



**The University of Jordan**

**Accreditation & Quality Assurance Centre**

**COURSE Syllabus**

1	Course title	<b>Selected topics in Pharmaceutical Microbiology</b>
2	Course number	<b>1202541</b>
3	Credit hours (theory, practical)	2(theory)
	Contact hours (theory, practical)	2 (theory)
4	Prerequisites/corequisites	Prerequisite:
5	Program title	Bsc
6	Program code	
7	Awarding institution	The University of Jordan
8	Faculty	Pharmacy
9	Department	Pharmaceutics and Pharmaceutical Technology
10	Level of course	undergraduate
11	Year of study and semester (s)	Second semester of the 5 <sup>th</sup> year
12	Final Qualification	Bsc
13	Other department (s) involved in teaching the course	Pharmaceutical Sciences & Biopharmaceutics & Clinical Pharmacy
14	Language of Instruction	English
15	Date of production/revision	31 January 2016

### 16. Course Coordinator:

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

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### 17. Other instructors:

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

### 18. Course Description:

In this course students will learn in more details the mechanisms of resistance to antimicrobials, whether inherent or acquired & how to limit it. In addition the students will study specific form of microbial resistance, the microbial biofilms. On the other hand, students will learn the use of microorganisms in pharmaceutical industry for the production of antibiotics, vaccines, immunological products & many other products. Also the students will be introduced to diagnostic tests & assays in which microorganisms or their products are major constituent in them.

19. Course aims and outcomes:

**A- Aims:**

- The student will understand microbial resistance including microbial biofilms and policies used to control hospital acquired infections
- 2- To introduce the students to the principles of use of antibiotics
- 3- The student will be familiar with microbial quality control.
- 4- The use of microorganisms in pharmaceutical Industry including fermentation, genetic engineering & other pharmaceutical products.

**B- Intended Learning Outcomes (ILOs):**

Successful completion of the course should lead to the following outcomes:

**A. Knowledge and Understanding:**

- A1- The student will know the principle of microbial resistance and understands different policies used to control this problem
- A2- The student will know the formation of microbial biofilms & their medical impact
- A3- The student will know how antibiotics are synthesized by fermentation & the good manufacturing practices implemented in manufacturing areas
- A4- The student will know the methods of preparing vaccines & different immunological products & their quality control tests
- A5- The students will understand the basics of pharmaceutical biotechnology & their application in manufacture of some hormones & in diagnosis of infectious diseases
- A6- The student will be introduced to different applications of microorganisms in pharmaceutical industry (manufacture of products, assays, diagnosis)
- A7- The student will be introduced to the rationale of different antibiotic use policies applied in hospitals

**B. Intellectual, Analytical and Cognitive Skills: Student is expected to**

- B1- Design policies to limit drug resistance in hospitals
- B2- Implement GMP for fermentation process
- B3- Set different quality control tests to immunological products
- B4- Set & implement antibiotic use policy in the hospital
- B5- Analyse & interpret the results of antibiotic assay & screening of mutagenicity

**C. Subject-Specific Skills: Student is expected to**

- C1- Design a suitable antibiotic use policy
- C2- Design proper quality control parameters to monitor fermentation process
- C3- design suitable quality control procedures for the manufacture of vaccines & immunological products
- C4- Interpret the results of PCR & DNA hybridization for the diagnosis of infectious diseases
- C5- Design a suitable assay method for antibiotics & for screening to mutagens

**D. Transferable Key Skills: Students is expected to**

- D1- Communicate effectively with the antibiotic manufacturer bodies concerning GMP
- D2- Communicate effectively with infection control committees in hospitals for setting antibiotic policies
- D3- Communicate effectively with clinical laboratories & physicians regarding the diagnosis of infectious diseases
- D4- Interact with regulatory authorities regarding microbial assays

**Program Competencies Achieved:**

- Identify drug resistance and its constraints on treatment
- Assess methods of transfer of drug resistances and correlate them with antibiotic use
- Identify medical problems associated with biofilms
- Identify basis of fermentation
- Design methods for production of antibiotics by fermentation process
- Identify problems related to GMP from microbiological point of view
- Assess methods for manufacturing of vaccines bacterial & viral
- Ability to apply quality control on vaccines
- Assess methods for production of immune sera
- Ability to apply quality control on immune sera
- Applications of biotechnology in pharmaceuticals & in diagnosis of infectious diseases (PCR & DNA hybridization)

**20. Topic Outline and Schedule:**

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
1. Introduction 2. bacterial resistance to antibiotics	1	Prof. Rula	2. To understand The genetic basis of acquired antibiotic resistance	3. Exams, Quizzes	4. Specified in each lecture. General references provided below
mechanisms of resistance	2	Prof. Rula	Identify specific mechanisms of resistance	Exams, Quizzes	Specified in each lecture. General references provided below
Biochemical mechanisms of resistance	3	Prof. Rula	Identify biochemical basis of resistance	Exams, Quizzes	Specified in each lecture. General references provided below
problem of bacterial resistance to antibiotics	4	Prof. Rula	How to combat the problem of bacterial resistance to antibiotics	Exams, Quizzes	Specified in each lecture. General references provided below
5. Resistant Bacteria by Overuse & Misuse of Antibiotics - Use of antibiotic combinations	5	Prof. Rula	Identify Selection of Resistant Bacteria by Overuse & Misuse of Antibiotics - Use of antibiotic combinations	Exams, Quizzes	Specified in each lecture. General references provided below
6. Biofilms	6	Prof. Rula	To understand: -Stages of biofilm formation -Advantages of biofilm to the microbe -Mechanisms of resistance -Medical impact	Exams, Quizzes	Specified in each lecture. General references provided below
6. Fermentation <b>Midterm Exam</b>	7	Prof. Rula	To learn: -The production of antibiotics by fermentation process -Factors affecting the manufacturing	Exams, Quizzes	Specified in each lecture. General references provided below

			process -GMP		
8. The manufacture of immunological products	8	Prof.Rula	To learn: -The manufacturing of vaccines bacterial & viral -Quality control on vaccines -Production of immune sera -Quality control on immune sera	Exams, Quizes	Specified in each lecture. General references provided below
Pharmaceutical biotechnology	9	Prof. Rula	To understand: -recombinant DNA, vectors & hosts. -Synthesis of recombinant Insulin -Applications of biotechnology in pharmaceuticals & in diagnosis of infectious diseases (PCR & DNA hybridization)	Exams, Quizes	Specified in each lecture. General references provided below
Other applications of microorganisms in pharmaceutical industry	10	Prof. Rula	To learn about: -Dextrans -Amino acids & vitamins -Iron chelating agents -Medically important enzymes -Applications of microorganisms in the partial synthesis of pharmaceuticals -Use of microorganisms and their products in assays [antibiotic assay, amino acid assay & screening for mutagenicity (Ames test)]	Exams, Quizes	Specified in each lecture. General references provided below
seminars	11	Prof. Rula	Research and writing skills	Exams, Quizes	Specified in each lecture. General

					references provided below
<b>Final Exam</b>	15				

## 21. Teaching Methods and Assignments:

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

ILO/s	Learning Methods	Evaluation Methods
A1-3, B1, C1	Lectures	Exams, Quizzes
D1	Assignment	Exams
D2	Seminars	Exams, Quizzes

### Learning skills:

1. Critical thinking
2. Digital literacy
3. Problem-solving skills
4. Self-directed learning

## 22. Evaluation Methods and Course Requirements:

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

1. Exams
2. Quizzes
3. Students reports on assignments

## 23. Course Policies:

A- Attendance policies:

### **Attendance: Mandatory.**

**First warning** – with 4 absences

**Last warning** – with 5 absences

Failing in the subject – with 6 absences

B- Absences from exams and handing in assignments on time:

Will result in zero achievement unless health report or other significant excuse is documented.

C- Health and safety procedures:



NA

D- Honesty policy regarding cheating, plagiarism, misbehavior:

The participation, the commitment of cheating will lead to applying all following penalties together

- 1) Failing the subject he/she cheated at
- 2) Failing the other subjects taken in the same course
- 3) Not allowed to register for the next semester. The summer semester is not considered as a semester

E- Grading policy:

Exams and Quizzes.

Mid Exam:	30 points
Assignments	10 points
Seminar	10 points
Final Exam:	50 points
Total	100 points

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

Classrooms, internet classes

#### 24. Required equipment:

Datashow and internet connection

#### 25. References:

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

Hugo, W.B and Russell, A.D. Pharmaceutical Microbiology. Eighth Edition

#### 26. Additional information:

Name of Course Coordinator: Prof. Rula M. Darwish -Signature: ----- Date: Jan, 31, 2016

Head of curriculum committee/Department: ----- Signature: -----

Head of Department: Nailya Bulatova Signature: -----

Head of curriculum committee/Faculty: ----- Signature: -----

Dean: ----- -Signature: -----

Copy to:

Head of Department  
Assistant Dean for Quality Assurance  
Course File