Course Plan for Bachelor Program - Study Plan Development and Updating Procedures/ Pharmacy Department	QF02/0408-4.0E

Study Plan No.	**2021/2022**		**University Specialization**		**Bachelor of Pharmacy**		
Course No.	**0201238**		**Course Name**		**Pharmaceutical Microbiology Lab**		
Credit Hours	**1**		**Prerequisite *Co-requisite**		**Anatomy and Physiology (1) + *Pharmaceutical Microbiology**		
Course Type	☐ Mandatory University Requirement	☐ University Elective Requirement	☐ Faculty Mandatory Requirement	☐ Support course family requirements	☑ **Mandatory Requirement**	☐ Elective Requirement	
Teaching Style	☐ Full Online Learning		☐ Blended Learning		☑ **Traditional Learning**		
Teaching Model	☐ 1 Synchronous: 1 Asynchronous		☐ 1 Face to Face: 1 Asynchronous		☑ **1 Traditional**		

Faculty Member and Study Divisions Information *(to be filled in each semester by the subject instructor)*

Name	Academic rank	Office No.	Phone No.	E-mail	
Office Hours (Days/Time)	**Sunday, Tuesday, Thursday ()**		**Monday, Wednesday ()**		
Division number	**Time**	**Place**	**Number of Students**	**Teaching Style**	**Approved Model**
				Traditional Learning	**1 Traditional**

Brief Description

In this course, students will apply the knowledge they have gained in pharmaceutical microbiology. They will perform environmental monitoring tests, including those for air, personnel, and water. Moreover, students will practice aseptic techniques while conducting laboratory experiments. They will also carry out microbial identification using simple and Gram staining methods. Furthermore, students will perform various *in vitro* tests to evaluate antimicrobial agents.

Learning Resources

Course Book Information (Title, author, date of issue, publisher ... etc)	1. Cappuccino, J.G. and Welsh, C.T. (2021) "Microbiology- A Laboratory Manual" 12th edition, Pearson Education.			
Supportive Learning Resources (Books, databases, periodicals, software, applications, others)	1. Dariel Burdass, John Grainger, Janet Hurst. (2016) "Basic Practical Microbiology: A Manual," Microbiology Society, London, UK.			
Supporting Websites				
The Physical Environment for Teaching	☐ Classroom	☑ **Labs**	☐ Virtual Educational Platform	☐ Others
Necessary Equipment and Software	☑ Moodle.			
Supporting People with Special Needs				
For Technical Support				

Course learning outcomes *(K= Knowledge, S= Skills, C= Competencies)*

No.	Course Learning Outcomes	The Associated Program Learning Output Code
Knowledge		
The student should be able to:		
K1	Explain general laboratory safety rules and practices in microbiology.	**MK3**
K2	Describe the different techniques used to monitor microbial quality of the environment.	**MK3**
K3	Determine the different methods and media used to culture and identify microorganisms.	**MK3**
K4	Identify the qualitative and quantitative approaches used in the laboratory for assessment of the susceptibility of microorganisms to antimicrobial agents.	**MK3**
Skills		
The student should be able to:		
S1	Apply practical skills of aseptic techniques in microbiology procedures to minimize microbial contamination.	**MS4**
S2	Evaluate the microbial quality of different pharmaceutical preparations and environmental conditions.	**MS4**
S3	Describe microorganisms macroscopically and microscopically.	**MS4**
S4	Interpret the MIC results of different antimicrobial agents.	**MS4**
Competencies		
The student should be able to:		

Mechanisms for Direct Evaluation of Learning Outcomes

Type of Assessment / Learning Style	Fully Electronic Learning	Blended Learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
Midterm Exam	30%	30%	30%	**0%**
Participation / Practical Applications	0%	0%	30%	**60%**
Asynchronous Interactive Activities	30%	30%	0%	**0%**
Final Exam	40%	40%	40%	**40%**

Note 1: *Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, and work within student groups ... etc, which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.*

Note 2: *According to the Regulations of granting Master's degree at Al-Zaytoonah University of Jordan, 40% of final evaluation goes for the final exam, and 60% for the semester work (examinations, reports, research or any scientific activity assigned to the student).*

Schedule of Simultaneous / Face-to-Face Encounters and their Topics

Week	Subject	Learning Style*	Reference **
1	Check in		
2	Laboratory safety and laboratory protocol. Aseptic techniques.	lecture	*Textbook* (17-22)
3	Sources of microbial contamination.	lecture	*Textbook* (13-15)
4	Sub-culturing of bacterial cultures.	lecture	*Textbook* (23-30)
5	Techniques for isolation of pure cultures	lecture	*Textbook* (31-40)
6	Media for routine cultivation of bacteria. Differential, selective and enrichment media (MacConkey agar, Mannitol-salt agar, EMB agar and Blood agar).	lecture	*Textbook* (115-119)
7	Microscopy. Preparation of bacterial smears. Simple staining.	lecture	*Textbook* (47-56) *Textbook* (63-70) *Textbook* (73-78)
8	Differential staining of bacterial cell structure (Gram stain and Acid-fast stain)	lecture	*Textbook* (83-93)
9	The fungi. Cultural characteristics of yeasts and molds. *Penicillium*, *Aspergillus*, and *Candida*.	lecture	*Textbook* (249-266)
10	Parasitic protozoa. Intestinal, luminal, blood and tissue protozoa	lecture	*Textbook* (241-248)
11	Practical Exam		
12	Chemotherapeutic agents. The Kirby-Bauer antibiotic susceptibility test procedure.	lecture	*Textbook* (305-314)
13	Disinfectants and antiseptics. Agar plate-sensitivity method.	lecture	*Textbook* (321-326)
14	Determination of minimal inhibitory concentration (MIC) by broth dilution method and agar diffusion method.	lecture	*Textbook* (315-320)
15	Check out		
16	Final Exam		

** Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.*
*** Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.*

Schedule of Asynchronous Interactive Activities *(in the case of e-learning and blended learning)*

Week	Task / Activity	Reference	Expected Results
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