Detailed Course Description - Course Plan Development and Updating Procedures/ Pharmacy Department	QF02/0408-3.0E

Faculty	Pharmacy	Department	Pharmacy
Course number	0201331	Course title	Pharmaceutical Microbiology
Number of credit hours	3	Pre-requisite/co-requisite	Biology

Brief course description
This course covers the basic information of microorganisms, their basic structure and mode of growth. Medical, pharmaceutical and environmental importance of some microorganisms. Anti-microbial chemotherapy: mode of action and prudent use. Also this course introduce the students for the concept of sterilization, disinfection, antisepsis and preservation. The different chemical and physical methods used to control microbial contamination. The principle of controlled environment, quality control and quality assurance.

	Course goals and learning outcomes
Goal 1	Provide the students with the basic information about microorganisms, their basic structure and mode of growth
Learning outcomes	**Upon successful completion of this course students will be able to:** 1.1. Know the general characteristics of prokaryotic and eukaryotic cells and how prokaryotic cells differ in size, shape and arrangements. 1.2. Know the structure and function of different components of the bacteria, fungi and virus. 1.3. Know the definition of bacterial growth, the different phases of bacterial growth and how it is measured and also the different physical factors that affect of bacterial culture growth.
Goal 2	Provide the students with the basic information about the meaning of bactericidal, bacteriostatic and chemical sterilants. The different biocides, their chemical nature, and their use.
Learning outcomes	2.1. Know the meaning of biocide and the difference between biocide and antibiotic. Disinfection, antisepsis, and preservation process 2.2. Know the different chemical and physical factors that affect the antimicrobial activity. 2.3. Know the different biocides in use, their chemical nature, their spectrum of activity and their mode of actions.
Goal 3	Introduce the factors that affect microbial spoilage, its outcome & how to protect the pharmaceutical products from it. Also provide the students with the principles of sterilization, methods and applications.
Learning outcomes	3.1. Know the effect of microorganisms on the spoilage of pharmaceutical preparations in addition to principle of preservation, the different quality control and quality assurance measures for the control of microbial contamination. 3.2. Know the principle of sterilization 3.3. Know the different methods used for sterilization, and the different sterile products available in the markets.

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Textbook	1.- Hugo, W.B and Russell, A.D.(2011); Pharmaceutical Microbiology, 8th ed. Blackwell Science, UK
Supplementary references	1.- Prescott, L.M., Harley, J.P., and Klein, D.A.(2008); Microbiology, 7th ed. McGraw Hill, USA 2. - Black, J.G. (2015); Microbiology, Principles and explorations. 9th ed. John Wiley Publication, USA. (Latest edition).

Course timeline

Week	Number of hours	Course topics	Pages (textbook)	Notes
1	**1** **1** **1**	- Introduction to pharmaceutical microbiology - Fundamental features of microbiology - Bacteria, structure and forms of bacterial cell.	**3-8** **9-23** **24-30**	
2	**1** **1** **1**	- Biofilm. Bacterial sporulation, toxins and reproduction. - Bacterial growth. Environmental factors that influence growth and survival. - Properties of pathogenic bacterial species.	**30-32** **32-43**	
3	**1** **1** **1**	- Properties of fungi, structure of fungal cell. - Antifungal therapy and fungal resistance. - Medically important fungal pathogens of humans' like: *C. albicans*, *Cryptococcus neoformans* and *Aspergillus fumigatus*.	**44-58**	
4	**1** **1** **1**	- Protozoa: parasitism, Habitat. Blood and Tissue parasites. Intestinal parasites. - Control of protozoan parasites and their drug resistance	**84-105**	
5	**1** **1** **1**	- General structures of viruses. - Multiplication of human viruses. - Virus-host cell interaction; HIV, tumor viruses.	**59-65** **68-70** **66-67**	
6	**1** **1** **1**	- Control of viruses: antiviral chemotherapy, vaccination. - Principles of microbial pathogenicity. The human microbiome, portals of entry. - Consolidation. Manifestation of disease.	**72-78** **109-113** **113-117**	
7	**1** **1** **1**	- Damage to tissues. Recovery from infection: exit of microorganisms. - Mechanisms of action of antibiotics and synthetic anti-infective agents. The microbial cell wall. - Protein synthesis. Chromosome function and	**117-120** **201-206** **206-212**	

		replication.		
8	**1 1 1**	- Folate antagonists. The cytoplasmic membrane - Bacterial resistance to antibiotics: origin of resistance. Mechanisms of resistance. - Resistance to β-lactam antibiotics, aminoglycosides, tetracycline and chloramphenicol.	**213-216 217-218 218-225**	
9	**1 1 1**	- Multiple drug resistance - Clinical uses of antimicrobial drugs: principles of use of antimicrobial drugs - Clinical uses: respiratory tract infections	**226-227 230-237 237-239**	
10	**1 1 1**	- Urinary tract infections. Gastrointestinal infections. - Antibiotic policies. - Spoilage-chemical and physicochemical deterioration of pharmaceuticals. Hazard to health.	**239-245 245-247 273-280**	
11	**1 1 1**	- Sources and control of contamination. The extent of microbial contamination. Factors determining the outcome of a medicament-borne infection. - Preservation of medicines using antimicrobial agents: basic principles. - Quality assurance and the control of microbial risk in medicines	**281-285 285-287 287-290**	
12	**1 1 1**	- Definitions: disinfectant and disinfection, antiseptic and antisepsis. Factors affecting choice of antimicrobial agent. - Types of compounds - Disinfection policies	**313-318 321-332 332-333**	
13	**1 1 1**	- Sensitivity of microorganism. Sterilization methods. - Heat sterilization. Gaseous sterilization. Radiation sterilization. - Filtration sterilization. New sterilization technologies. Sterilization control and sterility assurance.	**353 356-365 365-369**	
14	**1 1 1**	- Sterility testing. The role of sterility testing. - Types of sterile product - Sterilization considerations, quality control and quality assurance of sterile products.	**374-377 382-393 393-400**	
15	**1 1 1**	- Definitions: quality, manufacture, quality assurance, good manufacturing practice, quality control, validation.	**402-404**	

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		- Control of microbial contamination during manufacture: general aspects. - Manufacture of sterile products. Aseptic areas.	**404-407** **408-413**	
16	**1** **1** **1**	- Pharmaceuticals produced by microorganisms. - Application of microorganisms in the partial synthesis of pharmaceuticals. Applications of microorganisms in the discovery of pharmaceuticals. - Use of microorganisms and their products in assays. Microorganisms as therapy.	**463-469** **469-471** **471-479**	

Theoretical course evaluation methods and weight	First exam 25% Second exam 25% Final exam 50%	**Practical (clinical) course evaluation methods**	Semester students' work = 50% (Reports, research, quizzes, etc.) Final exam = 50%

Approved by head of department		**Date of approval**	

Extra information (to be updated every semester by corresponding faculty member)

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Office hours			