

# VALENCIA COLLEGE

## MCB 2010C MICROBIOLOGY Spring 2024

### COURSE SYLLABUS

**Professor:** Yasser Saad, Ph.D.

**Office:** AHS216

**E-mail:** ysaad1@valenciacollege.edu (Please check your email/Canvas on a regular basis to make sure you do not miss an important announcement).

**Phone Number:** 407-582-5516 (leave message)

#### **Office Hours:**

M-6:30 AM - 7 AM; M-12:45 AM - 2:00 PM

T-6:30 AM - 7 AM; T-2:00 PM - 3:45 PM

W-6:30 AM - 7 AM; W-12:45 AM - 2:00 PM

Th-6:30 AM - 7 AM; Th-2:00 PM - 3:45 PM

F- Zoom (9 AM to 1:00 PM)-appointment required.

**COURSE:** Microbiology (MCB2010C)

**Credit:** 4

**Prerequisite(s) and Co-requisite(s):** Minimum grade of C in BSC1010C or BSC2093C

#### **COURSE DESCRIPTION:**

This lecture/lab course is designed for Health Sciences majors. Survey of microbial forms with emphasis on bacteria and viruses: morphology, physiology, genetic mechanisms, and control of microorganisms. Pathogenic processes and microbes are discussed in detail.

#### **COURSE OBJECTIVES:**

Major Topics/ Concepts/ Skills/ Issues:

- Survey of Microorganisms
- Microscopy
- Aseptic Technique
- Cellular structures
- Virology
- The Human Microbiome
- Bacterial Isolation and Diagnosis Techniques
- Microbial Metabolism
- Microbial Growth and Nutrition
- Microbial Genetics and Genetic Engineering
- Control of Microbial Growth
- Antimicrobial Drugs and Drug Resistance
- Mechanisms of Pathogenicity
- Epidemiology
- Immunology
- Survey of Common Infectious Diseases and Causative Agents

Learning Outcomes:

***Students will describe major events/contributions that have shaped the field of microbiology.***

- *Describe major historical discoveries and current contributions of scientists to the field of microbiology*
- *Give examples of beneficial ways humans use microorganisms.*

***Students will describe the characteristics of microbes.***

- *Differentiate between the major groups of microbes.*
- *Describe the structure and function of microbes including bacterial cells, eukaryotic cells, and viral particles.*
- *Describe the role of cellular and acellular microbes in human health and infectious disease.*
- *Apply the binomial system of nomenclature to microorganisms.*

***Students will explain factors that influence microbial propagation.***

- *Describe the importance of essential nutrients as they relate to cell function.*
- *Compare and contrast processes of nutrient uptake by bacterial and eukaryotic cells.*
- *Describe the environmental factors that influence bacterial growth.*
- *Describe the replication processes used by cellular and acellular microbes.*

***Students will explain microbial metabolism.***

- *Differentiate between catabolic and anabolic pathways as they relate to microbial growth.*
- *Explain the role of enzymes in microbial metabolism.*
- *Differentiate between aerobic and anaerobic respiration and fermentation processes.*
- *Describe the ecological role of microbial photosynthesis.*

***Students will differentiate between bacterial and eukaryotic genetic mechanisms.***

- *Differentiate between bacterial and eukaryotic genomes.*
- *Differentiate between bacterial and eukaryotic DNA replication and gene expression processes.*
- *Explain genetic regulation in bacterial cells.*

- Explain horizontal gene transfer in bacterial cells.
- Discuss the effects of mutations on bacterial cells and populations.

***Students will explain methods of microbial control.***

- Identify cellular targets of physical and chemical microbial control agents.
- Explain the principles of antimicrobial therapy.
- Describe how microorganisms are tested for susceptibility to chemotherapeutic agents.
- Describe the mode of action of antimicrobial drugs and their targets.
- Describe adverse reactions and the importance of selective toxicity in antimicrobial therapy.
- Describe the mechanisms and implications of antimicrobial resistance.

***Students will describe the role of microbes in health and disease.***

- Describe the importance of the human microbiome.
- List the steps of infection and disease progression.
- Identify the role of virulence factors in causing disease.
- Describe different modes of transmission for infectious agents.
- Differentiate between community-acquired and hospital-acquired infections.
- Explain how infectious disease etiology is determined using methods such as Koch's postulates.
- Explain the role of epidemiology in tracking and controlling the spread of infectious diseases.
- Explain the epidemiological triad and the factors that affect disease state.

***Students will describe the role of the immune system in combating infections.***

- Differentiate between the three lines of defense in the human immune system.
- Explain components of nonspecific and specific immune defenses.
- Explain the role of molecular interactions in stimulating the immune response.
- Describe the development and function of humoral and cell-mediated defenses.
- Describe the implications of medical interventions, such as vaccines, on the development of immunity.

***Students will demonstrate proficiency in microbial laboratory techniques.***

- Operate a compound microscope to produce viewable images of microorganisms.
- Demonstrate the preparation of slides and clinically important staining procedures.
- Describe different methods used to isolate bacteria.
- Explain the main principle behind biochemical testing.
- Demonstrate the use of culture media and biochemical tests to characterize bacterial species.
- Demonstrate the recommended laboratory use of personal protective equipment (PPE) and safety procedures.
- Demonstrate the recommended laboratory methods for handling infectious materials, disposing of biological waste, and using aseptic techniques.

***Students will describe laboratory diagnostic techniques used in the identification of infectious agents.***

- List examples of microbial identification techniques.
- Describe how infectious agents are identified in the diagnosis of disease.
- Explain the importance of specimen collection techniques.
- Summarize the most common methods used for direct examination of a specimen.
- Explain various immunological and genetic engineering techniques useful in diagnosis.
- Explain the advanced use of genetic diagnostic techniques and treatments.

***Students will describe relevant infectious diseases.***

- *Describe the etiology of infectious diseases.*
- *Identify modes of transmission of infectious diseases.*
- *Describe significant signs/symptoms of infectious diseases.*
- *Describe commonly practiced culture and diagnostic methods for infectious diseases.*
- *Discuss notable treatment and prevention of infectious diseases.*

***Students will apply the scientific method when analyzing laboratory results and medical information.***

- *Identify the components and processes involved in scientific method/reasoning.*
- *Analyze data and make conclusions using the process of scientific method/reasoning.*

### **EDUCATIONAL MATERIALS:**

1). Required reading is provided to you within your Canvas course. **IF** you want a physical book, I recommend that you obtain an older version of Cowan's Microbiology-A System's Approach. This textbook is **NOT** required, since I provide you the reading material that I will be holding you responsible for free of charge.

2). Lab: Microbiology Lab Manual 23' Morton ISBN 9781640436138 Copyright: 23 Edition: 4

### **Valencia College Core Competencies:**

The faculty of Valencia College has identified four core competencies that define the learning outcomes for a successful Valencia graduate. These competencies are at the heart of the Valencia experience and provide the context for learning and assessment at Valencia College. You will be given opportunities to develop and practice these competencies in this class. The four competencies are:

- **Think-** think clearly, and creatively, analyze, synthesize, integrate and evaluate in the many domains of human inquiry
- **Value-** make reasoned judgments and responsible commitments
- **Communicate-** communicate with different audiences using varied means
- **Act-** act purposefully, effectively, and responsibly

### **ASSESSMENT METHODS AND EVALUATION:**

**-Lecture (Microbiology and General Biology Components)-** There will be a total of **4 lecture EXAMS AND 1 CUMULATIVE FINAL EXAM**. Exams will be administered in class. The number of questions per exam can vary. The exam will be mainly multiple-choice, but other types of questions are also possible (ex. fill in blank, matching, questions that ask you to explain or describe, etc.). All students will have to complete the exam by the deadline. **Make-up exams will not be provided.**

**-The lecture component of the class will also consist of LECTURE CHAPTER QUIZZES.**  
**Make-up quizzes will not be provided.**

**-Lab-** All labs will be in the lab. **Making up a lab will not be allowed.** The lab will have 4 quizzes and 2 exams.

### **GRADE BREAKDOWN:**

-Final grade will be determined as a percentage that combines both the lecture and lab components.

**LECTURE COMPONENT (70% OF TOTAL GRADE):** The lowest unit exam grade will be dropped.

\*Unit Lecture Exams (40% of total grade)

-Lecture Exam #1 (Units 1, 2)

-Lecture Exam #2 (Units 3, 4)

-Lecture Exam #3 (Units 5, 6)

-Lecture Exam #4 (Units 7, 8)

-Lecture Exam #4 (Units 9, 10, 12)

\*Cumulative Final Exam (All Units, except for unit 11). **I will test you on unit 11 on lab exam #2:** 12.5% of Overall Grade

\*Unit Lecture Quizzes (All Units, except for unit 11): 12.5% of Overall Grade (**I will drop the lowest Lecture Quiz Grade**)

\*Learning Unit Readings (All Units, including unit 11): 5 of Overall Grade

### **LAB COMPONENT (30% OF TOTAL GRADE):**

\*All Labs: 5% of Overall Grade

\*Lab Exam #1: 12.5% of Overall Grade

\*Lab Exam #2: 12.5% of Overall Grade

### **GRADE SCALE:**

90.0-100%=A   80.0-89.99%=B   70.0-79.99%=C   60.0-69.99%=D   Below 59.99%=F

-Grades will not be given out over the phone, or by email, by the instructor or the department secretaries. Grades will be made available to students as soon as possible after the exam in a manner that preserves student privacy, mainly through the grades link in your Canvas course.

## **CLASSROOM POLICIES AND ATTENDANCE:**

1. Regularity in classroom online participation is vital to academic success. A student who does not maintain regular online activity and who falls behind in his/her work will most certainly have a difficult time succeeding in this class.

The Professor **WILL NOT** drop any student at any time for any reason. It is the student's responsibility to withdraw himself or herself from the class prior to the withdrawal deadline. The professor will still maintain a record of attendance.

2. **Withdrawal (Deadline is on 03-15-2024, no later than 11:59 PM):** Per Valencia Policy 4-07 (Academic Progress, Course Attendance, and Grades, and Withdrawals), a student who withdraws from class before the established deadline for a particular term will receive a grade of "W". A student is not permitted to withdraw after the withdrawal deadline. A student who is withdrawn by faculty for violation of the class attendance policy will receive a grade of "W". Any student who withdraws or is withdrawn from a class during a third or subsequent attempt in the same course will be assigned a grade of "F". For a complete policy and procedure overview please refer to the Policy Manual link given below.

-Students should consult with a financial aid advisor or counselor before withdrawing from a course; there may be financial implications to the student which he or she must know about to make an informed decision before withdrawing from a course. Students with some scholarships who withdraw or are withdrawn from a class must pay the college for the cost of the class. Other scholarship sponsors may also require repayment. For a complete policy and procedure overview please refer to the Policy Manual link given below.

Valencia wants all students to be successful in their classes. In this class section, use the "Thinking of Withdrawing" located below "My Grades" in Blackboard to help you avoid needing to withdraw. To learn more go to: <https://youtu.be/fFlkAOh4pu4>

### **\*Drop/Refund Deadline: 01-16-2024, no later than 11:59 PM.**

3. **Academic Honesty:** Each student is required to follow Valencia's policy regarding academic honesty. All work submitted by students is expected to be the result of the student's individual thoughts, research, and self-expression unless the assignment specifically states "group project." Any act of academic dishonesty will be handled in accordance with Valencia policy as set forth in the Student Handbook and Catalog.

**NOTE: All turned-in class or lab work (assignments, homework, projects, exercises, etc.) are expected to be the product of the student's own effort. All answers given to exams/quizzes administered during lecture/lab are also expected to be the student's own effort. Evidence of cheating/plagiarism will be considered a form of academic dishonesty. A student showing evidence of dishonesty in any form will receive a failing grade for that single event. A subsequent event of dishonesty will result in a failing grade in the class among other potential consequences.**

**STUDENT ASSISTANCE PROGRAM:** Valencia College is interested in making sure all our students have a rewarding and successful college experience. To that purpose, Valencia students can get immediate help with issues dealing with stress, anxiety, depression, adjustment difficulties, substance abuse, time management as well as relationship problems dealing with school, home, or work. BayCare Behavioral Health Student Assistance Program (SAP) services are free to all Valencia students and available 24 hours a day by calling (800) 878-5470. Free face-to-face counseling is also available.

**STUDENTS WITH DISABILITIES INFORMATION:** "Students with disabilities who qualify for academic accommodations must provide a Notification to Instructor (NTI) form from the Office for Students with Disabilities (OSD) and discuss specific needs with the professor, preferably during the first two weeks of class; accommodations will not be applied retroactively. The Office for Students with Disabilities determines accommodations based on appropriate documentation of disabilities."

**PREGNANT STUDENTS:** Students are also invited to contact Mr. Ryan Kane, Title IX Coordinator/Equal Opportunity Officer, 407-582-3421, rkane8@valenciacollege.edu, regarding requests for alternative arrangements relating to pregnancy.

**KEY TO SUCCESS:** "Learning is an action verb!! Most students need to do more than just sit through lectures and reread their notes. Spend 1-2 hour blocks of time every day actively writing or discussing concepts to make them a part of your memory. Use the words you learn often, they will sink in better.

-Here are some study and classroom management tips that have assisted former students:

- Attend every class and lab.
- Do not be tardy.
- Preview the chapter prior to the lecture.
- Preview the labs prior to coming to the lab.
- Make a list of all the biology terms and their definitions (use flashcards).
- Make a list of other English words that you may not be familiar with and their definitions (use flashcards).
- Rewrite your notes soon after the lecture.
- If you record the lectures, replay them to refresh your memory when you rewrite your notes.
- Create flashcards with questions you make up from the lecture and lab with answers on the back.
- Make your own summary of each chapter (this becomes your study guide).
- Use mnemonic devices and other games to remember concepts; go to Google images, YouTube, and Khan Academy for additional pictures and videos to clarify concepts.
- Become a member of a study group and meet with your study group on a regular basis. You have to be adequately prepared when you are studying in a group setting. You should help each other learn the material and not hold each other back. So if you come to your study group as prepared as possible, most likely you will help one of your study group members understand something and that person will help you understand some

other concept that you may be having trouble with. If no one comes to a study group prepared, then it will be a waste of time for all the members involved.

- Make lists of confusing topics from your studying and ask questions.
- Take advantage of the professor's office hours.
- Tutoring services are available in bldg. 7-240 (extension 1633).
- Do all the assigned homework.
- Take advantage of all the extra credit opportunities.
- **Learning Support Services** provides students with academic support through distance tutoring, face-to-face tutoring at the campuses, writing consultations, library services, and resources. Tutoring is offered in most academic disciplines including math, science, foreign languages, English for academic purposes (EAP), computer programming, and writing assistance for any course. Assistance with library research can be accessed online through Atlas or the tutoring LibGuide. For more information on how to access tutoring and library research assistance, please visit the college-wide Learning Support Services LibGuide at: <https://valenciacollege.edu/students/learning-support/west/tutoring/>

**Please note:** Brainfuse is our new 24/7 online tutoring and learning hub, which is available to all of Valencia's students. This service is best used as a backup to Valencia's Distance Tutoring service, not as a replacement. Brainfuse is accessible through Canvas or by visiting <https://valenciacollege.edu/students/learning-support/west/tutoring/>

**SECURITY STATEMENT:** We want to reassure you that our security officers are here around the clock to ensure the safety and security of the campus community. It's important to remain alert and aware of your surroundings, especially during the early morning or evening hours. Remember that you can always call security for an escort if you feel uncomfortable walking alone on campus. White security phones can also be found in many of our buildings; simply pick up the phone and security will answer. Finally, report any suspicious persons to Campus Security by using the yellow emergency call boxes located on light poles in the parking lots and along walkways. Also, please find and record on your cell phone the most up-to-date Campus Security phone numbers.

**Student Audio/Video Recording:** Students are only allowed to audio/video record lecture content (not lab content) and are only allowed to record the instructor (not any other student). Students who are recording are not permitted to record another student on camera or by audio. Any recordings captured by the student will be strictly used for educational purposes by that student and it is not to be shared or posted.

**DISCLAIMER:** "The course outline and syllabus are subject to change as needed; changes will be announced in class and by email in a timely manner, when necessary."

**CONSENT:** By continuing in this course the student accepts the professor's policies and procedures to conduct class and lab, accepts the grading procedure, accepts all other things outlined in this syllabus, and accepts amendments.

*Valencia College is committed to providing each student with a quality educational experience. Faculty members have set high standards of instruction for themselves and for you. If you have a*



*problem in a class, your first step is to talk to your instructor. If you are still dissatisfied, you may talk with the academic dean of the division for your class. We will work together to resolve any issues that arise.”*