

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

Faculty	Computing and applied science	
Department	Biological Sciences	
Course title	<b>MICROBIAL PHYSIOLOGY</b>	
Year of study	3	
Course code	MCB 307	
Credit hours	3	
Contact hours	45	
Mode of delivery	CLASSROOM LECTURES	
Mode of assessment		WEIGHT%
Continuous assessment		30%
Final examination		70%
Total		100%
Course lecturers and Instructors	MRS F.J. OLAITAN-LECTURER	
Course description	Microbial Physiology focuses on the metabolic activities of microorganisms especially bacteria which is the most abundant and most-studied microbe. It describes the several modes by which microorganisms carry out their activities in synthesizing of macromolecules and breaking down of compounds into simpler forms that can easily be absorbed for energy.	
Course objectives	This course will facilitate the understanding of: 1. The basic stages of the microbial growth curve 2. Factors that affect microbial growth 3. Types of microbial culture 4. Modes of nutrient uptake and Transport 5. Forms of metabolism with respect to the energy and carbon source an organism can utilize.	
Learning outcomes	By the end of the course, students will be able to: 2. Describe microbial growth in a sequential path. 3. Elucidate how each environmental factors influence microbial growth. 4. Define a microbial culture and describe the several types that are obtainable.	

	<p>5. Classify microorganism according to the types of metabolism they undergo.</p> <p>6. Describe the several pathways that microorganisms can function metabolically</p>
Teaching and learning	The class will be taught for three hours a week.
Detailed course content	Microbial Growth and Effect of Environment on Microbial Growth: Definition and measurement of microbial growth, types of culture, Microbial growth in response to environment –Temperature, pH, solute and water activity, Oxygen. Microbial growth in response to nutrition and energy. Nutrient uptake and Transport: Passive and facilitated diffusion, Primary and secondary active transport, concept of uniport, symport and antiport, Group translocation Iron uptake. Chemoheterotrophic Metabolism - Aerobic and Anaerobic respiration and fermentation. Chemo-lithotrophic and Phototrophic Metabolism. Nitrogen Metabolism.
Course content sequencing	
Weeks	
Week 1	<p>Microbial Growth</p> <p>a. Definition of microbial growth</p> <p>b. Growth curve</p> <p>c. Measurement of microbial growth</p>
Week 2 & 3	Effect of Environmental factors such as Temperature, pH, solute and water activity, Oxygen on Microbial Growth
Week 4	<p>Microbial growth in response to nutrition and energy.</p> <p>Continous Assessment 1</p>
Week 5 & 6	Nutrient uptake and Transport in microorganisms: Passive and facilitated diffusion, Primary and secondary active transport, concept of uniport, symport and antiport, Group translocation Iron uptake.
Week 7	Chemoheterotrophic Metabolism – Aerobic respiration; Glycolysis, Krebs cycle, TCA cycle
Week 8	Anaerobic respiration and fermentation.
Week 9	Chemo-lithotrophic Metabolism.
Week 10	Phototrophic Metabolism.

Week 11	Nitrogen Metabolism: nitrogen fixation, Nitrification, Assimilation, Denitrification
Week 12	Revision
<b>Recommended reading material</b>	
<p>1. Joanne Willey and Kathleen Sandman and Dorothy Wood (2020). Prescott's Microbiology. 11<sup>th</sup> Edition.</p> <p>2. Byung Hong Kim and Geoffrey Michael Gadd (2008). Bacterial Physiology and Metabolism. Cambridge University Press The Edinburgh Building, Cambridge CB2 8RU, UK</p> <p>3. Albert G. Moat; John W. Foster and Michael P. Spector (). Microbial physiology Fourth Edition. 2002 by Wiley-Liss, Inc., New York.</p> <p>4. Fundamentals of Bacterial Physiology and Metabolism (2021). Rani Gupta and Namita Gupta. Springer Singapore.</p>	

Course code: MCB 307

Course title: MICROBIAL PHYSIOLOGY

Preamble: this course is aimed at describing the metabolic activities that microorganisms carry out and the several pathways in which they function. It explains in details the several modes by which microorganisms carry out their activities in synthesizing of macromolecules and breaking down of compounds into simpler forms that can easily be absorbed for energy.

### **Specific course objectives/learning outcomes.**

The course will enable the understanding of the following:

1. The basic stages of the microbial growth curve
2. Factors that affect microbial growth
3. Types of microbial culture
4. Modes of nutrient uptake and Transport
5. Forms of metabolism with respect to the energy and carbon source an organism can utilize.

### **Learning activities/Course delivery methods**

**Lectures: detailed content of course are taught in class**

**Course content:** Microbial Growth and Effect of Environment on Microbial Growth: Definition and measurement of microbial growth, types of culture, Microbial growth in response to environment –Temperature, pH, solute and water activity, Oxygen. Microbial growth in response to nutrition and energy. Nutrient uptake and Transport: Passive and facilitated diffusion, Primary

and secondary active transport, concept of uniport, symport and antiport, Group translocation Iron uptake. Chemoheterotrophic Metabolism - Aerobic and Anaerobic respiration and fermentation. Chemo-lithotrophic and Phototrophic Metabolism. Nitrogen Metabolism.