

**THOMAS ADEWUMI UNIVERSITY OKO**  
**COURSE OUTLINE**

Faculty	COMPUTING AND APPLIED SCIENCES	
Department	BIOLOGICAL SCIENCES	
Course title	<b>BACTERIOLOGY</b>	
Year of study	3	
Course code	MCB 303	
Credit hours	3	
Contact hours	45	
Mode of delivery	CLASSROOM LECTURES LABORATORY PRACTICAL SESSIONS	
Mode of assessment		WEIGHT%
Continuous assessment		30%
Final examination		70%
Total		100%
Course lecturers and Instructors	MRS F.J. OLAITAN-LECTURER	
Course description	<p>In the study of Microbiology, Bacteria are the most abundant group of microorganisms in nature. They have several classes with well-defined characteristics. Bacteriology is the study of prokaryotes which are divided into Bacteria and their close relation, Archea. These groups of organisms are very fastidious and ubiquitous. They can survive in the harsh conditions. Hence, they have to be studied so that man can explore them positively and not trivialize their effects due to their implications in human diseases and infections.</p>	
Course objectives	<p>This course will make it possible to understand</p> <ol style="list-style-type: none"> <li>1. The Organization of bacteria cell</li> <li>2. Effect of staining on bacteria cell wall e.g. Gram positive or Gram negative, acid fast staining, those without cell wall.</li> <li>3. Structure and composition of the bacteria and archeal cell membranes with the organelles involved</li> <li>4. Techniques involved in bacteriology.</li> </ol>	

	<ol style="list-style-type: none"> <li>5. Isolation, preservation and maintenance of pure culture</li> <li>6. Different types of culture media</li> <li>7. Reproductive forms in bacteria</li> <li>8. Forms of classifying and naming bacteria in different genera</li> <li>9. Important archaeal and eubacterial groups.</li> </ol>
Learning outcomes	<p>By the end of the course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the microbial world</li> <li>2. Make use of the microscope confidently</li> <li>3. Describe the organization of the bacterial and archeal cell.</li> <li>4. Classify and identify bacteria on culture media</li> <li>5. Describe the phases of bacterial growth</li> <li>6. Understand the growth requirements of each class of bacteria so as to adjust them accordingly when culturing a bacteria cell.</li> <li>7. Isolate and identify pure culture from mixed culture isolation.</li> <li>8. Maintain and preserve pure cultures; cultivate of anaerobic bacteria, and access nonculturable bacteria.</li> <li>9. Describe the methods of controlling microbial growth.</li> <li>10. Explain the process of Reproduction in Bacteria.</li> <li>11. Name and classify bacterial using cultural, conventional and molecular parameters</li> <li>12. Describe important archaeal and eubacterial groups.</li> </ol>
Teaching and learning	<p>The class will meet for three hours a week. It will be a combination of teachings and practical sessions.</p>
Detailed course content	<p>Cell organization: Cell size, shape and arrangement, Cell wall, Gram and acid-fast staining mechanisms, Effect of antibiotics and enzymes on the cell wall. Cell Membrane; structure, function and chemical composition of bacterial and archaeal cell membranes. Cytoplasm, Endospore. Bacteriological techniques, Pure culture isolation: Streaking, serial dilution and plating methods; cultivation, maintenance and</p>

	<p>preservation/stocking of pure cultures; cultivation of anaerobic bacteria, and accessing nonculturable bacteria. Microscopy. Growth and nutritional requirements in bacteria; Culture media types. Methods of controlling microbial growth. Reproduction in Bacteria. Bacterial Systematics: classification, systematics and taxonomy, conventional, molecular and recent approaches to polyphasic bacterial taxonomy, evolutionary chronometers, rRNA oligonucleotide sequencing, signature sequences, and protein sequences. Important archaeal and eubacterial groups.</p>
Course content sequencing	
Weeks	
Week 1	<p>Cell organization: Cell size, shape and arrangement, Cell wall, Gram and acid-fast staining mechanisms, Effect of antibiotics and enzymes on the cell wall. Cell Membrane; structure, function and chemical composition of bacterial and archaeal cell membranes. Cytoplasm, Endospore.</p>
Week 2	<p>Bacteriological techniques, Pure culture isolation: Streaking, serial dilution and plating methods; cultivation, maintenance and preservation/stocking of pure cultures; cultivation of anaerobic bacteria, and accessing nonculturable bacteria.</p>
Week 3	<p>Microscopy. Growth and nutritional requirements in bacteria; Culture media types. Continous Assessment 1</p>
Week 4	<p>Methods of controlling microbial growth. Reproduction in Bacteria. Practical 1</p>
Week 5	<p>Bacterial Systematics: classification, systematics and taxonomy, conventional, molecular and recent approaches to polyphasic bacterial taxonomy, evolutionary chronometers, rRNA oligonucleotide sequencing, signature sequences, and protein sequences.</p>
Week 6	<p>Important archaeal</p>

Week 7 to 10	Important Eubacterial groups Continuous Assessment 2
Week 11	Practical 2
Week 12	Revision
Recommended reading material	
<ol style="list-style-type: none"> <li>1. Joanne Willey and Kathleen Sandman and Dorothy Wood (2020). Prescott's Microbiology, <b>11<sup>th</sup> Edition</b></li> <li>2. Jennifer C. Stearns, PhD, Michael G. Surette, PhD, and Julienne C. Kaiser, MSc Microbiology For Dummies® Published by: John Wiley &amp; Sons, Inc., 111 River Street, Hoboken, NJ 07030-5774, www.wiley.com Copyright © 2019 by John Wiley &amp; Sons, Inc., Hoboken, New Jersey</li> <li>3. Stuart Hogg (2013). Essential Microbiology, 2nd Edition. Wiley-Blackwell, <i>University of Glamorgan, UK.</i></li> <li>4. Linda Bruslind, (2021). General Microbiology. Oregon State University Corvallis, OR.</li> </ol>	

Course code: MCB 303

Course title: BACTERIOLOGY

Preamble: This course will clearly state distinguishable characteristics of each class of Bacteria and explain how to identify them. There is a general misconception that all microorganisms are bacteria. This course will also correct that notion. The general cell structure of bacteria, the function of the structural components in a bacteria cell, study on bacterial growth and growth requirements

Specific course objectives/learning outcomes.

The course will enable the understanding of the following:

1. The basic organization of a bacterial cell.
2. Relationship between the cell wall and several staining mechanisms
3. How antibiotics and enzymes acts on the cell wall and Cell Membrane
4. The nutritional requirements for growth and reproduction in bacteria, Methods of controlling microbial growth and Pure culture isolation techniques
5. How to use the microscope effectively.
6. How to classify and name Bacteria correctly using both conventional and molecular techniques
7. Lastly, focusing extensively on important archaeal and eubacterial groups.

## Learning activities/Course delivery methods

1. Lectures: detailed content of course are taught in class
2. Laboratory Sessions: the practical application of the course are demonstrated in the laboratory

Course content: Cell organization: Cell size, shape and arrangement, Cell wall, Gram and acid-fast staining mechanisms, Effect of antibiotics and enzymes on the cell wall. Cell Membrane; structure, function and chemical composition of bacterial and archaeal cell membranes. Cytoplasm, Endospore. Bacteriological techniques, Pure culture isolation: Streaking, serial dilution and plating methods; cultivation, maintenance and preservation/stocking of pure cultures; cultivation of anaerobic bacteria, and accessing nonculturable bacteria. Microscopy. Growth and nutritional requirements in bacteria; Culture media types. Methods of controlling microbial growth. Reproduction in Bacteria. Bacterial Systematics: classification, systematics and taxonomy, conventional, molecular and recent approaches to polyphasic bacterial taxonomy, evolutionary chronometers, rRNA oligonucleotide sequencing, signature sequences, and protein sequences. Important archaeal and eubacterial groups.