

**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:	Ass. 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:	8/1/2017

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. Have a comprehensive knowledge on advanced molecular laboratory techniques used in isolation, identification of microbial pathogens.
5. Gain better skills and experiences in advanced molecular laboratory techniques used in diagnostic medical microbiology.



6. Critical analysis of data 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.

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.

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
- 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.



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



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)

Date of Academic Reference standards (ARS) approval by Institute Council:

12/2/2014

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	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 a2 - Identify basic and advanced methods available for the diagnosis and characterization of viral infections, serological and molecular methods
A2- Mutual relation between professional practice and effects on environment	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 . 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
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.	Recognize design, conduction & publishing of scientific research through student assignments and thesis.
A7- Ethical considerations in different types of scientific research.	summarize ethical consideration in different types of scientific research through 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



	<p>diagnosis of infectious diseases.</p> <p>b2- Interpret the most important signs and symptoms and laboratory findings of important viral infections to reach a proper diagnosis</p>
<p>B2- Solve the majority of problems in the specialty according to the available data (complete or incomplete)</p>	<p>b3- Evaluate the different methods used in detecting microorganisms and manage emerging health problems as antibiotic resistance</p> <p>B4- Analyze the use of different techniques used in diagnosis of different pathogens and offer alternative tools for detection.</p>
<p>B3- Conduct research studies that add to the existing specialty knowledge</p>	<p>Conduct research studies that add to the existing specialty knowledge through thesis.</p>
<p>B4- Publish scientific articles/papers (in indexed journals)</p>	<p>Publish scientific articles/papers (in indexed journals) through thesis.</p>
<p>B5- Plan and implement (or supervise implementation of) enhancement & Improvement approaches to practice</p>	<p>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>
<p>B6- Take decisions in various professional situations (including dilemmas & controversial issues)</p>	<p>b6- Illustrate emerging health problems in the field of microbiology and ways conducted to combat them</p>
<p>B7- Add to the specialty field through</p>	<p>Add to the specialty field through creativity and innovation through thesis</p>
<p>B8- Manage discussions on basis of evidence and proofs</p>	<p>b4- Analyze the use of different techniques used in diagnosis of different pathogens and offer alternative tools for detection</p> <p>b5- Manage different nucleic acid amplification and modern molecular diagnostic techniques for diagnosis and detection of public health problems with correct reporting</p>
<p>C1- Competent in all basic and all required advanced professional skills (to be determined according to the specialty board/ department)</p>	<p>c1- Acquire skills to isolate and identify pathogens by biochemical , serological diagnosis methods(ELISA, Fluorescent microscope)with ability to interpret test results</p> <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</p>



	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
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	Evaluate and improve methods and tools used in specialty through student questionnaire.
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	Plan professional development courses to improve practice and enhance performance of juniors through student questionnaire
D1- Communicate effectively using all Methods	d1. Communicate through group discussion. Manage scientific meeting and appropriately utilize time d2. Work as a part of team
D2- Use information technology to improve his/her professional practice	d3. Develop skills in information technology d4. Develop skills for oral presentation
D3- Teach and evaluate others	d4. Develop skills for oral presentation d5. Develop skills in reading and research
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	d3. Develop skills in information technology 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.
D6- Work in teams as well as a member in larger teams	d1. Communicate through group discussion. Manage scientific meeting and appropriately utilize time d2. Work as a part of team
D7- Manage scientific meetings and appropriately utilize time	d4- Develop skills in communication using all methods. Manage scientific meeting and appropriately utilize time.



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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)	Total	(24)
Compulsory	(20)	Elective	(4)	Optional	(0)

4.b.iii- No. of credit hours of basic science courses No. (4) % (16.7)

4.b.iv- No. of credit hours of courses of social sciences and humanities. No. (0) % (0)

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

4.b.vi- No. of credit hours of other courses (e.g.) statistics, computer) No. (0) % (0)

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



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4.b.viii- 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	1
1706804	Microbiology Laboratory Techniques II	2	0	2
1706805	Molecular Laboratory Techniques II	3	1	2
1706806	Special Topics in microbiology II	3	3	0

5.2 Elective Courses I

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



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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- 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 48 (24 CH and 24 hrs thesis) credit hours with CGPA of at least C+

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

Evaluation of the Program

Evaluator	Tool	Sample
1- Senior students	Interview	At least 50 %
2- Alumni	Interview	Representative sample
3- Stakeholders (Employers)	Interview	Representative sample
4- External Evaluator(S) or External Examiner (s)	Reports	Name of evaluator or examiner



5- Other		
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Dates of Previous editions/revisions:

Editions/Revisions Number	Date
Edition no.1	2009
Edition no. 2	2011
Edition no.3	5/6/2014
Edition no.3, revision no.1	12/2014
Edition no.3, revision no.2	10/2016
Edition no.3, revision no.3	9/2017

Program Coordinator: Ass. Prof. Dr. Dalia Ragab

Head of Department: Prof. Dr. Abeer Ghazal

Signature

Date of Department Council Approval 6/09/2017



*Program Aims vs ILOs matrix

	A 1	A 2	A 3	A 4	A 5	A 6	B 1	B 2	B 3	B 4	B 5	B 6	C 1	C 2	C 3	C 4	C 5	C 6	D 1	D 2	D 3	D 4	D 5	D 6	D 7
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	x	x	x	x	x	x	x	x					x	x	x	x	x	x	x	x	x	x	X		
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		x	x					x	x								x		X		x	x	X		x



Department Of: Microbiology

Medical Research Institute

3- Gain practical skills in diagnostic microbiological techniques essential for the practice of specialty				x						x						x	X		X			X	x			
4- Have a comprehensive knowledge on advanced molecular laboratory techniques used in isolation, identification of microbial pathogens.			x		x					x						x		x			x	x			x	
5-Gain better skills and experiences in advanced molecular laboratory techniques used in diagnostic medical microbiology.					x					x			x	x	x	x	x		x			x	x			
6-Critical analysis of data 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.		x				x					x							x		X	X	x			x	
7-Communicate information clearly both verbally and in writing	x	x	x	x	x	x																	X			x



* Courses vs Program 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
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	



Department Of: Microbiology

Medical Research Institute

Special Topics in microbiology II						X												X		X	X	X		X
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***Program ARS vs ILOs matrix (PhD degree in Diagnostic and Molecular Microbiology)**

	A 1	A 2	A 3	A 4	A 5	A 6	B 1	B 2	B 3	B 4	B 5	B 6	C 1	C 2	C 3	C 4	C 5	C 6	D 1	D 2	D 3	D 4	D 5	D 6	D 7	
<p>A1. Basic facts, theories, of the specialty and related subjects/ fields</p> <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>	x																									
<p>A2- Mutual relation between professional practice and effects on environment</p> <p>a1- Describe an awareness of concepts and the latest knowledge of medical</p>	x																									



Department Of: Microbiology

Medical Research Institute

<p>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>	x																							
<p>A3- Recent advances in the field of practice.</p> <p>a6. Describe current hot topics and important concepts in the field of microbiology.</p>				x																				
<p>A4-Details of ethical & legal practice.</p> <p>A5 -Quality standards of the practice.</p> <p>a4- Describe the principles and quality standards of the lab techniques used in diagnostic</p>			x																					



microbiology and details of ethical & legal practice and quality standards of the practice																								
A6- Design, conduction & publishing of scientific research. Recognize design, conduction & publishing of scientific research through student assignments and thesis.																								
A7- Ethical considerations in different types of scientific research. summarize ethical consideration in different types of scientific research through 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							x																	



Conduct research studies that add to the existing specialty knowledge through thesis.																				
B4- Publish scientific articles/papers (in indexed journals) Publish scientific articles/papers (in indexed journals) through thesis																				
B5- Plan and implement (or supervise implementation of) enhancement & Improvement approaches to practice 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																				
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											x														
B7- Add to the specialty field through Add to the specialty field through creativity and innovation through thesis																									
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										x															



<p>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>																							
<p>C2- Write and appraise reports</p> <p>C5- Write and appraise reports of culture and sensitivity and PCR.</p>																x							
<p>C3- Evaluate and improve methods and tools used in</p>																							



<p>specialty</p> <p>Evaluate and improve methods and tools used in specialty through student questionnaire</p>																							
<p>C4- Use technology to advance practice</p> <p>C6- Use technology to advance practice</p>																							
<p>C5- Plan professional development courses to improve practice and enhance performance of juniors</p> <p>Plan professional development courses to improve practice and enhance performance of juniors through student questionnaire</p>																							
<p>D1- Communicate effectively using all Methods</p> <p>d1. Communicate through group discussion. Manage scientific meeting and</p>																							



appropriately utilize time d2. Work as a part of team																			X						
D2- Use information technology to improve his/her professional practice d3. Develop skills in information technology d4. Develop skills for oral presentation																				X					
D3- Teach and evaluate others d4. Develop skills for oral presentation d5. Develop skills in reading and research																					X				
D4- Perform self-appraisal & seek continuous Learning d7. Develop skills in self-appraisal and seek continuous learning																									X
D5- Use different sources of information to obtain data d3. Develop skills in																									



information technology																		X															
d5. 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.																															X		
D6- Work in teams as well as a member in larger teams																																	
d1. Communicate through group discussion. Manage scientific meeting and appropriately utilize time																			X														
d2. Work as a part of team																				X													
D7- Manage scientific meetings and appropriately utilize time																																	
d4- Develop skills in communication using all methods. Manage scientific meeting and appropriately utilize time.																																	X





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							
Field Training							
Role playing							
Training Workshops					*		
Self-Directed Learning	*						
e-learning							
Project							