



Department of Microbiology
PROGRAM SPECIFICATIONS
FOR:

Doctor of Philosophy Degree in
Diagnostic and Molecular
Microbiology

CODE: 1706800

UNIVERSITY: Alexandria

FACULTY: Medical Research Institute

PROGRAM SPECIFICATION

A- BASIC INFORMATION

1- Program Title:	Doctor of Philosophy in Diagnostic and Molecular Microbiology
2- Program Type:	Single (<input checked="" type="checkbox"/>) Double (<input type="checkbox"/>) Multiple (<input type="checkbox"/>)
3- Department(s):	Department of Microbiology
4- Program Coordinator:	Prof. Dr. Dalia Ragab
5- External evaluator(s):	Prof. Khaled Bedewy: Professor of Microbiology, Faculty of Medicine, Alexandria University
6- Last date of program Specification Approval:	5/6/2014

B- PROFESSIONAL INFORMATION

1- Program aims:

By end of the program, the student should:

1. Acquire a methodical understanding of the scientific basis of microbiological concepts. Graduates are equipped with the theoretical knowledge, analytical and practical skills and understanding which will permit them to pursue careers in the medical microbiology in clinical sciences or academic and industrial research
2. Have comprehensive in-depth knowledge on medical bacteriology, virology and its relation to, virulence determinants, pathogenesis, host defense and detailed advanced detection and control methods
3. Gain practical skills in diagnostic microbiological techniques essential for the practice of specialty
4. Recognize advanced molecular laboratory techniques used in isolation, identification of microbial pathogens.

Department of Microbiology

5. Gain better skills and experiences in advanced molecular laboratory techniques used in diagnostic medical microbiology.
6. Analyze data Critically and modern technical approaches, current research on microbe/host interactions, infection of significant importance to public health, and chronic infectious disease leading to scientific excellence.
7. Communicate information clearly both verbally and in writing.
8. Develop skills in information technology, time management, scientific research, and team working.
9. Use systematic approaches to design and conduct scientific research.
10. Conduct research studies that add to the existing specialty knowledge.

2- INTENDED LEARNING OUTCOMES OF THE COURSE (ILOs)

a) Knowledge and Understanding:

- a1. Describe concepts and the latest knowledge of medical bacteriology, relevant to culture techniques, biochemical tests and the susceptibility and response of the host to pathogens
- a2. Recall basic and advanced methods available for the diagnosis and characterization of viral infections, serological and molecular methods.
- a3. Explain how application of principles of molecular biology has advanced our knowledge of pathogen's detection, virulence, replication, gene expression, and effects of pathogen infection on host cell.
- a4. Describe the principles and quality standards of the lab techniques used in diagnostic microbiology.
- a5. Describe how to use modern molecular-based techniques to recall the characteristic genetic features of pathogen species that cause infections.
- a6. Discuss current hot topics and important concepts in the field of microbiology as emerging antibiotic resistance, host and viral genes responsible for response to therapy.
- a7. Design, conduct and explore publishing of scientific research.

b) Intellectual Skills:

- b1. Examine the causal relationship of bacterial diseases, symptoms and application of microbiological techniques in the diagnosis of infectious diseases.
- b2. Distinguish the most important signs and symptoms and laboratory findings of important viral infections to reach a proper diagnosis
- b3. Appraise the different methods used in detecting microorganisms and manage emerging health problems as antibiotic resistance and offer alternative detection tools

Department of Microbiology

- b4. Analyze the use of different techniques used in diagnosis of different pathogens and offer alternative tools for detection
- b5. Contrast different nucleic acid amplification and modern molecular diagnostic techniques for diagnosis and detection of public health problems with correct reporting
- b6. Analyze emerging health problems in the field of microbiology and ways conducted to combat them.
- b7. Prepare scientific articles to be published in indexed journals.

c) Professional and Practical Skills:

- c1. Practice isolate and identify pathogens by biochemical , serological diagnosis methods(ELISA, Fluorescent microscope)with ability to interpret test results
- c2. Apply nucleic acid (RNA/DNA) purification , PCR amplification
- c3. Practice Molecular detection of viral and bacterial pathogens using molecular techniques as PCR, sequencing to illustrate antibiotic resistance, virulence genes and gene expression in addition to skills in Gene cloning
- c4. Apply amplification product detection by gel electrophoresis and quantitation methods as Real time PCR. Moreover, the student will practice the principal steps of cloning including: Plasmid preparation, Restriction endonuclease, Competent cells preparation and ligation and transformation and finally he will be able to assess the DNA sequencing data
- c5. Interpret reports of culture/ sensitivity and PCR reports
- c6. Use technology to advance practice

d) General and Transferable Skills:

- d1. Communicate through group discussion. Manage scientific meeting and appropriately utilize time
- d2. Work as a part of team
- d3. Develop skills in information technology
- d4. Develop skills for oral presentation
- d5. Develop skills in reading and research
- d6. Develop skills to work safely in a laboratory environment
- d7. Develop skills in self-appraisal and seek continuous learning

Department of Microbiology

3- ACADEMIC STANDARDS

3a External references for standards (Benchmarks)

Generic Academic Reference Standards of the National Authority for Quality Assurance and Accreditation of Education (NAQAAE) adopted at MRI council 12/2/2014 and re-adopted at 15/1/2023.

Last date of Academic Reference standards (ARS) approval by Institute Council: 15/1/2023.

3b Comparison of provision to selected external references

Generic Academic Standards	ARS of PhD degree in Diagnostic and Molecular Microbiology
A1. Basic facts, theories, of the specialty and related subjects/ fields	<p>a1- Describe an awareness of concepts and the latest knowledge of medical bacteriology, relevant to culture techniques, biochemical tests and the susceptibility and response of the host to pathogens</p> <p>a2 - Identify basic and advanced methods available for the diagnosis and characterization of viral infections, serological and molecular methods</p>
A2- Mutual relation between professional practice and effects on environment	<p>a1- Describe an awareness of concepts and the latest knowledge of medical bacteriology, relevant to culture techniques, biochemical tests, response of the host to pathogens, and the diverse treatment, prophylaxis and control measures .</p> <p>a2 - Identify basic and advanced methods available for the diagnosis and characterization of viral infections, serological and molecular methods and treatment, prophylaxis and control measures</p>
A3- Recent advances in the field of practice.	a6. Describe current hot topics and important concepts in the field of microbiology.
A4-Details of ethical & legal practice. A5 -Quality standards of the practice.	a4- Describe the principles and quality standards of the lab techniques used in diagnostic microbiology and details of ethical & legal practice and quality standards of the practice
A6- Design, conduction & publishing of scientific research.	a6- Discuss current hot topics and important concepts in the field of microbiology as emerging antibiotic resistance, host and viral genes responsible for response to therapy.

Department of Microbiology

A7- Ethical considerations in different types of scientific research.	a7-Recognize design, conduct& explore publishing of scientific research through student assignments and thesis.
B1- Analyze, deduce, extrapolate & evaluation of information	b1- Demonstrate an understanding of, the causal relationship of bacterial diseases, symptoms and application of microbiological techniques in the diagnosis of infectious diseases. b2- Interpret the most important signs and symptoms and laboratory findings of important viral infections to reach a proper diagnosis
B2- Solve the majority of problems in the specialty according to the available data (complete or incomplete)	b3- Evaluate the different methods used in detecting microorganisms and manage emerging health problems as antibiotic resistance B4- Analyze the use of different techniques used in diagnosis of different pathogens and offer alternative tools for detection.
B3- Conduct research studies that add to the existing specialty knowledge	b7- Prepare scientific articles to be published in indexed journals.
B4- Publish scientific articles/papers (in indexed journals)	b7- Prepare scientific articles to be published in indexed journals.
B5- Plan and implement (or supervise implementation of) enhancement & Improvement approaches to practice	B4- Analyze the use of different techniques used in diagnosis of different pathogens and offer alternative tools for detection.
B6- Take decisions in various professional situations (including dilemmas & controversial issues)	b6- Illustrate emerging health problems in the field of microbiology and ways conducted to combat them
B7- Add to the specialty field through	c6-Use technology to advance practice
B8- Manage discussions on basis of evidence and proofs	b4- Analyze the use of different techniques used in diagnosis of different pathogens and offer alternative tools for detection b5- Manage different nucleic acid amplification and modern molecular diagnostic techniques for diagnosis and detection of public health problems with correct reporting
C1- Competent in all basic and all required advanced professional skills (to be determined according to the	c1- Acquire skills to isolate and identify pathogens by biochemical , serological diagnosis methods(ELISA, Fluorescent microscope)with ability to interpret test results

Department of Microbiology

specialty board/ department)	<p>c2 - Gain skills in nucleic acid (RNA/DNA) purification , PCR amplification</p> <p>c3- Gain skills in Molecular detection of viral and bacterial pathogens using molecular techniques as PCR, sequencing to illustrate antibiotic resistance, virulence genes and gene expression in addition to skills in Gene cloning</p> <p>C4-Gain skills in amplification product detection by gel electrophoresis and quantitation methods as Real time PCR. Moreover, the student will practice the principal steps of cloning including: Plasmid preparation, Restriction endonuclease, Competent cells preparation and ligation and transformation and finally he will be able to assess the DNA sequencing data</p>
C2- Write and appraise reports	C5- Write and appraise reports of culture and sensitivity and PCR.
C3- Evaluate and improve methods and tools used in specialty	b6- Analyze emerging health problems in the field of microbiology and ways conducted to combat them.
C4- Use technology to advance practice	C6-Use technology to advance practice
C5- Plan professional development courses to improve practice and enhance performance of juniors	C6-Use technology to advance practice
D1- Communicate effectively using all Methods	<p>d1. Communicate through group discussion. Manage scientific meeting and appropriately utilize time</p> <p>d2. Work as a part of team</p>
D2- Use information technology to improve his/her professional practice	<p>d3. Develop skills in information technology</p> <p>d4. Develop skills for oral presentation</p>
D3- Teach and evaluate others	<p>d4. Develop skills for oral presentation</p> <p>d5. Develop skills in reading and research</p>
D4- Perform self-appraisal & seek continuous Learning	d7.Develop skills in self-appraisal and seek continuous learning
D5- Use different sources of information to obtain data	<p>d3. Develop skills in information technology</p> <p>b5. Apply and manage their own learning, including time management skills and the ability to learn effectively from a range of resources, including lectures, textbooks, websites and the scientific literature.</p>
D6- Work in teams as well as a member in larger teams	<p>d1. Communicate through group discussion. Manage scientific meeting and appropriately utilize time</p> <p>d2. Work as a part of team</p>

Department of Microbiology

	d6. Develop skills to work safely in a laboratory environment
D7- Manage scientific meetings and appropriately utilize time	d4- Develop skills in communication using all methods. Manage scientific meeting and appropriately utilize time.

4- CURRICULUM STRUCTURE AND CONTENT:

4.a. Program duration: 4-5 Years

4.b. Program Structure:

4.b.i. Number of hours per week in each year/semester

Semester	Core Courses	Elective Courses
	No. of hours	No. of hours
First semester: Advanced Bacteriology , Microbiology Laboratory Techniques II	4,2=6CH	
Second semester: Advanced Medical Virology, Special Topics In microbiology II	4,3=7CH	
Third semester: Molecular Diagnostic microbiology II, Molecular Laboratory Techniques II	4,3=7CH	
Fourth semester: Clinical Epidemiology II, Advanced Mycology		2,2=4CH

4.b.ii. Number of Credit hours:

Lectures	(15)	Practical	(9)		
Compulsory	(20)	Elective	(4)	Optional	(0)
Thesis	(24)	Total	(48)		

4.b.iii- No. of credit hours of specialized courses No. (20) % (83.3)

4.b.iv- No. of credit hours of other No. (4) % (16.3)

4.b.v- Field Training No. (0) % (0)

Department of Microbiology

4.b.vi- Program levels (in credit-hours system)

Student is required to pass at least 12 credit hours with CGPA not less than C+ before submitting a thesis proposal.

5-PROGRAM COURSES

5.1 Compulsory courses

Code No	Course Title	No of Credit Hours	No of hours/week	
			Lectures	Practical
1706801	Advanced Medical Bacteriology	4	4	-
1706802	Advanced Medical Virology	4	4	-
1706803	Molecular Diagnostic Microbiology II	4	3	2
1706804	Microbiology Laboratory Techniques II	2	0	4
1706805	Molecular Laboratory Techniques II	3	1	4
1706806	Special Topics in microbiology II	3	3	0
Total		20	15	10

5.2 Elective Courses I

Code No	Course Title	No of Credit Hours	No of hours/week	
			Lectures	Practical
1706807	Advanced Mycology	3	2	2
1700880	Clinical Epidemiology II	2	2	-
1701820	Biochemistry	3	2	2
1704820	Pharmacology	3	2	2
1707820	Parasitology	3	2	2
1708820	Immunology	3	2	2
1710820	Pathology	3	2	2
1709840	Advanced Laboratory Animal Science	2	1	2
1717820	Chemical Pathology	3	2	2

Department of Microbiology

5.3 Elective Courses II

(None)

5.4. Optional:

(None)

6- PROGRAM ADMISSION REQUIREMENTS

Postgraduate Students With a M.Sc. or an equivalent degree in Diagnostic Molecular Microbiology, Medical Microbiology and Immunology, or Pharmaceutical Microbiology.

7- TEACHING AND LEARNING METHODS

- Lecture
- Seminars/ Tutorials
- Practical/Clinical
- Brainstorming
- Discussion Groups
- Problem Solving
- Assignment
- Training Workshops
- Self-Directed Learning

8- REGULATIONS FOR PROGRESSION AND PROGRAM COMPLETION

For the progression and completion of the program to obtain the degree of Doctor of Philosophy in Diagnostic and Molecular Microbiology, the student must

- 1- Complete 24CH through courses with CGPA of at least C+
 - 2- Complete 24CH thesis credit hours
- 2- Submit a thesis validity report by an examination committee approved by the department council and their members include at least two external examiners.

8- EVALUATION OF STUDENTS ENROLLED IN THE PROGRAM

Tool evaluation	Intended learning outcomes being assessed
Written	ILOs a &b
Practical	ILOs c

Department of Microbiology

Oral	ILOs a ,b &d
Semester Work	ILOs b & d

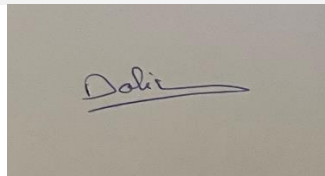
Evaluation of the Program

Evaluator	Tool	Sample
1- Senior students	Questionnaire	At least 50 %
2- Alumni	Questionnaire	Representative sample
3- Stakeholders (Employers)	Meeting	Representative sample
4- External Evaluator(S) or External Examiner (s)	Reports	Prof. Khaled Bedewy:
5- Other		

Program Coordinator: Prof. Dr. Dalia Ragab

Head of Department: Prof. Dr. Dalia Ragab

Signature.



Date of Department Council Approval 30/ 08 / 2023

*Program Aims vs ILOs matrix

	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7
1	x	x	x	x	x	x	x	x					x	x	x	x	x	x	x	x	x	x	X		
2		x	x					x	x								x		X		x	x	X		x
3				x					x				x				x	X		X			X	x	
4			x		x					x							x		x			x	x		x
5					x						x			x	x	x	x	x		x			x	x	
6		x				x						x							x		X	X	x		x
7	x	x	x	x	x	x																X			x
8	x	x	x	x	x	x															x				x
9					x	x					x	x						x			x	x	x	x	x
10					x	x					x	x						x			x	x	x	x	x

* Courses vs Program ILOs matrix

	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7
Advanced Medical Bacteriology	x							x													X		X	x	X		X
Advanced Medical Virology		x							x												X		X	x	X		X
Molecular Diagnostic Microbiology II		x										x									x		x	x	X		x
Microbiology Laboratory Techniques II	x			x						x					x				X		x	x	x		X	X	
Molecular Laboratory Techniques II			x		x						x	X				x	x	x	x	x		x	x		X	x	
Special Topics in microbiology II						x							x								x		x	x	x		x
Thesis							X							X													

*Program ARS vs ILOs matrix (PhD degree in Diagnostic and Molecular Microbiology)

ILO ARS	a1	a2	a3	a4	a5	a6	a7	b1	b2	b3	b4	b5	b6	b7	c1	c2	c3	c4	c5	c6	d1	d2	d3	d4	d5	d6	d7
A1	X																										
A2		X																									
A3			X																								
A4				X																							
A5					X																						
A6						X																					
A7							X																				
B1								X																			
B2									X																		
B3										X																	
B4											X																
B5												X															
B6													X														
B7														X													
C1															X												
C2																X											
C3																	X										
C4																		X									
C5																			X								
C6																				X							
D1																					X						
D2																						X					
D3																							X				
D4																								X			
D5																									X		
D6																										X	
D7																											X

Department of Microbiology

Teaching and Learning Methods Vs Courses Matrix

	Advanced Medical Bacteriology 1706801	Advanced Medical Virology 1706802	Molecular Diagnostic Microbiology II 1706803	Microbiology Laboratory Techniques II 1706804	Molecular Laboratory Techniques II 1706805	Special Topics in microbiology II 1706806	Advanced Mycology 1706807
Lecture	*	*	*		*	*	*
Seminars/ Tutorials	*	*	*		*	*	*
Practical/Clinical			*	*	*		*
Brainstorming	*						
Discussion Groups	*	*	*	*		*	*
Problem Solving			*	*	*	*	
Assignment		*	*	*	*		*
Case Study							
Training Workshops					*		
Self-Directed Learning	*						
e-learning							
Project							

****Generic Attributes * Program Attributes * Program Aims Matrix***

Generic Graduate Attributes of NAQAAE	Graduate Attributes	Program Aims
	By the end of this program, Graduate should be able to	
Master the basics and methodologies of scientific research.	Master the scientific basis of microbiological concepts.	Acquire a methodical understanding of the scientific basis of microbiological concepts. Graduates are equipped with the theoretical knowledge, analytical and practical skills and understanding which will permit them to pursue careers in the medical microbiology in clinical sciences or academic and industrial research.
Work continuously to add to his/her knowledge in the field of specialty.	Work continuously to add to his/her knowledge in the field of medical bacteriology, virology and its relation to, virulence determinants, pathogenesis, host defense and detailed advanced detection and control methods.	Have comprehensive in-depth knowledge on medical bacteriology, virology and its relation to, virulence determinants, pathogenesis, host defense and detailed advanced detection and control methods
Apply the analytical and critical approach to knowledge in the field of specialty and related fields.	Analyze data Critically and modern technical approaches, current research on microbe/host interactions, infection of significant importance to public health, and chronic infectious disease leading to scientific excellence.	Analyze data Critically and modern technical approaches, current research on microbe/host interactions, infection of significant importance to public health, and chronic infectious disease leading to scientific excellence.
Integrate knowledge in the field of specialty with related knowledge, deduce and develop relationships between them.	Use systematic approaches to design and conduct scientific research.	Use systematic approaches to design and conduct scientific research.
Demonstrate a deep awareness of current problems and modern theories in the field of specialty.	Recognize advanced molecular laboratory techniques used in isolation, identification of microbial pathogens	Recognize advanced molecular laboratory techniques used in isolation, identification of microbial pathogens
Identify professional problems and find innovative solutions to solve them.	Use systematic approaches to design and conduct scientific research.	Use systematic approaches to design and conduct scientific research.

Department of Microbiology

Master a wide range of professional skills in the field of specialty.	Master practical skills in diagnostic microbiological techniques essential for the practice of specialty	Gain practical skills in diagnostic microbiological techniques essential for the practice of specialty
Develop new methods, tools and methods for professional practice.	Recognize advanced molecular laboratory techniques used in isolation, identification of microbial pathogens	Recognize advanced molecular laboratory techniques used in isolation, identification of microbial pathogens
Use appropriate technological means to serve his professional practice.	Recognize advanced molecular laboratory techniques used in isolation, identification of microbial pathogens	Recognize advanced molecular laboratory techniques used in isolation, identification of microbial pathogens
Communicate efficiently and lead work teams in various professional scenarios.	Develop skills in information technology, time management, scientific research, and team working.	Develop skills in information technology, time management, scientific research, and team working.
Take Decision in light of available data.	Use systematic approaches to design and conduct scientific research.	Use systematic approaches to design and conduct scientific research.
Employ and develop available resources efficiently and work to find new resources.	Use systematic approaches to design and conduct scientific research.	Use systematic approaches to design and conduct scientific research.
Show awareness of his/her role in community development and environmental preservation	Conduct research studies that add to the existing specialty knowledge.	Conduct research studies that add to the existing specialty knowledge.
Act in a manner that reflects a commitment to integrity, credibility, and professionalism.	Develop skills in information technology, time management, scientific research, and team working.	Develop skills in information technology, time management, scientific research, and team working.
Commit to continuous self-development and transfer his/her knowledge and experiences to others.	Communicate information clearly both verbally and in writing.	Communicate information clearly both verbally and in writing.