MICROBIOLOGY & IMMUNOLOGY DEPARTMENT

Courses of Microbiology and Immunology Department

No.	Course Title	Course Code
1	Parasitology	PMI 211
2	Basic and Pharmaceutical Microbiology	PMI 312
3	Basic and Applied Immunology	PMI 413
4	Clinical Microbiology	PMI 424
5	Pharmaceutical Biotechnology	PMI 525

Elective Courses:

No.	Course Title	Course Code
1	Infection and Immunity	PMI 611
2	Advanced Biotechnolgy	PMI 612

Parasitology (PMI 211)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Microbiology and Immunology
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Parasitology **Course Code: PMI 211**

Prerequisites: Medical Terminology (PHL 122)

Students' Level/Semester: Second Level/ Third Semester

Credit hours: **2 (1+1)**

Actual teaching hours per week: **3 hours**

Lectures: 1 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 3 hr/week

B. Professional Information

1. Overall Aim of Course

This course provides all scientific disciplines and possession of skills and beliefs that is required for diagnosis, treatment & control of parasitic infections efficiently and correctly.

It also provides the taxonomy, habitat, morphology, life cycle, pathogenicity, clinical picture, diagnosis & treatment of Trematodes, Cestodes, Nematodes & Protozoa of medical importance.

In addition to, Arthropods that are biological vectors of important human pathogens & their control.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. List the taxonomy of parasites of medical importance.
a2. Identify habitat, morphology of different parasites of medical importance.
a3. Describe life cycles of different Trematodes, Cestodes, Nematodes & Protozoa of medical importance.
a4. Mention the aetiology of various parasitic infections.
a5. List the different measures used for treatment, prevention and control.
a6. Identify the arthropod vectors of disease.
a7. Describe the relationship between arthropod vectors and the parasites they carry.

b- Intellectual Skills:

b1. Relate knowledge of pharmacy related subjects in practice settings regarding community health and parasitic diseases.
b2. Describe patient's state of health.

b3. Apply measures related to health promotion, disease prevention & encouraging self-care.
b4. Implement efficient and effective methods of diagnosis.
b5. Suggest treatment for parasitic diseases.

c- Professional and Practical Skills:

c1. Diagnose parasitic infections microscopically, biochemically and serologically.
c2. Interpret patient clinical data.
c3. Develop knowledge and skills related to the field of parasitology..

d- General and Transferable Skills:

d1. Interpret various parasitic diseases and clinical pictures associated with them.
d2. Propose general education concerning control of parasites.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	**Introduction to Parasitology**	**3**	**1**	
	Protozoology			**2**
Two	**- Protozoa Class A** (**Rhizopoda**: *Entamoeba histolytica*) **-Protozoa Class B** (**Ciliates:** *Balantidium coli*).	**3**	**1**	
	Protozoology (cont.)			**2**
Three	**- Protozoa Class C (Flagellates)** 1. *Giardia lamblia* 2. *Trichomonas Vaginalis*	**3**	**1**	
	Trematodes			**2**
Four	1. Blood and tissue flagellates *(Leishmania & Trypanosoma)*	**3**	**1**	
	Trematodes (cont.)			**1.5**
	First Midterm Exam			**0.5**
Five	**Protozoa Class D (Sporozoa)** 1. *Plasmodium sp.* 2. *Toxoplasma gondii*	**3**	**1**	
	Cestodes			**2**

Six	**Class Trematodes** 1.*Fasciola hepatica & Fasciola gigantica* 2. *Schistosoma haematobium & S. mansoni*. 3. *Heterophyes heterophyes*	**3**	**1**	
	Nematodes			**2**
Seven	**Class Cestodes** 1. *Taenia saginata* 2. *Taenia solium*	**3**	**1**	
	Nematodes cont.			**2**
Eight	**Second Midterm exam**			
Nine	**Class Cestodes (continued)** 3.*Hymenolepis nana* 4.*Echinococcus granulosus*	**3**	**1**	
	Nematodes cont.			**2**
Ten	**Class Nematodes** *1.Ascaris lumbricoides* *2.Enterobius vermicularis*	**3**	**1**	
	Revision			**2**
Eleven	**Class Nematodes (continued)** *3. Ancylostoma duodenale* *4. Strongyloides stercoralis*	**3**	**1**	
	Final Practical Exam			**2**
Twelve	**Class Nematodes (continued)** *5. Trichinella spiralis* *6. Trichocephalus trichiurus* *7. Wuchereria bancrofti*	**3**	**1**	
	Final Practical Exam			**2**
Thirteen	**Arthropods**	**1**	**1**	
	_____			_____
Total No. of hours		**34**	**12**	**22**
Fourteen	University Elective Final Exams			
Fifteen	Final Exams			
Sixteen				

4. Teaching and Learning Methods

4.1 - Data show and computer in lectures.
4.2 - Discussion sessions.
4.3 - Assignments
4.4- Practical work
4.5- Power point presentations

5. Student Assessment Methods

5.1- Class Work (Assignments) to assess all types of skills.
5.2- Practical exam to assess professional and practical skills.
5.3- Written exams to assess the ability of student to remember and retrieve information as well as understanding of the scientific background in addition to intellectual skills.
5.4. Oral exam to assess all types of skills and mainly general and transferrable skills.

Assessment Schedule

Assessment 1 First Mid-Term	Week …4
Assessment 2 Second Mid-Term	Week …8
Assessment 3 Practical Exam	Week ….11& 12
Assessment 4 Final Term Exam	Week ……15/16
Assessment 5 Oral exam	Week……15/16
Class Work	During the semester

Weighting of Assessments

First Mid-Term Examination	5	%
Second Mid-Term Examination	15	%
Final-Term Examination	30	%
Oral Examination	10	%
Practical Examination	30	%
Class Work	10	%
Total	**100**	**%**

6. List of References

6.1. Course Notes

- **Handouts:** Lecture notes of Parasitology prepared by instructors are uploaded to the Moodle.
- lab manual **is given to each student**

6.2. Essential Books (Text Books)

- Clinical Parasitology: A Practical Approach by Elizabeth Zeibig. ElSevier. Second Edition

- **Recommended Books**
- Medical Parasitology: A Self-Instructional Text by Ruth Leventhal and Russell Cheadle (2011)

6.3. Periodicals, Websites, ……etc

- Websites: www.ncbi.nlm.nih.gov; www.cdc.gov

7. Facilities Required for Teaching and Learning

- Computer aided with data show.
- White board
- Personal computer (available for each staff member)

Course Coordinator: -

Head of Department: Associate Professor. Dr. Amal Emad ElDin

Department Approval Date: September 2014

Basic and Pharmaceutical Microbiology (PMI 312)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Microbiology and Immunology
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Basic and Pharmaceutical Microbiology **Course Code: PMI 312**

Prerequisites: Biochemistry I (PBC 211)

Students' Level/Semester: Third Level / Fifth semester

Credit hours: 4 (3+1)

Actual teaching hours per week:

Lectures: 3 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 5 hr/week

B. Professional Information

1. Overall Aim of Course

The course provides good knowledge on the fundamentals of Microbiology, including taxonomy, bacterial cell structure, and difference between prokaryotic and eukaryotic cells, microbial metabolism, microbial growth and microbial genetics.

Also, it provides good background and information on most common chemotherapeutic agents, its mechanism of action, kinetics of microbial growth, control on microbial growth, and sterilization methods used in laboratories and pharmaceutical industries, in addition to its validation.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Define Microbiology.
a2. Classify all types of microorganisms.
a3. Outline the structure of bacterial cell.
a4. Compare the structure of prokaryotic and eukaryotic cells.
a5. Discuss the structure and function of nuclear material of microorganisms.
a6. Describe the process of DNA replication
a7. Discuss the role of different enzymes in the process of replication.
a8. Describe the process of transcription and translation including the role of mRNA, tRNA, and rRNA.
a9. List methods of gene transfer.
a10. Describe microbial cell growth and multiplication.
a11. Differentiate between major terms for microbial control as sterilization, disinfection, preservation…etc.
a12. List several physical methods used in controlling microbes.

a13. Describe the basic effects of temperature on microbes.
a14. Mention some methods of moist and dry heat and their main applications.
a15. Recognize the use of radiation as a method of microbial control.
a16. Describe the concept of sterilization by filtration, with examples of application.
a17. State the five most common mechanisms of action of antimicrobial agents.
a18. Classify antibiotics according to source and spectrum of activity.
a19. State the difference between narrow-spectrum and broad-spectrum antimicrobial agents.
a20. Identify the most common mechanisms by which bacteria become resistant to antimicrobial agents.
a21. Define non antibiotic antimicrobial agents and their mechanism of action.
a22. Classify disinfectants according to their effect.
a23. Illustrate phases of bacterial growth.
a24. Discuss advantages, disadvantage, and limitation of different sterilization techniques.

b- Intellectual Skills:

b1. Detect ways by which bacteria acquire genetic information.
b2. Relate bacterial structures and the microorganism pathogenesis.
b3. Distinguish several factors that affect the growth of microorganisms.
b4. Discriminate selective toxicity of antibiotics.
b5. Differentiate between bactericidal and bacteriostatic agents.
b6. Select the appropriate antibiotic for chemoprophylaxis.
b7. Predict the characteristic of ideal disinfectant.
b8. Investigate kinetic and mechanism of thermal destruction of microorganisms.

c- Professional and Practical Skills:

c1. Develop experience in microscopic techniques, and using oil emersion lens.
c2. Practice in different methods of staining of the bacteria.
c3. Isolate microorganism in pure colonies.
c4. Apply pharmaceutical microbiology evaluation assays for antimicrobial agents.
c5. Select the most appropriate antibiotic for specified microorganism.
c6. Practice sterility testing for sterile pharmaceutical products.
c7. Point out hospital disinfection policy

d- General and Transferable Skills:

d1. Interpret reasons of failure of antibiotic treatment in some cases..
d2. Argue about the benefits and hazards of random usage of antibiotics.
d3. Justify the reasons of selection of an antibiotic in treatment of certain infection.
d4. Justify the benefits of using the selected antibiotic in proper regimen.
d5. Evaluate the efficacy of sterilization process.
d6. Estimate the most appropriate method for sterilization of a pharmaceutical product.

d7. Judge the best method for disinfection of different articles in hospitals.
d8. Explain the importance of using "aseptic technique" in microbiology labs and in sterile areas.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	Introduction & Historical review. Classification of microorganisms. General properties of bacteria. Morphology & Structure of bacteria.	**5**	**3**	
	• *Safety measures in Microbiology lab* • *Wide distribution of microorganisms* • *Microscopic Examination of microorganisms by simple stain*			**2**
Two	Cont. Structure of bacteria. Bacterial Genetics**:** DNA structure & replication. Gene expression.	**5**	**3**	
	• *Microscopic Examination of single & mixture of microorganisms by Gram Stain* • *Negative Stain*			**2**
Three	Cont. Bacterial Genetics	**5**	**3**	
	• *Acid Fast Stain* • *Spore stain* • *Capsule Stain* • *Motility test* • *Isolation of microorganisms by streaking*			**2**
Four	Cont. Bacterial genetics	**5**	**3**	
	Practical Revision I , Gram stain for mixture of bacteria.			**1.5**
	First Midterm Exam			**0.5**
Five	Bacterial metabolism Bacterial reproduction& growth. Sterilization: definitions, and characters. Limitation and significance of sterilization Methods of sterilization Kinetic and mechanism of microbial			

	death	5	3	
	First Practical Exam (part I): Basic Microbiology			2
Six	Heat sterilization (Dry heat& moist heat) Radiation sterilization Filtration sterilization Chemical sterilization Sterilization indicators Sterility test	5	3	
	Tests for sterility for simple ampoules and vials. Microbial Viable count			2
Seven	Cont. sterilization	5	3	
	Antibiotic sensitivity test. Spectrum of antibiotics.			2
Eight	**Second Midterm exam**			
Nine	Antimicrobial agents: Definitions, characters and classification.	5	3	
	Determination of the MIC by serial dilution & by agar diffusion method.			2
Ten	Mechanism of action of antibiotics. Development of bacterial resistance Clinical uses of antibiotics Combination of antibiotics General characters of antiviral, antifungal agents, and antitubercular agents.	5	3	
	Practical Revision II			2
Eleven	Cont. antiviral, antifungal and antitubercle agents	5	3	
	Final Practical Exam			2
Twelve	Different classes of non antibiotic antimicrobial agents. Mechanism of action of non antibiotic antimicrobial agents	3	3	
	—			—
Thirteen	Cont. different classes of non antibiotic antimicrobial agents**.**	3	3	
	—			—

Total No. of hours		56	36	20
Fourteen	University Elective Final Exams			
Fifteen	Final Exams			
Sixteen				

4. **Teaching and Learning Methods**
   - **4.1.** Lectures
   - **4.2.** Practical sessions
   - **4.3.** Illustrative videos
   - **4.4.** Quizzes/ Tests
   - **4.5.** Assignment
   - **4.6.** Power point presentations
5. **Student Assessment Methods**.
   - **5.1.** Practical exams to assess professional and practical skills.
   - **5.2.** Written exams to assess knowledge and understanding as well as intellectual skills.
   - **5.3.** Oral exam to assess all types of skills and mainly general and transferrable skills.
   - **5.4.** Class Work (Quizzes, discussions and assignments) to assess all types of skills.

Assessment Schedule

Assessment 1: First Midterm Exam Week 4.
Assessment 2: Second Midterm Exam Week 8.
Assessment 3: Practical Exam Week 11
Assessment 4: Final written Exam Week 15/16
Assessment 5: Oral Exam Week 15/16
Assessment 6: Class work (Quizzes, discussions and assignments) During the semester

Weighting of Assessments

First Mid-Term Examination	5%
Second Mid- Term Examination	15 %
Final-Term Examination	30 %
Oral Examination	10 %
Practical Examination	30 %
Class Work (Quizzes, discussions and assignments)	10 %
Total	**100 %**

6. List of References

6.1. Course Notes

- Staff lectures handouts are uploaded to the Moodle.
- Basic& Pharmaceutical Microbiology Lab manual is given to each student.

6.2. Essential Books (Text Books)

- Foundation in Microbiology, Talaro and Chess, McgrawHill NinethEdition. (2014).Year
- Pharmaceutical Microbiology, Hugo WB and Russel AD. (8th edition). Blackwell Scientific Publications, Oxford. (2011).

6.3. Recommended Books

- Medical Microbiology. Jawetz, Melnick, 7 Adelberg's.26 th edition. (2013)
- Burton's microbiology for the health sciences. P.G. Engelkirk, and J.D. Engelkirk (9th edition) Wolters Kluwer, Lippincott Williams &Wilkins. (2011)

6.4. Periodicals, Websites, ……etc

- **Periodical Scientific Journals**: Journal of basic Microbiology; International Journal of Pharmaceutical Medicine; Journal of applied Microbiology
- **Websites**: www.nlm.nih.gov/medlineplus; www.ncbi.nlm.nih.gov

7. Facilities Required for Teaching and Learning

Computer aided with data show.
White board
Laboratories
Different laboratory equipment (Bunsen flames, autoclave, refrigerator, hot air Oven, Incubator, microscopes with oil immersion lens, centrifuge)

Course Coordinator:

Head of Department: Associate Prof. Dr. Amal Emad ElDin

Department Approval Date: September 2014

Basic and Applied Immunology (PMI 413)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Microbiology and Immunology
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Basic and Applied Immunology Course Code: PMI 413

Prerequisites: Basic and Pharmaceutical Microbiology (PMI 312)

Students' Level/Semester: Fourth Level/ seventh Semester

Credit hours: **3 (2+1)**

Actual teaching hours per week:

Lectures: 2 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 4 hr/week

B. Professional Information

1. Overall Aim of Course

This course presents the fundamentals of immunology, beginning with innate immunity, followed by a discussion of the structure and function of important molecules in the immune system and the course is concluded with a discussion of the development and function of the cellular immune response. The course focuses on applied immunology and discusses hypersensitivity, autoimmunity, immunodeficiencies, tumor immunology, infectious disease, transplantation immunology, development of vaccines and antibody based therapies, antigen-antibody reactions and antibody detection for the diagnosis of infectious disease.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. List the main stages in the development of an infection.
a2. Mention the characteristics of basic host defenses.
a3. Describe the nature of the different types of innate, nonspecific defense.
a4. Discuss the characteristic and the functions of the lymphatic system.
a5. Describe the main events in the inflammatory reaction, and explain what is occurring in each.
a6. Define phagocytosis.
a7. Identify which cells serve this function.
a8. Characterize the complement system, its origin, pathways, and basic functions.
a9. Define antigen
a10. Enumerate different types of antigen.
a11. Identify the mechanism of action of superantigen.
a12. Describe the major events in the origin of diversity in the immune system.

a13. Recognize the structure and basic functions of the major types of immunoglobulins.
a14. Describe the main activities of cell-mediated immunities.
a15. Explain the concepts of natural killer cells.
a16. Identify different types of vaccines.
a17. Describe general characteristics of hypersensitivity reactions.
a18. List different types of antigen-antibody reactions and their use in clinical diagnosis.
a19. Describe the concepts of the main types of serological reactions
a20. Mention the steps and mechanism of different serological tests.
a21. Describe the origin of interferon.
a22. Describe the sources and the uses of artificial immunization.
a23. Identify the major categories of vaccine antigens and their examples.
a24. Identify the categories of grafts and how rejection is prevented.
a25. List the major types of autoimmune disease.
a26. Describe the characteristics of cancer,
a27. Summarize the types and the functions of cytokines, chemokines and other mediators.

b- Intellectual Skills:

b1. Relate the humoral and cell mediated immunity.
b2. Distinguish between active and passive immunity.
b3. Distinguish between natural and acquired immunity.
b4. Differentiate between classical antigen and superantigen..
b5. Analyze the primary and secondary responses to antigens.
b6. Differentiate between natural and artificial immunities and between active and passive immunities
b7. Differentiate between the main serological tests
b8. Estimate some new strategies for developing vaccine.
b9. Detect the role of T cells in organ transplantation.
b10. Detect possible reasons that grafted tissues may be rejected.
b11. Relate the defect in immune function relates to the development of cancer.
b12. Select appropriate immunological techniques.

c- Professional and Practical Skills:

c1. Apply different serological techniques.
c2. Interpret the outcome of immunoassay methods.
c3. Use several techniques for immunological diagnosis.

d- General and Transferable Skills:

d1. Explain the role of different immunoprophylaxis.
d2. Contrast between the protective and destructive mechanism of immune system.
d3. Evaluate the role of natural and adaptive immunity in protecting against diseases.

d4. Advise people about the ways of preventing hemolytic diseases in newborn.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	Microbial- Human Interactions Human Immune system	**2**	**2**	
	-			-
Two	Innate immunity.	**4**	**2**	
	Introduction and general features of immune testing			**2**
Three	Immunogens: definition, characters and types. Lymphatic system. Acquired immune response: 1- Cell mediated immune response	**4**	**2**	
	Agglutination reactions			**2**
Four	Acquired immune response Humoral immune response.	**4**	**2**	
	Precipitation reactions			**1.5**
	First Midterm Exam			**0.5**
Five	Immunoglobulin Monoclonal antibodies.	**4**	**2**	
	Complement fixation reactions			**2**
Six	Cytokines Interferons	**4**	**2**	
	Immunoflorescence reactions			**2**
Seven	Superantigen The complement system	**4**	**2**	
	Enzyme linked immunosorbent assay (ELISA)			**2**
Eight	**Second Midterm Exams**			
Nine	Hypersensitivity reactions	**4**	**2**	
	Revision			**2**
Ten	Immunotherapy	**4**	**2**	
	***Final Practical Exam* I**			**2**

Eleven	Organ transplantation Autoimmune diseases	**4**	**2**	
	Final Practical Exam II			**2**
Twelve	Immunodeficiency diseases The function of immune system in cancer	**2**	**2**	
	-			**-**
Thirteen	Immunological tests.	**2**	**2**	
	-			**-**
Total No. of hours		**42**	**24**	**18**
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

4.1. Lectures (power point)
4.2. Videos
4.3. Practical sessions
4.4. Office hours
4.5. Projects

5. Student Assessment Methods

5.1. Class Work (Project) to assess general and transferrable skills.
5.2. Practical Exams to assess professional and practical skills.
5.3. Written Exams to assess knowledge and understanding as well as intellectual skills.
5.4. Oral Exam to assess all types of skills and mainly general and transferrable skills.

Assessment Schedule

Assessment 1: First Midterm Exam	Week 4.
Assessment 2: Second Midterm Exam	Week 8.
Assessment 3: Practical Exam	Week 10, 11
Assessment 4: Final written Exam	Week 15/16
Assessment 5: Oral Exam	Week 15/16

Assessment 6: Class Work During the semester

Weighting of Assessments

First Midterm Examination	5%
Second Midterm Examination	15%
Practical Examination	30%
Class Work (Project)	10%
Final-Term Examination	30%
Oral Examination	10%
Total	**100%**

6. List of References

6.1. Course Notes

Staff lectures handouts are uploaded to the moodle
Lab manual is given to each student

6.2. Essential Books (Text Books)

Immunology at a Glance, J. H. L. PLAYFAIR & B. M. CHAIN, seventh edition, Blackwell Publishing. (2000)

6.3. Recommended Books

Basic Immunology: Functions and Disorders of the Immune System, A.K. Abbas and A.H. Lichtman, 4th edition, Elsevier. (2004)
Foundation in Microbiology, Talaro and Chess, McgrawHill Ninth edition. (2014)
Essential Clinical Immunology, John B. Zabriskie, Cambridge University Press(2009)

6.4. Periodicals, Websites, ……etc

Periodicals: Annual review of immunology journal; Nature immunology journal; Immunity journal.
Websites: www.annualreviews.org/journal/immunol; www.cell.com/immunity/home

Facilities Required for Teaching and Learning

Computer aided with data show.

- Different Laboratory Equipment and supplies:Refrigerator
- Hot air Oven
- Incubator

- ELISA Reader
- Centrifuge

Course Coordinator: -

Head of Department: Ass. Prof. Dr. Amal Emad ElDin

Department Approval Date: September 2014

Clinical Microbiology (PMI 424)

Program (s) on which the course is given: Bachelor of Pharmacy
Department offering the program: All Faculty Departments
Department offering the course: Microbiology and Immunology

Academic year: ----------
Approval Date: September 2014

A. Basic Information

Course Title: Clinical Microbiology **Course Code: PMI 424**
Prerequisites: Basic & Applied Immunology (PMI 413)
Students' Level/Semester: Fourth Level/ Eighth Semester
Credit hours: **4(3+1)**
Actual teaching hours per week:
Lectures: 3 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 5 hr/week

B. Professional Information

1. Overall Aim of Course

The course provides pharmacy student with information about medically important diseases caused by bacteria, fungi and viruses. It also gives detailed information about the characteristics of the etiological agent(s), mode of transmission, pathogenesis and clinical symptoms, host response, laboratory diagnosis as well as prophylaxis, control and treatment of each disease.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Describe bacterial infectious diseases.
a2. List the classification of each of the infectious diseases.
a3. Describe characteristics of infectious bacteria.
a4. List different virulence factors of infectious bacteria.
a5. Mention the mode of transmission of infectious diseases.
a6. List diseases caused by each bacterial spp.
a7. Describe the general biological and physical properties of viruses and how they differ from other infectious agents.
a8. Describe the virus structures, function, and replication.
a9. Describe the virus classification and the major properties of DNA & RNA viruses.
a10. Mention the effect of physical and chemical agents on viruses.
a11. Mention the importance of cultivation of virus in diagnosis.
a12. Mention diseases caused by DNA, RNA viruses.
a13. List the basic principles of infection control.

b- Intellectual Skills:

b1. Select the appropriate specimen and processing method needed to diagnose a suspected causative pathogen causing infection.
b 2. Relate the infectious diseases to microorganisms.
b 3. Relate the infectious diseases and microbial virulence factors.
b 4. Detect bacterial pathogenesis, diseases and host response.
b 5. Detect viral pathogenesis, diseases and host response.

c- Professional and Practical Skills:

c 1. Correlate clinical symptoms to diseases.
c 2. Select the appropriate types of media required for culturing routine clinical specimens.
c3. Identify human pathogenic bacteria by means of their cultural characteristics and biochemical reactions.
c 4. Differentiate between diseases based on related symptoms.
c 5. Identify microorganisms in clinical specimen.
c 6. Differentiate between Gram positive cocci based on laboratory diagnosis.
c 7. Discriminate between *Enterobacteriaecae* based on laboratory diagnosis.
c 8. Differentiate between Gram positive rods based on laboratory diagnosis.
c 9. Discriminate between Gram negative rods based on laboratory diagnosis.

d- General and Transferable Skills:

d1. Evaluate the measures for control of infectious diseases.
d2. Demonstrate planning policies for treatment as well as prophylaxis measure for each disease.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	Introduction Gm +ve cocci staphylococci Introduction to viral diseases	5	3	
	Culture media			2
Two	Gm +ve cocci Streptococci Introduction to viral diseases	5	3	
	Gm +ve cocci staphylococci			2
Three	Gm +ve Bacilli (Cornybacteria Gm +ve Bacilli (Bacillus)	5	3	

	Introduction to viral diseases			
	Gm +ve cocci streptococci			2
Four	Gm -ve cocci (Neisseria) DNA viral diseases	5	3	
	Gm +ve Bacilli (Corynbacterium, Clostridium, acid fast bacilli			1.5
	1st Mid Term exam			0.5
Five	Gm -ve Bacilli (Enterobacteriaceae) Continue DNA viral diseases	5	3	
	Enterobacteriaceae			2
Six	Gm –ve bacilli (Enterobacteriaceae) RNA viral diseases	5	3	
	Enterobacteriaceae			2
Seven	Gm –ve bacilli (Enterobacteriaceae RNA viral diseases	5	3	
	Other Gm –ve bacteria (Pseudomonas, Vibrio)			2
Eight	**Second Midterm exam**			
Nine	Non-enteric Gram negative bacteria Fastidious group, curved rods RNA viral diseases	5	3	
	Revision			2
Ten	Acid fast bacteria, RNA viral diseases	5	3	
	Practical Exam			2
Eleven	Acid fast bacteria, Mycology, Hepatitis viral diseases	5	3	
	Practical Exam			2
Twelve	Mycology, Hepatitis viral diseases	3	3	
Thirteen	Chlamydia, Mycoplasma HIV and AIDS	3	3	
Total No. of hours		56	36	20
Fourteen				
	University Elective Final Exams			

Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

4.1. Data show and computer in lectures.
4.2. Practical work.
4.3. Assignments.
4.4. Power point presentations.
4.5. Demonstration videos.
4.6. Case study

5. Student Assessment Methods

5.1 Written exams to assess knowledge and understanding as well as intellectual skills.
5.2 Practical work to assess professional and practical skills.
5.3 Class work (case study and project) to assess knowledge and understanding of the practical part, intellectual skills as well as professional and practical skills.
5.4 Oral exam to assess all skills including general and transferable skills.

Assessment Schedule

Assessment 1… 1st Mid Term exam Week: 4
Assessment 2… 2nd Mid Term exam Week: 8
Assessment 3 … Practical Exam Week: 10-11
Assessment 4… Final written exam Week: 15/16
Assessment 5… Oral exam Week: 15/16
Assessment 6….Class Work (During the semester)
(Case study and projects)

Weighting of Assessments

1st Mid-Term Examination	5%
2nd Mid-Term Examination	15%
Final-Term Examination	30%
Oral Examination	10%
Practical Examination	30%
Class Work	10%

(Case study and project)

Total **100%**

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.

Lab manual **is given to each student.**

6.2. Essential Books (Text Books):

Jawetz**, Melnick, & Adelberg's.** Medical Microbiology 26 th edition (2012)

6.3. Recommended Books:

- Baron, E.J. and Finegold, M. Bailey and Scotts. Diagnostic Microbiology (10th edition), the CV Mosby Company (1998)
- Henry'sClinical Diagnosis and Management by Laboratory Methods. 22nd edition (2011)

6.4. Periodicals, Websites, ……etc

Periodicals: Journal of medical Microbiology; Journal of infectious diseases

Websites: www.cdc.gov; www.indstate.edu/thcme/micro/; www.fda.gov/default.htm

7. Facilities Required for Teaching and Learning

- Computer equipped with data show
- White board.
- Different laboratory equipment (autoclave, oven, centrifuge, incubator,…)

Course Coordinators:

Head of Department: Assoc. professor. Dr. Amal Emad ElDin

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Pharmaceutical Biotechnology (PMI 525)

Program (s) on which the course is given: Bachelor of Pharmacy
Department offering the program: All Faculty Departments
Department offering the course: Microbiology and Immunology
Academic year: ----------
Approval Date: September 2014

A. Basic Information

Course Title: Pharmaceutical biotechnology Course Code: PMI 525
Prerequisites: Basic and Pharmaceutical Microbiology (PMI 312)
Students' Level/Semester: Fifth Level/ Tenth Semester
Credit hours: 2 (1+1)
Actual teaching hours per week:
Lectures: 1 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 3 hr/week

B. Professional Information

1. Overall Aim of Course

The course provides comprehensive information in basic biotechnology and provides scientific knowledge for producing different products of biotechnology including microbial enzymes, antibiotics, recombinant proteins using different technologies such as; fermentation technology, recombinant DNA technology. It also gives detailed insight into the design of process, separation of products and the major problems encountered in biotechnology. The course reviews the recent techniques used in biotechnology including; DNA cloning, PCR, and hybridization technique and different applications of biotechnology.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Mention examples of historic and current applications of biotechnology.

a2. List the components of the fermentation process.

a3. Define upstream and downstream manipulation.

a4. Describe the main characteristics of raw materials used in fermentation process.

a5. List the main categories of biotechnology products.

a6. Outline different types of enzymes produced by microbes.

a7. List examples of primary and secondary metabolites.

a8. Identify the key steps in production of genetically engineered proteins.

a9. List examples of medically important proteins produced in bacteria using recombinant DNA technology.

a10. Define bioremediation, biotransformation with examples.

a11. Describe how polymerase chain reactions, DNA sequencing and other molecular techniques are used to study gene structure, function and expression

b- Intellectual Skills:

b 1. Suggest strategies for improvement of fermentation process

b 2. Compare between primary and secondary metabolites

b 3. Compare between bioremediation and other cleanup approaches

b 4. Apply biotechnological knowledge correctly and independently.

b 5. Design various process developments for many valuable biotechnological products.

b6. Estimate how the genetically modified organisms are produced.

b7. Detect major problems encountered in biotechnology and possible solutions.

c- Professional and Practical Skills:

c1. Select the most suitable technique for different applications in biotechnology.

c2. Interpret results of experiments. .

c3. Apply some techniques used in biotechnology.

c4. Relate production of biotechnological products & developing processes, in such a way that the finished pharmaceutical product will be suitable for its purpose.

d- General and Transferable Skills:

d1. Extract the information from different sources.

d2. Apply problem solving for encountered problems.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	General introduction to biotechnology	**3**	**1**	
	Introduction to biotechnology			**2**
Two	Introduction to all elements in fermentation process	**3**	**1**	
	Product of fermentation: Biomass			**2**
Three	Elements of fermentation process Scheme of the bioprocesses	**3**	**1**	

	Screening for amylase activity in soil samples			**2**
Four	Biomass applications	**3**	**1**	
	Assesment of amylase activity			**1.5**
	1st midterm exam			**0.5**
Five	Microbial enzymes and biosensors	**3**	**1**	
	Production of glucose oxidase from different microorganisms/ Degradation of phenolic compound by bacterial isolate			**2**
Six	Primary metabolites	**3**	**1**	
	How to set a PCR reaction, DNA electrophoresis (demonstration)			**2**
Seven	Primary metabolites	**3**	**1**	
	Production of silver nanoparticles using microorganisms			**2**
Eight	**2nd midterm exam**			
Nine	Secondary metabolites	**3**	**1**	
	Revision			**2**
Ten	Bioremediation, biotransformation, vaccines	**3**	**1**	
	Practical exam			**2**
Eleven	Genetic engineering techniques	**3**	**1**	
	Practical exam			**2**
Twelve	Genetically engineered proteins	**1**	**1**	
Thirteen	Genetically engineered proteins	**1**	**1**	
Total No. of hours		**32**	**12**	**20**
Fourteen	**University Elective final exams**			
Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

4.1. Lectures
4.2. Practical work
4.3. Projects
4.4. Group discussion

5. Student Assessment Methods

5.1 Written exam to assess knowledge and understanding as well as intellectual skills.
5.2 Practical work to assess professional and practical skills.
5.3 Class work (quiz, projects) to assess knowledge and understanding of the practical part, intellectual skills as well as professional and practical skills.
5.4 Oral exam to assess all skills including transferable skills.

Assessment Schedule

Assessment 1… 1st Mid Term exam Week: 4
Assessment 2… 2nd Mid Term exam Week: 8
Assessment 3 … Practical Exam Week: 10-11
Assessment 4… Final written exam Week: 15/16
Assessment 5… Oral exam Week: 15/16
Assessment 6…Class Work (Quiz, projects) During the semester

Weighting of Assessments

1st Mid-Term Examination	5%
2nd Mid-Term Examination	15%
Final-Term Examination	30%
Oral Examination	10%
Practical Examination	30%
ClassWork (Quiz, projects)	10%
Total	100**%**

5 List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.
lab manual **is given to each student**

6.2. Essential Books (Text Books)

Basic Biotechnology by Colin Ratledge (Editor), Bjorn Kristiansen, Publisher: Cambridge University. Third Edition. (2006).

6.3. Recommended Books

Basic Laboratory Methods for Biotechnology, Lisa A. Seidman, Cynthia J. Moore

Publisher: Benjamin Cummings. 2nd Edition (2008).

6.4.Periodicals, Websites, ……etc

- **Periodicals:** Microbiology & Molecular Biology Reviews, Nucleic acids research, Biotechnology letters, Nature biotechnology
- **Websites:** http://www.ncbi.nlm.nih.gov/

7. Facilities Required for Teaching and Learning

- Computer equipped with data show
- White board.
- Different laboratory equipment (autoclave, hotair oven, centrifuge, Bunsen flames, incubator, spectrophotometer)

Course Coordinator: -

Head of Department: Assc. Prof. Dr. Amal Emad ELDin

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Infection and Immunity (PMI 611)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Microbiology and Immunology
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Infection and Immunity **Course Code: PMI 611**

Prerequisites: Basic and Pharmaceutical Microbiology (PMI 312)

Students' Level/Semester: Elective

Credit hours: **2 (2+0)**

Actual teaching hours per week:

Lectures: 2 hr/week **Practical:** N/A **Tutorial:** N/A **Total:** 2 hr/week

B. Professional Information

1. Overall Aim of Course

The course deals with advanced studies on major topics in cellular and molecular immunology, such as: development of the immune system, molecular basis of lymphocyte differentiation, molecular basis of antigen recognition by B and T lymphocytes, repertoire selection, lymphocyte homeostasis, immune responses, innate immunity and various aspects of immunopathology. The course also covers the interactions between pathogenic microorganisms such as viruses, bacteria, protozoa and the immune system with emphasis on the regulation of the immune response and dysfunctional immune systems in some disease states.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Mention the characteristics of basic host defenses.
a2. Describe the nature of the different types of innate, nonspecific defense.
a3. Describe the characteristic and the functions of the lymphatic system.
a4. Describe the major events in the origin of diversity in the immune system.
a5. Mention the molecular basis of natural killer cells activation.
a6. Identify dendritic cells subsets in pathogen interactions.
a7. Define dendritic cell, natural killer cell and neutrophils.
a8. Mention the basic principle of microbial infection.
a9. Describe the role of neutrophil as a key modulator in immunity.

b- Intellectual Skills:

b1. Explain why an individual might not develop infectious diseases after exposure to a pathogen.
b2. Describe how B and T cells encounter antigen and develops in different location.
b3. Differentiate between the lines of immune defense, describing examples of each.
b4. Discuss the events in B cell maturation, development and function.
b5. Discuss the events in T cell maturation, development and function.
b6. Compare the development of memory T and B lymphocytes.
b7. Outline the cooperative interaction cells, T- cells, and B-cells.
b8. Outline stem cells development and differentiation.
b9. Discuss the innate and adaptive immunity to extracellular bacteria.
b10. Discuss the innate and adaptive immunity to intracellular bacteria.
b11. Explain immune evasion by extracellular and intracellular bacteria.
b12. Explain with example the role of immune system in viral infection.
b13. Discuss immune evasion by viruses.
b14. Explain with examples immune response in some fungal infections.

c- Professional and Practical Skills:

c1. Conclude the role of immune system in protection against microbial diseases.
c2. Carry out research studies.
c3. Predict the host pathogen interactions in emerging infections.
c4. Evaluate the role of natural and adaptive immunity in protecting against diseases.

d- General and Transferable Skills:

d1. Exchange ideas and information.
d2. Participate actively in teamwork.
d3. Use information technology in search and studies.
d4. Collect information and data search from different sources.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture
One	The Immune System. Homeostasis	**2**	**2**
Two	Stem cells development and differentiation	**2**	**2**
Three	T cell development and selection	**2**	**2**
Four	B cell development, selection and heterogeneity	**2**	**1.5**
	First Midterm Exam		**0.5**
Five	Innate lymphoid cells Dendritic cells	**2**	**2**
Six	Neutrophil in immunity	**2**	**2**
Seven	Molecular basis of NK cell activation.	**2**	**2**
Eight	**Second Midterm Exam**		
Nine	Anti-microbial immunity: 1- Immunity to viruses with examples	**2**	**2**
Ten	Anti-microbial immunity: 2- Immunity to bacteria with examples	**2**	**2**
Eleven	Anti-microbial immunity: 3- Immunity to fungi with examples	**2**	**2**
Twelve	Anti-microbial immunity:	**2**	**2**

	4- Immunity to protozoa with examples		
Thirteen	Revision	**2**	**2**
Total No. of hours		**24**	**24**
Fourteen	**University Elective Final Exams**		
Fifteen	**Final Exams**		
Sixteen			

4. Teaching and Learning Methods

4.1. Lectures (power point)
4.2. Videos
4.3. Discussions
4.4. Assignments

5. Student Assessment Methods

5.1. Written exams to assess knowledge and understanding, intellectual skills as well as professional skills.
5.2. Class Work (Participation and assignments) to assess all types of skills including general and transferrable skills.

Assessment Schedule

Assessment 1: First Midterm Exam — Week 4.
Assessment 2: Second Midterm Exam — Week 8.
Assessment 3: Final written Exam — Week 15/16
Assessment 4: Class work (Participation and Assignments) (During the semester) .

Weighting of Assessments

First Midterm Examination	10%
Second Midterm Examination	20%

Class Work (Participation+ Assignments)	30%
Final-Term Examination	40%
Total	100**%**

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the moodle**

6.2. Essential Books (Text Books)

Basic Immunology: Functions and Disorders of the Immune System, A.K. Abbas and A.H. Lichtman, 4th edition, Elsevier. (2004)

6.3. Recommended Books

- Immunology at a Glance, by Playfair, J. H. L; Chain, B. M.J,7th edition, (2000), Blackwell Publishing.
- Foundation in Microbiology, Talaro and Chess, McgrawHill 9th Edition, (2014)
- Essential Clinical Immunology, John B. Zabriskie, Cambridge University Press. (2009)

6.4. Periodicals, Websites, ……etc

Periodicals: Annual review of immunology journal, Nature immunology journal, Immunity journal, Journal of clinical immunology
Websites: http://www.annualreviews.org/journal/immunol, http;//www.nature.com/ni/, http://www.cell.com/immunity/home

7. Facilities Required for Teaching and Learning

Computer aided with data show.
Whiteboard

Course Coordinator: -

Head of Department: Ass. Prof.Dr. Amal Emad ElDin

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Advanced Biotechnology (PMI 612)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Microbiology and Immunology
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Advanced biotechnology **Course Code: PMI 612**

Prerequisites: Basic and Pharmaceutical Microbiology (PMI 312)

Students' Level/Semester: **Elective**

Credit hours: **2 (2+0)**

Actual teaching hours per week:

Lectures: 2 /week **Practical:** N/A **Tutorial:** N/A **Total:** 2 hr /week

B. Professional Information

1. Overall Aim of Course

The course aims to provide the students with advanced level knowledge and understanding of modern biotechnology. The course provides in addition, a good grounding in core biotechnology, medical, industrial, environmental and fermentation biotechnology. It provides a deeper look in molecular and therapeutic biotechnology. It gives detailed insight into molecular biology tools and genetic engineering. It also gives detailed information on applications of genetic, protein engineering, and manipulation of gene expression, transgenic animals, and large scale production of proteins.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. List the different types of biotechnology and their applications.

a2. Mention examples of potential advances in biotechnology.

a3. Mention examples of bacteria and yeast used in biotechnology

a4. Describe the fermentation process and its components.

a5. Define recombinant DNA technology.

a6. List examples of medically important proteins, that are produced in bacteria using recombinant DNA technology.

a7. List some biological products that can be produced using transgenic animals.
a8. Define gene therapy.
a9. Mention different strategies used to isolate and purify nucleic acids.
a10.Explain the major findings of human genome project and related medical applications.
a11. Explain DNA gel electrophoresis
a12. Mention the principle of site directed mutagenesis.

b- Intellectual Skills:

b1. Detect the use of DNA technology is used to clone genes and manipulate DNA.
b2. Compare different types of cloning vectors
b3. Compare different cloning hosts and methods to detect the right clone.
b4. Solve problems encountered in genetic engineering and possible solutions.

c- Professional and Practical Skills:

c1. Apply learned knowledge in gene cloning.
c2. Plan a general scheme for protein purification.
c3. Use molecular techniques to study gene structure and function and genetic abnormalities.
c4.
c5. Apply different methods for protein purification.

d- General and Transferable Skills:

d1. Extract the information from different sources.
d2. Apply critical thinking to solve problems.
d3. Work effectively in a team.

3. Contents

Teaching Weeks	Topic	No. of hours	No. of hours of Lectures
One	Types of Biotechnology	**2**	**2**
Two	Microbial biotechnology	**2**	**2**
Three	Fermentation process	**2**	**2**

Four	Production of biomass, organic acids, vitamins	**2**	**1.5**
	1st Midterm exam		**0.5**
Five	Production of enzymes, antibiotics	**2**	**2**
Six	Molecular biology techniques	**2**	**2**
Seven	Molecular biology techniques	**2**	**2**
Eight	**2nd midterm exam**	**-**	**-**
Nine	Genetic engineering, gene cloning systems, cloning vectors, host cells for cloning,	**2**	**2**
Ten	Recombinant proteins, proteins as products,, purification	**2**	**2**
Eleven	Environmental applications of biotechnology Animal biotechnology, Transgenic animals	**2**	**2**
Twelve	Microbial genomes and sequencing	**2**	**2**
Thirteen	Medical Biotechnology, Human genome project, diagnosis of diseases, gene therapy	**2**	**2**
Total No. of hours		**24**	**24**
Fourteen	**University Elective Final Exams**		
Fifteen	**Final Exams**		
Sixteen			

4. Teaching and Learning Methods

4.1. Lectures
4.2. Projects
4.3. Group discussion

5. Student Assessment Methods

5.1 Written exams to assess knowledge and understanding as well as intellectual skills.

5.2 .Class Work (Assignments + Projects) to assess all types of skills including general and transferrable skills.

Assessment Schedule

Assessment 1…. 1st Mid Term exam Week: 4
Assessment 2… 2nd Mid Term exam Week: 8
Assessment 3… Final written exam Week: 15/16
Assessment 4….Class Work (Assignments + Projects) (During the semester)

Weighting of Assessments

1st Mid-Term Examination	10%
2nd Mid-Term Examination	20%
Final-Term Examination	40%
Class Work (Assignments+ Projects)	30%
Total	100**%**

6 List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.

6.2. Essential Books (Text Books)

Introduction to Biotechnology. William J. Thieman and Michael A. Palladino Pearson, Benjamin Cummings, 3rd edition, (2013).

6.3. Recommended Books

Molecular biotechnology Principles and applications of recombinant DNA Bernard R. Glick, Jack J. Pasternak 4th edition, (2010).

6.4. Periodicals, Websites, ……etc

Periodicals: Microbiology & Molecular Biology Reviews, Nucleic acids research, Biotechnology letters, Nature biotechnology

Websites: http://www.ncbi.nlm.nih.gov/

7. Facilities Required for Teaching and Learning

- Computer equipped with data show
- White board.

Course Coordinator: -

Head of Department: Ass. Prof. Dr. Amal Emad ELDin

Department Approval Date: September 2014