Course Syllabus

MBMB 626 Bacteriology

Academic year 2025

Course ID and Title MBMB 626 Bacteriology

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Instructors:

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Credits: 2 (2-0-4)

Curriculum: Master of Science Program in **Molecular and integrative biosciences** (elective course)

Doctor of Philosophy Program in **Molecular and integrative biosciences** (elective course)

Semester offering: Second semester

Pre-requisites: None

Course learning outcomes (CLOs) and their alignment with PLOs:

CLOs **By the end of the course, student should be able to:**	**PLO1**	**PLO2**	**PLO3**	**PLO4**
1. Describe the structure, physiology, and genetics of bacteria.	✓		✓	
2. Explain the mechanisms underlying bacterial growth inhibition by anti-infective agents and resistance	✓		✓	
3. Understand the role of bacteria in health, disease, and environmental aspect.	✓		✓	

4. Critically evaluate scientific literature in the field of bacteriology and engage in meaningful discussions.	✓	✓	✓	✓
5. Communicate scientific concepts effectively through result discussions and presentations.		✓	✓	✓

Course description

Bacterial cell structure and function, Bacterial cell envelope, Bacterial genetics, Bacterial genome structure and organization, Bacterial adaptation and evolution, Mechanisms of gene transfer, Antibiotics, Mechanism of action or antibiotic, Antimicrobial resistance, Microbiome, Environmental Microbiome, Microbiome in health and diseases, Microbiome engineering, Bacteriophages, Bacteriophage replication cycle, Phage therapy

Alignment of Teaching and Assessment Methods to Course Learning Outcomes:

Course Learning Outcomes	Teaching Method	Assessment Method
1. Describe the structure, physiology, and genetics of bacteria.	1. Lecture 2. Discussion	1. Q&A during lecture 2. Discussion performance 3. Quiz / short exercise 4. Assignment
2. Explain the mechanisms underlying bacterial growth inhibition by anti-infective agents and resistance	1. Lecture 2. Discussion	1. Q&A during lecture 2. Discussion performance 3. Quiz / short exercise 4. Assignment
3. Understand the role of bacteria in health, disease, and environmental aspect.	1. Lecture 2. Discussion	1. Q&A during lecture 2. Discussion performance 3. Quiz / short exercise 4. Assignment
4. Critically evaluate scientific literature in the field of bacteriology and engage in meaningful discussions.	1. Writing paper assessment summary 2. Discussion	1. Assignment 2. Discussion performance
5. Communicate scientific concepts effectively through discussions and presentations.	1. Presentation 2. Discussion	1. Presentation performance 2. Discussion performance

Course Schedule, learning activity and assessment:

	Activities	Description	Assessment methods	Scores	Time
Day 1	Topic 1: Bacterial Structure and Physiology (SC)				
1	Lecture, discussion, quiz	Overview of bacterial cell structure and function.	Quiz xx1	40%	9.00-10.15
2	Lecture, discussion, quiz	Bacterial cell envelope: cell wall, membrane, and their roles.	Quiz xx2	40%	10.15-11.30
3	Lecture, discussion	Intro to discussion of an assigned paper	Participation	10%	11.30-12.00
4	Participation		Participation	10%	9.00-12.00
Day 2	Topic 1: Bacterial Structure and Physiology (SC)				
1	Presentation	Presentation of a scientific literature related to topic 1	Presentation	40%	9.00-12.00
2	Discussion	Critically evaluate a scientific literature related to topic 1	Discussion	60%	9.00-12.00
Day 3	Topic 2: Bacterial Genetics and Evolution				
1	Lecture, discussion, quiz	Bacterial genetics, Bacterial genome structure and organization	Quiz xx1	40%	9.00-10.15
2	Lecture, discussion, quiz	Bacterial adaptation, evolution, and horizontal gene transfer	Quiz xx2	40%	10.15-11.30
3	Lecture, discussion	Intro to discussion of an assigned paper	Participation	10%	11.30-12.00
4	Participation		Participation	10%	9.00-12.00
Day 4	Topic 2: Bacterial Genetics and Evolution				
1	Presentation	Presentation of a scientific literature related to topic 2	Presentation	40%	9.00-12.00
2	Discussion	Critically evaluate a scientific literature related to topic 2	Discussion	60%	9.00-12.00
Day 5	Topic 3: Medical Bacteriology				

1	Lecture, discussion, quiz	Major bacterial pathogens Antibiotics and mechanism of action	Quiz xx1	40%	9.00-10.15
2	Lecture, discussion, quiz	Antimicrobial resistance, and mechanisms of resistance. Antibiotic alternatives	Quiz xx2	40%	10.15-11.30
3	Lecture, discussion	Intro to discussion of an assigned paper	Participation	10%	11.30-12.00
4	Participation		Participation	10%	9.00-12.00
Day 6	Topic 3: Medical Bacteriology				
1	Presentation	Presentation of a scientific literature related to topic 3	Presentation	40%	9.00-12.00
2	Discussion	Critically evaluate a scientific literature related to topic 3	Discussion	60%	9.00-12.00
Day 7	Topic 4: Microbiome				
1	Lecture, discussion, quiz	Microbiome and its components, importance of the microbiome for human health	Quiz xx1	40%	9.00-10.15
2	Lecture, discussion, quiz	Environmental Microbiomes factor affecting microbiome, and basic microbiome study workflow	Quiz xx2	40%	10.15-11.30
3	Lecture, discussion	Intro to discussion of an assigned paper	Participation	10%	11.30-12.00
4	Participation		Participation	10%	9.00-12.00
Day 8	Topic 4: Microbiome				
1	Presentation	Presentation of a scientific literature related to topic 4	Presentation	40%	9.00-12.00
2	Discussion	Critically evaluate a scientific literature related to topic 4	Discussion	60%	9.00-12.00
Day 9	Topic 5: Bacteriophage				

1	Lecture, discussion, quiz	Bacteriophages, Bacteriophage Replication Cycle,	Quiz xx1	40%	9.00-10.15
2	Lecture, discussion, quiz	Phage therapy	Quiz xx2	40%	10.15-11.30
3	Lecture, discussion	Intro to discussion of an assigned paper	Participation	10%	11.30-12.00
4	Participation		Participation	10%	9.00-12.00
Day 10	Topic 5: Bacteriophage				
1	Presentation	Presentation of a scientific literature related to topic 5	Presentation	40%	9.00-12.00
2	Discussion	Critically evaluate a scientific literature related to topic 5	Discussion	60%	9.00-12.00
Day 11	Course reflection and AAR				
1	Student's Reflection	To provide students opportunities to describe their learning experiences received from this course and how it can be applied to their future learning.	-	-	9.00-12.00
2	After Action Review	To collect comments, suggestions from students for further improvements of the course.	-	-	9.00-12.00

Note: Some changes might be applied as appropriate.

Assessment Criteria:

Assessment method	**Performance criteria**	**Scoring rubric**
Participation	Engagement level of learner	Active engage (4) Fairly active (2-3) Inactive (1)
Quiz	Correctness level	Raw scores will be adjusted to be in a range of % indicated above

Discussion	Participation (20%)	Active (4) Fairly active (2-3) Inactive (1)
	Interpersonal and interpersonal skill (leadership, teamwork, responsibility, patience, communication, positive attitude, active listening, critical thinking) (20%)	Excellent (4) Good (3) Fair (2) Underperform (1)
	Demonstrate critical and high-order thinking skills (60%)	Excellent (4) Good (3) Fair (2) Underperform (1)
Presentation	Background and Research Question: Did the presenter provide an understanding of background and clearly present the research question? Provide adequate information? (20%)	Excellent (4) Good (3) Fair (2) Underperform (1)
	Quality of the Slide: Was the slide well-organized, insightful, and attractive? (10%)	Excellent (4) Good (3) Fair (2) Underperform (1)
	Spelling & Grammar: Correct spelling and grammar? (10%)	Excellent (4) Good (3) Fair (2) Underperform (1)
	Quality of the presenter: Storytelling skill. Is narration engaging? (20%)	Excellent (4) Good (3) Fair (2) Underperform (1)
	Interpersonal and interpersonal skill (communication, positive attitude, active listening, scientific presentation) (40%)	Excellent (4) Good (3) Fair (2) Underperform (1)

Student's achievement will be graded using symbols: A, B+, B, C+, C, D+, D and F, based on the criteria as follows:

Percentage range	Grade	Description
80-100	A	Excellent
75-79	B+	Very Good
70-74	B	Good
65-69	C+	Fairly Good
60-64	C	Fair
55-59	D+	Poor
50-54	D	Very Poor
0-49	F	Fail

Date of revision: XXXXXXX