, locate, and process information.
- Students will demonstrate competency in writing, reading, speaking, and listening.
- Students will be able to compete academically upon transfer to a four-year institution.

**COURSE OBJECTIVES:** Upon successful completion of Microbiology and Immunology, the student should be able to:

- Review the history of microbiology, including important scientists.
- Describe the importance of chemistry and biological molecules to cellular metabolism.
- Differentiate types of microorganisms by structure and physiology.
- Describe the reproductive methods of microorganisms.
- Discuss the role of DNA replication and how DNA passed among microorganisms.
- Explain the process of protein synthesis.
- Explain the importance of genetics to the theory of evolution.

- Discuss the causative agents, symptoms, transfer and treatments of common microbial diseases.
- Explain how infection occurs and the human body resists infection.
- Discuss ways to control microorganisms by physical and chemical means.
- Compare how different antibiotics and chemotherapeutic drugs work
- Practice general laboratory techniques, including aseptic techniques, streaking plates, identification methods, and estimating numbers of microbes.
- Use a light microscope to view and interpret slides of different microorganisms.
- Prepare slides for microbiological examination, including cleaning, smearing, and gram and endospore staining.
- Use lab equipment and computer technology to research information on microorganisms.

## LECTURE AND EXAM SCHEDULE

| **Unit** | **Chapter** | **Topic** |
|---|---|---|
| | | |
| Introduction | 1 | Introduction to Microbes and Their Building Blocks |
| | 2 | Tools of the Laboratory: The Methods for the culturing and Microscopic analysis of Microorganisms |
| The Cell | 3 | Bacteria and Archaea |
| | 4 | Eukaryotic Cells and Microorganisms |
| | | |
| **Test 1** | | **9/24T** |
| Viruses | 5 | Viral Structures and Life Cycles |
| Molecules<br>Metabolism | 6<br>7 | Microbial Nutrition and Growth<br>Microbial Metabolism |
| Genetics | 8 | Microbial Genetics and Genetic Engineering |
| | | |
| **Test 2 (Mid-term)** | | **10/12T** |
| | | |
| Controlling Microbes<br><br>Defenses | 9<br>10<br>11<br>12<br>13 | Physical and Chemical Control of Microbes<br>Antimicrobial Treatment<br>Interactions Between Microbes and Humans<br>Host Defenses I: Nonspecific Defenses<br>Host Defenses II: Specific Immunity |
| | | |
| **Test 3** | | **11/12 T** |
| Infectious diseases and health | 16<br>17<br>18<br>19<br>20<br>21<br>22 | Infectious Diseases Affecting the Skin & Eyes<br>Infectious Diseases Affecting the Nervous System<br>Infectious Diseases Affecting the Cardiovascular<br>Infectious Diseases Affecting the Respiratory System<br>Infectious Diseases Affecting the Digestive System<br>Infectious Diseases Affecting the Genitourinary System<br>The Interconnected Health of the Environment, Human, and other Animals |
| **Test 4** | | **12/2 T** |
| **Final Exam** | | **12/10T** |

**Disclaimer**: The information contained in this syllabus is as accurate as possible but may be subject to change with reasonable advance notice. The schedule and content of lectures and assignments may be changed at the discretion of the instructor upon oral notification in class. Changes may involve additions, deletions, substitutions, or changes in sequence or due date.

**Tentative Lab Schedule, Fall 2020**

| **Lab topic and assignment** | **Exercises** |
|---|---|
| Discuss for syllabus, Introduction/ Safety and Overview / Microscopes | 1 |
| Algae, Protists, Fungi | 4, 5, 6 |
| Aseptic Technique, Intro to Staining, Negative Stain | 2, 8, 9 |
| Isolation Streak, Motility Slides, Capsule Stain | 3, 7, 10 |
| Gram Stain, Acid-Fast Stain, Endospore Stain | 11, 12, 13 |
| Blood Agar, Catalase and Oxidase Reaction | 14, 22, 23 |
| ***Review and Practices & Scientific Discussion (10/13 Tuesday)*** | |
| ***Formal Laboratory Report & lab mid-term (10/13 Thrusday)*** | |
| Mannitol Salt, EMB, and MacConkey Agars | 15, 16, 17 |
| Antimicrobial Susceptibility Testing | 25 |
| Hand Washing Technique | |
| EnteroPluri-Test | 26 |
| Parasitic Protozoa, Worms, Vectors of Disease | 29-31 |
| ***Review and Practices & Scientific Discussion (12/8 Tuesday)*** | 37 |
| ***Formal Laboratory Report & lab mid-term (12/10 Thrusday)*** | |

**COURSE CONDUCT:** Classroom presentation is basically of the lecture-demonstration type. Lecture will be over pre-assigned chapters with powerpoints delivered as a visual aid. This will be supplemented with various scientific models, representative specimens, supplemental handouts, and special projects. Students should **TAKE NOTES** and are expected to **STUDY** beyond the lab and classroom and manage their time to develop good study habits for this course.

**LABORATORY CONDUCT:** The laboratory consists of a series of hands-on exercises that are designed to reinforce some of the principles covered in lecture. Labs will also introduce the student to some common laboratory equipment and Good Laboratory Practices. Students are expected to follow the instructor's direction and comply with the Rules of the Laboratory. Lab exercises are assigned beforehand and it is expected that you **read the material BEFORE coming to class**. Labs are designed to be investigative and will require critical thinking skills to analyze results of experiments.

**UARM CREDIT HOUR CALCULATOR:** For every course credit hour, you should expect to spend at least three clock hours per week of concentrated attention on course-related work, including but not limited to time attending class, as well as out-of-class time spent reading, reviewing, organizing notes, preparing for upcoming quizzes/exams, problem solving, developing and completing homework, and other activities that enhance learning. For a three hour course, a typical student should expect to spend at least nine hours per week dedicated to the course. This includes the time spent in class.

**Course Requirements / Evaluation for Lecture:** Evaluation of student performance in the course will be based on the followings. However, each student need to be graded independently for Lecture & Lab, respectively.

| | | | |
|---|---|---|---|
| 1. | Four Tests 1-4: | 4 @ 100 points each | = 400 points ( Test 2 is Mid-term Exam. |
| 2. | Quizzes and assignment | 11 @ 10 points each | = 100 points (lowest quiz will be dropped) |
| 3. | Final Exam: | 1 @ 100 points | = 100 points |
| 4. | Lab activities: | 11 @ 10 points each | = 100 points (one lowest will be dropped) |
| 5. | Techniques on Microbiology: | 1 @ 20 points | = 20 points |
| 6. | One Formal Lab Report: | 1 @ 20 points | = 30 points |
| 7. | Lab Final Exam: | 1 @ 50 points | = 50 points |
| **Total points** | | | **= 800** |

**GRADING SCALE:**
The final grade for the course will be determined by dividing the student's total number of points earned by the number of possible points. Grades are assigned on the basis of the following percentage scale, after rounding the calculated percentage to the nearest whole number:

| Percentage | Final Grade |
|---|---|
| 90-100 | A |
| 80- 89 | B |
| 70- 79 | C |
| 60- 69 | D |
| <60 | F |

**EXAMS:** Exam dates are given in the syllabus and students are required to take all the tests offered including the final exam. Exam questions will be taken from lecture notes, laboratory exercises, discussion, audiovisuals, handouts, textbook and other assignments. Many exam questions will require use of this material and critical thinking to conclude the answer. Exams may include all or any combination of the following types of questions: multiple choice, true/false, short-answers, fill-in-the blank, draw and label, matching, and short answer.

**Lab Assignments:** Twelve lab activities will be considered as written exams or quizzes or assignment as per the need. Each activity will contains multiple choice, true/false, matching, short-answer, and fill in the blank questions on laboratory exercises students have done during lab activities (one lowest will be dropped)

**TECHNIQUES IN MICROBIOLOGY**– Gram stain and isolation streaks and/or any other techniques which were performed during lab activities, in particular **GRAM STAIN AND ISOLATION STREAK,** are techniques that all microbiology students should know the importance of them and how to do. After practicing these several times, each student will be graded individually on the results of their technique.

**LABORATORY REPORT** – One formal laboratory report will be submitted during the semester. These will be a summary report over one of the exercises performed in the lab. An outline will be provided when assigned. Each student is expected to write their own lab report. **Completion of a lab report is a course requirement for successful completion of this course.**

**ATTENDANCE REQUIREMENTS:** As a student, you are responsible for all material presented during lecture, whether present for the class or not. Assignments are to be completed in a timely fashion; therefore, all make-up work must be completed within 5 calendar days of your return following an absence. Unexcused absences are not to exceed twice what the class meets in a week. Laboratory is a required part of this course and failure to attend or participate **will** result in an "F" for this course. For further information, see "Student Attendance" on page 70 of the 2017/2018 UARM Academic Catalog.

**Make-up Policy:** A student who misses an assignment because of an officially sanctioned college activity or those with a documented excuse for their absence, will be permitted to make up the assignment or test without penalty. Others may also make up missed exams but will be penalized 20% for each occurrence. Any deviation from this policy will be considered on a case-by-case basis.

**Additional Information:** Food and drinks are not permitted in the laboratory. Please make sure that your cell phone and any other electronic devices are turned off (or to a non-sound mode) during the class session. **Place all such devices out on the desktop**.

**Disability Policy:** It is the policy of UARM to accommodate students with disabilities, pursuant to state and federal law. Any student with a disability who needs accommodations should contact the Vice President for Student Affairs Office, 394-7622 ext.1400.

**Arkansas Clean Air Act:** In compliance with the Arkansas Clean Air Act, UARM is a smoke and tobacco free facility. Students are to refrain from the use of all tobacco products while on campus.

**Student Misconduct:** Students committing misconduct are subject to disciplinary sanction(s) and or restrictions. Misconduct or prohibited behavior includes, but is not limited to endangerment, harassment, disruption, sexual misconduct, dishonesty, illegal drugs and/or alcohol, fire or safety issues, gambling, property violations, computer violations or other violations as listed in detail in the UARM catalog.

**Campus Security:** UA Rich Mountain strives to provide a safe learning environment; therefore, students who know of any security risk are asked to contact a college official. For more information follow this link and look under Health and Safety: http://www.uarichmountain.edu/at-a-glance/disclosures

**UA Rich Mountain Mission:** UA Rich Mountain provides transformative education to all learners*.

*Under review

# Credit Hour Requirement Calculator

| | | | |
|---|---|---|---|
| **Course Information** | | | |
| Department, Course Number | | Biological Science | BIO204 |
| Course Title | | Microbiology & Immunology | I |
| Credit Hours | 4 | | |
| Mode of Delivery | Traditional | | Lecture/Lab |
| Weeks in Part of Term | 15 | | |
| Level of Reading Material | Advanced/Scientific/Technical (2) | | 2 |
| Reading Level of Students | Average Student (2) | | 2 |
| Average Pages per Hour | 11 | | |

*Enter either week or term, not both*

| **Contact Hours** | | **Hours/Week** | **Hours/Term** | **Total Hours** |
|---|---|---|---|---|
| Lecture/Recitation | | | 45 | 45 |
| Lab Contact Hours | | | 30 | 30 |
| | **Pages Asg'd** | **Hours/Week** | **Hours/Term** | |
| **Syllabus Items** | | | | |
| Reading Lecture Material | 650 | | 18.9 | 59.1 |
| Reading Lab Assignment | 50 | | 10.8 | 4.5 |
| Writing Lab Reports | | | 6 | 6 |
| Reviewing for Practical | | | 3 | 3 |
| Reviewing for Exams | | | 10 | 10 |
| | | | | 0 |
| **Total Hours** | | | | 157.6 |
| **Required Hours** | | | | 150 |
| **Difference** | | | | Ok + 7.6 |