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Genetic Engineering and
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جامعة مدينة السادات
معهد بحوث الهندسة الوراثية والتكنولوجيا الحيوية
وحدة ضمان الجودة والتطوير المستمر





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Animal Biotechnology
Master
Program Specification
(2015/2016)



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I
ACADEMIC REFERENCE
STANDARDS (ARS)
FOR POSTGRADUATE
STUDIES, NAQAEE,
MARCH 2009



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Academic reference standards (ARS) for postgraduate studies, NAQAAE, March 2009

1- Graduate Attributes

1-The graduate of Master program must:

- 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. Merge and develop specialized knowledge with that of related subjects extrapolating bilateral ties in between.
- 1.5. Show deep consciousness of the ongoing specialty problems and theories.
- 1.6. Determine 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 professional methods, and new tools.
- 1.9. Use appropriate technological means to serve professional practice.
- 1.10. Communicate effectively and lead work team in different professional contexts.
- 1.11. Make decisions according to available information.
- 1.12. Employ available and new resources efficiently and work on developing.
- 1.13. Be aware of the role in community development and environmental conservation.
- 1.14. Act in a manner reflecting the commitment to integrity, credibility and rules of the profession.
- 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 Master 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 Master 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.



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- 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 Master 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 Master 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.



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II

ACADEMIC REFERENCE STANDARDS FOR MASTER POSTGRADUATE STUDIES OF ANIMAL BIOTECHNOLOGY



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1- Animal Biotechnology Program Academic standards:

2.1- Graduate Attributes

Preparation of Master graduate must:

- 1.1. Mastering the basics of scientific research and methodologies using the different tools of animal biotechnology.
- 1.2. Using the applications of analytical method in the different fields and sub branches of Animal biotechnology.
- 1.3. Applying and integrating the relevant knowledge in cell culture, viral biotechnology, transgenic animals and new techniques of reproductions.
- 1.4. Demonstrating awareness of the ongoing animal biotechnology problems and modern visions.
- 1.5. Identifying appropriate scale of professional skills, and use of suitable technological means to serve professional practice.
- 1.6. Communicating effectively, making decisions in different professional contexts and leading work teams.
- 1.7. Use available resources to achieve the highest benefit and preservation.
- 1.8. Being aware of the role in community development and environmental conservation according to global and regional changes.
- 1.9. Dedicating to academic, professional self-development and continuous learning.

3- Program Academic standards:

3.1 Knowledge & Understanding

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

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



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3.2 Intellectual Skills

By the end of the study of Master program, the graduate must:

- 3.2.1 Interpret, analyze & evaluate the information to solve problems in the field of animal biotechnology.
- 3.2.2 Solve some problems that do not conform to classic data regarding animal biotechnology.
- 3.2.3 Integrate different information to solve professional problems in the field of animal biotechnology.
- 3.2.4 Conduct a scientific research and/ or write scientific systematic approach to a research problem (hypothesis) in the field of animal biotechnology.
- 3.2.5 Evaluate professional risks of animal biotechnology.
- 3.2.6 Plan for professional improvement in the field animal biotechnology.
- 3.2.7 Take professional decisions in animal biotechnology fields.

3.3. Professional skills:

By the end of the study of Master program the graduate must:

- 3.3.1 Be competent in all basic and some of the advanced professional skills in animal biotechnology fields.
- 3.3.2 Write and appraise reports about animal biotechnology.
- 3.3.3 Evaluate methods and tools used in animal biotechnology fields.

3.4. General & Transferable skills

By the end of Master Program, the graduate must:

- 3.4.1 Communicate effectively using all methods.
- 3.4.2 Use information technology to improve professional practice.
- 3.4.3 Practice self appraisal and determines learning needs.
- 3.4.4 Utilize different information sources to obtain data. Share in determination of standards for evaluation of others (e.g.: subordinates/ trainees etc.)
- 3.4.5 Determine standards for evaluation of others (e.g.: subordinates/ trainees etc.)
- 3.4.6 Work in and lead a team in comparable work level.
- 3.4.7 Manage time effectively.
- 3.4.8 Learn independently.



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II

The matrix between Program ARS and NAQAAE -ARS



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2.1 Knowledge & Understanding

ARS	NAQA AE_ARS				
	2.1.1	2.1.2	2.1.3	2.1.4	2.1.5
3.1.	X				
3.1.2		X			
3.1.3			X		
3.1.4				X	
3.1.5					X

2.2. Intellectual Skills

ARS	NAQA AE_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



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2.3.1 Professional Skills

ARS	NAQAAE 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

ARS	NAQAAE 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



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ANIMAL BIOTECHNOLOGY
MASTER
PROGRAM SPECIFICATION
(2015/2016)



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University: Sadat City

Institute: Genetic engineering and Biotechnology Research Institute

Program Specification

(2015/2016)

A-Basic Information

1- Program title: Master of Animal Biotechnology

2- Program type: Single Double Multiple

3- Department: Animal Biotechnology

4- Program coordinator: Dr. Medhat Hashem

5- Last date of program specifications reapproval: 20 / 4 /2010

6- Program initiation Date: //2002

7- Program internal reviewer: Prof.H. Dahy Mahboub (Fac.Vet.- USC)

8- Program external reviewer: Prof.Sherif Mousa Elsherbeiny(Fac. Science-women –ain shams Univ).

Department mission and vision:

The mission of the program Animal Biotechnology is divided actually in two principal lines the first is to develop the domain of animal biotechnology through multidisciplinary research activities on different model animal systems, insects, pathogens, fish (aquatics), *in vitro* technologies, make fundamental discoveries, generate innovative solutions to practical problems, and develop new technologies for commercial applications.

The second parallel principal line is the academic **educational** mission to educate and excite professional and personal growth students capable to receiving, to design and performing with interests in the life sciences could react with the job market and environmental problems

Our goals: More teachers teaching and more students learning and manipulate animal biotechnologies. One of our objectives is to develop receiving units for the new emerging technologies, infrastructure to be able to establish several linkages with various biotechnology laboratories at international standards in advanced countries.



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B- Professional Information:

1. Program aims to:

Preparation of Master graduate must:

- 1.1. Master the basics of scientific research and methodologies using the different tools related to animal biotechnology.
- 1.2. Apply and use the applications of analytical method in the field of aquatic biotechnology, virology and cell culture.
- 1.3. Apply and integrate the relevant knowledge in specialized professional practice in Electroporation, electro fusion and Embryo manipulation
- 1.4. Demonstrate awareness of the ongoing specialty problems and modern visions modern techniques of reproduction and viral biotechnology.
- 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 in relation with animal biotechnology.
- 1.11. Act with commitment to integrity, credibility and profession rules.
- 1.12. Dedicate to academic, professional self-development and continuous learning.

2- Intended learning outcomes (ILOs):

2/1 Knowledge and understanding:

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

- a-Describe the basic facts and theories of animal gene transfer and expression protocols, Electroporation and electro fusion and Embryo manipulation.
- b – Express the mutual relations between different molecular mechanisms of animal biotechnology, Protein Structure and Function Relationship and Immunoassays.
- c – Classify the main microorganisms of animal pathology, and aquatic importance.
- d – Summarize the fundamental of ethical and legal various tools of molecular virology as viral genotypic and its value in on phenotypic and viral characterization, and describe the relationship between viral pathogens and diversity of host populations.
- e- Express the quality standards of the practice general issues and applications of biotechnology and Current techniques in animal reproduction.
- f- Summarize the basics and ethics of scientific researches of various types of cell culture techniques and describe the fundamentals of animal cell culture.
- g- Write lists of basic rules and scientific terms of English technical terms used in animal biotechnology research.
- h. Describe the principles of data collection, analysis and presentation through the use of computers.



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- i. Divide factors contributed to the development of various types of Breeding and cultivation of fish, aquaculture and aquatic biotechnology.
- j. Describe the principles of practical approaches in PCR used for diagnostic purposes.
- k. Summarize the fundamental aspects of approaches used in Molecular Entomology and Molecular immunology.
- l. Identify the fundamentals of Mammalian cell biotechnology and basic concepts of biological electron microscope.

2/2 Intellectual abilities:

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

- a-Appoint suitable methods for some practical applications of cell culture, Current techniques in animal reproduction (IVF) and in molecular virology.
- b- Analyze and determine the viruses involved in the development of animal diseases.
- c- Compare between the findings of animal diseases of different model and species by using different electron microscope techniques.
- d-Integrate different information to solve problems of aquaculture.
- e-Interoperate the bio-pesticides and biological control in environment.
- f- Conduct the scientific researches to solve the problems and estimate the usefulness of laboratory techniques applied for molecular diagnosis of animal (insect, and fish ect.) pathology.
- g- Take a professional decision for suitable methods of Animal gene transfer and expression protocols.
- h- Plan Paraphrasing English technical terms used in scientific researches.

2/3 Professional Skills:

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

- a – Apply the different methods for cell culture and molecular methods in virology and animal gene transfer and expression protocols.
- b – Measure the quality of different Current techniques in animal reproduction as Artificial Insemination, In vitro Fertilization, embryo- transfer protein functions and Cloning aspects of animal biotechnology.
- c – Form different types of cell culture, PCR and electron microscope in studying molecular virology.
- d – Write reports on Embryo manipulation, Animal Cell and Tissue Culture, Reproductive technologies (Artificial Insemination, In vitro Fertilization, Embryo Transfer and Cloning,) Aquatic Biotechnology, using correct English language.
- e. Apply appropriate computational and statistical packages and tools for handling, manipulation and presentation of experimental results.
- f. Apply procedures used in molecular entomology, immunology and virology.
- g. Form data of an experiment in digital or poster form.

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, colleagues and appropriate authorities.
- b- Use information technology to improve professional practice in internet and relative information in the specialty.



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- c- Practice self appraisal and determines learning needs.
- d- Use different sources of information to obtain data for a given course topics.
- e- Work in team and manage time effectively.
- f- Lead team in situation comparable to his level.
- g- Learn independently and seek continuous learning in animal biotechnology.
- h- Take a professional decision for suitable methods of biological waste management.

3- Program Academic standards:

3.1 Knowledge & Understanding

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

- 3.1.1 Basic facts, theories of the animal biotechnology and related subjects.
- 3.1.2 Mutual effects between professional practices of animal biotechnology effects on environment.
- 3.1.3 Main scientific advances of cell culture, PCR and electron microscope in studying molecular virology.
- 3.1.4 Ethical and legal fundamentals and their application in the field of Embryo manipulation, Animal Cell and Tissue Culture, Reproductive technologies (Artificial Insemination, In vitro Fertilization, Embryo Transfer and Cloning,) Aquatic Biotechnology
- 3.1.5 Quality standards of professional practice in the field of animal biotechnology.
- 3.1.6 Basics and ethics of scientific research in the field of handling, manipulation molecular entomology, immunology.

3.2 Intellectual Skills

By the end of the study of Master program, the graduate must:

- 3.2.1 Interpret, analyze & evaluate the information to solve problems in the field of animal biotechnology.
- 3.2.2 Solve some problems that do not conform to classic data regarding cell culture, PCR and Embryo manipulation, Animal Cell and Tissue Culture, Reproductive technologies (Artificial Insemination, In vitro Fertilization, Embryo Transfer and Cloning,) Aquatic Biotechnology .
- 3.2.3 Integrate different information to solve professional problems in the field of animal biotechnology.
- 3.2.4 Conduct a scientific research and/ or write scientific systematic approach to a research problem (hypothesis) in the field of animal biotechnology.
- 3.2.5 Evaluate professional risks of animal biotechnology.



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3.2.6 Plan for professional improvement in the field animal biotechnology.

3.2.7 Take professional decisions in animal biotechnology fields.

3.3. Professional skills:

By the end of the study of Master program the graduate must:

3.3.1 Be competent in all basic and some of the advanced professional skills in animal biotechnology fields.

3.3.2 Write and appraise reports about animal biotechnology.

3.3.3 Evaluate methods and tools used in of handling, manipulation molecular entomology, immunology and electron microscope in studying molecular virology fields.

3.4. General & Transferable skills

By the end of Master Program, the graduate must:

3.4.1 Communicate effectively using all methods.

3.4.2 Use information technology to improve professional practice.

3.4.3 Practice self appraisal and determines learning needs.

3.4.4 Utilize different information sources to obtain data. Share in determination of standards for evaluation of others (e.g.: subordinates/ trainees etc.)

3.4.5 Determine standards for evaluation of others (e.g.: subordinates/ trainees etc.)

3.4.6 Work in and lead a team in comparable work level.

3.4.7 Manage time effectively.

3.4.8 Learn independently.

4- Program Academic standards:

- **Academic Standards of Animal Biotechnology MSc. program** approved in department council no () date 10 /3 /2010 , and in institute council no. () date 10/4/2010 .

(ملحق ١)

4- Bench Marks: ARS

a) (Reference standards (Benchmarks)
Academic reference standards (ARS), Master of Science Program (March 2009)



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, which were issued by the National Authority for Quality Assurance & Accreditation of Education NAQAAE (ملحق ٢)

b) External references standards: (ملحق ٣) .

5- Curriculum Structure and Contents:

a. Program duration: 2 years min.

b. Program structure:

No. of hours/units: 44/36

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

No. %

7	63.6
---	------

- basic sciences courses

No. %

1	9
---	---

- Social sciences and
humanity courses

No. %

4	33.4
---	------

- Specialized courses

No. %

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- Other sciences courses



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- Practical/Field Training

The time spent in
achievement of a thesis

c- Program Levels (in credit-hours system):

Not Applicable

6. Program courses:

a. Compulsory:

Code No.	Course Title	No. of Units (hrs)	No. of hours/week		
			Lect.	Ex.	Lab/ App
	English language	3	3		
A-80	Computer	3	2		2
	Research and research methodology	6	2		8
B4-27	Special topics	3	3		
B4-28	Seminars	3	---		6
A-23	Biotechnology I	3	3		
B4-3	Animal cell culture I	3	3		
	Total	24	16		16

b- Specialized courses (4 courses from the listed below courses at least):

	Code No.	Course Title	No. of Units	No. of hours/week		
				Lect.	Ex.	App.
1	A-18	Biological electron microscopy	3	3		
2	A-82	Virology	3	3		
3	A-34	Electroporation and electrofusion	3	3		
4	B4-10	Aquatic biotechnology	3	3		
5	B4-13	Embryo manipulation	3	3		
6	B4-17	Mammalian cell biotechnology	3	3		
7	B4-8	Aquaculture	3	3		
8	B4-12	Breeding and cultivation of fish	3	3		



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	Code No.	Course Title	No. of Units	No. of hours/week		
				Lect.	Ex.	App.
9	B7-23	Immunoassays	3	3		
10	B1-85	Protein Structure and Function Relationship	3	3		
11	B1-46	Molecular Entomology	3	3		
12	B1-54	Molecular immunology	3	3		
13	B1-32	Animal Molecular Pathology	3	3		
14	C-78	Methods in molecular virology	3	2	2	
15	C-101	Practical approach in PCR	3	2	2	
16	C-5	Animal gene transfer and expression protocols	3	2	2	
17	C-15	Current techniques in animal reproduction	3	2	2	

C- M.Sc. thesis

All MSc-degree students should prepare a thesis in Animal biotechnology. The department and the ethical committees must approve the protocol of the research. The thesis should include a review part and a research part. The thesis is supervised by one or more senior staff members of the Animal Biotechnology Department 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:

- Bachelor degree from appropriate practical faculty from Egyptian or an equivalent university with general grade (Pass).
- Diploma in cell culture.

8. Regulations for progression and program completion:

Successful completion of the required courses (equivalent to at least 12 units) in addition to compulsory courses: English language, 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



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Pass	From 60 to less than 70 degrees
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- Approved completion of the research experiments.
- Approved scientific writing of M.Sc. thesis.
- Successfully passes of thesis open defense examination

9. Assessment methods for Evaluating program Applicants:

No.	Method	Intended Learning Outcomes ' ILO's '
1	Semester Works(5 th &10 th)	Measure Problems Solving Skills, Presentation Data and Discussion and Work on team.
2	Midterm Exam (6 th) Week.	Measure Abilities on Concentration and understanding Scientific Points & Background.
3	Term paper presentation (13 th) Week.	Measure Applications Skills and Professional & art Skills.
4	Oral Exam (14 th) Week.	Measure Analysis, Presentation and Discussion Skills.
5	Written (Final) Exam (15 th) Week.	Measure Remembering & Innovating Skills.
6	Thesis discussion	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	Senior students	Questionnaire	20
2	Alumni	Depth Meeting	5
3	Stakeholders (Employers)	Nucleus Meeting	5
4	External (Evaluators & Examiners)	Remarking Questionnaire & Nucleus Meeting	2
5	Staff		

Program coordinator:Dr . Usama Badr

Signature:

Date: /April / 2011



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Matrix the targeted Knowledge of the Animal biotechnology master program

No.	Course No.	Course title	Targeted Knowledge													
			a	b	c	d	e	f	g	h	i	j	k	l		
1		English language										X				
2	A-80	Computer										X				
3		Research and research methodology									X	X				
4	B4-27	Special topics							X							
5	B4-28	Seminars						X								
6	A-23	Biotechnology I		X				X		X						
7	B4-3	Animal cell culture I							X							
1	A-18	Biological electron microscopy														X
2	A-82	Virology			X	X										
3	A-34	Electroporation and electrofusion	X													
4	B4-10	Aquatic biotechnology			X							X				
5	B4-13	Embryo manipulation	X													
6	B4-17	Mammalian cell biotechnology							X							X
7	B4-8	Aquaculture										X				
8	B4-12	Breeding and cultivation of fish										X				
9	B7-23	Immunoassays		X												
10	B1-85	Protein Structure and Function Relationship				X										
11	B1-46	Molecular Entomology														X
12	B1-54	Molecular immunology														X
13	B1-32	Animal Molecular Pathology			X											X
14	C-78	Methods in molecular virology			X	X										
15	C-101	Practical approach in PCR											X			
16	C-5	Animal gene transfer and expression protocols	X													
17	C-15	Current techniques in animal reproduction						X								
MSc Thesis			X	X	X	X	X	X	X	X	X	X	X	X	X	X



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Matrix the targeted Intellectual abilities of the Animal biotechnology master program

No.	Course No.	Course title	Intellectual abilities									
			a	b	c	d	e	f	g	h		
1		English language										X
2	A-80	Computer							X			
3		Research and research methodology										X
4	B4-27	Special topics										X
5	B4-28	Seminars	X									X
6	A-23	Biotechnology I							X	X		
7	B4-3	Animal cell culture I	X									
1	A-18	Biological electron microscopy			X							
2	A-82	Virology							X			
3	A-34	Electroporation and electrofusion	X	X							X	
4	B4-10	Aquatic biotechnology				X						
5	B4-13	Embryo manipulation				X						
6	B4-17	Mammalian cell biotechnology	X			X						
7	B4-8	Aquaculture		X		X						
8	B4-12	Breeding and cultivation of fish				X						
9	B7-23	Immunoassays							X			
10	B1-85	Protein Structure and Function Relationship									X	
11	B1-46	Molecular Entomology			X				X			
12	B1-54	Molecular immunology		X					X	X		
13	B1-32	Animal Molecular Pathology		X	X							
14	C-78	Methods in molecular virology	X		X							
15	C-101	Practical approach in PCR			X							
16	C-5	Animal gene transfer and expression protocols	X	X		X			X			
17	C-15	Current techniques in animal reproduction		X		X						
M.Sc. Thesis			X	X	X	X	X	X	X	X	X	X



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Matrix the targeted Professional skills of the Animal biotechnology master program

N o.	Course No.	Course title	Professional and practical skills						
			a	b	c	d	e	f	g
1		English language				X			
2	A-80	Computer				X	X		X
3		Research and research methodology					X		X
4	B4-27	Special topics				X	X		X
5	B4-28	Seminars				X	X		X
6	A-23	Biotechnology I		X		X			
7	B4-3	Animal cell culture I	X			X			
1	A-18	Biological electron microscopy			X				
2	A-82	Virology				X			
3	A-34	Electroporation and electrofusion	X	X					
4	B4-10	Aquatic biotechnology				X			
5	B4-13	Embryo manipulation				X			
6	B4-17	Mammalian cell biotechnology				X			
7	B4-8	Aquaculture	X			X			
8	B4-12	Breeding and cultivation of fish				X			
9	B7-23	Immunoassays						X	
10	B1-85	Protein Structure and Function Relationship		X					
11	B1-46	Molecular Entomology						X	
12	B1-54	Molecular immunology						X	
13	B1-32	Animal Molecular Pathology		X				X	
14	C-78	Methods in molecular virology	X		X				
15	C-101	Practical approach in PCR			X				
16	C-5	Animal gene transfer and expression protocols	X	X		X			
17	C-15	Current techniques in animal reproduction		X		X			



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N o.	Course No.	Course title	Professional and practical skills						
			a	b	c	d	e	f	g
		M.Sc Thesis	X	X	X	X	X	X	X

Matrix the targeted General and transferable skills of the Animal biotechnology master program

No.	Course No.	Course title	General and transferable skills							
			a	b	c	d	e	f	g	h
1		English language						X		
2	A-80	Computer	X							
3		Research and research methodology				X				
4	B4-27	Special topics		X						
5	B4-28	Seminars		X						
6	A-23	Biotechnology I								X
7	B4-3	Animal cell culture I			X					
1	A-18	Biological electron microscope	X							
2	A-82	Virology	X							
3	A-34	Electroporation and electrofusion			X					
4	B4-10	Aquatic biotechnology	X							
5	B4-13	Embryo manipulation		X						
6	B4-17	Mammalian cell biotechnology		X						
7	B4-8	Aquaculture	X							
8	B4-12	Breeding and cultivation of fish								X
9	B7-23	Immunoassays				X				
10	B1-85	Protein Structure and Function Relationship				X				
11	B1-46	Molecular Entomology	X							
12	B1-54	Molecular immunology							X	
13	B1-32	Animal Molecular Pathology		X						
14	C-78	Methods in molecular virology			X					



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No.	Course No.	Course title	General and transferable skills							
			a	b	c	d	e	f	g	h
15	C-101	Practical approach in PCR						X		
16	C-5	Animal gene transfer and expression protocols					X			
17	C-15	Current techniques in animal reproduction								
MSc Thesis			X	X	X	X	X	X	X	X
Head of Department: Prof. Omaima Khamiss			Program coordinator Assoc Prof. Medhat Hashem							