Department of Microbial Biotechnology

Master Program Specification

(2015/ 2016)

I

Academic reference standards for Master postgraduate studies of Microbial Biotechnology

Academic Reference Standards (ARS) for Master Postgraduate studies, NAQAAE, March 2009

1.Graduate Attributes:

1- The graduate of Master program of any specialty must:

1.1. Master the basics of scientific research and methodologies using different tools.
1.2. Apply and use the applications of analytical method in the field of specialization.
1.3. Apply and integrate the relevant knowledge in specialized professional practice.
1.4. Demonstrate awareness of the ongoing specialty problems and modern visions.
1.5. Identify and solve professional problems.
1.6. Master appropriate scale of professional skills, and use of suitable technological means to serve professional practice.
1.7. Communicate effectively and lead work teams.
1.8. Make decisions in different professional contexts.
1.9. Use available resources to achieve the highest benefit and preservation.
1.10. Be aware of the role in community development and environmental conservation according to global and regional changes.
1.11. Act with commitment to integrity, credibility and profession rules.
1.12. Dedicate to academic, professional self-development and continuous learning.

2.General academic standards:

2.1. Knowledge & Understanding:

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

2.1.1. Basic facts, theories, of the specialty and related fields.
2.1.2. Mutual effects between professional practice and environment.
2.1.3. Main scientific advances in the specialty field.
2.1.4. Ethical and legal fundamentals of profession.
2.1.5. Quality standards of the profession practice.
2.1.6. Basics and ethics of scientific research.

2.2 Intellectual skills:

By the end of the study of Master program of any specialty, the graduate should be able to:

2.2.1. Interpret, analyze & evaluate the information to solve problems.
2.2.2. Solve some problems that do not conform to classic data (incomplete data).
2.2.3. Integrate different information to solve professional problems.
2.2.4. Conduct a scientific research &/ or write scientific systematic approach to a research problem (hypothesis).
2.2.5. Evaluate professional risks.
2.2.6. Plan for professional performance improvement.
2.2.7. Take professional decisions.

2.3. Professional skills:

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

2.3.1. Master fundamental and advanced professional skills in the field of specialization.
2.3.2. Write and appraise professional reports
2.3.3. Evaluate methods and tools used in the field of specialization.

2.4. General & transferable skills:

By the end of the study of Master program of any specialty, the graduate should be able to:

2.4.1. Communicate effectively using all methods.
2.4.2. Use information technology to improve professional practice.
2.4.3. Practice self appraisal and determines learning needs.
2.4.4. Utilize different information sources to obtain data. Share in determination of standards for evaluation of others (e.g.: subordinates/ trainees etc.)
2.4.5. Determine standards for evaluation of others (e.g.: subordinates/ trainees etc.)
2.4.6. Work in and lead a team in comparable work level..
2.4.7. Manage time effectively.
2.4.8. Learn independently.

Academic Reference Standards (ARS) for Master Program of Microbial Biotechnology

1.Graduate Attributes of the Program:

1- The graduate of Master program of any specialty must:

1.1. Master the basics of scientific research and methodologies in microbial biotechnology using different tools.
1.2. Apply and use the applications of analytical method in the field of microbial biotechnology.
1.3. Apply and integrate the relevant knowledge in professional practice of microbial biotechnology.
1.4. Demonstrate awareness of the ongoing specialty problems and modern visions.
1.5. Identify and solve professional problems.
1.6. Master appropriate scale of professional skills, and use of suitable technological means to serve professional practice.
1.7. Communicate effectively and lead work teams.
1.8. Make decisions in different professional contexts.
1.9. Use available resources to achieve the highest benefit and preservation.
1.10. Be aware of the role in community development and environmental conservation according to global and regional changes.
1.11. Act with commitment to integrity, credibility and professional rules.
1.12. Dedicate to academic, professional self-development and continuous learning.

2- Program Academic standards:

2.1 Knowledge & Understanding

By the end of theMicrobial Biotechnology master program , the graduate must have knowledge and understanding of:

2.1.1 .Theories, Basics relevant with learning different branches of microbial Biotechnology (virus, bacteria, fungi and algae).

2.1.2 Mutual effects between professional practices its reflection on the microorganisms (virus, bacteria, fungi and algae).

2.1.3 Scientific developments in the methods of microbial biotechnology that can be used to assess potential impact on non-target organisms.

2.1.4. Ethical & legal principals practice in the field of microbial biotechnology those identifying and detecting risk factors (ex., exotoxin variation).

2.1.5. Quality principals & basics in professional practice through application microorganisms in medicine, industry, agriculture and environmental pollution.2.1.6 Basics and ethics of scientific research in the field of animal biotechnology.

2.1.6 Basics& ethics of the scientific researches.

2.2 Intellectual Skills

By the end of study of the program the graduate must be able to:

2.2.1 Analyze & Evaluate the information in the microorganisms and related application on industry agriculture and environmental and Measuring it for solving problems.

2.2.2 Solve professional problems with no offered some data.

2.2.3 Link between different knowledge for solving professional problems

2.2.4 Implement researching study and/or write methodology scientific study along a research problem that causing by some microorganisms and also that solve by microorganisms.

2.2.5 Evaluate risks in professional practice in the when manipulation of disease microorganisms.

2.2.6 Plan for developing performance in the field of microbial biotechnology.

2.2.7 Make professional decisions different professional contexts

2.3. Professional and Practical skills

By the end of study of the program the graduate must be able to:

2.3.1 Master & modern professional skills in the microbial biotechnology.

2.3.2 Write & evaluate professional reports.

2.3.3 Evaluate methods & tools based on the microbial biotechnology.

2.4. General & Transferable skills

By the end of study of the program, the graduate must be able to:

2.4.1 Implement Active Communication with different types.

2.4.2 Use information technology for serving Developing professional practice.

2.4.3 Appoint Self-evaluation and determine its private Educational needs.

2.4.4 Use different resources for obtaining information & knowledge.

2.4.5 Setting Evaluation Basics & Pointers of others performance.

2.4.6 Work in team and lead teams in different professional contexts...

2.4.7 Manage time by efficiency

2.4.8..Appoint Self & continuous learning.

Matrix between Program Graduate Attributes 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
1.1	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

II
Matrix between
Program ARS

and

ARS from NAQAAE

2.1 Knowledge & Understanding

Program ARS	ARS					
	2.1.1	2.1.2	2.1.3	2.1.4	2.1.5	2.1.6
2.1.	X					
2.1.2		X				
2.1.3			X			
2.1.4				X		
2.1.5					X	
2.1.6						

2.2. Intellectual Skills

Program ARS	ARS						
	2.2.1	2.2.2	2.2.3	2.2.4	2.2.5	2.2.6	2.2.7
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

2.3.1 Professional Skills

Program ARS	ARS		
	2.3.1	2.3.2	2.3.3
3.3.1	X		
3.3.2		X	
3.3.3			X

2.3.2 General and Transferable skills

Program 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

Department of
Microbial Biotechnology
Master Program Specification
(2015/2016)

Master Program Specification

(2015/2016)

A-Basic Information

1- Program title: (Master trend)

2- Program type: Single √ Double Multiple

3- Program coordinator: Dr. Ragaa A. Haoumda

Head of department: Dr/Atef Mohamed Ibrahim

Department: Microbial biotechnology

Program Approval Date: March 2011

B- Professional Information:

1- Program aims:

1.1. Building master graduate show self-Learning abilities and able to continuation education & scientific research, having scientific research tools microbial biotechnology fields.

1.2. Preparing master graduate having capability of applying the basics, its different tools and able to formulate methodologies of scientific research of relationship between microorganism and their applying in microbial biotechnology branches.

1.3. Improving skills of the master graduate in collecting evidences of problems and appoint information for using available resources to solve them for achieving highest benefits in microbial biotechnology fields.

1.4. Applying analytical methods & specialized knowledge and using appropriate technological means through the production of antibiotic and enzymes as industrial catalysts either producing valuable chemicals or destroying hazardous/polluting chemicals.

1.5. Demonstrating awareness of interpretation & deriving medical problems by using genome of the virus and bacteria or by removing genes causing disease.

2- Intended learning outcomes (ILOs):

2/1Knowledge and understanding:

After the end of master program graduate can be able to:

a- Describe basic facts and theories of industrial microbiology, environmental microbiology, food microbiology,fermentation technology, food science technology and food safety, quality management in courses microbiology I and algal biotechnology.

b- Express the mutual relation between professional practice in biotechnology using microbes and effects on agricultural, industrial waste, exploitation of genetically engineered microorganisms for soil and water remediation environment in courses microbial degradation and bacterial genome.

c- Classify main scientific advances in microbial biotechnology, application of agriculture, environmental pollutants, industry and gene cloning for biological research in course Biotechnology I

d- Explain actual fundamental of ethical and legal practice in the field of using microbes in biotechnology domains in courses applied microbial genetics I and biology of yeasts.

e- Divide quality standards of the practice during the analysis and determination of microbial metabolism, its regulation; phenotype and factors that control phenotype improvement of

microbial culture collection during studying in courses Bacterial genetics and methods approach in PCR.

f- Summarize main basics & ethics of scientific researches of safety and risk of microbial products, roles of micro-organism in industries in courses Biotechnology of microorganisms, biology of prokaryotes and computer-I.

g- Write list of the basic rules and scientific terms in courses English language, research and research methodology, medical microbiology and microbial biotechnology area.

2/2 Intellectual abilities:

After the end of master program graduate can be able to:

a- Appoint suitable methods for different biological treatment of biotechnological in the branch of which makes the microbes producing the products of different kinds and great economic by studying course Methods approach in PCR.

b- Plan the identification of microbial biotechnology application in medicine (medical microbiology), industry (Biotechnology of microorganisms), agriculture and environmental pollutions.

c- Compare between different methods of bioremediation, biodegradation, bioleaching and transgenic using microorganisms (bacteria, fungi and algae) in courses Microbiology-I and algal biotechnology.

d- Interpret different information to solve the problems and improving products yield using microbial biotechnology application in course Biology of prokaryotes.

e- Evaluate the information in microbiology, biochemistry, genetics and physiology to solve some professional problems in microbial biotechnology.

f- Analyze scientific researches computer- I to solve the problems in courses Microbial degradation, bacterial genome and Research and research methodology-I

g- Derive risks during transgenic microorganisms in courses applied microbial genetics I and biology of yeasts.

h- Plan paraphrasing English technical terms processes using in scientific researches in courses English language and Biotechnology -I.

2/3 Professional and practical skills:

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

a) Apply all basics and some of microbial biotechnology application, research, microbes' manipulation and advanced new techniques in courses methods approach in PCR, Biotechnology- I, Microbiology I, algal biotechnology, bacterial genome and Computer-I

b) Measure the active tools used in microbial biotechnology and choose the appropriate one for each task in courses methods approach in PCR, applied microbial genetics I, special topics and biology of yeasts.

c) Form and enhancement different types of biofertilizers, bio-pesticides bioremediation, biodegradation,in courses seminars, microbial degradation and Methods approach in PCR.

d) Execute quality written reports in different fields of microbial biotechnology assessment using English language in courses Biotechnology of microorganisms, medical microbiology, biology of prokaryotes, Bacterial genetics, research and research methodology and Methods approach in PCR.

2/4 General and transferable skills:

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

a) Communicate effectively using all methods with public, collegeous and appropriate authorities.
b) Use information technology to improve his professional practice in internet and relative information in courses computer-I.
c) Practice self-appraisal and determines his learning needs.
d) Show the management sources of information to obtain data for a given course topics.
e) Work in teams and capable to manage time effectively.
f) Manage time effectively.
g) Work as team leader in situation comparable to his level.
h) Learn independently and seek continuous learning in microbial biotechnology.
i) Take a professional decision for suitable methods of microbial biotechnology.

3. Program Academic standards:

3.1 Knowledge & Understanding

By the end of Master Program Graduate must able to acquire the knowledge and understanding of:

3.1.1 Fundamental facts, theories of the microbial biotechnology and related subjects.
3.1.2 Mutual relation between professional practice of microbial biotechnology and effects on environment.
3.1.3 Main scientific advances of microbial biotechnology practice.
3.1.4 Ethical and legal fundamentals and their application in the field of microbial biotechnology researches.
3.1.5 Quality standards of the practice in the field of microbial biotechnology.
3.1.6. Basics & ethics of the scientific researches.

3.2 Intellectual Skills

After the end of Master Program Graduate can be able to :

3.2.1 Analyze and evaluate the information for solving problems in the field of microbial biotechnology.
3.2.2 Solve some problems that lack data of microbial biotechnology.
3.2.3 Integrate different information for solving professional problems in the field of microbial biotechnology.
3.2.4 Implement scientific researches and/or write scientific study about problems in the field of microbial biotechnology.
3.2.5 Evaluate threats imposed during professional practice of microbial biotechnology.
3.2.6 Plan for professional improvement in the field microbial biotechnology.
3.2.7 Take professional decisions in wide range of professional situations of in microbial biotechnology fields.

3.3. Professional and Practical skills

After the end of Master Program Graduate can be able to:

3.3.1 Excels modern and essential professional skills in microbial biotechnology fields.
3.3.2 Write and evaluate reports about microbial Biotechnology.
3.3.3 Evaluate methods and tools based on microbial biotechnology fields.

3.4. General & Transferable skills

After the end of Master Program Graduate can be able to:

3.4.1 Active Communication by its different and effective methods.
3.4.2 Use information communication technology for serving professional practice in the field of on microbial biotechnology.
3.4.3 Self evaluation and determining their educational needs.
3.4.4 Setting basics and pointers for others performance.
3.4.5 Using different resources of information to obtain data, knowledge and information in the field of microbial biotechnology.
3.4.6 Work in teams and Manage time in different professional trends.
3.4.7. Efficient manage of time.
3.4.8 Work as team leader in situation comparable to his level.
3.4.9 Continuous self learning.

4. Bench Marks: ARS

Adopted from ARS of master programs from NAQAA 2009 and approved by the department council.

5. Curriculum structure and contents:

a. Program duration: at least 2 years

b. Program structure:

No. of hours/units:

44	Total	**16**	Lab./ Exercise	**28**	Lectures
12	Elective	**-**	Optional	**32**	Compulsory

%		No.	
20		**9**	• basic sciences courses
6.7		**3**	• Social sciences and humanity courses
66.7		**30**	• Specialized courses
6.7		**3**	• Other sciences courses
-		**Master thesis**	• Practical/Field Training

c- Program Levels (in credit-hours system): Not Applied

5 . Program courses:

A. Compulsory:

Semester	Year/ Level	No. of hours/week			No. ofUnits	Course Title	Code No.	No.
		Exe	Lab.	Lect.				
			-	3	3	Biotechnology -I	A-23	1
			-	3	3	English language	A-35	2
			2	2	3	Use of microcomputers: level 2	A-80	3
			-	3	3	Biotechnology of microorganisms	B2-10	4
			-	3	3	Special topics	B2-23	5
			6	-	3	Seminars	B2-24	6
			8	2	6	Research and research methodology-I		7
			16	16	24	Total		

B. Elective:

Program courses: Specialized courses (At least 4 courses from the listed below courses)

Semester	Year /Level	No. of hours/week			No. ofUnits	Course Title	Code No.	No.
		Ex.	Lab.	Lect.				
			-	3	3	Microbiology - I	A-59	1
			-	3	3	Genomics: Bacterial genome	B1-22	2
			-	3	3	Algal biotechnology	B2-1	3
			-	3	3	Applied microbial genetics -I	B2-3	4
			-	3	3	Bacterial genetics	B2-7	5
			-	3	3	Biology of prokaryotes	B2-8	6
			-	3	3	Biology of yeasts	B2-9	7
			-	3	3	Medical microbiology -I	B2-16	8
			-	3	3	Microbial degradation	B2-19	9
			2	2	3	Methods approach in PCR	C-101	10
			2	29	30	Total		

M.Sc. thesis (at least 2 academic years)

All Msc-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.

6. Program admission requirements:

- Bachelor degree from appropriate practical faculty from Egyptian or equivalent universities with general grade (good).
- Diploma in microbial biotechnology.

7. Regulations for progression and programme completion:

- Successful completion of the required courses (equivalent to at least12 units, 4 courses containing at least one practical course) in addition to compulsory courses: English language, computer, Research and research, special topics, Seminars, Biotechnology of microorganisms and Biotechnology -I.

- Student success in any course of study is estimated in one of the following estimates:

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

- Approved completion of the research experiments.
- Approved scientific writing of M.Sc. thesis.
- Successfully passes of thesis open defense examination.

8. - Assessment methods for evaluating program applicants:

Intended Learning Outcomes ' ILO's '	**Method**	**No.**
Measure problems solving skills, presentation data and discussion and work on team.	Semester Works(5th&10th)	**1**
Measure abilities on concentration and understanding scientific points & background.	Midterm Exam (6th) Week	**2**
Measure practices & applications skills and professional & art skills.	Practical Exam (13th) Week.	**3**
Measure analysis, presentation, and discussion skills.	Oral Exam (14th) Week.	**4**
Measure remembering & innovating skills.	Written (Final) Exam (15th) Week.	**5**
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.	Thesis discussion	**6**

9. Program Evaluation methods:

Sample	**Tool**	**Evaluator**	**No.**
20	Questionnaire	Senior students	**1**
5	Depth Meeting	Alumni	**2**
5	Nucleus Meeting	Stakeholders (Employers)	**3**
2	Remarking Questionnaire & Nucleus Meeting	External (Evaluators & Examiners)	**4**
---------	Not Applied	Others	**5**

Matrix of master programme courses

Knowledge and understanding skills							Coursetitle	Course No.	No.
g	f	e	d	c	b	a			
	X			X			Biotechnology -I	A-23	1
X							English language	A-35	2
						X	Microbiology -I	A-59	3
	X						Use of microcomputers: level 2	A-80	4
X							Research and research methodology-I		5
					X		Genomics: Bacterial genome	B1-22	6
						X	Algal biotechnology	B2-1	7
			X				Applied microbial genetics -I	B2-3	8
		X					Bacterial genetics	B2-7	9
	X						Biology of prokaryotes	B2-8	10
			X				Biology of yeasts	B2-9	11
	X						Biotechnology of microorganisms	B2-10	12
X							Medical microbiology -I	B2-16	13
					X		Microbial degradation	B2-19	14
						X	Special topics	B2-23	15
						X	Seminars	B2-24	16
		X					Methods approach in PCR	C-101	17

Intellectual skills								Coursetitle	Course No.	No.
h	g	f	e	d	c	b	a			
X								Biotechnology -I	A-23	1
X								English language	A-35	2
					X			Microbiology -I	A-59	3
		X						Use of microcomputers: level 2	A-80	4
		X						Research and research methodology-I		5
		X						Genomics: Bacterial genome	B1-22	6
					X			Algal biotechnology	B2-1	7
	X							Applied microbial genetics-I	B2-3	8
			X					Bacterial genetics	B2-7	9
				X				Biology of prokaryotes	B2-8	10
	X							Biology of yeasts	B2-9	11
						X		Biotechnology of microorganisms	B2-10	12
						X		Medical microbiology-I	B2-16	13
		X						Microbial degradation	B2-19	14
				X				Special topics	B2-23	15
				X				Seminars	B2-24	16
							X	Methods approach in PCR	C-101	17

Professional and practical skills				Coursetitle	Course No.	No.
d	c	b	a			
			X	Biotechnology- I	A-23	1
X				English language	A-35	2
			X	Microbiology -I	A-59	3
			X	Use of microcomputers: level 2	A-80	4
X				Research and research methodology-I		5
			X	Genomics: Bacterial genome	B1-22	6
			X	Algal biotechnology	B2-1	7
		X		Applied microbial genetics -I	B2-3	8
X				Bacterial genetics	B2-7	9
X				Biology of prokaryotes	B2-8	10
		X		Biology of yeasts	B2-9	11
X				Biotechnology of microorganisms	B2-10	12
X				Medical microbiology -I	B2-16	13
	X			Microbial degradation	B2-19	14
				Special topics	B2-23	15
X				Seminars	B2-24	16
X	X	X	X	Methods approach in PCR	C-101	17

General and transferable skills								Coursetitle	Course No.	No.
h	g	f	e	d	c	b	a			
					X			Biotechnology -I	A-23	1
				X				English language	A-35	2
	X							Microbiology -I	A-59	3
						X		Use of microcomputers: level 2	A-80	4
				X				Research and research methodology-I		5
	X			X				Genomics: Bacterial genome	B1-22	6
				X	X			Algal biotechnology	B2-1	7
							X	Applied microbial genetics -I	B2-3	8
		X						Bacterial genetics	B2-7	9
			X					Biology of prokaryotes	B2-8	10
X								Biology of yeasts	B2-9	11
X								Biotechnology of microorganisms	B2-10	12
	X							Medical microbiology -I	B2-16	13
			X					Microbial degradation	B2-19	14
							X	Special topics	B2-23	15
					X			Seminars	B2-24	16
					X			Methods approach in PCR	C-101	17

Program coordinator: Dr/Ragaa H. Hamouda

Head of department: Dr/Atef Mohamed Ibrahim

The matrix between Program ARS and Program ILo's

2/1 (Knowledge & Understanding)

Program ILo's (Knowledge & Understanding)							**Program Academic Standard**
2/1g	**2/1f**	**2/1e**	**2/1d**	**2/1c**	**2/1b**	**2/1a**	
						X	**2.1.1**
					X		**2.1.2**
				X			**2.1.3**
			X				**2.1. 2.1.4**
X	X	X					**2.1. 2.1.5**

2/2 Intellectual Skills

Program ILo's (Intellectual Skills)									**Program Academic Standard**
2/2i	**2/2h**	**2/2g**	**2/2f**	**2/2e**	**2/2d**	**2/2c**	**2/2b**	**2/2a**	
								X	**2.2.1**
							X		**2.2.2**
						X			**2.2.3**
					X				**2.2.4**
				X					**2.2.5**
			X						**2.2.6**
X	X	X							**2.2.7**

2/3/1 (Practical and Professional Skills)

Program ILo's (Practical and professional Skills)				**Program Academic Standard**
2/3/1d	**2/3/1c**	**2/3/1b**	**2/3/1a**	
			X	**2.3.1**
		X		**2.3.2**
X	X			**2.3.3**

2/3/2 (General and Transferable skills)

Program ILo's (General and Transferable skills)									Program Academic Standard
2/3/2i	2/3/2h	2/3/2g	2/3/2f	2/3/2e	2/3/2d	2/3/2c	2/3/2b	2/3/2a	
								X	2.4.1
							X		2.4.2
						X			2.4.3
					X				2.4.4
				X					2.4.5
			X						2.4.6
		X							2.4.7.
	X								2.4.8
X									2.4.9

Program coordinator: **Dr/Ragaa H. Hamouda**

Head of department: **Prof.Dr/Atef Mohamed Ibrahim**