



The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

1	Course title	Microbial physiology
2	Course number	0304942
3	Credit hours (theory, practical)	3 credit hours (3 hrs theory)
	Contact hours (theory, practical)	Theory: 3 hrs weekly
4	Prerequisites/co-requisites	General Microbiology
5	Program title	Ph.D. in Biological Sciences
6	Program code	04
7	Awarding institution	The University of Jordan
8	Faculty	Faculty of Science
9	Department	Department of Biological Sciences
10	Level of course	
11	Year of study and semester(s)	2022/2023, Second Semester
12	Final Qualification	Ph.D.
13	Other department(s) involved in teaching the course	None
14	Language of Instruction	English
15	Date of production/revision	20/02/2023

16. Course Coordinator:

Office number, office hours, phone numbers and email addresses should be listed.

Prof. Hesham Al-Younes

Office no.: 032 Biology

Office hours: 10-11 Sunday, 11-12:30 Monday and 8-9 Thursday

Phone no./Ext.: 22201

E-mail: alyounes@ju.edu.jo

17. Other instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.

18. Course Description:

As stated in the approved study plan.

A detailed study of the bacterial cell structure and function. Also a brief study of cell structure for other microorganisms (such as archaea, fungi, protozoa and algae) Study the dynamic of bacterial growth in both batched and continuous bacterial cultures. Environmental factors that influence bacterial growth and physiological adaptations of microorganisms to various environmental factors, Microbial cellular metabolism, including various pathways for energy production (aerobic and anaerobic respiration, fermentation, chemolithoautotrophic and bacterial phototrophic metabolism).

19. Course aims and outcomes:

A- Aims:

Detailed study of bacterial cell structure and function.

Dynamics of bacterial growth and physiological adaptations of bacteria to various environmental factors.

Bacterial metabolism and diversity of energy production pathways used by various microorganisms.

B- Intended Learning Outcomes (ILOs):

Upon successful completion of this course students will be able to:

1. Understand the meaning of the phylogenetic classification of living organisms and differentiation between bacteria, archaea and eukaryotes.
2. Distinguish between morphological characteristics of microorganisms and detailed study of bacterial cell structure and function.
3. Dynamics of bacterial growth and physiological adaptations of bacteria to various environmental factors.
4. Bacterial metabolism and diversity of energy production pathways used by various microorganisms.

20. Topic Outline and Schedule:**Theory part**

Week No.	Topic
1-4	- Organization, structure and function of microorganisms.
5-6	- Microbial growth The cell cycle Microbial growth in natural environment Cell-cell communication Resting cells Microbial growth curve and mathematics of microbial growth Continuous culture systems
7-8	- Catabolism (Energy release and conservation) Chemoorganotrophy (Chemotrophic microorganisms and fueling processes) Aerobic respiration

Anaerobic respiration

Fermentation

Catabolism of other carbohydrates

Lipid catabolism

Protein and amino acid catabolism

Chemolithotrophy (Chemolithotrophic microorganisms and fuelling processes)

Phototrophy (Phototrophic microorganisms and fuelling processes)

Anabolism (The use of energy in biosynthesis)

Principles governing biosynthesis

Precursor metabolites

CO₂ fixation

Synthesis of carbohydrates

Synthesis of amino acids

Synthesis of purines, pyrimidines and nucleotides

Lipid synthesis

Time remaining will be dedicated to student presentations.

SUGGESTED TOPICS for the PRESENTATION and TERM PAPER

Topics may focus on prokaryotic motility and diversity, nutrition and growth, metabolism and physiology. Other interesting subjects related to cellular microbiology and infection biology (pathogenesis and virulence factors) may also serve as material for presentations and reviews. Topics of presentations that will shed some light on modern scientific experimental approaches will have the highest priority. Titles have to be decided after discussion with the instructor before the end of the first month of the semester.

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

1. Lecturing and discussions throughout the semester
2. Exams

3. PowerPoint presentation and movies
4. Preparing term papers
5. Presentations of scientific research
6. Office hours

22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

The grade is distributed as follows:

Description	Weight
<i>Theory midterm exam</i>	<i>30%</i>
<i>Term paper</i>	<i>10%</i>
<i>Presentation</i>	<i>10%</i>
<i>Final theory exam</i>	<i>50%</i>

23. Course Policies:

A- Attendance policies:

Absence from lectures should not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course.

B- Absences from exams:

You should talk to your instructor as soon as possible if you miss an exam. All such cases will be dealt with according to the rules outlined in your student handbook.

C- Health and safety procedures:

D- Honesty policy regarding cheating, plagiarism, misbehaviour:

All violations pertaining to cheating, plagiarism, misbehaviour will be dealt with in accordance to the rules outlined in your student handbook.

E- Grading policy:

Exams may include the following question forms: multiple choice questions, True or False questions, matching questions, drawings and labelling questions, essay questions, and "fill in the blank" questions.

F- Available university services that support achievement in the course:

24. Required equipment:**Overhead projectors****Data show projectors****25. References:**

A- Required book (s), assigned reading and audio-visuals:

COURSE BOOK and references:

- Bacterial Physiology and Metabolism. 2008. B. H. Kim and G. M. Gadd. Cambridge University Press, Cambridge, UK.
- Brock Biology of Microorganisms. 2012. M. Madigan, J. Martinko, D. Stahl and D. Clark. 13th Edition. Pearson Publishers, San Francisco, USA.
- Microbiology: A System Approach. 2009. M. K. Cowan and K. P. Talaro. 2nd Edition. McGraw-Hill Publishers, New York, USA.
- Prescott's Microbiology. 2019. J. M. Willey, K. M. Sandman and D. H. Wood. 11th Edition. McGraw-Hill Publishers, New York, USA.

B- Recommended books, materials, and media:

26. Additional information:**None**Name of Course Instructor: Prof. **Hesham Al-Younes** Signature: ----- Date: **20/02/2023**Head of curriculum committee/Department: **Dr. Said Damhoureyeh** Signature: -----Head of Department: **Dr. Amer Imraish** Signature: -----Head of curriculum committee/Faculty: **Prof. Saber Al-Rousan** Signature: -----Dean: **Prof. Mahmoud I. Jaghoub** Signature: -----Copy to:

Head of Department
 Assistant Dean for Quality Assurance
 Course File