

# The University of Jordan

Faculty: Pharmacy  
Program: Pharmacy & Pharm D

Department: Pharmaceutics & Pharmaceutical technology  
Academic Year/ Semester: 2013/2014

## Selected topics in Pharmaceutical Microbiology (Course Number: 1202541)

<b>Credit hours</b>	2	<b>Level</b>	5 <sup>th</sup> yr	<b>Pre-requisite</b>	Pharmaceutical microbiology II
<b>Coordinator/ Lecturer</b>		<b>Office number</b>		<b>Office phone</b>	
<b>Course website</b>		<b>E-mail</b>		<b>Place</b>	

<b>Office hours</b>					
<b>Day/Time</b>	<b>Sunday</b>	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>

### 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.

### Learning Objectives

- 1- 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.

### 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

## **ILOs: Learning and Evaluation Methods**

<b>ILO/s</b>	<b>Learning Methods</b>	<b>Evaluation Methods</b>
	Lectures Assignments/seminars Discussions	Exams, Quizzes, Assignments/seminars

## Course Contents

<b>Content</b>	<b>Reference</b>	<b>Week</b>	<b>ILO/s</b>
bacterial resistance to antibiotics	Hugo & Russell's	1, 2, 3, 4,5	To understand: The genetic basis of acquired antibiotic resistance -specific mechanisms of resistance -Biochemical mechanisms of resistance -How to combat the problem of bacterial resistance to antibiotics -Selection of Resistant Bacteria by Overuse & Misuse of Antibiotics - Use of antibiotic combinations
Biofilms	Hugo & Russell's	6	To understand: -Stages of biofilm formation -Advantages of biofilm to the microbe -Mechanisms of resistance -Medical impact
Fermentation	Hugo & Russell's	7	To learn: -The production of antibiotics by fermentation process -Factors affecting the manufacturing process -GMP
The manufacture of immunological products	Hugo & Russell's	8,9	To learn: -The manufacturing of vaccines bacterial & viral -Quality control on vaccines -Production of immune sera -Quality control on immune sera
Pharmaceutical biotechnology	Hugo & Russell's	9,10	To understand: -recombinant DNA, vectors & hosts. -Synthesis of recombinant Insulin -Applications of biotechnology in pharmaceuticals & in diagnosis of infectious diseases (PCR & DNA hybridization)
Other applications of	Hugo & Russell's	11,12	To learn about: -Dextrans

microorganisms in pharmaceutical industry			-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)]
<b>seminars</b>		13,14	

### Learning Methodology

Lectures

Assignments/seminars

Discussions

### Evaluation

<b>Evaluation</b>	<b>Point %</b>	<b>Date</b>
<b>Midterm Exam</b>	<b><u>30%</u></b>	<b><u>To be announced</u></b>
<b>Quiz</b>	<b><u>10%</u></b>	
<b>Assignment/seminar</b>	<b><u>10%</u></b>	
<b>Final Exam</b>	<b><u>50%</u></b>	<b><u>To be announced</u></b>

### Main Reference/s:

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

### References: