Department of Environmental Biotechnology

Environmental Master Index

Academic Reference Standards for Master Program of Environmental biotechnology

Academic Reference Standards (ARS) for Master's Postgraduate Studies, NAQAAE, March 2009.

1. Attributes of the graduate:

The graduate of Master program of any specialty must be able to:

1.1. Master basics and methodologies of scientific research and the use of different tools.

1.2. Apply the analytical method and its use in the field of specialization.

1.3. Apply and integrate specialized knowledge with the relevant knowledge in professional practice.

1.4. Demonstrate awareness of the ongoing problems and visions in the modern area of specialization.

1.5. Identify and solve professional problems.

1.6. Master appropriate scale of the professional skills, and use of appropriate technological means to serve his /her 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 his/her role in community development and environmental conservation according to global and regional changes.

1.11. Behave to reflect commitment to act with integrity, credibility and to the rules of the profession.

1.12. Dedicate to academic and 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 must have sufficient knowledge & understanding of:

2.1.1. Basic facts, theories, of the specialty and related subjects/ fields.

2.1.2. Mutual relation between professional practice and effects on environment.

2.1.3. Main scientific advances in the field of practice.

2.1.4. Fundamentals of ethical & legal practice.

2.1.5. Quality standards of the 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 must be able to do the following (related to the specialty):

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 risks imposed during professional practice.

2.2.6. Plan for professional improvement.

2.2.7. Take professional decisions in a wide range of professional situations.

2.3. Professional & Practical skills:

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

2.3.1. Competent in all basic and some of the advanced professional skills.

2.3.2. Write and appraise reports

2.3.3. Evaluate methods and tools used in specialty.

2.4. General & transferable skills:

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

2.4.1. Communicate effectively using all methods.

2.4.2. Use information technology to improve his/her professional practice.

2.4.3. Practice self appraisal and determines his/her learning needs.

2.4.4. Use different sources of information to obtain data.

2.4.5. Share in determination of standards for evaluation of others (e.g.: subordinates/ trainees etc.)

2.4.6. Work in teams and lead teams in situations comparable to his/her work level.

2.4.7. Manage time effectively.

2.4.8. Learn independently and seek continuous learning.

Academic Reference Standards (ARS) for Environmental Biotechnology Master Program

1. Graduate Attributes of the Program:

The graduate of the master program must be able to:

1.1. Master basics, methodologies of different scientific research tools in the field of environmental biotechnology.

1.2. Apply the analytical method and its use in the field of environmental biotechnology.

1.3. Apply and integrate specialized knowledge with the relevant knowledge in professional practice.

1.4. Demonstrate awareness of the role of environmental biotechnology to solve ongoing problems on the environmental scale.

1.5. Identify and solve professional problems.

1.6. Master appropriate scale of the professional skills, and use of appropriate technological means to serve his /her 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 his/her role in community development and environmental conservation

1.11. Behave to reflect commitment to act with integrity, credibility and to the rules of the profession.

1.12. Dedicate to academic and professional self-development and continuous learning.

2- Program Academic standards:

2.1 Knowledge & Understanding

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

2.1.1 Basic facts, theories of the environmental biotechnology and related subjects.
2.1.2 Mutual relation between professional practices of environmental biotechnology and its effects on environment.
2.1.3 Main scientific advances in environmental biotechnology.
2.1.4 Ethical and legal fundamentals and their application in the field of environmental biotechnology researches.
2.1.5 Quality standards in the field of environmental biotechnology.
2.1.6 Basics and ethics of scientific research in the field of environmental biotechnology.

2.2 Intellectual Skills

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

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

2.3. Professional skills:

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

2.3.1. Be competent in all basic and some of the advanced professional skills in environmental biotechnology fields.
2.3.2 Write and appraise reports about environmental biotechnology.

2.3.3 Evaluate methods and tools used in environmental biotechnology fields.

2.4. General & Transferable skills

By the end of Master Program, the graduate must 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.

I

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
3.1.	X				
3.1.2		X			
3.1.3			X		
3.1.4				X	
3.1.5					X

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

Environmental Biotechnology

Master

Program Specification

(2016/2017)

University: Sadat city.

Institute: Genetic engineering and Biotechnology Research Institute

Program Specification

A-Basic Information

1- Program title: Master of Science in Environmental Biotechnology

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

Department: Environmental Biotechnology

Program coordinator: Dr. Ayman Said Eldourghamy

Program Approval Date: 19/10/2016

B- Professional Information:

1- Program aims:

Preparation of Master graduate capable of:

1.1 Improving skills of the graduate in collecting evidences of environmental problems and recall recent information to solve them.

1.2 Prepare graduate to show self-learning abilities and to be able to practice the scientific research in the field of environmental biotechnology.

1.3 Providing students with the basics, ethics and methodologies of scientific research and the use of its tools in the field of environmental biotechnology.

1.4 Applying analytical methods, specialized knowledge and using appropriate technological means to work individually or in team.

1.5 Acquiring students the skills of effective communication, integrity, decision making, credibility and commitment to community development and environmental conservation.

2- Intended learning outcomes (ILOs):

2/1 Knowledge and understanding:

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

a- Describe the basic facts and theories of biological industrial effluent treatment, bioremediation, genetic toxicology and environmental microbiology.

b – Express the mutual relation between biodegradation with agriculture and environment.

c – Classify the main scientific bases of using biofertilizer, hazard identification and biopesticides on the environment.

d – Summarize the fundamental of ethical and legal practice in the field of biological treatment of industrial effluent and toxicants in environment.

e- Express the quality standards of the practice during the analysis and determination of environmental chemistry.

f- Summarize the basics and ethics of environmental scientific research.

g- Write lists of scientific terms of English language of environmental area.

2/2 Intellectual skills:

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

a- Appoint suitable methods for biological treatment of industrial effluents.

b- Analyze and determine the environmental hazards, biofertilizer and microorganisms in environment.

c- Compare between different methods of bioremediation.

d- Integrate different information to solve the problems of genetic toxicology.

e- Interoperate the biopesticides and toxicants in environment.

f- Conduct the scientific research to solve the problems of environmental pollution.

g- Derive risks facing researchers during the treatment and analysis of environmental pollutants.

h- Take a professional decision for suitable methods of biological waste management.

i- Plan Paraphrasing English technical terms used in scientific researches.

2/3 Professional Skills:

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

a – Apply the different analytical methods for determination and analysis of environmental pollutants and its treatment and PCR methods.

b – Measure and evaluate environmental hazards.

c – Evaluate techniques and tools during the experimental part of research.

d- Prepare technical reports and scientific essay

2/4 General and transferable Skills:

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

a- Communicate effectively using all methods with public, collegeous and appropriate authorities.

b- Use information technology to improve professional practice in internet and relative information.

c- Practice self appraisal and determines his learning needs.

d- Use different sources of information to obtain data for a given course topic.

e- Work in teams and manage time effectively.

f- Work as team leader in situation comparable to his level.

g- Learn independently and seek continuous learning in environmental biotechnology.

h- Take professional decision for suitable methods of biological waste management.

i- Manage time efficiently with other groups.

3- Program Academic standards:

3.1 Knowledge & Understanding

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

3.1.1 Basic facts, theories of the environmental biotechnology and related subjects.

3.1.2 Mutual effects between professional practices of environmental biotechnology effects on environment.

3.1.3 Main scientific advances of environmental biotechnology practice.

3.1.4 Ethical and legal fundamentals and their application in the field of environmental biotechnology researches.

3.1.5 Quality standards of professional practice in the field of environmental biotechnology.

3.1.6 Basics and ethics of scientific research in the field of environmental biotechnology.

3.2 Intellectual Skills

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

3.2.1 Interpret, analyze & evaluate the information to solve problems in the field of environmental

biotechnology.

3.2.2 Solve some problems that do not conform to classic data regarding environmental biotechnology.

3.2.3 Integrate different information to solve professional problems in the field of environmental biotechnology.

3.2.4 Conduct a scientific research and/ or write scientific systematic approach to a research problem (hypothesis) in the field of environmental biotechnology.

3.2.5 Evaluate professional risks of environmental biotechnology.

3.2.6 Plan for professional improvement in the field environmental biotechnology.

3.2.7 Take professional decisions in environmental biotechnology fields.

3.3. Professional skills:

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

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

3.3.2 Write and appraise reports about environmental biotechnology.

3.3.3 Evaluate methods and tools used in environmental biotechnology fields.

3.4. General & Transferable skills

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

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- Bench Marks:

M.Sc. of Environmental Biotechnology program. The university of western Australia.

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

5- Curriculum Structure and Contents:

a. Program duration: 2 years min.

b. Program structure:

No. of hours/units: 36 Units

Lectures	27	Lab./ Exercise	18	Total	45
Compulsory	32	Optional	-----	Elective	13

	No.	%
▪ Basic sciences courses	10	23
▪ Social sciences and humanity courses	3	7
▪ Specialized courses	31	70
▪ Other sciences courses		

	No.	%
▪ Practical (Thesis)	The time spent in achievement of a thesis (8 hrs/week)	

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

Not Applicable

6. Program courses:

a- Compulsory (General Courses):

Code No.	Course Title	No. of Units	No. of hours/week		
			Lect.	Ex.	Lab/ App
	English language	3	3		
	Research and research methodology	6	2		8
A-23	Biotechnology I	3	3		
A-80	Computer I	3	2		2
B6-34	Hazard Identification	3	3		
B6-47	Special topics	3	3		
B6-48	Seminars	3	---		6
	Total	24	16		16

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

Code No.	Course Title	No. of Units	No. of hours/week		
			Lect.	Ex.	Lab/ App.
B6-1	Agriculture and Environment	3	3		
B6-6	Biodegradation in Environment	3	3		
B6-8	Biofertilizes	3	3		
B6-10	Biological industrial effluents treatments	3	3		
B6-11	Biological waste management	3	3		
B6-13	Biopesticides	3	3		
B6-16	Bioremediation	3	3		
B6-20	Environmental microbiology	3	3		
B6-23	Environmental chemistry	3	3		
B6-32	Genetic toxicology	3	3		

B6-44	Toxicants in the environment	3	3		
C-101	Methods approach in PCR	3	2		2

c- M.Sc. thesis

All MSc-degree students should prepare a thesis in Environmental 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 Environmental 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 Contents:

Code No.	Course Title	Contents
	English Language	1. Introduction and definition of English language and its relation to the study of Genetic Engineering and Biotechnology (GEB). 2. Historical perspective of this study and the role of language as a means. 3. Scope and importance of (GEB) through language debates in lecture. 4. Describing experiments and their processes in language workshops inside lectures in two or more groups with commentary. 5. Suggesting paper handouts on topics such as: polymerase chain reaction, DNA profiling, human genome projects, and gene transfer technique. 6. Public perception of Biotechnology in Arab countries in general and Egypt in particular with anecdotes. 7. Unite operations and lab experiments description.
A - 80	Use of Microcomupters (Computer)	1. Introduction: Definition, History & Generation of Computers. 2. Types of Computer and Block Diagram of Computer System 3. Memory concept: memory cell, types of memory (primary memory & secondary memory). 4. Input & Output Devices and Non-Impact Printers – Inkjet printer, Laser printer, Plotter 5. Algorithms, Flowcharts & Languages: Definitions- Algorithm, Flowchart, Program, Compiler, Interpreter, Hardware, Software. 6. Symbols used for flowchart and Some sample Algorithms & Flowcharts. 7. Network Concepts: Introduction to computer network and Types of network- LAN, WAN, MAN, Internet
A-23	Biotechnology I	1. BioProcess Technology: the technology of culturing cells and unicellular organisms for biological molecule production 2. Genetic Technology: tools and techniques for genetic analysis and applications to food and healthcare industries 3. Immunodiagnostics: the generation of antibodies and development of antibody-based technologies for application in

Code No.	Course Title	Contents
		diagnostic and research laboratories 4. Protein Technology: how protein synthesis and function have been enhanced to produce biopharmaceutical and industrial proteins on a commercial scale 5. Quality Standards: quality standards for the efficient and safe running of industrial biotechnology enterprises. 6. Bioremediation 7. Biotechnology Resources: Periodicals, Web Sites, General Science Journals. Biotech Education & Careers
B6-34	Hazard Identification	1. Hazard identification. 2. Types of hazards 3. Relation between hazards and risks 4. Hazard evaluation, severity and probability 5. Control measure of hazards 6. Ethical issues that may arise from chemical industrial processes 7. Emergency and preparedness
	Research and Research methodology I	1. Methods of thinking 2. What is the Research and how to read an article 3. Research Design 4. The Ethics and Politics of the Research . 5. Survey research 6. Observation; Documents and archives
	Special Topics (B6-47)	1. -7 Based on the subject of students thesis
	Seminars	1. Reading background material; how to analyze the audience; What are their needs, constraints, knowledge level? a assignment criteria 2. Preparing and delivering a talk, demonstrate an understanding of the main points of tutorial readings, and additional relevant information. 3. Expressing the proper own conclusions about the opinion/argument/ thesis that the author is trying to express. How to demonstrate an ability to evaluate the strengths and weaknesses in the material presented in the texts. 4. Preparing handouts and visual aids; Structuring the Oral Presentation in his thesis 5. Preparing relevant and thought-provoking questions and leading a group discussion. 6. Submitting a written assignment based on the presentation topic, estimating timing and tutorial discussion, and how to answer questions 7. Observation; repetition, and pre-evaluation. .
B6-1	Agriculture and Environment	1. Introduction 2. The environmental factors in Agriculture 3. The effect of the air, soil and water pollutants 4. Physio-genic plant diseases 5. Environmental microbiology 6. Biocontrol 7. Biofertilizers
B6-6	Biodegradation in Environment	1. Biotechnology and Biodegradation 2. Aerobic and anaerobic degradation of the hydrocarbons 3. Biodegradation of halogenated organic compounds

Code No.	Course Title	Contents
		4. Biodegradation of N-containing Xenobiotics 5. Biodegradation of Dioxins and Dioxin- like compounds 6. Aromatic Hydrocarbon dioxygenase 7. The Extent of microbial catalysis and biodegradation estimation methods
B6-8	Biofertilizes	1. Introduction of Biofertilizers 2. Rhizobium inoculants 3. Azospirillum inoculants 4. Azotobacter inoculants 5. Azolla & Microrhizae inoculants 6. Phosphate solubilizing bacteria 7. Organic matter and composting
B6-10	Biological industrial effluents treatment	1. Introduction of biological industrial effluents treatments 2. Conventional methods of treatment 3. Advanced methods of treatment 4. Biodegradation of polycyclic aromatic hydrocarbons 5. Biological control of air pollution 6. Biomethanogenesis 7. Treatment of industrial solids
B6-11	Biological waste management	1. Introduction 2. Water and solid wastes 3. Environmental standards 4. Biology of wastewater treatment 5. Solid waste management 6. Wastewater treatment 7. Bioremediation
B6-13	BiopesticideS	1. Biochemical pesticides 2. Microbial pesticides 3. Plant pesticides 4. Plant incorporated protectant rules 5. Herbicides tolerant plants 6. Organic farming 7. Modern biotechnology of pesticides
B6-16	Bioremediation	1. Bioremediation of compounds hazardous to health and the environment: An overview 2. Biodegradation of fuel oils and lubricants: Soil and water bioremediation options. 3. Sewage treatment systems: Microbiological aspects 4. Microbial degradation of xenobiotics : Biochemical aspects and ecological implication 5. Microbial variables for bioremediation of heavy metals from industrial effluents 6. Oxidation of organic and inorganic sulfur compounds by aerobic heterotrophic marine bacteria 7. Sewage treatment systems: Microbiological aspects

Code No.	Course Title	Contents
B6-20	Environmental microbiology	1. Introduction of environmental microbiology 2. Prokaryotes and Eukaryotes 3. Fungi and algae associations 4. Methods in environmental microbiology 5. Water and biosolids microbiology 6. Biotechnology of Biocontrol and Nitrogen fixation 7. Environmental biotechnology and industry
B6-23	Environmental chemistry	1. Introduction in environmental chemistry 2. Environmental science, technology and chemistry 3. Oxidation – Reduction reactions and Phase interactions 4. Atmosphere and atmospheric chemistry 5. Water pollution 6. Soil environmental chemistry and Soil pollutants 7. Analytical methods for environmental pollutants
B6-32	Genetic toxicology	1. Introduction and historical perspective of genetic toxicology 2. Genotoxicity Assays 3. Molecular and biochemical toxicology 4. Overview of molecular techniques in toxicology: genes and transgenes 5. Toxicogenomics 6. Environmental DNA damage 7. Categorization of agents associated with carcinogenesis
B6-44	Toxicants in environment	1. Major categories of environmental toxicants 2. Organic toxicants 3. Inorganic toxicants 4. Industrial toxicants 5. Agricultural toxicants 6. Manmade Ionizing Radiation and Radioactivity 7. Microwaves and Ultraviolet Radiation
c-101	Methods approach in PCR	1. PCR: Introduction, environment and basic principles 2. PCR assays 3. Identification of PCR products 4. Applications of PCR assays 5. Optimization of the PCR 6. PCR: Troubleshootings 7. Practical PCR: setting up PCR lab, experiment and electrophoresis of PCR product DNA

8. Program admission requirements:

- Bachelor degree from appropriate practical faculty from Egyptian or an equivalent university with general grade (Acceptable) or Diploma in Environmental pollution or equivalent.

9. Regulations for progression and program completion:

Successful completion of the required courses (equivalent to at least 12units 4 courses containing at least one practical course) 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
Pass	From 60 to less than 70 degrees

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

10. 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	Oral Exam (14^{th}) Week.	Measure Analysis, Presentation and Discussion Skills.
4	Written (Final) Exam (15^{th}) Week.	Measure Remembering & Innovating Skills.
5	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.

11. 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	Others	Not Applied	---------

Program coordinator: Dr./ Ayman Said Eldourghamy

Head of department: Prof. Dr./ Nashwa Mokhtar Hassan Rizk

Matrix of Courses and Targeted Knowledge and Skills of the Program

No.	Course No.	Course title	Knowledge and understanding							
			a	b	c	d	e	f	g	
1		English language							X	
2		Research and research methodology I						X		
3	A-23	Biotechnology I	X							
4	A-80	Computer							X	
5	B6-34	Hazard Identification			X					
6	B6-47	Special topics						X		
7	B6-48	Seminars						X		
8	B6-1	Agriculture and Environment		X						
9	B6-6	Biodegradation in Environment		X						
10	B6-8	Biofertilizes			X					
11	B6-10	Biological industrial effluents treatment	X			X				
12	B6-11	Biological waste management				X				
13	B6-13	Biopesticides			X					
14	B6-16	Bioremediation	X							
15	B6-20	Environmental microbiology	X							
16	B6-23	Environmental chemistry					X			
17	B6-32	Genetic toxicology	X							
18	B6-44	Toxicants in environment				X				
19	C-101	Methods approach in PCR					X			
MSc Thesis			X	X	X	X	X	X	X	

No.	Course No.	Course title	Intellectual abilities								
			a	b	c	d	e	f	g	h	i
1		English language									X
2		Research and research methodology I								X	
3	A-23	Biotechnology I								X	
4	A-80	Computer I	X								
5	B6-34	Hazard Identification		X					X		
6	B6-47	Special topics								X	
7	B6-48	Seminars									X
8	B6-1	Agriculture and Environment						X			
9	B6-6	Biodegradation in Environment						X			
10	B6-8	Biofertilizes		X							
11	B6-10	Biological industrial effluents treatment	X					X			
12	B6-11	Biological waste management	X						X	X	
13	B6-13	Biopesticides					X				
14	B6-16	Bioremediation			X			X		X	
15	B6-20	Environmental microbiology		X				X			
16	B6-23	Environmental chemistry					X				
17	B6-32	Genetic toxicology				X					
18	B6-44	Toxicants in environment					X				
19	C-101	Methods approach in PCR							X		
MSc Thesis			X	X	X	X	X	X	X	X	X

No.	Course No.	Course title	Professional and practical skills			
			a	b	c	d
1		English language	-			
2		Research and research methodology I				X
3	A-23	Biotechnology I			X	X
4	A-80	Computer I	X			
5	B6-34	Hazard Identification		X		
6	B6-47	Special topics				X
7	B6-48	Seminars		X		
8	B6-1	Agriculture and Environment			X	
9	B6-6	Biodegradation in Environment	X		X	
10	B6-8	Biofertilizes			X	
11	B6-10	Biological industrial effluents treatment	X			
12	B6-11	Biological waste management	X			
13	B6-13	Biopesticides			X	
14	B6-16	Bioremediation	X			
15	B6-20	Environmental microbiology		X		
16	B6-23	Environmental chemistry		X		
17	B6-32	Genetic toxicology				X
18	B6-44	Toxicants in environment		X	X	
19	C-101	Methods approach in PCR	X		X	
MSc Thesis			X	X	X	X

No.	Course No.	Course title	General and transferable skills								
			a	b	c	d	e	f	g	h	i
1		English language			X						
2		Research and research methodology I				X					
3	A-23	Biotechnology I							X		
4	A-80	Computer I		X							
5	B6-34	Hazard Identification				X					
6	B6-47	Special topics				X			X		
7	B6-48	Seminars			X	X					
8	B6-1	Agriculture and Environment	X								
9	B6-6	Biodegradation in Environment									
10	B6-8	Biofertilizes					X				
11	B6-10	Biological industrial effluents treatment	X							X	
12	B6-11	Biological waste management	X							X	
13	B6-13	Biopesticides							X		
14	B6-16	Bioremediation					X				
15	B6-20	Environmental microbiology	X								
16	B6-23	Environmental chemistry			X						
17	B6-32	Genetic toxicology			X						
18	B6-44	Toxicants in environment							X		
19	C-101	Methods approach in PCR						X			X

No.	Course	Course title	General and transferable skills								
MSc Thesis			X	X	X	X	X	X	X	X	X

The matrix between Program ARS and Program ILO's

2/1 (Knowledge & Understanding)

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

2/2 Intellectual Skills

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

2/3/1 (Practical and Professional Skills)

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

2/3/2 (General and Transferable skills)

Program Academic Standard	Program ILO's (General and Transferable skills)								
	2/4/a	2/4/b	2/4/c	2/4/d	2/4/e	2/4/f	2/4/g	2/4/h	2/4/i
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									X

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