Academic Reference Standards (ARS)
for
M. Sc in Pharmaceutical Sciences
(Microbiology and Immunology)

Microbiology and Immunology Dept.

ARS

Academic Year: 2021/2022

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Academic Reference Standards (ARS)

M. Sc in Microbiology and Immunology

Approved by the department Council on December 8th 2021

The Academic Reference Standards (ARS) for M. Sc in (Microbiology and Immunology) regarding attributes and capabilities of the graduates were based essentially on the General Academic Reference Standards of graduate studies published by the National Authority for Quality Assurance and Accreditation of Education (NAQAAE, 2009).

I. Attributes of the graduate:

The graduates of the Master Degree of Pharmaceutical Sciences (Microbiology and Immunology) should be capable of:

- Applying the basics and methodologies of scientific research and manipulating its various tools in the field of Microbiology and Immunology.
- Mastering of advanced knowledge, professional research skills, attitudes and values in the field of Microbiology and Immunology and integrating with the relevant subjects in his/her professional practice.
- Recognizing the current issues in the field of Microbiology and Immunology.
- Adopting the scientific thinking approaches in subjects relevant to Microbiology and Immunology.
- Identifying and solving problems in the field of Microbiology and Immunology.
- Mastering adequate range of specialized professional skills and using appropriate technology to improve his/her professional practice.
- Communicating effectively and having ability to participate and lead teamwork.
- Taking appropriate professional and scientific decisions in light of the available information.
- Providing the ability to critically analyze the impact and outcomes of research results.

- Training in ethical and legal aspects of scientific research.
- Employing the available resources to achieve and preserve the maximum benefit.
- Exhibiting awareness of his/her role in the community development and preservation of environment in response to regional global changes.
- Reflecting commitment to integrity, credibility and rules of the pharmacy profession.
- Developing continuous self-academic and professional learning.

II. General Standards

1. Knowledge and Understanding:

Upon successful completion of the Program, graduates should be able to:

1.1 Identify the theories and fundamentals of Microbiology and Immunology and other related fields.
1.2 Recognize the recent and advanced scientific developments in the field of Microbiology and Immunology.
1.3 Detect all basic and new techniques used in the field of Microbiology and Immunology.
1.4 Distinguish the value of ethics and legal issues of research and professional practice in Microbiology and Immunology.
1.5 Identify principles and fundamentals of quality in professional practice in the field of Microbiology and Immunology.
1.6 Illustrate the mutual interaction between the pharmaceutical professional practice and the surrounding environment.

2. Intellectual Skills

Upon successful completion of the Program, graduates should be qualified to:

2.1 Analyze and evaluate information in the field of Microbiology and Immunology.
2.2 Deduce solutions for specialized problems in absence of some information.
2.3 Integrate information to solve professional problems.

2.4 Develop methodological scientific studies on certain research problems.
2.5 Assess risk assessment of professional practice of Microbiology and Immunology.
2.6 Plan for development in the field of Microbiology and Immunology.
2.7 Generate professional decision in response to various professional contexts.

3. Professional and Practical Skills

Upon completion of the program, graduates should be able to

3.1 Master basic and professional skills in Microbiology and Immunology and related fields.
3.2 Assess methods and techniques used in Microbiology and Immunology.
3.3 Write and evaluate professional research reports in Microbiology and Immunology.

4. General and transferable skills:

Upon completion of the program, graduates should be able to:

4.1 Communicate effectively by various methods.
4.2 Utilize effectively information technology in professional practice development.
4.3 Perform self-assessment, continuous learning and identifying personal educational needs.
4.4 Use different resources to acquire knowledge and information.
4.5 Anticipate needs and risks in the research fields.
4.6 Work in a team and lead others in various professional contexts.
4.7 Manage time effectively.
4.8 Interpret and evaluate data available from scientific research.
4.9 Show awareness of ethics and legal issues of research and professional practice in Microbiology and Immunology.

Program: Master in Pharmaceutical Sciences (*Microbiology and Immunology*)

Microbiology and Immunology Dept.

Program Specification

Academic Year: *2021/2022*

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A-Basic Information

1	**Faculty**	**Pharmacy**
2	**Program Title:**	**Master in Pharmaceutical Sciences (Microbiology and Immunology)**
3	**Program Type:**	**Single**
4	**Department (s):**	**Department of Microbiology and Immunology**
5	**Final award:**	**Master degree in Microbiology and Immunology**
6	**Coordinator:**	**Prof. EL-Sayed E Habib**
7	**External Evaluator(s):**	--
8	**Date of Program Specification Approval:**	***Department council: 8/12/2021***

B-Professional Information

1-Program Aims

Upon successful completion of the program, graduates should demonstrate comprehensive knowledge, clear understanding and outstanding skills in pharmaceutical sciences and Microbiology and Immunology and should be capable of:

1.1 Mastering of advanced knowledge, professional research skills, attitudes and values in the field of Microbiology and Immunology and integrating with the relevant subjects in his/her professional practice.

1.2 Applying the basics and methodologies of scientific research and manipulating its various tools in the field of microbiology and immunology.

1.3 Mastering practical research procedures according to the good laboratory practice (GLP) basics in microbiology and immunology labs and performing experiments in accordance with safety guidelines.

1.4 Mastering of all traditional and new techniques used in the field of microbiology and immunology.

1.5 Applying the scientific thinking approaches and problem-based learning in subjects relevant to microbiology and immunology.

1.6 Formulating hypotheses based on current concepts in microbiology and immunology fields.

1.7 Designing and conducting research projects.

1.8	Analyzing and interpreting results and information acquired from primary literature sources.
1.9	Manipulating computer programs, online databases, software and other IT skills to get information and analyzing the obtained research data.
1.10	Acquiring communication skills, research ethics, time management, decision-making, and team-working.

2-Intended Learning Outcomes (ILOs)

A- Knowledge and Understanding:

By the end of this program the graduate should be able to:

A1	Explain the theories and fundamentals of instrumental analysis, statistics and biostatistics, physical chemistry and bioinformatics.
A2	Explain the theories and fundamentals of different fields of microbiology and immunology.
A3	Recognize the current problems, the recent and advanced scientific developments in different fields of microbiology and immunology.
A4	Utilize effectively all basic and recent techniques and technological tools used in the field of microbiology and immunology.
A5	Identify the legal and ethical issues of research and professional practice in microbiology and immunology.
A6	Define the principles and the basics of quality in professional practice in the fields of microbiology and immunology.
A7	Identify appropriate types of data needed to tackle a certain research problem.

B- Intellectual Skills

By the end of this program the graduate should be able to:

B1	Analyze and evaluate the gained information in the field of instrumental analysis, biostatistics, physical chemistry, bioinformatics, microbiology, immunology and bioinformatics.
B2	Demonstrate logic and critical way of thinking to suggest solutions for scientific and professional problems according to accompanying circumstances and causes.
B3	Demonstrate creativity and innovative scientific and professional approaches regarding microbiology and immunology.
B4	Utilize the available professional and scientific resources and research skills to solve problems.
B5	Assess professional and scientific risks in practicing microbiological and immunological techniques.
B6	Plan to improve performance and research in the field of microbiology and immunology.
B7	Interpret and validate the obtained research data.

B8	Recommend professional and scientific decisions based on proofs, evidences and available data.
B9	Participate in comprehensive scientific and professional discussions and communications based on scientific evidences and proofs.

C- Professional and Practical Skills

By the end of this program the graduate should be able to:

C1	Apply different statistical methods for data analysis and validation.
C2	Develop different research methodologies, appropriate experimental procedures and reporting skills in the microbiological and immunological practice.
C3	Manage safely and efficiently advanced technological research tools and equipment relevant to microbiology and immunology research.
C4	Outline and illustrate the calculations of the heat of the reaction, neutralization, combustion ….etc of a chemical reaction.
C5	Carry out scientific research and contribute to the knowledge in the field of microbiology and immunology.
C6	Write accurately, evaluate professional reports and publish scientific research papers in scientific journals and conferences.
C7	Write thesis in a scientific and precise way.
C8	Illustrate the effect of his/her professional practice on the community in addition to different methods of environmental development and maintenance.

D. General and Transferable Skills

By the end of this program the graduate should be able to:

D1	Communicate clearly by verbal and written means.
D2	Manipulate computer programs, online databases, software and other IT to get information and analyze the obtained research data.
D3	Practice self-assessment and self-learning needed for continuous professional development.
D4	Utilize different available information resources relevant to microbiology and immunology.
D5	Promote critical thinking, problem-solving and decision-making capabilities.
D6	Deal with obstacles and problems.
D7	Work effectively in a team and offer experience and advice to others
D8	Develop creativity and time-management capabilities.
D9	Evaluate and criticize scientific work, literature and research data.
D10	Adopt ethical, legal, professional responsibilities and safety guidelines.

D11	Develop presentation skills, give seminars and defend thesis in public.

3-Academic Reference Standards (ARS):

Approved by both the Department and Faculty Councils
Department council Approval Date: ***8/12/2021***,
Faculty council Approval Date:

3a- Academic References Standards: (**Attached)**

3b-Comparison of provision to External References

Achievement of academic reference standards via program Intended Learning Outcomes.

ILOs	ARS	Program
1. **Knowledge and Understanding**	**1.1**	A1, A2
	1.2	A3
	1.3	A4
	1.4	A5
	1.5	A6
	1.6	A6, A7
2. **Intellectual Skills**	**2.1**	B1
	2.2	B2
	2.3	B2, B4, B7
	2.4	B3, B4
	2.5	B5
	2.6	B3, B6
	2.7	B8
3. **Professional and Practical Skills**	**3.1**	C2, C3, C5
	3.2	C1, C2, C3
	3.3	C6, C7, C8
4. **General and Transferable Skills**	**4.1**	D1
	4.2	D2
	4.3	D3
	4.4	D4
	4.5	D5, D6
	4.6	D7
	4.7	D8
	4.8	D9
	4.9	D10

4-Curriculum Structure and Contents

4A. Program duration: 18 months from the date of registration -5 years.

4B. Program structure:

a- The program consists of 46 credit hours of study (16 credit hours of courses and 30 credit hours for thesis).

b. The program includes 16 credit hours of graduate courses. These courses include 8 credit hours of general courses as Faculty requirement, in addition to 8 credit hours of special (6 credit hours) and special elective (2 credit hours) courses. The courses will possess the code [200] according to Faculty By-Law.

c. A scientific research thesis of 30 credit hours represents a main component of the program. It is achieved in a subject assigned by the supervision committee, endorsed by the Department Council, the committee of graduate studies & research and the Faculty Council.

d. The student should publish at least one scientific research article in a scientific journal before the public defense of his/her thesis.

4c. Program Components

1- Courses according to the By-law

Code number	Name of the course	Type	Credit Hours	Semester
GCM-201	**Instrumental Analysis**	***General*** -Compulsory	2	Fall
GCM-202	**Statistics and biostatistics**	***General*** Compulsory	2	Fall
GCM-203	**Physical chemistry**	***General*** Compulsory	1	Fall
GCM-204	**Bioinformatics**	***General*** Compulsory	1	Fall
GCM-205	**Research Methodology & Ethics**	***General*** Compulsory	1	Fall
GCM-206	**Scientific writing and Seminar**	***General*** Compulsory	1	Fall
PMM-201	**Advanced Microbiology**	***Special*** Compulsory	2	Spring
PMM -202	**Medical Immunology**	***Special*** Compulsory	2	Spring
PMM -203	**Antimicrobial Chemotherapy**	***Special*** Compulsory	2	Spring
PMM -204	**Infectious Diseases**	elective	2	Spring
PMM -205	**Industrial Microbiology and Biotechnology**	elective	2	Spring
Total (Courses)			16	
	Thesis		30	
Total			46	

2- Achievement of Program Intended Learning Outcomes by its components

Course	C.H/ week	Program ILOs (by No.)			
		K.U*	IS**	P.P.S***	G.T.S****
First Semester - *General Courses (8 C.H.)*					
Instrumental Analysis (GCM-201)	**2**	A1	B1, B2	C2	D1, D3, D5
Statistics and biostatistics (GCM-202)	**2**	A1	B1, B2, B7	C1	D1, D2, D3, D5
Physical chemistry (GCM-203)	**1**	A1	B1, B2	C4	D1, D3, D5
Bioinformatics (GCM-204)	**1**	A1	B1, B2, B4	C5	D1, D3, D5, D9
Research Methodology & Ethics (GCM-205)	**1**	A5	B5	C2, C8	D1, D3, D5, D10
Scientific writing and Seminar (GCM-206)	**1**	A7	B6, B7, B8, B9	C6, C7	D1, D3, D5, D9, D11
Total	**8**				
Second Semester - *Special Courses (8 C.H.)*					
Advanced Microbiology *(PMM-201)*	**2**	A2, A3	B1, B2, B3,B4, B9	C2	D1, D2, D3, D4, D5
Medical Immunology *(PMM-202)*	**2**	A2	B1, B2, B3, B4, B9	C2, C6	D1, D2, D3, D4, D5
Antimicrobial Chemotherapy *(PMM-203)*	**2**	A2, A4	B1, B6, B7	C2, C6	D1, D2, D4, D5
Infectious Diseases *(PMM-204) (elective)*	**2(E)**	A2, A3, A4	B1, B2, B3, B4, B5, B9	C2, C6	D1, D2, D3, D4, D5
Industrial Microbiology and Biotechnology *(PMM-205) (elective)*	**2(E)**	A2, A3, A4	B1, B2, B3, B4, B9	C2, C6	D1, D2, D3, D4, D5
Total	**8**				
Thesis	**30**	A4, A5, A6, A7	B2, B3, B4, B5, B6, B7, B8, B9	C1, C2, C3, C4, C5, C6, C7, C8	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11
Total	**46**				

* ***K**nowledge and **U**nderstanding*
** ***I**ntellectual **S**kills*
*** ***P**rofessional and **P**ractical **S**kills*
**** ***G**eneral and **T**ransferable **S**kills*

Code	Course title	K.U*							IS**								
		A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	B8	B9
GCM-201	Instrumental Analysis	√							√	√							
GCM-202	Statistics and biostatistics	√							√	√					√		
GCM-203	Physical chemistry	√							√	√							
GCM-204	Bioinformatics	√							√	√		√					
GCM-205	Research Methodology & Ethics					√							√				
GCM-206	Scientific writing and Seminar							√						√	√	√	√
PMM-201	Advanced Microbiology		√	√					√	√	√	√					√
PMM -202	Medical Immunology		√						√	√	√	√					√
PMM -203	Antimicrobial Chemotherapy		√		√				√	√	√	√			√		√
PMM -204	Infectious Diseases (E)		√	√	√				√	√	√	√	√				√
PMM -205	Industrial Microbiology and Biotechnology (E)		√	√	√				√	√	√	√					√
	Thesis				√	√	√	√		√	√	√	√	√	√	√	√

* ***K**nowledge and **U**nderstanding*
** ***I**ntellectual **S**kills*
*** ***P**rofessional and **P**ractical **S**kills*
**** ***G**eneral and **T**ransferable **S**kills*
E ***E**lective course*

Code	Course title	P.P.S***								G.T.S****										
		C1	C2	C3	C4	C5	C6	C7	C8	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
GCM-201	Instrumental Analysis		√							√		√		√						
GCM-202	Statistics and biostatistics	√								√	√	√		√						
GCM-203	Physical chemistry				√					√		√		√						
GCM-204	Bioinformatics					√				√		√		√				√		
GCM-205	Research Methodology & Ethics		√						√	√		√		√					√	
GCM-206	Scientific writing and Seminar						√	√		√		√		√				√		√
PMM-201	Advanced Microbiology		√							√	√	√	√	√						
PMM -202	Medical Immunology		√				√			√	√	√	√	√						
PMM -203	Antimicrobial Chemotherapy		√				√			√	√	√	√	√						
PMM -204	Infectious Diseases (E)		√				√			√	√	√	√	√						
PMM -205	Industrial Microbiology and Biotechnology (E)		√				√			√	√	√	√	√						
	Thesis	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

* ***K**nowledge and **U**nderstanding*
** ***I**ntellectual **S**kills*
*** ***P**rofessional and **P**ractical **S**kills*
**** ***G**eneral and **T**ransferable **S**kills*
E ***E**lective course*

6- Student Assessment Methods

6.1- Written exam (general and special courses).	To assess Knowledge and Understanding and Intellectual Skills
6.2- Oral exam (general and special courses).	To assess Knowledge and Understanding, Intellectual Skills and General and transferable Skills
6.3- Scientific seminar for thesis registration	To assess Knowledge and Understanding, Intellectual Skills and General and transferable Skills
6.4- Published scientific research paper.	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills
6.5- Thesis writing	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills
6.5- Public presentation and discussion of the thesis.	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills

7- Program Admission Requirements

7.1- The candidate should hold a Bachelor Degree in Pharmacy from any Faculty of Pharmacy from Egypt or Arabian countries or foreign Universities recognized by the Supreme Council of Universities with minimum general grade of "**Good**". Candidates having Diploma in the area of specialty are preferred. It is possible to enroll foreign students with general grade of "**Good**".

7.2- The candidate should be available for the study at least two days per week throughout the duration of study.

7.3- The candidate should possess at least grade "**Good**" in the subject of the specialty.

7.4- The Department council starts the registration process for the candidate after his/her successful passing of the general courses of the first semester.

7.5- The candidate should follow postgraduate rules of by-law (**2014**) and its modified by-law **(2017)** of Faculty of Pharmacy-Mansoura University.

8- Regulations for progression and program completion

8.1- The minimum duration of time to gain the master degree is two years from the date of enrollment or 18 months from the date of registration of the master thesis.

8.2- The maximum duration of time to gain the master degree is 5 years from the date of registration, taking into consideration the periods of enrollment/suspension. It is possible to extend this period up to two years (one year at a time) based on a request from the candidate's main supervisor, a suggestion from the department council and the committee of graduate studies &

research and the approval of the Faculty Council. The final decision should be endorsed by the University Council of Graduate Studies & Research.

8.3- The student has to pass the assigned courses, perform a practical scientific research thesis, publish a scintific article for the complete fulfilment of the Master Degree.

8.4- An annual progress report is presented by the supervisors of the thesis to the specified Deptartment Council by December.

8.5- The candidate should follow postgraduate rules of by-law (**2014**) and its modified by-law **(2017)** of Faculty of Pharmacy-Mansoura University.

9- Facilities Required for Search:

9.1- Computers.Library and digital library supplied by recent scientific books and journals.

9.3- Laboratories equipped with the required advanced instruments and chemicals,.

9.4- Access to search engines for scientific periodicals in the field of microbiology and immunology.

10-Thesis

A thesis should be prepared by the student for complete fulfillment of the Master Degree.

11- Evaluation of program

Evaluator	Method	Sample
Internal evaluator	Program evaluation Courses evaluation	Program report Courses report
External evaluator	Program evaluation Courses evaluation	Program report Courses report
Stakeholders	Questionnaires	To be Attached
Postgraduates	Questionnaires	To be Attached
Self-evaluation	Matrices	To be Attached
Supervisors of Thesis	Reports	Reports of staff members of committee to evaluate the thesis

Program Coordinator: Prof. El-sayed El sherbeny Habeb

Head of Department: Prof. El-sayed El sherbeny Habeb

Signature:

Annex : ***Attach courses and thesis specifications.***

Program: Master in Pharmaceutical Sciences (*Microbiology and Immunology*)

Microbiology and Immunology Dept.

Master Thesis Specification

Academic Year: 2021/2022

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A-Basic Information

1	**Faculty**	**Pharmacy**
2	**Program Title:**	**Master in Pharmaceutical Sciences (Microbiology and Immunology)**
3	**Program Type:**	**Single**
4	**Department (s):**	**(Microbiology and Immunology)**
	Total credits of the Thesis	**30 C. H.**
	Total credits of the Program	**46 C.H.**
5	**Final award of the Program:**	**Master Degree of Pharmaceutical Sciences (Microbiology and Immunology)**
6	**Coordinator:**	**Prof. EL-Sayed E Habib**
7	**External Evaluator(s):**	---
8	**Date of Program Specification Approval:**	***Department council: 8/12/2021,***

B-Professional Information

1-Aims

The overall aims of the thesis:

1.1 Applying the basics and methodologies of scientific research and manipulating its various tools in the field of microbiology and immunology.

1.2 Mastering practical research procedures according to the good laboratory practice (GLP) basics in microbiology and immunology labs and performing experiments with safety guidelines.

1.3 Mastering of advanced knowledge, professional research skills, attitudes and values in the field of microbiology and immunology and integrating them with the relevant subjects in his/her professional practice.

1.4 Mastering of all the traditional and new techniques used in the field of microbiology and immunology.

1.5 Applying the scientific thinking approaches and problem-based learning in subjects relevant to microbiology and immunology.

1.6 Formulating hypotheses based on current concepts in microbiology and immunology fields.

1.7 Designing and conducting research projects.

1.8 Analyzing and interpreting results and information acquired from primary literature sources.

1.9 Manipulating computer programs, online databases, software and other IT skills to get information and analyzing the obtained research data.

1.10 Acquiring communication skills, research ethics, time-management, decision-making, and team-working.

2-Intended Learning Outcomes (ILOs)

a- Knowledge and Understanding:

Upon successful completion of the thesis, the graduate should be able to efficiently demonstrate the essential knowledge and understanding of:

A1	All basic and recent techniques and technological tools used in the field of microbiology and immunology.
A2	Legal and ethical issues of research and professional practice in microbiology and immunology.
A3	The principles and the basics of quality in professional practice in the fields of microbiology and immunology.
A4	The appropriate types of data needed to tackle a certain research problem.

b- Intellectual Skills

By the end of this thesis, the graduate should be able to:

B1	Exhibit logical and critical way of thinking to suggest solutions for scientific and professional problems according to accompanying circumstances and causes.
B2	Show creativity and innovative scientific and professional approaches regarding microbiology and immunology.
B3	Use the available professional and scientific resources and research skills to solve problems.
B4	Consider professional and scientific risks in practicing microbiological and immunological techniques.
B5	Enhance the performance and research in the field of microbiology and immunology.
B6	Understand and validate the obtained research data.
B7	Make professional and scientific decisions based on proofs, evidences and available data.
B8	Contribute to the comprehensive scientific discussions and communications based on scientific evidences and proofs.

c- Professional and Practical Skills

By the end of this thesis, the graduate should be able to:

C1	Use variable statistical methods for data analysis and validation.
C2	Design different research methodologies and good experimental skills in the microbiological and immunological practice.
C3	Manage safely and efficiently advanced technological research tools and equipment relevant to microbiology and immunology research.
C4	Perform scientific research and contribute to the knowledge in the field of microbiology and immunology.
C5	Write accurately, evaluate professional reports and publish scientific research papers in scientific journals and conferences.
C6	Write thesis in a scientific and precise way.
C7	Demonstrate the effect of his/her professional practice on the community in addition to different methods of environmental development and maintenance.

d. General and Transferable Skills

By the end of this thesis, the graduate should be able to:

D1	Communicate clearly by verbal and written means.
D2	Use computer programs, online databases, software and other IT to get information and analyze the obtained research data.
D3	Practice self-assessment and self-learning needed for continuous professional development.
D4	Manage different available information resources relevant to microbiology and immunology.
D5	Promote critical thinking, problem-solving and decision-making capabilities.
D6	Deal with obstacles and problems.
D7	Work effectively in a team and offer experience and advice to others.
D8	Develop creativity and time management abilities.
D9	Assess and criticize scientific work, literature and research data.
D10	Adopt ethical, legal, professional responsibilities and safety guidelines.
D11	Develop presentation skills, give seminars and defend thesis in public.

3- Thesis Contents:

Part	Topics
1	Abstract (Arabic and English)
2	Introduction
3	Aims, Objectives and Rational of the work
4	Results and Discussion, covering all fields
5	Methodology and Experimental Work of all fields
6	Conclusion
7	References

4- Matrix of knowledge and skills of the Thesis:

Part	Topics	Thesis ILOs			
		K.U*	**IS****	**P.P.S*****	**G.T.S******
2	Introduction	A1, A2, A3, A4	B1, B3	C5, C6	D1, D3, D4, D9, D11
3	Objectives/Rational	A3, A4	B1, B2, B3	C4, C5, C6	D1, D2, D5, D11
4	Results and Discussion	A1, A2, A3, A4	B1, B2, B3, B7, B8	C4, C5, C6, C7	D1, D2, D5, D9, D11
5	Experimental Work	A1, A2, A3	B4, B5	C1, C2, C3, C5, C6, C7	D1, D2, D3, D4, D6, D7, D8, D10, D11
6	Conclusion	A1, A2, A3, A4	B3, B7	C4, C5, C6, C7	D1, D2, D5, D11

* ***K**nowledge and **U**nderstanding* *****I**ntellectual **S**kills* ******P**rofessional and **P**ractical **S**kills* *******G**eneral and **T**ransferable **S**kills*

5. Student Assessment:

A written Thesis	To assess Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills
Published Research Paper(s)	To assess Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills
Public Defense	To assess Knowledge and Understanding, Intellectual Skills and General and transferable Skills
Committee-in-Charge Report	Assess and evaluate thesis
Dept Council Approval	To approve thesis

Guidelines of the Thesis (according to By-Law).

1- The minimum period for obtaining a Master is two years from the date of enrolment and 18 months from the date of approval of the University's Graduate Studies Council for registration.
2- The maximum limit for obtaining a doctoral degree is five years from the date of registration, taking into account cases of suspension of registration, and registration may be extended upon the request of supervisors and the approval of the relevant department council, the Graduate Studies and Research Committee, and the College Board for an academic year with a maximum of two years.

3- The student must pass the English Language Examination with the minimum score specified by the University Studies Board to approve the Master defense date.

4- The number of credit hours for obtaining a master's degree is 46 hours (16 course hours - 30 credit hours per thesis). The student studies courses of at least 16 credit hours of postgraduate courses from code [200], including compulsory general courses (8 credit hours) as the college requirements and compulsory and optional specialized courses (8 credit hours).
5- The student conducts a research on a topic determined by the supervisory committee and approved by the relevant department council and the college, graduate studies and research councils.
6- The researcher submits, before registering for the academic degree, the research plan in a public discussion in the department to discuss the topic of the thesis, determine the objectives of the research, the extent of its application, potential problems and how to overcome them.

7- The scientific thesis is the responsibility of the relevant department council and is accomplished scientifically and technically under the responsibility of the supervisory committee. Scientific, technical and administrative support must be provided to the researcher for its completion, and the supervision committee is formed as follows:
8- The College Council, upon the proposal of the relevant Department Council, appoints a professor who supervises the thesis (principal supervisor). The council may entrust the supervision of the thesis to one of the assistant professors.
9- It is permissible for the supervisors to be many professors or assistant professors, and teachers may participate with a maximum of one in the same specialty.
10- A member from abroad who has experience in the specialty to which the dissertation belongs may be joined to the supervision committee.

11- The student should meet his main supervisor at least once monthly and a semi-annual report must be provided by the supervisor(s) on the progress of student to the department council and the Graduate Studies Committee and the graduate should be given a copy of the report. The annual report must be submitted to the college council in October each year.

12- A postgraduate student registered to obtain a master's degree or a doctorate degree, after completing the thesis preparation, holds a public discussion session on the thesis summary and the results he reached, during which the supervisors determine the extent to which the student fulfills the research point before submitting the thesis to the department council.
13- The principal supervisor submits an application that includes a proposal to form a discussion committee and judge the thesis after preparing it and preparing it for discussion in preparation for presentation to the Postgraduate Studies and Research Committee and then the College Board for approval and is supported by the following:
14- The report on the validity of the dissertation for discussion, signed by the majority of the members

of the supervisory committee, one of whom is the main supervisor.
15- A copy of the thesis prepared according to the instructions for writing scientific theses in the faculty.
16- At least one research published in a scientific refereed journal.
17- The committee for discussion and judgment on the dissertation is formed of three members based on the proposal of the relevant department council, the graduate studies and research committee, and the approval of the college council, one of whom is the main supervisor or two members with one vote. And two other members from among the professors or assistant professors, at least one of them is from outside the college for master's theses, and at least one of them is from outside the university for doctoral theses (the two are from outside the college) according to the text of Article 153 of the Universities Organization Law.

18- The department council approves the individual reports, the group report, and what indicates that the student has made the proposed amendments from the discussion and judgment committee and submitted them to the Graduate Studies and Research Committee and the College Board in preparation for presentation to the University Council.
19- The date of awarding the academic degree is the date on which the University Council approved the College Board's recommendation for grants.
20- The college council, based on the proposal of the discussion and judgment committee, may return the message to the student to correct the errors and complete what the committee deems short of or submit another message in case the thesis is rejected.

6 – Facilities Required:

Laboratory	Laboratories equipped with enough chemicals and advanced instruments.
Library	Library and digital library supplied by recent scientific books and journals.
Others	Computers. Access to search engines for scientific periodicals in the field of Microbiology and Immunology.

Thesis Coordinator	Head of Department	Date
Prof. El-sayed El sherbeny Habib	Prof. El-sayed El sherbeny Habib	8/12 / 2021

* Date of Dept. Council Approval

Dept. of Microbiology and Immunology	Course Specification	Master in Pharmaceutical Sciences

Master in Pharmaceutical Sciences

Course Specification

Academic year: 2021/2022

البرنامج	توصيف مقرر
ماجستير العلوم الصيدلية	Advanced Microbiology

رئيس القسم	منسق المقرر
أ د. السيد الشربينى حبيب	أ.د. رمضان حسن ابراهيم

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	**Microbiology & Immunology**
Department supervising the course	**Microbiology & Immunology**
Program on which the course is given	Master in Pharmaceutical Sciences
Academic Level	Postgraduate
Academic year	2021/2022 - second semester
Date of course specification approval	8/12/2021

A. Basic Information:Course data :

Course Title	**Advanced Microbiology**
Course Code	**PM-201**
Prerequisite	------
Teaching Hours: Lecture	2عدد الساعات الزمنية
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

-Upgrading the microbiological knowledge of classification, structure, physiology, metabolism, reproduction and identification of microorganisms including bacteria, fungi and viruses.
-Providing advanced knowledge in microbial genetics and their applications in molecular biology.
-Mastering of all traditional and new techniques used in the field of molecular biology.

2- Intended Learning Outcomes (ILOs)

a. *Knowledge and Understanding*

After completion of the course, graduates will be able to

a1	Explain fundamentals and principles of microbiology.
a2	Recognize the recent and advanced scientific development in microbiology.

b. Intellectual Skills

After completion of the course, graduates will be able to

b1	Analyze and evaluate the gained information related to microorganisms and microbial genetics.
b2	Demonstrate logic and critical way of thinking to suggest solutions for scientific and professional problems according to accompanying circumstances and causes.
b3	Demonstrate creativity and innovative scientific and professional approaches regarding microbiology.
b4	Utilize the available professional and scientific resources and research skills to solve problems related to microbial infection.
b5	Participate in comprehensive scientific and professional discussions and communications based on scientific evidences and proofs.

c. Professional and Practical Skills

After completion of the course, graduates will be able to

c1	Develop different research methodologies in molecular biology.

d. General and Transferable Skills

After completion of the course, graduates will be able to

d1	Communicate clearly by verbal and written means.
d2	Manipulate computer program, online database, software and other IT to get information and analyze molecular biology information.
d3	Practice self- assessment and learning needed for continuous professional development.
d4	Utilize different available information resources relevant to microbiology.
d5	Promote critical thinking, problem-solving and decision-making capabilities.

3. Course Contents

Week No.	Topics	Lecture Hours
1	Microscopy including: optical light microscope, fluorescent microscope, Phase contrast microscope, electron microscope and atomic force microscopy.	2
2 3	Classification- Three-domain system. An Overview of prokaryotic cell structure. An Overview of eukaryotic cell structure.	4
4 5	Nutritional types of microorganisms. Culture media and isolation of pure culture. Physiology and metabolism of bacteria Microbial growth curve. Measurement of microbial growth. Continuous culture of microorganisms. Influence of environmental factors on growth. Microbial growth in natural environments.	4
6 7	Structure and cultivation of viruses and fungi	4
8 9	Nucleic acid structure, DNA replication. Genetic code and gene structure. Mutations and their chemical basis. Detection and isolation of mutants. DNA repair	4
10 11	Conventional and pulsed-field gel electrophoresis, Polymerase Chain Reaction (PCR), Micrarray technology, DNA sequencing and Next generation DNA sequencing	4
12	Construction of cDNA, and genomic libraries and cDNA library screening.	2
Total: 12 weeks		**24**

4- Matrix of knowledge and skills of the course(contents versus ILOsof the course)

Topic	Course ILOs			
	K.U*	IS**	P.P.S***	G.T.S****
Microscopy including: optical light microscope, fluorescent microscope, Phase	a1,a2	b2	-	d1, d3, d4,d5

contrast microscope, electron microscope and atomic force microscopy.				
Classification- Three-domain system. An Overview of prokaryotic cell structure. An Overview of eukaryotic cell structure.	a1,a2	b1,b2,b4,b5	-	d1, d3, d4,d5
Nutritional types of microorganisms. Culture media and isolation of pure culture. Physiology and metabolism of bacteria Microbial growth curve. Measurement of microbial growth. Continuous culture of microorganisms. Influence of environmental factors on growth. Microbial growth in natural environments.	a1,a2	b1,b2,b4 ,b5	-	d3, d4,d5
Structure and cultivation of viruses and fungi	a1,a2	b1,b2,b4,b5	-	d1, d3, d4,d5
Nucleic acid structure, DNA replication. Genetic code and gene structure. Mutations and their chemical basis. Detection and isolation of mutants. DNA repair.	a1,a2	b1,b2,b3,b4,b5	c1	d1, d2,d3, d4,d5
Conventional and pulsed-field gel electrophoresis, Polymerase Chain Reaction (PCR), Microarray technology, DNA sequencing and Next generation DNA sequencing	a1,a2	b1,b2,b3,b4,b5	c1	d1, d2,d3, d4,d5
Construction of cDNA, and genomic libraries and CDNA library screening.	a1,a2	b1,b2,b3,b4,b5	c1	d1, d2,d3, d4,d5

** Knowledge and Understanding **Intellectual Skills***Professional and Practical Skills ****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	**Lectures using Data Show and Power point presentation**
5.2	**Lectures using white board**
5.3	**Computers and internet searching**
5.4	**Discussion**

6- Student Assessment:

	Assessment Methods		**Assessment Schedule**	**Weighing of Assessments**
Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess knowledge, understanding, intellectual, professional skills	Week 13	90 %
Assessment 2	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	Week 13	10 %
				100 %

7- List of References

	Reference	**Type**
1.	Prescott, Harley and Klein's Microbiology, seventh edition, copyright 2008, Publisher McGraw-Hill.	Text book
2.	Topley and Wilson's Microbiology and Microbial Infections, 10th edition, copyright 2007, Wiley.	Text book
3.	Principles of Genetics (2002): by Robert H. Tamarin published by McGrawhill, New York.	Text book
4.	Lippincott Illustrated Reviews: Pharmacology Sixth Edition	Text book

5.	Molecular Cloning A laboratory Manual, by Michael R. Green and Joseph Sambrook, 2012, Cold Springer Harbor Laboratory Press.	Recommended book
6.	Bergey's Manual of Determinative Bacteriology, 9th Edition. Edited by John G. Holt, Copyright 1994, Williams & Wilkins, Baltimore ISBN 0-683-00603-7.	Recommended book
7.	http:// www.pubmed.com http://www.sciencedirect.com / http://www.google scholar.com / https://www.ekb.eg	Periodicals, Web Sites,…etc

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet.**
- Video conference programs	**Microsoft teams**

9. Signature

Course Coordinator	Head of Department	Date
Prof Dr. **Ramadan Hassan Ibrahim**	Prof Dr. **El Sayed El Sherbiny Habib**	8/12/2021

Dept. of Microbiology and Immunology	Course Specification	Master in Pharmaceutical Sciences

Master in Pharmaceutical Sciences

Course Specification

Academic year: 2021/2022

البرنامج	توصيف مقرر
ماجستير العلوم الصيدلية	Antimicrobial chemotherapy

رئيس القسم	منسق المقرر
أ د. السيد الشربينى حبيب	أ.د. مني إبراهيم شعبان

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	**Microbiology & Immunology**
Department supervising the course	**Microbiology & Immunology**
Program on which the course is given	Master in Pharmaceutical Sciences
Academic Level	Postgraduate
Academic year	2021/2022 - Second semester
Date of course specification approval	8/12/2021

A.Basic Information: Course data :

Course Title	**Antimicrobial chemotherapy**
Course Code	**PMM-203**
Prerequisite	------
Teaching Hours: Lecture	2 عدد الساعات الزمنية
Practical:	
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

-Upgrading the microbiological knowledge of microbial infection and antimicrobial agents.
-Providing advanced knowledge in treatment of infectious diseases.
-Mastering of all traditional and new techniques used in the assay of antimicrobial agents.

2- Intended Learning Outcomes (ILOs)

a. *Knowledge and Understanding*

After completion of the course, graduates will be able to

A2	a1	Explain fundamentals and principles of antimicrobial agents
A3	a2	Recognize the recent and advanced scientific development in antimicrobial agents.

b. Intellectual Skills

After completion of the course, graduates will be able to

B1	b1	Demonstrate ability of thinking to solve scientific and professional problems accompanying antimicrobial resistance
B6	b2	Participate scientific discussions to solve problems related to microbial infection
B7	b3	Analyze and evaluate the gained information related to chemotherapeutic agents.

c. Professional and Practical Skills

After completion of the course, graduates will be able to

C2	c1	Develop different research methodologies in the assay of antimicrobial agents.
C6	c2	Evaluate scientific data and reports and compare to publish scientific research.

d. General and Transferable Skills

After completion of the course, graduates will be able to

D1	d1	Communicate orally and in written means.
D2	d2	Utilize software and scientific websites get in data collection and analysis
D4	d3	Utilize different available information resources to follow guidelines and updates about antimicrobial therapy
D5	d4	Apply critical thinking for problem-solving and decision-making.

3. Course Contents

Week No.	Topics	Lecture Hours
1	Introduction to antimicrobial agent	2
2	Beta-lactam and cephalosporin	2
2		
3	Monobactams and carbapenam	2
4	Non beta lactam cell wall inhibitors + resistance mechanism	4
5		

6	Antibiotics inhibit protein synthesis	2
7	Antibiotics inhibit DNA synthesis	2
8	Antiviral and antifungal agents	4
9		
10	Testing antibiotic efficiency and antimicrobial combinations	4
11		
Total: 11weeks		**22**

4- Matrix of knowledge and skills of the course (contents versus ILOs of the course)

Week	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1	Introduction to antimicrobial agent	a1,a2	b1,b2, b3	-	d1, d2, d3, d4
2	Betalactam and cephalosporin	a1,a2	b1,b2, b3	-	d1, d2, d3, d4
3	Monobactams and carbapenam	a1,a2	b1,b2, b3	-	d1, d2, d3, d4
4	non beta lactam cell wall inhibitors + resistance mechanism	a2	b1,b2, b3	-	d1, d2, d3, d4
5					
6	Antibiotics inhibit protein synthesis	a1,a2	b1,b2, b3	-	d1, d2, d3, d4
7	Antibiotics inhibit DNA synthesis	a1,a2	b1,b2, b3	-	d1, d2, d3, d4
8	Antiviral and antifungal agents	a1,a2	b1,b2, b3	-	d1, d2, d3, d4
9					

10	Testing antibiotic efficiency and antimicrobial combinations	a1,a2	b1,b2, b3	C1, C2	d1, d2, d3, d4
11					

** Knowledge and Understanding **Intellectual Skills***Professional and Practical Skills ****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	**Lectures using Data Show and Power point presentation**
5.2	**Lectures using white board**
5.3	**Computers and internet searching**
5.4	**Discussion**

6- Student Assessment:

	Assessment Methods		Assessment Schedule	Weighing of Assessments
Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess knowledge, understanding, intellectual, professional skills	Week 13	90 %
Assessment 2	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	Week 13	10 %
				100 %

7- List of References

	Reference	Type
1.	Prescott, Harley and Klein's Microbiology, seventh edition, copyright 2008, Publisher McGraw-Hill.	Text book
2.	Topley and Wilson's Microbiology and Microbial Infections, 10th edition, copyright 2007, Wiley.	Text book
3.	Principles of Genetics (2002): by Robert H. Tamarin published by McGrawhill, New York.	Text book

4.	Lippincott Illustrated Reviews: Pharmacology Sixth Edition	Recommended book
5.	http:// www.pubmed.com	Internet Sites

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet.**
- Video conference programs	**Microsoft teams**

9. Signature

Course Coordinator	Head of Department	Date
Prof Dr. Mona Ibrahim Shaaban	Prof Dr. **El Sayed El Sherbiny Habib**	8/12/2021

Dept. of Microbiology and Immunology	Course Specification	Master in Pharmaceutical Sciences

Master in Pharmaceutical Sciences

Course Specification

Academic year: 2021/2022

البرنامج	توصيف مقرر
ماجستير العلوم الصيدلية	Medical Immunology

رئيس القسم	منسق المقرر
أ د. السيد الشربينى حبيب	أ.د. ايمان سلامه

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	**Microbiology & Immunology**
Department supervising the course	**Microbiology & Immunology**
Program on which the course is given	Master in Pharmaceutical Sciences
Academic Level	Postgraduate
Academic year	2022-2021 – 2nd semester
Date of course specification approval	8/12/2021

A.Basic Information: Course data :

Course Title	**Medical Immunology**
Course Code	PMD-202
Prerequisite	------
Teaching Hours: Lecture	2
Practical:	
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

- Mastering of advanced knowledge, professional research skills, attitudes and values in the field of Immunology and integrating with the relevant subjects in his/her professional practice.
- Developing the ability of the students to understand the different diseases due to immunological disorders and the causes of these immunological disorders.
- Developing new strategies for treatments of these immunological diseases.

2- Intended Learning Outcomes (ILOs)

a. *Knowledge and Understanding*

After completion of the course, graduates will be able to

a1	Explain the theories and fundamentals of different fields of microbiology and immunology.
a2	Describe which cell types and organs are involved in an immune response.

a3	Differentiate between different types of Hypersensitivity.

b. Intellectual Skills

After completion of the course, graduates will be able to

b1	Analyze and evaluate the gained information in the field of immunology.
b2	Demonstrate logic and critical way of thinking to suggest solutions for scientific and professional problems according to accompanying circumstances and causes.
b3	Demonstrate creativity and innovative scientific and professional approaches regarding immunology.
b4	Utilize the available professional and scientific resources and research skills to solve problems.
b5	Participate in comprehensive scientific and professional discussions and communications based on scientific evidence and proof.

c. Professional and Practical Skills

After completion of the course, graduates will be able to

c1	Develop different research methodologies and good experimental and reporting skills in the immunological practice.
c2	Write accurately, evaluate professional reports and publish scientific research papers in scientific journals and conferences.

d. General and Transferable Skills

After completion of the course, graduates will be able to

d1	Communicate clearly by verbal and written means.
d2	Manipulate computer program, online database, software and other IT to get information and analyze the obtained research data.
d3	Practice self- assessment and learning needed for continuous professional development.
d4	Utilize different available information resources relevant to microbiology and immunology.
d5	Promote critical thinking, problem-solving and decision-making capabilities.

3. Course Contents

Week No.	Topics	Lectures hours
1-3	Immune system and its cells	**6**

4-8	Cytokines and complement and their therapeutic applications	**10**
9-12	Immunological disorders and Immunization	**8**
	Total	**24 h**

4- Matrix of knowledge and skills of the course (contents versus ILOs of the course)

Week	Topic	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1-3	Immune system and its cells	a1	b1, b2, b3, b4, b5	c1, c2	d1, d2, d3, d4, d5
4-8	Cytokines and complement and their therapeutic applications	a1	b1, b2, b3, b4, b5	c1, c2	d1, d2, d3, d4, d5
9-12	Immunological disorders and Immunization	a1	b1, b2, b3, b4, b5	c1, c2	d1, d2, d3, d4, d5

** Knowledge and Understanding* ***Intellectual Skills***Professional and Practical Skills*
*****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	**Lectures using Data Show and Power point presentation**
5.3	**Computers and internet searching**
5.4	**Discussion**

6- Student Assessment:

	Assessment Methods		Assessment Schedule	Weighing of Assessments
Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess knowledge, understanding, intellectual, professional skills	Week 13	90 %

Assessment 2	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	Week 13	10 %
				100 %

7- List of References

	Reference	Type
1.	Essential clinical Immunology, John B. Zabriskie. Cambridge University Press 2009, New York, 2009.	Textbook
2.	Cellular and Molecular Immunology 8th Edition by Abul K. Abbas, Andrew H. Lichtman and Shiv Pillai, Elsevier Inc; (2012)	Textbook
3.	Janeway's Immunobiology, 9th edition 2016	Textbook
4.	http:// www.pubmed.com	Web site
5.	http:// www.jimmunol.org	Web site

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet.**
- Video conference programs	**Microsoft teams**

9. Signature

Course Coordinator	Head of Department	Date
Prof Dr. **Eman salama**	Prof Dr. **El Sayed El Sherbiny Habib**	8/12/2021

Dept. of Microbiology and Immunology	Course Specification	Master in Pharmaceutical Sciences

Master in Pharmaceutical Sciences

Course Specification

Academic year: 2021/2022

البرنامج	توصيف مقرر
ماجستير العلوم الصيدلية	**Infectious diseases**

رئيس القسم	منسق المقرر
أ د. السيد الشربينى حبيب	ا. د. رشا فتحى بروه

General

University	**Mansoura**
Faculty	**Pharmacy**
Department offering the course	**Microbiology & Immunology**
Department supervising the course	**Microbiology & Immunology**
Program on which the course is given	**Master in Pharmaceutical Sciences**
Academic Level	**Postgraduate**
Academic year	**2021/2022 – 2nd semester**
Date of course specification approval	**8/12/2021**

A.Basic Information: Course data:

Course Title	**Infectious diseases**
Course Code	**PMD-204**
Prerequisite	**------**
Teaching Hours: Lecture	**2**
Practical:	**-**
Total Credit Hours	**2**

B. Professional Information

1- Overall Aims of Course:

Upon successful completion of the program, graduates should demonstrate comprehensive knowledge, clear understanding and outstanding skills in pharmaceutical sciences related to infectious diseases.

- Mastering advanced knowledge, professional research skills, attitudes and values in the field of Microbiology and Immunology and integrating with the relevant subjects in the professional practice.
- Applying the basics and methodologies of scientific research and manipulating its various tools in the field of Microbiology and Immunology.
- Mastering practical research procedures according to the good laboratory practice (GLP) basics in microbiology and immunology labs and performing experiments with safety guidelines.
- Mastering of all traditional and new techniques used in the field of Microbiology and Immunology.
- Applying the scientific thinking approaches and problem-based learning in subjects relevant to Microbiology and Immunology.
- Formulating hypotheses based on current concepts in Microbiology and Immunology fields.
- Designing and conducting research projects.

- Analyzing and interpreting results and information acquired from primary literature sources.
- Manipulating computer programs, online databases, software and other IT skills to get information and analyze the obtained research data.
- Attaining communication skills, research ethics, time management, decision-making, and teamwork.

2- Intended Learning Outcomes (ILOs)

a. *Knowledge and Understanding*

After completion of the course, graduates will be able to

a1	Explain the theories and fundamentals of different fields of microbiology and immunology.
a2	Recognize the current problems, the recent and advanced scientific development in different fields of microbiology and immunology.
a3	Utilize effectively all basic and recent techniques and technological tools used in the field of microbiology and immunology.

b. Intellectual Skills

After completion of the course, graduates will be able to

b1	Analyze and evaluate the gained information in the field of microbiology, immunology and bioinformatics.
b2	Demonstrate logic and critical way of thinking to suggest solutions for scientific and professional problems according to accompanying circumstances and causes.
b3	Demonstrate creativity and innovative scientific and professional approaches regarding microbiology and immunology.
b4	Utilize the available professional and scientific resources and research skills to solve problems.
b5	Assess professional and scientific risks in practicing microbiological and immunological techniques
b6	Participate in comprehensive scientific and professional discussions and communication based on scientific evidence and proof.

c. Professional and Practical Skills

After completion of the course, graduates will be able to

c1	Develop different research methodologies and good experimental and reporting skills in the microbiological and immunological practice

c2	Write accurately, evaluate professional reports and publish scientific research papers in scientific journals and conferences.

d. General and Transferable Skills

After completion of the course, graduates will be able to

d1	Communicate clearly by verbal and written means.
d2	Manipulate computer programs, online database, software and other IT to get information and analyze the obtained research data.
d3	Practice self- assessment and learning needed for continuous professional development.
d4	Utilize different available information resources relevant to medical microbiology and infectious diseases.
d5	Promote critical thinking, problem-solving and decision-making capabilities.

3. Course Contents

Week No.	Topics	Lecture Hours
1	Pathogenesis of Microbial infections, Microbial mechanisms for escaping host defenses, and Spread of infectious diseases.	**2**
2	Diseases caused by enteric Gram negative rods	**2**
3	Diseases caused by aerobic and anaerobic Gram positive rods	**2**
4	Diseases caused by Gram positive cocci (Staphylococci)	**2**
5	Diseases caused by Gram positive cocci (Streptococci)	**2**
6	Diseases caused by Gram negative cocci (Neisseria) and Spirochetes	**2**
7	Diseases caused by bacteria with special cell wall (Mycoplasma, Mycobacteria) and obligate intracellular bacteria (Chlamydia, Rickettsia, Coxiella)	**2**
8	Diseases caused by Haemophilus group, Brucella, and Bordetella	**2**
9	Viral diseases 1 (DNA viruses)	**2**
10	Viral diseases 2 (RNA viruses)	**2**
11	Fungal Diseases 1	**2**

12	Fungal Diseases 2	**2**
Total: 12 weeks		**24**

4- Matrix of knowledge and skills of the course (contents versus ILOs of the course)

Week	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1	Pathogenesis of Microbial infections, Microbial mechanisms for escaping host defenses, and Spread of infectious diseases.	a1, a3	b6	-	-
2	Diseases caused by enteric Gram negative rods	a1, a3	b1, b2, b3	c1, c2	d4
3	Diseases caused by aerobic and anaerobic Gram positive rods	a1, a3	b1, b2, b3	c1, c2	d4
4	Diseases caused by Gram positive cocci (Staphylococci)	a1, a3	b1, b2, b3	c1, c2	d4
5	Diseases caused by Gram positive cocci (Streptococci)	a1, a3	b1, b2, b3	c1, c2	d4
6	Diseases caused by Gram negative cocci (Neisseria) and Spirochetes	a1, a3	b1, b2, b3, b5	c1, c2	d4
7	Diseases caused by bacteria with special cell wall (Mycoplasma, Mycobacteria) and obligate intracellular bacteria (Chlamydia, Rickettsia, Coxiella)	a1, a3	b1, b2, b3	c1, c2	d4
8	Diseases caused by Haemophilus group, Brucella, and Bordetella	a1, a3	b1, b2, b3	c1, c2	d4
9	Viral diseases 1 (DNA viruses)	a1, a3	b1, b2, b3	c1, c2	d4, d5

10	Viral diseases 2 (RNA viruses)	a1, a3	b1, b2, b3	c1, c2	d4, d5
11	Fungal Diseases 1	a1, a2, a3	b1, b4, b5, b6	c1, c2	d1, d2, d3, d4, d5
12	Fungal Diseases 2	a1, a2, a3	b1, b4, b5, b6	c1, c2	d1, d2, d3, d4, d5

** Knowledge and Understanding* ***Intellectual Skills***Professional and Practical Skills*
*****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	Lectures using Data Show and Powerpoint presentation
5.2	Lectures using MS Teams
5.3	Computers and internet searching
5.4	Discussion

6- Student Assessment:

	Assessment Methods		**Assessment Schedule**	**Weighing of Assessments**
Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess knowledge, understanding, intellectual, professional skills	Week 13	90 %
Assessment 2	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	Week 13	10 %
				100 %

7- List of References

	Reference	**Type**
1.	Jawetz, Melnick and Adelberg's Medical microbiology, 27th edn, Appleton and Lange, 2016.	Textbook
2.	Infectious Diseases. Ferid Murad, Atta-ur-Rahman, and Ka Bian. Bentham Books. 2021	Textbook
3.	Introduction to Clinical Infectious Diseases: A Problem-Based Approach. Joseph Domachowske. Springer International Publishing, 2019	Textbook
4.	Comprehensive Review of Infectious Diseases. Andrej Spec, Gerome V. Escota, and Courtney Chrisler. 2019	

5.	https://www.who.int/ http://www.sciencedirect.com / http://www.google scholar.com / http://www.pubmed.com https://www.ekb.eg	Web site

8- Facilities required for teaching and learning

- Class room	**Data show- Computers, Internet.**
- Video conference programs	**Microsoft teams**

9. Signature

Course Coordinator	Head of Department	Date
Prof. Dr. **Rasha Fathy Barwa**	Prof Dr. **El Sayed El Sherbiny Habib**	8/12/2021

Dept. of Microbiology and Immunology	Course Specification	Master's Program

Master's Program

Course Specification

Academic year: 2021/2022

توصيف مقرر المعلوماتية الحيوية **Bioinformatics**	البرنامج **ماجستير العلوم الصيدلية**
منسق المقرر د. هبه شحته عبدالله سعيد	رئيس القسم أ د. السيد الشربينى حبيب

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Microbiology & Immunology and Biochemistry
Department supervising the course	Microbiology & Immunology
Program on which the course is given	Master's Program
Academic Level	Postgraduate
Academic year	2021/2022 - First semester
Date of course specification approval	10/11/2021

A.Basic Information :Course data :

Course Title	Bioinformatics
Course Code	GCM-204
Prerequisite	------
Teaching Hours: Lecture	1 عدد الساعات الزمنية
Practical:	0 عدد الساعات الزمنية
Total Credit Hours	1

B. Professional Information

1- Overall Aims of Course:

- Develop a multi-disciplinary/inter-disciplinary perspective of bioinformatics that brings together biological, computational and mathematical skills in application to practical problems in a professional setting.
- Engage with the essential facts, major concepts, principles and theories associated with bioinformatics.
- Introduce the advantages and disadvantages of different machine learning techniques in bioinformatics and how the relative merits of different approaches can be evaluated by correct benchmarking techniques.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

a1	Understand fundamental concepts in bioinformatics and its applications to molecular biology, clinical medicine, and pharmacology.
a2	Be familiar with different biological databases (e.g. NCBI database), their structure and key terms.

a3	Explain the difference between Prokaryotic and Eukaryotic genomes (description, structure and gene prediction programs).
a4	Define functional genomics (Approaches of transcriptomic analyses, Serial analysis of gene expression, RNA sequencing and analyses, Microarray).
a5	Know the basics of protein structure and degradation.
a6	Understand the secondary and tertiary structure of proteins and protein misfolding in relation to development of various diseases.

2.2. Intellectual Skills

After completion of the course, graduates will be able to

b1	Implement Bioinformatics tools to solve clinical and pharmaceutical problems.
b2	Design and compute substitution-scoring matrices.
b3	Predict evolutionary relationships of proteins from their sequences.

2.3. Professional and Practical Skills

After completion of the course, graduates will be able to

c1	Utilize different biological databases for retrieving biological data (e.g. DNA and protein sequences).
c2	Perform, validate and assess sequence alignment using different algorithms.
c3	Apply different computational, mathematical and statistical techniques and software to the storage and analysis of biological data.
c4	Select the most appropriate bioinformatics tools for a given analysis.

2.4. General and Transferable Skills

After completion of the course, graduates will be able to

d1	Develop the skills necessary for self-managed and lifelong learning (e.g. working independently, time management, organizational, and knowledge transfer skills).
d2	Use the Web and other resources for gene and protein surveys.
d3	Conduct scholarly activities in a professional and ethical manner.

3. Course Contents

Week No.	Topics	Lecture Hours	Practical / Tutorial hr.
1	Introduction to Bioinformatics.	1	0
2	Introduction to Biological Databases.	1	0
3	Pairwise sequence alignment.	1	0
4	Database similarity searching.	1	0
5	Multiple sequence alignment.	1	0
6	Protein motifs and domains prediction, Protein structure basics.	1	0
7	Protein secondary and tertiary structure prediction.	1	0
8	Structural Genomics (Gene prediction)	1	0
9	Functional genomics (Sequencing and Microarray approaches)	1	0
10	Phylogenetics	1	0
Total:	**10 weeks**	**20**	**20**

4- Matrix of knowledge and skills of the course(contents versus ILOsof the course)

Week	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1	Introduction to Bioinformatics.	A1	B1	C1	D1, D3
2	Introduction to Biological Databases.	A2	B1	C1	D2
3	Pairwise sequence alignment.	A1, A2	B2, B3	C2	D1
4	Database similarity searching.	A2	B2	C2	D1
5	Multiple sequence alignment.	A1	B2, B3	C2	D1
6	Protein motifs and domains prediction, Protein structure basics.	A5	B1, B2, B3	C3	D2
7	Protein secondary and tertiary structure prediction.	A6	B1	C3, C4	D1, D2
8	Structural Genomics (Gene prediction)	A5	B1	C3	D1, D2

9	Functional genomics (Sequencing and Microarray approaches)	A6	B1	C3, C4	D1, D2
10	Phylogenetics	A1, A4	B3	C4	D1, D2

** Knowledge and Understanding* ***Intellectual Skills***Professional and Practical Skills*
*****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	Lectures using Data Show and Power point presentation
5.2	Group Discussion
5.3	Self learning by problems, quizzes, research and reports

6- Student Assessment:

	Assessment Methods		**Assessment Schedule**	**Weighing of Assessments**
Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess understanding, intellectual, professional skills		80 %
Assessment 2	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills		20 %
				100 %

7- List of References

	Reference	**Type**
1.	Essential Bioinformatics. Jin Xiong. Cambridge University Press.	Text book
2.	Introduction to Bioinformatics. Arthur M. Lesk. Oxford University Press.	Text book
3.	Introduction to Bioinformatics: A Theoretical and Practical Approach. Krawetz. Stephen A. Humana Press.	Text book
4.	https://www.ncbi.nlm.nih.gov https://www.ebi.ac.uk https://www.ddbj.nig.ac.jp/index-e.html	Internet Sites

8- Facilities required for teaching and learning

-Class room	Smart lecture rooms provided with Data show, computers for students and internet connection
- Library	Library supplied by recently published scientific books and journals.
- Video conference programs	Microsoft teams, Zoom

9. Signature

Course Coordinator	Head of Department	Date
Dr. **Heba Shehta Abdallah Said**	**Prof Dr.** **El Sayed El Sherbiny Habib**	**10/11/2021**