Microbial Biotechnology

Doctorate

Program Specification

(2015/2016)

Doctorate Program Specification

(2015/2016)

A. Basic Information

1- Program title: Microbial Biotechnology

2- **Program type:** **Single** √ Double Multiple

3- Program coordinator: Dr/ Mahmoud abdel-Mongy

4- Head of department: Prof. Dr. Atef Mohamed Ibrahim

5- **Department: Microbial Biotechnology**

6- Program Approval Date: 19/9/2015

B. Professional Information:

1- Program aims:

Preparation of Doctorate Graduate Able to:

1.1. Apply the most recent techniques in the field of microbial biotechnology.

1.2. Develop the student knowledge and skills to solve the theoretical and practical problems in the filed of microbial biotechnology .

1.3. Help students to acquire the skills of writing and publishing research papers in microbial biotechnology journals and scientific conferences.

1.4. Develop the student research team-work skills and setting research rules in the field of microbial biotechnology.

1.5. Enhance the students understanding of research system (input – process-output) and be able to develop and manage new vision toward supervising scientific research projects in the field of microbial biotechnology.

2- Intended learning outcomes (ILOs):

***By the end of this program, the graduate must able to*:**

2/1 Knowledge and understanding:

a. Understand in depth the basic facts & theories of molecular bacteriology, yeast molecular biology, methods in general and molecular bacteriology and applied microbial genetics-II.

b. Explain the mutual links between professional practice in anaerobic microbiology, molecular mycology and their effects on environment.

c. Know critically the main scientific basics of using microorganisms on the field genetically manipulation of *Streptomyces* and medical microbiology.

d. Express the fundamental of ethical and legal practice and their using in different fields that use applied microbial genetics-II and their products.

e. Realize the actual quality standards of the analysis methods and determination bacterial genetic regulatory mechanisms

f. Explain basics and ethics of scientific researches in genetically engineering microorganisms, biotechnology fields and Research and research methodology-II.

g. Understand microbial terminology written in germane language and identify advanced computer models used in microbial biotechnology analysis.

2/2 Intellectual abilities:

By the end of this program, the graduate must able to:

a. Innovate solutions conduct to genetic manipulation of *Streptomyces* and biotechnology by using Advanced computer-II.

b. Evaluate information in yeast molecular biology, molecular bacteriology related specialties and Research and research methodology-II

c. Interpret results of different methods of applied microbial genetics and anaerobic microbiology.

d. Determine problems in different fields related to medical microbiology and yeast molecular biology.
e. Find solution for the majority of problems using microbes in different applications, bacterial genetic regulatory mechanisms, methods in general and molecular bacteriology.
f. Suggest research studies that add to the existing microbial biotechnology knowledge in German language
g. Design enhancement and improvement approaches to practice using molecular mycology,and applied microbial genetics.
h. Evaluate professional decision taking for biological waste management in genetically engineered microorganisms.

2/3. Professional and practical Skills:

By the end of this program, the graduate must able to:

a. Write professional scientific reports in the field of molecular mycology and applied microbial genetics.
b. Execute the basic and advanced professional skills in molecular bacteriology and medical microbiology during the experimental work in research.
c. Select and evaluate methods and tools during the research in yeast molecular biology and bacterial genetic regulatory mechanisms.
d. Prepare modern modules of genetic manipulation of *Streptomyces,* biotechnology research and methods in general and molecular bacteriology.
e. Use professional technologies for serving in genetically engineered microorganisms, seminars and anaerobic microbiology research and practice such as German language, advanced computer soft ware and Research and research methodology-II.

2/4. General and transferable Skills:

***By the end of this program, the graduate must able to*:**

a. Work on team for using all methods with public, colleagues and appropriate authorities.
b. Show management skills for using information technology to improve his professional practice in internet and relative information.
c. Use different sources of information to obtain data for a given course topics.
d. Communicate with others & Manage time effectively.
e. Show self-learning abilities in situation comparable to his level.
f. Use audio & video means for displaying information to learn independently and seek continuous learning in microbial biotechnology.

Academic Reference Standards (ARS) for Doctorate Postgraduate Studies, NAQAAE.

-The graduate of Doctorate program of any specialty must be able to:

1.1. Master basics and methodologies of scientific research.
1.2. Add to the knowledge in the specialization field.
1.3. Apply analytical and critical approach to the knowledge in specialty and related areas.
1.4. Integrate specialized knowledge with relevant knowledge by extrapolating and developing relations between the two interfaces
1.5. Show in depth awareness of recent theories and ongoing problems in the specialization field.
1.6. Identify professional problems and find innovative solutions.
1.7. Master a wide range of professional skills in the specialty area.
1.8. Work towards the development of new methods, tools and procedures in professional practice.
1.9. Use appropriate technological means to serve his/her professional practice.
1.10.Communicate effectively and lead team-work in different professional contexts.
1.11.Make decisions according to available information.

1.12.Employ available resources efficiently and work to find and develop new resources.
1.13.Be aware of his/her role in community development and environmental conservation.
1.14.Act in a manner reflecting the commitment to integrity, credibility and rules of the profession.
Disposition to reflect the commitment to integrity and credibility of the profession and the rules
1.15.Be committed to continuous self-development and transfer knowledge and expertise to others.

2- General academic standards:

2.1. Knowledge & Understanding:

By the end of the study of Doctorate program of any specialty, the graduate must have fluent deep knowledge & understanding of:

2.1.1. Basic facts, theories and recent advances of the specialty and related subjects.
2.1.2. Basics, methodologies and scientific research ethics as its different tools.
2.1.3. Ethical and legal principles of professional practice.
2.1.4. Quality standards of professional practice.
2.1.5. Knowledge related to the professional practice impact on the environment development and conservation.

2.2. Intellectual skills:

By the end of the Doctorate program study in any specialty, the graduate must be able to:

2.2.1. Analyze, evaluate and deduce the information in the specialty fields.
2.2.2. Solve the specialized problems according to available data.
2.2.3. Conduct research studies that add to specialty knowledge.
2.2.4. Write and publish scientific articles.
2.2.5 Evaluate professional practice risks.
2.2.6. Plan to improve specialty performance.
2.2.7. Take decisions in various professional situations including dilemmas and controversial issues.
2.2.8. Add to the specialty field through creativity & innovation.
2.2.9. Manage discussions on basis of evidence and proofs.

2.3. Professional skills:

By the end of Doctorate program study in any specialty, the graduate must:

2.3.1. Master basic and advanced professional skills in the specialty field.
2.3.2. Write and appraise professional reports.
2.3.3. Evaluate and improve methods and tools used in the specialty.
2.3.4. Use technological tools to serve professional practice.
2.3.5. Plan for professional practice development and performance of others.

2.4. General & transferable skills:

By the end of the study of Doctorate program of any specialty, the graduate must:

2.4.1. Communicate effectively using different means.
2.4.2. Use information technology to improve professional practice.
2.4.3. Teach and evaluate others.
2.4.4. Perform self appraisal and seek continuous learning.
2.4.5. Use different resources to obtain information and knowledge.
2.4.6. Work in and lead a team.
2.4.7. Manage scientific meetings and time

I

Matrix between Graduate Attributes of the Program and Graduate Attributes from NAQAAE

Program Graduate Attributes	Graduate Attributes from NAQAAE														
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	1.12	1.13	1.14	1.15
1.1	X														
1.2		X													
1.3			X												
1.4				X											
1.5					X										
1.6						X									
1.7							X								
1.8								X							
1.9									X						
1.10										X					
1.11											X				
1.12												X			
1.13													X		
1.14														X	
1.15															X

II
The Matrix Between Program ARS and ARS from NAQAAE

2.1 Knowledge & Understanding

ARS	ARS				
	2.1.1	2.1.2	2.1.3	2.1.4	2.1.5
3.1.1	X				
3.1.2		X			
3.1.3			X		
3.1.4				X	
3.1.5					X

2.2. Intellectual Skills

ARS	ARS								
	2.2.1	2.2.2	2.2.3	2.2.4	2.2.5	2.2.6	2.2.7	2.2.8	2.2.9
3.2.1	X								
3.2.2		X							
3.2.3			X						
3.2.4				X					
3.2.5					X				
3.2.6						X			
3.2.7							X		
3.2.8								X	
3.2.9									X

2.3.1 Professional Skills

ARS	ARS				
	2.3.1	2.3.2	2.3.3	2.3.4	2.3.5
3.3.1	X				
3.3.2		X			
3.3.3			X		
3.3.4				X	
3.3.5					X

2.3.2 General and Transferable skills

ARS	ARS							
	2.4.1	2.4.2	2.4.3	2.4.4	2.4.5	2.4.6	2.4.7	2.4.8
3.4.1	X							
3.4.2		X						
3.4.3			X					
3.4.4				X				
3.4.5					X			
3.4.6						X		
3.4.7							X	
3.4.8								X

3. Program Academic standards:

3.1. Knowledge and understanding

By the end of the study of doctorate program of any specialty, the graduate should have sufficient knowledge & understanding of:

3.1.1 Basic facts, theories and recent advances of the microbial Biotechnology and related subjects.

3.2.2. Basics, methodologies and scientific research ethics as different tools

3.1.3. Ethical and legal fundamentals (research writing – supervising – authorizing – applying) and their applications on the field of microbial Biotechnology.

3.1.4. Quality standards of professional practice in the field of microbial Biotechnology.

3.1.5. Knowledge related to the professional practice impact on the environment development and conservation.

3.2. Intellectual Skills

By the end of the Doctorate program study in any specialty, the graduate must be able to

3.2.1. Analyze and evaluate the information in the field of microbial Biotechnology.

3.2.2. Solve the specialized problems according to available data of microbial Biotechnology.

3.2.3. Conduct research studies that add knowledge to microbial biotechnology.

3.2.4. Write and publish scientific articles in the field of microbial biotechnology

3.2.5. Evaluate professional practice risks in microbial biotechnology

3.2.6. Plan to improve specialty performance in the field of microbial biotechnology

3.2.7. Take decisions in various professional situations including dilemmas and controversial issues

3.2.8. Add to the specialty field through creativity & innovation

3.2.9. Manage discussions on basis of evidence and proofs

3.3. Professional Skills

By the end of Doctorate program study in any specialty, the graduate must:

3.3.1. Master basic and advanced professional skills in the field of microbial biotechnology

3.3.2. Write and appraise professional reports about microbial biotechnology

3.3.3. Evaluate and improve methods and tools used in the field of microbial biotechnology

3.3.4. Use technological tools to serve professional practice

3.3.5. Plan for professional practice development and performance of others

3.4. General & Transferable skills

By the end of the study of Doctorate program of any specialty, the graduate must:

3.4.1. Communicate effectively using different means

3.4.2. Use information technology to improve professional practice

3.4.3. Teach and evaluate others.

3.4.4. Perform self appraisal and seek continuous learning.

3.4.5. Use different resources to obtain information and knowledge.

3.4.6. Work in and lead a team.

3.4.7. Manage scientific meetings and time.

4. Bench mark: ARS

There are no External Bench Marks for Minor Specialist interest of Microbial biotechnology in microbial biotechnology Department

5. Curriculum structure and content:

a. Program duration: not less than 3 years

b. Program structure: Number of hours/units:

Lectures	**28**	Lab./ Exercise	**16**	Total	**44**
Compulsory	**24**	Optional		Elective	**12**

	No.		%
▪ basic sciences courses	**7**		**63.6**
▪ Social sciences and humanity courses			
▪ Specialized courses	**4**		**36.4**
▪ Other sciences courses	**-**		**-**
▪ Practical/Field Training	The time spent in achievement of a thesis (8 hrs/week)		

c. **Program Levels (in credit-hours system):** Not Applicable

6. courses

1. Compulsory: (General courses)

No.	Code No.	Course Title	No. of Units	No. of hours/week			Year/ Level	Semester
				Lect.	Lab.	Exe.		
1	A-24	**Biotechnology -II**	3	3				
2	A-48	**German language**	3	3	-			
3	A-81	**Use of microcomputers: level 3**	3	2	2			
4	B2-4	**Applied microbial genetics II**	3	3				
5	B2-23	**Special topics**	3	3	-			
6	B2-24	**Seminars**	3	---	6			
7		**Research and research methodology-II**	6	2	8			
Total			24	16	16			

2. Elective: Specialized courses (4 courses from the listed below courses):

No	Code No.	Course Title	No. of Units	No. of hours/week			Year/ Level	Semester
				Lect.	Lab.	Ex.		
1	B1-33	**Molecular bacteriology**	3	3	-			
2	B1-55	**Molecular mycology**	3	3	-			
3	B1-93	**Yeast molecular biology**	3	3	-			
4	B2-2	**Anaerobic microbiology**	3	3	-			
5	B2-6	**Bacterial genetic regulatory mechanisms**	3	3	-			
6	B2-12	**Genetic manipulation of**	3	3	-			

		Streptomyces						
7	B2-13	**Genetically engineered microorganisms**	3	3	-			
8	B2-17	**Medical microbiology -II**	3	3	-			
9	C- 61	**Methods in general and molecular bacteriology**	3	2	2			
Total			27	26	2			

c- PhD. dissertation (at least 3 academic years)

All PhD-degree students should prepare a thesis in microbial biotechnology. The department and the ethical committees must approve the protocol of the research. The thesis should include a review or research part; materials and methods part; results and discussion part. Also contain the English and Arabic summary and list of references which were used in the study. The thesis is supervised by one or more senior staff members of the Department of microbial biotechnology and may include other specialties according to the nature of the research. The thesis should be evaluated and approved by a committee of three professors including one of the supervisors and an external professor.

7. Program admission requirements:

- Master degree from appropriate practical faculty from Egyptian or equivalent universities.

8. Regulations for progression and program completion:

- Successful completion of the required courses (equivalent to at least18 units) in addition to compulsory courses: Deutch language, advanced computer, Research and research methodology, special topics and Seminars.
- Student success in any course of study is estimated in one of the following estimates:

Excellent	From 90 to 100 degrees
Very Good	From 80 to less than 90 degrees
Good	From 70 to less than 80 degrees
Pass	From 60 to less than 70 degrees

- Successfully passes of both oral and written qualifying examinations.
- Approved completion of the research experiments.
- Approved scientific writing of Ph.D. dissertation.
- Successfully passes of dissertation open defense examination.

9. Assessment methods of program intended learning outcomes:

No.	Method	Intended Learning Outcomes (ILOs)
1	Semester Work (5^{th} & 10^{th})	Measure problem solving skills, presentation and self-learning.
2	Midterm Exam (6^{th}) Week	Measure abilities on concentration and understanding scientific points & background.
3	Practical exam (13^{th}) Week In practical courses only	Measure practices & application skills and professional & art skills.
4	Oral exam (14^{th}) Week	Measure analysis, presentation, and discussion

		skills.
5	Written (final) exam (15th) Week	Measure Knowledge, Understanding, Intellectual and Professional skills
6	PhD dissertation	To assess the ability to write a review article, perform the needed practical steps and to present the results in tables and graphs. In addition, the skills of analysis of results and discussion with previous findings obtained by other authors are also assessed.

10. Program Evaluation methods:

No.	Evaluator	Tool	Sample
1	Students	Questionnaire	20
2	Alumni	Depth meeting	5
3	Stakeholders (Employers)	Nucleus meeting	5
4	External (Evaluators & Examiners)	Remarking questionnaire & nucleus meeting	2
5	Others	Not Applied	-

Matrix of Knowledge and Skills of Microbial Biotechnology Doctorate Program Targeted

No	Course No.	Course title	Knowledge and understanding skills						
			a	b	c	d	e	f	g
1	A-24	Biotechnology -II						X	
2	A-48	German language							X
3	A-81	Use of microcomputers: level 3							X
4	B1-33	Molecular bacteriology	X						
5	B1-55	Molecular mycology		X					
6	B1-93	Yeast molecular biology	X						
7	B2-2	Anaerobic microbiology		X					
8	B2-4	Applied microbial genetics- II	X			X			
9	B2-6	Bacterial genetic regulatory mechanisms					X		
10	B2-12	Genetically manipulation of *Streptomyc*es			X				
11	B2-13	Genetically engineered microorganisms						X	
12	B2-17	Medical microbiology II			X				
13	B2-23	Special Topics							
14	B2-24	Seminars	X						
15		Research and research methodology-II						X	
16	C- 61	Methods in general and molecular bacteriology	X			X			

No.	Course No.	Course title	Intellectual skills							
			a	b	c	d	e	f	g	h
1	A-24	Biotechnology –II	X							
2	A-48	German language						X		
3	A-81	Use of microcomputers: level 3	X			X				
4	B1-33	Molecular bacteriology		X						
5	B1-55	Molecular mycology							X	
6	B1-93	Yeast molecular biology		X		X				
7	B2-2	Anaerobic microbiology			X					
8	B2-4	Applied microbial genetics- II			X				X	
9	B2-6	Bacterial genetic regulatory mechanisms					X			
10	B2-12	Genetic manipulation of *Streptomyces*	X							
11	B2-13	Genetically engineered microorganisms							X	X
12	B2-17	Medical microbiology –II				X				
13	B2-23	Special Topics								
14	B2-24	Seminars					X			
15		Research and research methodology		X						
16	C-61	Methods in general and molecular bacteriology					X			

No.	Course No.	Course title	Professional and practical skills				
			a	b	c	d	e
1	A-24	Biotechnology -II				X	
2	A-48	German language					X
3	A-81	Use of microcomputers: level 3					X
4	B1-33	Molecular bacteriology		X			
5	B1-55	Molecular mycology	X				
6	B1-93	Yeast molecular biology			X		
7	B2-2	Anaerobic microbiology					X
8	B2-4	Applied microbial genetics -II	X				
9	B2-6	Bacterial genetic regulatory mechanisms			X		
10	B2-12	Genetic manipulation of *Streptomyces*				X	
11	B2-13	Genetically engineered microorganisms					X
12	B2-17	Medical microbiology -II		X			
13	B2-23	Special Topics					
14	B2-24	Seminars	X				
15		Research and research methodology					X
16	C-61	Methods in general and molecular bacteriology				X	

No.	Course No.	Course title	General and transferable skills					
			a	b	c	d	e	f
1	A-24	Biotechnology -II	X			X		
2	A-48	German language				X		
3	A-81	Use of microcomputers: level 3	X					
4	B1-33	Molecular bacteriology			X		X	
5	B1-55	Molecular mycology		X				
6	B1-93	Yeast molecular biology						X
7	B2-2	Anaerobic microbiology		X			X	
8	B2-4	Applied microbial genetics- II		X				X
9	B2-6	Bacterial genetic regulatory mechanisms				X		
10	B2-12	Genetic manipulation of Streptomyces	X		X			

No.	Course No.	Course title	General and transferable skills					
			a	b	c	d	e	f
1	A-24	Biotechnology -II	X			X		
2	A-48	German language				X		
3	A-81	Use of microcomputers: level 3	X					
4	B1-33	Molecular bacteriology			X		X	
5	B1-55	Molecular mycology		X				
6	B1-93	Yeast molecular biology						X
11	B2-13	Genetically engineered microorganisms				X		X
12	B2-17	Medical microbiology -II	X					
13	B2-23	Special Topics			X			
14	B2-24	Seminars			X			X
15		Research and research methodology		X				
16	C-61	Methods in general and molecular bacteriology		X	X	X		

Program coordinator:

Dr/ Mahmoud abdel-Mongy

Head of the department council: Prof. Dr. : Atef Mohamed Ibrahim