Program index

Contents

Department of Plant Biotechnology

I

Academic Reference Standards for Doctorate Postgraduate Studies of Plant Biotechnology

Academic Reference Standards (ARS) for Doctorate Postgraduate Studies, NAQAAE, March 2009

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

1.1. Doctorate 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. Doctorate 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. Show awareness of his/her role in community development and environmental conservation.
1.14. Reflect the commitment to integrity and credibility of the profession and its rules
1.15. Commit him/her self to continuous self-development and to transfer knowledge and experience to others

2- General academic standards:

2.1. Knowledge & Understanding:

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

2.3.1. Doctorate 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 be able to:
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.

Doctorate Program Reference Academic Standards

1. Program Graduate Attributes

The graduate of the program must be able to:

1.1. Doctorate basics and methodologies of scientific research in the field of plant biotechnology.
1.2. Add to the knowledge in the field of plant biotechnology.
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 field of plant biotechnology.
1.6. Identify professional problems and find innovative solutions.
1.7. Doctorate 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. Show awareness of his/her role in community development and environmental conservation.
1.14. Reflect the commitment to integrity and credibility of the profession and its rules
1.15. Commit him/her self to continuous self-development and to transfer knowledge and experience to others

2- Program Academic standards:

2.1 Knowledge & Understanding

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

2.1.1 Basic facts, theories and recent advances of the plant biotechnology and related subjects.

2.1.2 Basics, methodologies and scientific research ethics as its different tools

2.1.3 Ethical and legal fundamentals (research writing – supervising – authorizing – applying) and their applications on the field of plant biotechnology.
2.1.4 Quality standards of professional practice in the field of plant biotechnology.
2.1.5 Knowledge related to the professional practice impact on the 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 field of plant biotechnology.
2.2.2 Solve the specialized problems according to available data of plant biotechnology.
2.2.3 Conduct research studies that add knowledge to plant biotechnology.
2.2.4 Write and publish scientific articles in the field of plant biotechnology.
2.2.5 Evaluate professional practice risks in plant biotechnology.
2.2.6 Plan to improve specialty performance in the field of plant biotechnology.
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 able to:

2.3.1 Doctorate basic and advanced professional skills in the field of plant biotechnology.
2.3.2 Write and appraise professional reports about plant biotechnology.
2.3.3 Evaluate and improve methods and tools used in the field of plant biotechnology.
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

	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

Prog 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

Prog 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

Prog 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

Prog 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 Plant Biotechnology

Plant Biotechnology
Doctorate
Program Specification
(2015/2016)

A-Basic Information

1- Programme title: Doctorate in Plant Biotechnology
2- Program type: Single √ Double Multiple
3- Department: Plant Biotechnology
4- Program Coordinator: Dr. / Metwally Bekhit
5- Program Approval Date: 20 /10 /2015
6- Program internal reviewer: Ass.Prof. Dr. Yehia Khedr, (GEBRI, University of Sadat City)
7- Program external reviewer:Prof.Dr. Abd Alfatah Badr(Faculty of science Helwan University)

B- Professional Information:

1- Program aims:

1.1. To prepare distinguished graduates capable to apply the most recent techniques in the field of plant biotechnology.
1.2. To develop student environmental knowledge and skills to solve the theoretical and practical biotechnological problems in plants.
1.3. To help students to acquire the skills of writing and publishing research papers in plant biotechnology journals and scientific conferences.
1.4. To develop the student research team-work skills and setting research rules in the field of plant biotechnology.
1.5. To 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 plant biotechnology.

2- Intended learning outcomes (ILOs):

2/1 Knowledge and understanding:

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

a. Clarify differences relations between basic facts & theories of, plant tissue culture, plant nematology, and plant physiology and environmental stress, biotechnology of general issues and application of plant biotechnology.
b. Explain how crop plants developed; genetically protect themselves and the role of the morphology in the evolution of those plants and creation of plant growth regulators.
c. Divide the different methods of miropropagation, and the main scientific parts of using molecular biology and genetic engineering on the field of plant biotechnology.
d. Express the basic rules of genetic transformation and gene expression and methods of their evaluation, application and improvement.
e. Remolding the actual quality standards of the practical analysis of natural products from plants and biotechnology.
f. Explain basics and ethics of using computational analysis of scientific research fields

g. Summarize basics of the various types of field crop biotechnology, plant breeding and protoplast fusion.

2/2 Intellectual abilities:

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

a. Evaluate information in plant biotechnology, techniques of tissue culture and different methods of plant transformation, plant breeding, plant development, plant physiology and related specialties.
b. Determine problems in different fields related to plant biotechnology.
c. Find solution for the majority of problems using biotechnology in different applications.
d. Suggest research studies that add knowledge to the existing plant biotechnology.
e. Design enhancement and improvement approaches to practice using plants.
f. Innovate solutions regarding to plant biotechnology.
g. Suggest paraphrase English and German technical terms that used in scientific researches and programs for plant breeding to various stresses of the environment.

2/3 Professional skills:

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

a. Estimate methods of plant natural products and various tools used in plant biotechnology area and select advanced professional skills in plant biotechnology.
b. Prepare professional development to improve practice and enhance performance in plant biotechnology branches.
c. Perform technical reports in plant biotechnology research analysis for simplifying assessment by using English and German terminologies
d. Test the different analytical methods for analysis of plant products, plant stresses and analyze experimental results and determine their strength and validity.
e. Diagnose of the plant pathology, nematology and different scientific problems in the field of plant biotechnology.
f. Working knowledge of laboratory techniques used in plant biotechnology.

2/4. General and transferable skills:

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

a- Work in team with public, collegeous and appropriate authorities.
b- Show management skills for using information technology to improve his/her 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 and manage time effectively.
e- Show self learning abilities in situation comparable to his/her level.
f- Use audio and video means for displaying information to learn independently and seek continuous learning in plant biotechnology research.

3- Program Academic standards:

Academic Standards of plant Biotechnology PhD program was prepared according to **Graduate Attributes from NAQAAE and** approved in department council № ( ) date /9/ 2015, and in faculty council № ( ) date / / 2015.

3.1 Knowledge & Understanding

By the end of the study of postgraduate diploma of any specialty, graduate must have sufficient knowledge & understanding of:

3.1.1 Basic facts, theories and recent advances of the environmental biotechnology and related subjects.
3.1.2 Basics, methodologies and scientific research ethics as its different tools
3.1.3 Ethical and legal fundamentals (research writing – supervising – authorizing – applying) and their applications on the field of environmental biotechnology.
3.1.4 Quality standards of professional practice in the field of environmental 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, evaluate and deduce the information in the field of environmental biotechnology.
3.2.2 Solve the specialized problems according to available data of environmental biotechnology.
3.2.3 Conduct research studies that add knowledge to environmental biotechnology.
3.2.4 Write and publish scientific articles in the field of environmental biotechnology.
3.2.5 5 Evaluate professional practice risks in environmental biotechnology.
3.2.6 Plan to improve specialty performance in the field of environmental 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 environmental biotechnology.
3.3.2 Write and appraise professional reports about environmental biotechnology.
3.3.3 Evaluate and improve methods and tools used in the field of environmental 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 Marks: ARS

There is bench mark for specialist interest in plant biotechnology Department.

Doctorate of Biotechnology (Plant Biotechnology) The University of Adelaide, Australia
http://www.adelaide.edu.au/degree-finder/mbiot_mbiotechpb.html

5. Curriculum Structure and Contents:

a. Program duration: at least 3 years.

b. Program structure: No. of hours/units: 36

Lectures	28	Lab./Exercise	16	Total	44

Compulsory	32	Optional	---	Elective	12

	No.	%
▪ **Basic sciences courses**	7	63.6
▪ **Social sciences and Humanity courses**	1	9
Specialized courses	4	36.4
▪ **Other sciences courses**		

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

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

6. Program courses:

a- Compulsory (General Courses):

	Code No.	Course Title	No. of Units (hrs)	No. of hours/week			Year/Level	Semester
				Lect.	Ex.	App.		
1		Research and research methodology	6	2	-	8		
2	A-24	Biotechnology II	3	3	-	-		
3	A-48	German language	3	3	-	-		
4	A-81	Use of Microcomputer: level 3	3	2		2		
5	B3-41	Plant biotechnology	3	3	-	-		
6	B3- 65	Special topics	3	3	-	-		
7	B3- 66	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			Year/Level	Semester
				Lect.	Ex.	Lab/ App.		
8	A-17	Biochemistry of plant growth regulators	3	3				
9	A-67	Plant breeding for environmental stress	3	3				
10	B3-2	Advanced plant breeding II	3	3				
11	B3-3	Advanced plant physiology	3	3				
12	B3-6	Analysis of natural products	3	3				
13	B3-8	Medicinal and aromatic plant biotechnology	3	3				
14	B3-13	Breeding of diseases resistant plants	3	3				
15	B3-14	Breeding of insect resistant plants	3	3				
16	B3-18	Evolution of crop plants	3	3				
17	B3-21	Field crop biotechnology II	3	3				
18	B3-22	Field crop biotechnology III	3	3				
19	B3-24	Fruit biotechnology	3	3				
20	B3-25	Gene manipulation in plants	3	3				
21	B3-34	Micropropagation	3	3				
22	B3-39	Mutation breeding	3	3				
23	B3-44	Plant cell culture	3	3				
24	B3-47	Plant ecophysiology	3	3				
25	B3-49	Plant genetic protection	3	3				
26	B3-53	Plant protoplast and genetic engineering	3	3				

	Code No.	Course Title	No. of Units	No. of hours/week			Year/Level	Semester
				Lect.	Ex.	Lab/ App.		
27	B3-60	Tissue culture of horticulture crops	3	3				
28	C-90	Molecular methods in plant pathology II	3	2	2			
29	C-95	Plant gene transfer and expression protocols	3	2	2			

c. PhD dissertation (at least three academic years)

All PhD-degree students should prepare a thesis in Plant 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 Department of Plant 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:

Master degree from the Institute or from an equivalent.

7. Regulations for progression and program completion:

- Successful completion of the required courses (equivalent to at least18 units) in addition to compulsory courses: German language, advanced computer, Research and research, 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 for Evaluating program Applicants:

No.	Method	Intended Learning Outcomes ' ILO's '
1	Semester Works(5th&10th)	Measure Problems Solving Skills, Presentation, and Self learning.
2	Midterm Exam (6th) Week.	Measure Abilities on Concentration and Understanding Scientific Points & Background.
3	Oral Exam (14th) Week.	Measure Analysis, Presentation and Discussion Skills.
4	Written (Final) Exam (15th) Week.	Measure Knowledge, Understanding, Intellectual and Professional skills.
5	PhD dissertation	To assess the ability to write a review of literature, 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	Staff	Questionnaire	---------

Program coordinator: Dr. / Metwally Bekhit

Head of department: Prof. Dr. / Haroun Aboshama

Matrix of courses and ILO's (Knowledge and Skills) of Plant Biotechnology Doctorate Program Targeted

No.	Course No.	Course title	Knowledge and understanding						
			a	b	c	d	e	f	g
1		Research and research methodology						x	
2	A-17	Biochemistry of plant growth regulators		x					
3	A-24	Biotechnology II	x						
4	A-48	German language						x	
5	A-67	Plant breeding for environmental stress							x
6	A-81	Use of Microcomputer: level 3						x	
7	B3-2	Advanced plant breeding II							x
8	B3-3	Advanced plant physiology	x						
9	B3-6	Analysis of natural products					x		
10	B3-8	Medicinal and aromatic plant biotechnology					x		
11	B3-13	Breeding of diseases resistant plants							x
12	B3-14	Breeding of insect resistant plants							x
13	B3-18	Evolution of crop plants		x					
14	B3-21	Field crop biotechnology II							x
15	B3-22	Field crop biotechnology III							x
16	B3-24	Fruit biotechnology	x						
17	B3-25	Gene manipulation in plants			x				
18	B3-34	Micropropagation			x				
19	B3-39	Mutation breeding							x
20	B3-41	Plant biotechnology	x						
21	B3-44	Plant cell culture	x						
22	B3-47	Plant ecophysiology	x						
23	B3-49	Plant genetic protection		x					
24	B3-53	Plant protoplast and genetic engineering							x
25	B3-60	Tissue culture of horticulture crops	x						
26	B3- 65	Special topics						x	
27	B3- 66	Seminars						x	
28	C-90	Molecular methods in plant pathology II			x				
29	C-95	Plant gene transfer and expression protocols				x			
PhD Thesis			x	x	x	x	x	x	x

No.	Course No.	Course title	Intellectual skills						
			a	b	c	d	e	f	g
1		Research and research methodology				x			
2	A-17	Biochemistry of plant growth regulators	x						
3	A-24	Biotechnology II				x			
4	A-48	German language							x
5	A-67	Plant breeding for environmental stress							x
6	A-81	Use of Microcomputer: level 3					x		
7	B3-2	Advanced plant breeding II							x
8	B3-3	Advanced plant physiology	x						
9	B3-6	Analysis of natural products						x	
10	B3-8	Medicinal and aromatic plant biotechnology		x					
11	B3-13	Breeding of diseases resistant plants							x
12	B3-14	Breeding of insect resistant plants							x
13	B3-18	Evolution of crop plants	x						
14	B3-21	Field crop biotechnology II		x					
15	B3-22	Field crop biotechnology III		x					
16	B3-24	Fruit biotechnology		x					
17	B3-25	Gene manipulation in plants			x				
18	B3-34	Micropropagation	x						
19	B3-39	Mutation breeding							x
20	B3-41	Plant biotechnology	x						
21	B3-44	Plant cell culture	x						
22	B3-47	Plant ecophysiology		x					
23	B3-49	Plant genetic protection		x					
24	B3-53	Plant protoplast and genetic engineering						x	
25	B3-60	Tissue culture of horticulture crops			x				
26	B3- 65	Special topics					x		
27	B3- 66	Seminars					x		
28	C-90	Molecular methods in plant pathology II						x	
29	C-95	Plant gene transfer and expression protocols	x						
PhD Thesis			x	x	x	x	x	x	x

No.	Course No.	Course title	Professional Skills					
			a	b	c	d	e	f
1		Research and research methodology			x			
2	A-17	Biochemistry of plant growth regulators		x				
3	A-24	Biotechnology II	x					
4	A-48	German language			x			
5	A-67	Plant breeding for environmental stress				x		
6	A-81	Use of Microcomputer: level 3		x				
7	B3-2	Advanced plant breeding II					x	
8	B3-3	Advanced plant physiology			x			
9	B3-6	Analysis of natural products	x					
10	B3-8	Medicinal and aromatic plant biotechnology				x		
11	B3-13	Breeding of diseases resistant plants		x				
12	B3-14	Breeding of insect resistant plants		x				
13	B3-18	Evolution of crop plants		x				
14	B3-21	Field crop biotechnology II						x
15	B3-22	Field crop biotechnology III						x
16	B3-24	Fruit biotechnology						x
17	B3-25	Gene manipulation in plants					x	
18	B3-34	Micropropagation						x
19	B3-39	Mutation breeding					x	
20	B3-41	Plant biotechnology						x
21	B3-44	Plant cell culture					x	
22	B3-47	Plant ecophysiology			x			
23	B3-49	Plant genetic protection		x				
24	B3-53	Plant protoplast and genetic engineering				x		
25	B3-60	Tissue culture of horticulture crops				x		
26	B3- 65	Special topics					x	
27	B3- 66	Seminars					x	
28	C-90	Molecular methods in plant pathology II					x	
29	C-95	Plant gene transfer and expression protocols		x				
PhD Thesis			x	x	x	x	x	x

No.	Course No.	Course title	General and transferable Skills					
			a	b	c	d	e	f
1		Research and research methodology	x					
2	A-17	Biochemistry of plant growth regulators					x	
3	A-24	Biotechnology II	x					
4	A-48	German language						x
5	A-67	Plant breeding for environmental stress					x	
6	A-81	Use of Microcomputer: level 3		x				
7	B3-2	Advanced plant breeding II					x	
8	B3-3	Advanced plant physiology						x
9	B3-6	Analysis of natural products		x				
10	B3-8	Medicinal and aromatic plant biotechnology				x		
11	B3-13	Breeding of diseases resistant plants					x	
12	B3-14	Breeding of insect resistant plants			x			
13	B3-18	Evolution of crop plants	x					
14	B3-21	Field crop biotechnology II				x		
15	B3-22	Field crop biotechnology III			x			
16	B3-24	Fruit biotechnology				x		
17	B3-25	Gene manipulation in plants					x	
18	B3-34	Micropropagation				x		
19	B3-39	Mutation breeding		x				
20	B3-41	Plant biotechnology	x					
21	B3-44	Plant cell culture			x			
22	B3-47	Plant ecophysiology					x	
23	B3-49	Plant genetic protection				x		
24	B3-53	Plant protoplast and genetic engineering				x		
25	B3-60	Tissue culture of horticulture crops			x			
26	B3- 65	Special topics		x				
27	B3- 66	Seminars					x	
28	C-90	Molecular methods in plant pathology II				x		
29	C-95	Plant gene transfer and expression protocols		x				
PhD Thesis			x	x	x	x	x	x

The matrix between Program ARS and Program ILO's

Program Academic Standards	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 (Knowledge & Understanding)

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
2.2.1	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

2/3/1 (Practical and professional Skills)

Program Academic Standard	Program ILO's (Practical and professional Skills)				
	2/3/1a	2/3/1b	2/3/1c	2/3/1d	2/3/1e
2.3.1	X				
2.3.2		X			
2.3.3			X		
2.3.4				X	
2.3.5					X

2/3/2 (General and Transferable skills)

Program Academic Standard	Program ILO's (General and Transferable skills)								
	2/3/2a	2/3/2b	2/3/2c	2/3/2d	2/3/2e	2/3/2f	2/3/2g	2/3/2h	2/3/2i
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	

Program coordinator: Dr. / Metwally Bekhit

Head of department: Prof. Dr. / Haroun Abou Shama

Department: **Plant Biotechnology**

Course Specifications

1. Course information							
Course Code:		**Course Title:**	**Research and Research Methodology**				
No. units	**3**	**Lec.**	**2**	**App.**	**2**	**Level**	**PhD**
Department	**Plant Biotechnology**						

2. Course Aims	
	• This course is designed for students to gain experience in definition means for right scientific research. • It also gave them the foundation for scientific research. • The course aims also to develop the scientific writing skills for students.

3. Intended Learning Outcomes of Course (ILO's)	
3.1. Knowledge and Understanding:	1. To become familiar with the main methods of qualitative data collection such as interview and observation. 2. To become familiar with basic principles in writing and in critical reading of scientific papers, and to be able to apply these principles in practice. 3. To understand the basic principles of ethics in research on human subjects. 4. To become familiar with procedures involved in questionnaire surveys, oral presentation and advantages and limitations when using a questionnaire approach.
3.2. Intellectual skills:	a. To appreciate the importance of sample size determination, and to be able to perform sample size

	calculations. b. To discuss and develop an appropriate format for a research writing proposal. c. To develop the objectives for an individual research papers.
3.3. Practical and Professional Skills of course:	a. To be able to select the most appropriate test for the data and to perform simple statistical tests by hand and on computer. b. To be able to construct questionnaire forms and to phrase correct questions. c. To assess the relevance of research results as evidence base for policies and for strategic and service plans. d. To develop strategies for communication of scientific results and further interaction with politicians, other decision makers, the public and beneficiaries.
3.4. General and Transferable Skills	a. To know how to summarize data simply and clearly. b. To know how to prepare data for statistical analysis and how to control for confounding when analyzing data. c. To transform scientific knowledge to relevant information for stakeholders.

4. Course Contents:

No.	Topic
1	**Methods of thinking**
2	**Researcher Preparation**
3	**Characteristics science and types of experiments**
4	**Role played by chance and hypotheses in research**
5	**Mid Term Exam**
6	**Research Methodology**
7	**Research planning and design of experiments**

5. Teaching and Learning Methods

5.1 Lectures.
5.2. Research assignment.
5.3 Oral presentation.
5.4 Computer analysis.
5.5 Internet access for using data bases.

6. Teaching and Learning Methods (for students with special needs)

Not applicable

7. Student Assessment:		
a. Assessment Methods:	* Semester works, * Midterm exam, * Practical exam, * Oral exam, * Written (Final) exam.	
b. Assessment Schedule	* 5th &10th works, * 6th week, * 13th week, * 14th week, * 15th week.	
c. Weighting of Assessments	10 degrees 10 degrees 10 degrees 10 degrees 60 degrees Total 100 degrees	Ratios 10%, Ratios 10%, Ratios 10%, Ratios 10%, Ratios 60%, Ratios 100%.

8. List of References:	
a. Notes	Course notes
b. Essential Books (Text Books)	• Paul D. Leedy (1980) Practical research: planning and design, Macmillan
c. Suggested Books	
d. Periodicals, Web Sites, … etc.	• http://courses.wcupa.edu/jones/his311/archives/helpers/howto.htm

Course coordinator: **Prof. E. A. El-Absawy**
Head of Department **Prof. Haroun Abou Shama**
Date:

Matrix of Knowledge and skills of the educational course targeted
Course name: Research and Research Methodology
Department: Plant Biotechnology
PhD Course

No.	Course topic	Knowledge and understanding	Intellectual abilities	Professional and practical skills	General and transferable skills
1	**Methods of thinking**	**3.1a**	**3.2a**	**3.3a**	**3.4c**
2	**Researcher Preparation**	**3.1b**	**3.2b**	**3.3b**	**3.4b**
3	**Characteristics science and types of experiments**	**3.1c**	**3.2a**	**3.3d**	**3.4a**
4	**Role played by chance and hypotheses in research**	**3.1d**	**3.2b**	**3.3c**	**3.4c**
5	**Mid Term Exam**	**3.1b**	**3.2c**	**3.3b**	**3.4a**
6	**Research Methodology**	**3.1c**	**3.2a**	**3.3d**	**3.4b**
7	**Research planning and design of experiments**	**3.1d**	**3.2c**	**3.3c**	**3.4c**

Course coordinator: **Prof. E. A. El-Absawy**
Head of Department **Prof. Haroun Abou Shama**
Date:

Department: **Plant biotechnology**

Course Specifications

5. Course information:							
Course Code:	A-17	**Course Title:**	**Biochemistry of plant growth regulators**				
No. units	3	**Lec.**	3	**App.**	-	**Level**	Ph.D
Department	**Plant biotechnology**						

6. Course Aims	
1- Providing students with biosynthesis of plant growth regulators 2- Understanding the chemistry, biological effects and mechanism of action of PGRs in plant growth and development. 3- Improving the awareness and understanding of the role of PGRs as a seed dormancy, cell division and cell elongation. 4- Acquiring growth retardant chemicals that are used to control plant height especially on ornamental plants.	

7. Intended Learning Outcomes of Course (ILO's)	
a. Knowledge and Understanding:	a/1 Describe basic rules of plant hormones and growth regulators a/2 Describe understanding the fundamentals of plant hormones and growth regulators and its application a/3 Summarize outline the general issues and application of plant growth retardants and inhibitors. a/4 Describe quality standards of the practice during the analysis and determination of Gene banks and Cytogenetics, the scientific basics and methods of plant breeding; plant tissue culture techniques, plant transformation, plant propagation, roles plant diseases and control, the main concept of somatic embryogenesis
b. Intellectual skills:	b/1 Compare the various types of hormones and growth regulators . b/2 Analyze and explain how crop plants developed and the role of plant hormones and growth regulators b/3 Explain the plant growth retardants, inhibitors and its application b/4 Appraise and analyze researches and related subjects in the field of plant cell, tissue and organ culture.
c. Professional Skills:	c/1 Apply the plant hormones and growth regulators for improving the high yield.

	c/2 Apply the various methods for application of plant hormones and growth regulators c/3 Apply the various methods for application of plant growth retardants and inhibitors
d. General and Transferable Skills	d/1 Practice self appraisal and determines his learning needs. d/2 Use different sources of information to obtain data for a given course topics. d/3 Use information technology to improve his professional practice in internet and relative information. d/4 Lead a team in a familiar professional work level.

	8. Course Contents:
No.	**Topic**
1	- Introduction and biosynthesis of plant growth regulators: Auxin- Cytokinin- Gibberellin - abscisic acid – Ethylene.
2	- Structural formulas for plant growth regulators.
3	- Structure – activity relationship of plant growth regulators
4	- Inactivation of plant growth regulators by several processes.
5	- The role of growth regulators on cell division and cell elongation.
6	- Nucleic acids and plant growth regulators mode of action.
7	- Growth retardants mechanisms on gibberellins – auxins and applications

9. Teaching and Learning Methods	
	Lectures Class activities Discussion Presentation Reports

10. Teaching and Learning Methods (for students with special needs)	**Not applicable**

7. Student Assessment:	
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.
b. Assessment Schedule	* 5th &10th works,

	* 6th week, * 14th week, * 15th week.	
c. Weighting of Assessments	10 degrees 10 degrees 20 degrees 60 degrees Total 100 degrees	Ratios 10%, Ratios 10%, Ratios 20%, Ratios 60%, Ratios 100%.

11. List of References:	
a. Notes	
b. Essential Books (Text Books)	**William G.Hopkins and Norman P. A. Hiiner (2004)**: Plant physiology **Taiz L. and Zeiger E.(2006):** Plant physiology fourth ed. **Davies P.I. |( ) :**Plant Hormone
c. Suggested Books	**Verma S.K. 2010:** Plant physiology**,** Biochemistry and biotechnology**.**
d. Periodicals, Web Sites, … etc ...	
Course coordinator:	**prof. Adel Hegazy**
Head of the department council:	**Prof. Haroun Abou Shama**
Date:	

Matrix of Knowledge, Skills ILOs for Education Course
Biochemistry of plant growth regulators (A-17)

Course Contents	Week No.	a- Knowledge and Understanding	b- Intellectual skills	c- Professional Skills of course	d-General and Transferable Skills
1-- Introduction and biosynthesis of plant growth regulators: Auxin- Cytokinin- Gibberellin - abscisic acid – Ethylene.	**1&2**	**a1,a2**	**b1,b2**	**c1**	**d3,d4**
2-- Structural formulas for plant growth regulators.	**3&4**	**a4**	**b2**	**c3**	**d1,d2,d4**
3-- Structure – activity relationship of plant growth regulators	**5&6**	**a2**	**b2**	**c1,c2**	**d4**
4-- Inactivation of plant growth regulators by several processes.	**7&8**	**a1,a2**	**b1**	**c3**	**d4**
5-- The role of growth regulators on cell division and cell elongation.	**9&10**	**a1,a2**	**b1,b2**	**c3**	**d4**
6- Nucleic acids and plant growth regulators mode of action.	**11&12**	**a2**	**b3**	**c3**	**d4**
7- Growth retardants mechanisms on gibberellins – auxins and applications	**13&14**	**a3**	**b3**	**c3**	**d4**

Course coordinator:	**Prof. Dr. Adel Hegazy**
Head of the department council:	**Prof. Haroun Abou Shama**
Date:	**2015-2016**

Department: **Plant Biotechnology**

Course Specifications

12. Course information:							
Course Code:	A-24	**Course Title:**	**Biotechnology II**				
No. units	3	**Lec.**	3	**App.**	-	**Level**	**Ph.D**
Department	Plant Biotechnology						

13. Course Aims	
	1-Providing the fundamental of DNA markers, different kind's hybridization and PCR based markers, Relationship among different DNA markers - Linkage relationship among different markers-principles of genetic linkage and Development of mapping population. 2- Knowing the general concept of environmental stresses. 3- Dealing with biotechnology career and resources.

14. Intended Learning Outcomes of Course (ILO's)	
Knowledge and Understanding:	a1-Review the principles of genome composition and kinds of markers, biosensors, nano-biotechnology and Environmental stresses a2- Outline the basics of PCR based markers-RAPD, AFLP and their application
Intellectual skills:	b1- Distinguish the types of kinds of markers, biosensors, nano-biotechnology and Microarrays. b2- Summarize large scale clonal propagation of plants, PCR based markers-RAPD, AFLP and their application
Professional Skills:	c1-Use appropriate of PCR based markers-RAPD, AFLP and their application. c2-Select the environmental stresses and Modeling.
General and Transferable Skills	d/1- Acquire of self confidence and leadership skills. d2-Participate in biotechnology workshops and training courses. d/3- Organize and manage scientific seminars and presentation. d/4- Utilize self-learn and distance learn capabilities.

	d5- Possess in getting knowledge from scientific data sources including, text books, scientific journals, internet sites and multimedia. d/6- Create thinking skills through analysis of data.

	15. Course Contents:
Week No.	**Topic**
1&2	Composition of genome and kinds of Markers-Morphological/physiological and agronomic markers
3&4	Molecular markers-Protein markers and Hybridization based markers-RFLP and their application
5&6	PCR based markers-RAPD, AFLP and their application
7&8	Biosensors , Nanobiotechnoloy and Microarrays
9&10	Large scale clonal propagation of plants
11&12	Environmental stresses and Modelling - types in relation to environmental stresses
13&14	Biotechnology Resources: Periodicals, Web Sites, General Science Journals Biotech Education & Careers

16. Teaching and Learning Methods	
	1-Persentations 2-Projector slides 3-Data show 4- Lectures

17. Teaching and Learning Methods (for students with special needs)	**Not applicable**

18. Student Assessment:	
a. Assessment Methods:	*Semester works, *Midterm exam, *Oral exam, *Written (Final) exam.
b. Assessment Schedule	* (5^{th}&10^{th} weeks), * (6^{th}) Week, * (14^{th}) Week, * (15^{th}) Week.

c. Weighting of Assessments	10 degrees	ratios	10%,
	10 degrees	ratios	10%,
	20 degrees	ratios	20 %,
	60 degrees	ratios	60%
	Total 100 degrees	ratios	100%

19. List of References:	
e. Notes	Handout notes
f. Essential Books (Text Books)	1- The Guide to Biotechnology (2007)is compiled by the Biotechnology Industry Organization (BIO)Debbie Strickland, BIO, Director of Marketing, Editor C o n t r i b u t o r s Deb Carstoiu, BIO, Director of State Media Relations and Advocacy Elinor Van Dyck, Blue House Publishing, Art Director Barbara Glenn, BIO, Managing Director of Animal Bitoechnology Crispin Littlehales, Writer/Editor Adrienne Massey, Ph.D., Writer/Editor. 2- Owen, M. R. L. and Pen, J. 1996. Transgenic plants:a production system for industrial and pharmaceutical proteins,John Wiley & sons,New York.350p.. 3- Viruses and Nanotechnology ISBN 978-3-540-69376-5 e-ISBN 978-3-540-69379-6 DOI 10.1007/978-3-540-69379-6 Current Topics in Microbiology and Immunology ISSN 0070-217x Library of Congress Catalog Number: 2008931406 © 2009 Springer-Verlag Berlin Heidelberg
g. Periodicals, Web Sites, … etc ...	1- www. Wiley. Com 2- Casida, L. E. Jr. 1996. Industrial microbiology. Wiley Eastern 3- www. Pubmed. com

Course coordinator: Dr.

Head of the department council: Prof. Haroun Abou Shama

Matrix of Knowledge and skills of Biotechnology II course (A-24)

Course Contents	**Week No.**	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Composition of genome and Kinds of Markers-Morphological/physiological and agronomic markers	**1&2**	a1	b1	-	d1 &d2
Molecular markers-Protein markers and Hybridization based markers-RFLP and their application	**3&4**	a1	-	-	d1
PCR based markers-RAPD, AFLP and their application	**5&6**	a2	b1	c1	d2, d3
Biosensors , Nanobiotechnoloy and Microarrays	**7&8**	a1	b2	-	d2, d3
Large scale clonal propagation of plants	**9&10**	a2	b2	-	d3
Environmental stresses and Modelling - types in relation to environmental stresses	**11&12**	a1	b2	c2	d4
Biotechnology Resources:Periodicals , Web Sites, General Science Journals Biotech Education & Careers	**13&14**	-	-	c1	d5,d6

Course coordinator: Dr.

Head of department council: Prof. Haroun Abou Shama

Institute: GEBRI

Course Specifications

20. Course information:							
Course Code:	A-48	**Course Title:**	**German language**				
No. units	3	**Lec.**	2	**App.**	2	**Level**	PhD
Department	**Plant Biotechnology**						

21. Course Aims	
	1- Understanding the contents of German language. 2- Showing skills of contents of German language. 3- Remodeling methods in Unit operation.

1 Intended Learning Outcomes of Course (ILO's)	
i. Knowledge and Understanding:	a/1- Explain every content of german language. a/2- Clarify the difference between every treatment of greman language. a/3- simplify the categories of the previous content.
j. Intellectual skills:	b/1- Suggest the moderation of language. b/2- Evaluate the German syllable of the previous content. b/3 – Innovate advanced content of German language.
k. Professional Skills:	c/1- Select important topology of German language. c/2- Estimate the principals. c/3 Prepare the Introduction, and process and output of German language.
l. General and Transferable Skills	d/1- Use information communication technology to improve his/her professional practice in internet and relative information of German language. d/2- Practice self-appraisal and determines his/her learning needs. d/3- Use different sources of information to obtain data for a given German language.. d/4- Use educational technology displaying devices for explain important modern techniques of presentation in.

	d/5- Manage time effectively. d/6- Show Work effectively in teamwork.

	2 Course Contents:
No.	**Topic**
1	Einfuhrung مقدمة (Introduction)
2	Das verbs الأفعال, Der artikel الاداة, Bestimmet and Unbestimmt المعرفة والنكرة
3	Nominativ und Akkusativ الفاعل والمفعول به, Personalpronomen الضمائر, Fragepronomen أدوات الاستفهام, plural الجمع
4	Die Zhalen الأعداد, Negativ النفي, Demonstrativpronomrn اسماء الاشارة
5	Verbzusatz + Verb, Vorsilb + Verb الافعال المكونة من مقطعين, Possessiv Pronomen ضمائر الملكية
6	Wissenschafliche Worte دراسة بعض المصطلحات العلمية الزراعية
7	Die Lehrbucher مقتطفات من بعض الكتب العلمية

3 Teaching and Learning Methods	
	1-Data show and power point presentations 2- Print outs 3- Internet 4- Educational tours.

4 Teaching and Learning Methods (for students with special needs)	**Not applicable**

7. Student Assessment:	
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.

c. Weighting of Assessments	10degrees	Ratios 10%,
	10 degrees	Ratios 10%,
	20 degrees	Ratios 20%,
	60 degrees	Ratios 60%,
	Total 100 degrees	Ratios 100%.

5 List of References:	
h. Notes	Print out documents
i. Essential Books (Text Books)	• Learn German where you want, when you want – learn Everywhere! • Transparent German Premium Edition • German books: novels and drama.
j. Suggested Books	• Scientific terms in German.
k. Periodicals, Web Sites, … etc ...	• http://www.goethe.de/ins/de/spr/enindex.htm • http://www.gistonline.ca/?lang=en • http://www.die-deutschule.de/?gclid=CIvBvqvk1K4CFQeFDgodVROccw • http://www.german-bookworld.com/german-books.html

Course Coordinator:

Head of the department council: **Prof. Haroun Abou Shama**

Matrix of Knowledge, Skills ILOs for German language Course

No.	Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Professional Skills	d-General and Transferable Skills
1	Einfuhrung مقدمة (Introduction)	**1&2**	**a1,a2**	**b1,b2**	**c1,c2,c3**	d1, d2
2	Das verbs الأفعال, Der artikel الاداة, Bestimmet and Unbestimmt المعرفة والنكرة	**3&4**	**a1,a2**	**b1, b3**	**c1,c2,c3**	d1, d3
3	Nominativ und Akkusativ الفاعل والمفعول به, Personalpronomen الضمائر, Fragepronomen أدوات الاستفهام, plural الجمع	**5&6**	**a1,a2**	**b1, b3**	**c1,c2,c3**	d1, d4
4	Die Zhalen الأعداد, Negativ النفي, Demonstrativpronomrn اسماء الاشارة	**7&8**	**a1,a2**	**b2,b3**	**c1,c2,c3**	d3, d4
5	Verbzusatz + Verb, Vorsilb + Verb الافعال المكونة من مقطعين, Possessiv Pronomen ضمائر الملكية	**9&10**	**a1,a2**	**b3**	**c1,c2,c3**	d5, d6
6	Wissenschafliche Worte دراسة بعض المصطلحات العلمية الزراعية	**11&12**	**a1,a2**	**b1, b2**	**c1,c2,c3**	d1, d5
7	Die Lehrbucher مقتطفات من بعض الكتب العلمية	**13&14**	**a1,a2**	**b1,b2**	**c1,c2,c3**	d5, d6

Course Coordinator: **Dr.**

Head of the department council: **Prof. Haroun Abou Shama**

Department: **Plant Biotechnology**

Course Specifications

22. Course information:							
Course Code:	A-67	**Course Title:**	**Plant breeding for environmental stress**				
No. units	3	**Lec.**	3	**App.**		**Level**	Ph.D.
Department	**Plant Biotechnology**						

23. Course Aims	
	Providing students with fundamental structure and reproductive features of crops. Their adaptation and importance in global agriculture. Practices and inputs needed for economic production of a quality product and interaction of these factors within the constraints of climate, soils, and topography in maintaining a quality environment. Theory and principles of breeding for abiotic tolerance. Experimental approaches for examining genetics of genotype-environment interactions, expression and stability of abiotic tolerance and breeding strategies for developing abiotic tolerance cultivars.

24. Intended Learning Outcomes of Course (ILO's)	
m. Knowledge and Understanding:	a1) Recognize the basic rules of plant tissue culture, plant pathology, plant breeding, biotechnology of secondary products, breeding of disease-resistant plants, plant physiology, biotechnology of field, horticulture, vegetable and ornamental crops, and mushroom propagation. a2) Know the basic rules of plant breeding science, technology and molecular breeding and its biological impacts and genetic application. a3) Know the basics of breeding to insect resistance, stresses resistance and tolerance, especially the molecular breeding, genetic protection, gene technology and population biology

n. Intellectual skills:	b1) Discuss the different methods of plant breeding and its application. b2) Suggest programs for breeding to produce plants resistant or tolerant to different stresses, biotic or abiotic.
o. Professional Skills:	c1) Perform laboratory and field tests for molecular markers for plant breeding.
p. General and Transferable Skills	d1) Collect the knowledge from data sources, e.g., text books, scientific journals, internet, multimedia……etc. d2) Organize and manage scientific seminars and presentation.

	25. Course Contents:
No.	**Topic**
1	Introduction, Importance of abiotic stress, Characteristics of abiotic stress
2	Breeding for drought resistance, Effects of drought resistance plant growth and development
3	Types of drought environment, Drought resistance
4	Genetic of drought resistance, Mineral stresses (salinity, mineral deficiency and mineral toxicity) and heat and cold resistance
5	Source of drought resistance, Relationship between drought resistance treat and yield
6	Selection criteria, Breeding methods and approaches
7	Difficulties in breeding for drought resistance, Mineral stresses (salinity, mineral deficiency and mineral toxicity) and heat and cold resistance

26. Teaching and Learning Methods	
	Theoretical lectures Practical works Lab experiments Scientific trips

27. Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:	
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam,

	* Written (Final) exam.	
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.	
c. Weighting of Assessments	10degrees	Ratios 10%,
	10 degrees	Ratios 10%,
	20 degrees	Ratios 20%,
	60 degrees	Ratios 60%,
	Total 100 degrees	Ratios 100%.

28. List of References:	
l. Notes	Lectures written by course coordinator(s)
m. Essential Books (Text Books)	Blum, A. (1988). Plant Breeding for Stress Environments. CRC Press Inc., Boca Raton, Florida, USA.
n. Suggested Books	Singh, B. D., Plant Breeding
o. Periodicals, Web Sites, … etc ...	Plant Breeding J., Crop Science J., plant pathology J.

Course coordinator: **Dr. Khaled F. M. Salem**
Head of the department council **Prof. Haroun Abou Shama**

Date:

Matrix of Knowledge and skills of the educational course targeted
Course name: Plant breeding for environmental stress (A-67)
Department: Plant Biotechnology

No.	Course topic	Knowledge and understanding	Intellectual abilities	Professional and practical skills	General and transferable skills
1	Introduction, Importance of abiotic stress, Characteristics of abiotic stress	a/1	b/1	-	d/1
2	Breeding for drought resistance, Effects of drought resistance plant growth and development	a/2	b/1	-	d/2
3	Types of drought environment, Drought resistance	a/3	b/2	c/1	d/1
4	Genetic of drought resistance, Mineral stresses (salinity, mineral deficiency and mineral toxicity) and heat and cold resistance	a/3	b/2	c/1	d/1
5	Source of drought resistance, Relationship between drought resistance treat and yield	a/1	b/1	c/1	d/2
6	Selection criteria, Breeding methods and approaches	a/2	b/2	c/1	d/2
7	Difficulties in breeding for drought resistance, Mineral stresses (salinity, mineral deficiency and mineral toxicity) and heat and cold resistance	a/3	b/2	c/1	d/2

Course coordinator: **Dr. Khaled F. M. Salem**
Head of the department council **Prof. Haroun Abou Shama**

Date:

Department: Bioinformatics

Course Specifications

1. Course information:							
Course Code:	**A-81**	**Course Title:**	**Use of Microcomupters -3 (Advanced computer)**				
No. units	3	**Lec.**	2	**App.**	2	**Level**	**Doctorate**
Department	**Bioinformatics**						

2. Course Aims

- Getting acquainted with fundamentals of computers.
- Using various operating systems.
- Understanding concepts in computing and networking.
- Managing research team-works & setting research rules for Doctorate graduate needs in the bioinformatics.

3. Intended Learning Outcomes of Course (ILO's)	
3.a Knowledge and Understanding	a1. Express technical terms used in computer scientists. 2. Explain the principles of Processing. 3. Explain the fundamentals of modern computers. 4. Summarize main scientific in the field of Networking gadgets. 5. Clarify difference in the scientific research and different research methodologies adopted to solve scientific problems.
3.b Intellectual skills	b1. Design the information to solve problems of computational approaches for Processing system and modern computers. 2. Suggest evidences to understanding the Computer Networking. 3. Evaluate information programming for operating systems. 4. Distinguish between different ways of using computers models for Internet and its Resources.
3.c Practical and Professional Skills	c1-. Evaluate the Networking gadgets. 2. Test appropriates the Internet and its Resources.

	3. Select different types of modern computers and Processing.
3.d General and Transferable Skills	d1. Work effectively in a team. 2. Use application of computer in the field of biological information systems. 3. Appear management skills in writing in different professional and academic audiences. 4. Use audio & video means for displaying information modern modalities of presentation.

4. Course Contents:

No.	Topic
1	Overview and functions of a computer system, storage, devices, memory, etc.
2	Types of Processing: Batch, Real-Time, Online, Offline.
3	Types of modern computers: The workstation, The Minicomputer, Mainframe Computers, Parallel Processing Computer, The Super Computer, etc.
4	Introduction to operating systems: Windows/Unix/Linux.
5	The Internet and its Resources, World Wide Web (WWW): associated tools, services, resources and various terminologies, advance search techniques.
6	Computer Networking; Fundamentals of networking: OSI Reference Model, TCP/IP, topologies and protocols, designing networks.
7	Networking gadgets (Router, Switch, etc); Data Communication (ISDN, VPN, DSL, cable modem, cellular modem, etc); Communication Links (Wire pairs, Coaxial cables, Fiber optics, Microwave, Satellite, etc).

5. Teaching and Learning Methods

5.1 Lectures.
5.2. Research assignment.
5.3 Oral presentation.
5.4 Computer analysis.
5.5 Internet access for using data bases.

6. Teaching and Learning Methods (for students with special needs)

Not applicable

7. Student Assessment:

a. Assessment Methods:	* Semester works, * Midterm exam,

	* Practical exam, * Oral exam, * Written (Final) exam.
b. Assessment Schedule	* 5th &10th works, * 6th week, * 13th week, * 14th week, * 15th week.
c. Weighting of Assessments	10degrees Ratios 10%, 10 degrees Ratios 10%, 10 degrees Ratios 10%, 10 degrees Ratios 10%, 60 degrees Ratios 60%, Total 100 degrees Ratios 100%.

8. List of References:	
a. Notes	Course notes
b. Essential Books (Text Books)	• Tanenbaum Andrew S. Computer networks 4th edition. Publisher: Prentice Hall PTR, 2003. • Rajaraman V. Fundamentals of Computers. Publisher: Phi Learning 2001. • Operating System concepts – Peterson Silberschatz.
c. Suggested Books	• Sinha P. K. Computer Fundamentals: concepts system applications: Publisher: Delhi BPB publications 2001. • Forouzan Behrouz A., Coombs Catherine Ann, Fegan Sophia Chung. Data Communications and Networking 2nd edition. Publisher: Osborne Publishing, 2000.
d. Periodicals, Web Sites, etc.	• Journal of computational.

Course coordinator: **Prof. Alaa Hemeida**

Head of the department: **Prof. Haroun Abou Shama**

Matrix of Knowledge and skills of the educational course targeted

No.	Course topic	Knowledge and understanding	Intellectual abilities	Professional and practical skills	General and transferable skills
1	Overview and functions of a computer system, storage, devices, memory, etc.	3. a1	3.b1	---	3.d2
2	Types of Processing: Batch, Real-Time, Online, Offline.	3.a2	3.b1	3.c3	3.d3
3	Types of modern computers: The workstation, The Minicomputer, Mainframe Computers, Parallel Processing Computer, The Super Computer, etc.	3.a3	3.b1	3.c3	3.d3
4	Introduction to operating systems: Windows/Unix/Linux.	3.a1	3.b3	3.c2	3.d1
5	The Internet and its Resources, World Wide Web (www): associated tools, services, resources and various terminologies, advance search techniques	3.a5	3.b4	3.c2	3.d4
6	Computer Networking; Fundamentals of networking: OSI Reference Model, TCP/IP, topologies and protocols, designing networks.	3.a5	3.b2	3.c1	3.d3
7	Networking gadgets (Router, Switch, etc); Data Communication (ISDN, VPN, DSL, cable modem, cellular modem, etc); Communication Links (Wire pairs, Coaxial cables, Fiber optics, Microwave, Satellite, etc).	3.a5	3.b2	3.c1	3.d2

Course coordinator: **Prof. Alaa Hemeida**

Head of the department: **Prof. Haroun Abo Shama**

Department: **Plant Biotechnology**

Course Specifications

29. Course information:							
Course Code:	**B3-2**	**Course Title:**	**Advanced plant breeding II**				
No. units	**3**	**Lec.**	**3**	**App.**		**Level**	**PhD**
Department							

30. Course Aims	
	1. Reviewing a number of novel techniques recently developed in plant breeding and plant biotechnology. 2. Discussing Origin, Evolution and Breeding of plants strategies and specific methods utilized in variety and population improvement and related research. 3. Providing students with different plant breeding such as and production of plants tolerant to biotic and abiotic stresses via transgenic approach

31. Intended Learning Outcomes of Course (ILO's)	
Knowledge and Understanding:	a/1) Summarize Genetic Markers and Plant Genetic Resource Management. a/2) Express the production of transgenic plants against biotic and abiotic stresses. a/3) Outline the applications of genetic markers. a/4) Clarify difference between Origin, Evolution and Breeding in maize and cotton. a/5) Explain the interaction of rust diseases and wheat plants.
a. Intellectual skills:	b/1) Design breeding programs to overcome or combat biotic and abiotic stresses . b/2) Distinguish between Origin, Evolution and Breeding of maize and cotton plants b/3) Evaluate molecular markers and their roles in plant breeding and plant genetic resource management

b. Professional Skills:	c/1) select programs for producing plants resistant or tolerant to different stresses, biotic or abiotic, explain. c/2) test the different methods of plant transformation and its field performance. c/3) Estimate genetic markers for crop improvement and how to evaluate and breed plants against rust diseases
c. General and Transferable Skills	d/1) Collect the knowledge from data sources, *e.g.*, text books, scientific journals, internet, multimedia…etc d/2) Acquire of self confidence and leadership skills, Self-learn and distance learn capabilities. d/3) Create thinking skills through analysis of data, participate in workshops and training courses and experience in the plant biotechnology.

32. Course Contents:	
No.	**Topic**
1	**Origin, Evolution and Breeding of the Maize plants**
2	**Genetics of Wheat-Rust Interaction**
3	**Genetic Markers and Plant Genetic Resource Management**
4	**Breeding for transgenic plants tolerant to biotic stresses**
5	**Breeding for transgenic plants tolerant to abiotic stresses**
6	**Breeding of Rice for biotic and abiotic environmental stresses**
7	**Origin, Evolution and Breeding of the cotton**

33. Teaching and Learning Methods	
	1. Data show 2. Scientific Journals 3. Text books 4. Internet

34. Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:	
a. Assessment Methods:	* Semester works, * Midterm exam,

	* Oral exam, * Written (Final) exam.
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.
c. Weighting of Assessments	10degrees Ratios 10%, 10 degrees Ratios 10%, 20 degrees Ratios 20%, 60 degrees Ratios 60%, Total 100 degrees Ratios 100%.

35. List of References:	
p. Essential Books (Text Books)	1. Principles and Procedures of Plant Breeding: Biotechnological and Conventional Approaches 2. Advanced Methods in Plant Breeding and Biotechnology (Biotechnology in Agriculture, No. 4) January 2, 1991, ISBN-13: 978-0851987064. 3. Breeding field crops By D. A. Sleper, John Milton Poehlman 4. Practical Plant Breeding (2005) by S K Gupta 5. Plant Breeding Reviews (Volume 3, Plant Breeding Reviews, 2009)
q. Periodicals, Web Sites, … etc ...	• J. Plant Breeding • Crop Sceince

Course Coordinator: **Dr. Kamal F. Abdellatif**

Head of the department council: **Prof. Haroun Abou Shama**

Matrix of Knowledge and skills of the educational course targeted
Course name: Advanced plant breeding II (B3-3)
Department: Plant Biotechnology
PhD Course

No.	Course topic	Knowledge and understanding	Intellectual abilities	Professional and practical skills	General and transferable skills
1	**Origin, Evolution and Breeding of the Maize plants**	a/4	b/2	c/3	d/1
2	**Genetics of Wheat-Rust Interaction**	a/5	---	….	---
3	**Genetic Markers and Plant Genetic Resource Management**	a/1,3	b/3	c/3	d/2
4	**Breeding for transgenic plants tolerant to biotic stresses**	a/2	b/1	c/1,2	d/3
5	**Breeding for transgenic plants tolerant to abiotic stresses**	a/2	b/1	c/1,2	---
6	**Breeding of Rice for biotic and abiotic environmental stresses**	a/2	b/1	c/1,2	d/2
7	**Origin, Evolution and Breeding of the cotton**	a/4	b/2	c/3	d/3

Course Coordinator : **Dr. Kamal F. Abdellatif**
Head of the department council: **Prof. Haroun Abou Shama**

Department: **Plant biotechnology**

Course Specifications

Course information:							
Course Code:	B3-3	**Course Title:**	**Advanced Plant Physiology**				
No. units	3	**Lec.**	3	**App.**	-	**Level**	PhD
Department	**Plant biotechnology**						

2. Course Aims	
	1. Studying of how plants work and the emphasis of this course is plant function at the level of the organism and how plants acquire and transport raw materials for growth. 2. Understand organisms, however, it is necessary to understand the functions of their cells and biological molecules and how plants grow and develop throughout their lives. 3. Considering what cells and molecules do in the intact plant, which is the emphasis of modern plant physiology and how plants interact with their environment

3. Intended Learning Outcomes of Course (ILO's)	
a. Knowledge and Understanding:	a/1. Summarize Protein sorting and vehicles traffic, the cytoskeleton and genome organization and expression. a/2. Express membrane structure and membrane organelles, the cell wall and membrane transport and genome organization and expression. a/3 . Explain respiration and photorespiration, long distance transport reproductive development, Applications of enzyme . a/4 Clarify difference nature of enzymes and specificity and enzyme substrate complex and prosthetic groups, cofactors and coenzymes

	a/5 Express cell division regulation, photosynthesis and carbohydrate metabolism, Pigments and structure of photosynthetic apparatus.
b. Intellectual skills:	b/1 Find solutions of protein sorting and vehicles traffic, the cytoskeleton and genome organization and expression, respiration and photorespiration . b/2 Evaluate cell division regulation, photosynthesis and carbohydrate metabolism, respiration and photorespiration . b/3 Evaluate membrane structure and membrane organelles, the cell wall and membrane transport. b/4 Evaluate Nature of enzymes and specificity and enzyme substrate complex and prosthetic groups, cofactors and coenzymes, pigments and structure of photosynthetic apparatus, applications of enzyme
c. Professional Skills:	c/1Select and appraise professional reports. c/2Prepare and improve methods and tools used in the specialty. c/3Write and appraise professional reports about plant biotechnology. c/4 Evaluate and improve methods and tools used in the field of plant biotechnology.
d. General and Transferable Skills	d/1Use information technology to improve professional practice. d/2Teach and evaluate others. d/3Work on team

	Course Contents:
No.	**Topic**
1	**Membrane structure and membrane organelles, the cell wall and membrane transport**
2	**Protein sorting and vehicles traffic, the cytoskeleton and genome organization and expression**
3	**Cell division regulation, photosynthesis and carbohydrate metabolism**
4	**Respiration and photorespiration, long distance transport reproductive development**
5	**Nature of enzymes and specificity and enzyme substrate complex and prosthetic groups, cofactors and coenzymes**

6	**Pigments and structure of photosynthetic apparatus.**
7	**Application of enzymes**

36. Teaching and Learning Methods	
	- Lectures - scientific seminars and presentation - Students activity -Discusion / Reports
37. Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:			
a. Assessment Methods:	* Oral exam, * Written (Final) exam.		
b. Assessment Schedule	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam	5th &10th works 8th week, 16th week, 16th week.	
c. Weighting of Assessments	Oral exam Semester work Written exam Total	20 degrees 20 degrees 60 degrees 100 degrees	Ratios 20%, Ratios 20%, Ratios 60%, Ratios 100%.

8.List of References:	
a. Notes	
b. Essential Books (Text Books)	Plant :**(١٩٧٢)Bandey S. N. and B. K. Sinha** physiology يفلين و فرانسيس ه. ويذام : فسيولوجيا النبات ١٩٨٥ روبرت Modern .**(٢٠٠٢) Holt, Rinehart and Winston-** Biology
c. Suggested Books	
Periodicals, Web Sites, … etc ...	

Course coordinator	**Dr. Awatef Badr-Elden**
Head of the department council:	**Prof. Haroun Abou Shama**
Date:	

Matrix of Knowledge and skills of the educational course targeted
Course name: **Advanced Plant Physiology** (B3-3)

	Week No.	**a-Knowledge and Understanding**	**b-Intellectual skills**	**c- Professional Skills of course**	**d-General and Transferable Skills**
1-Membrane structure and membrane organelles, the cell wall and membrane transport	1&2	a/2	b/3	c/2	d/1
2-Protein sorting and vehicles traffic, the cytoskeleton and genome organization and expression	3&4	a/1, 2	b/1	c/2	d/3
3-Cell division regulation, photosynthesis and carbohydrate metabolism	5&6	a 5	b/2	c/2	d/2, 3
4-Respiration and photorespiration, long distance transport reproductive development	7&8	a3	b/2	c/2	d/2, 3
5-Nature of enzymes and specificity and enzyme substrate complex and prosthetic groups, cofactors and coenzymes	9&10	a 4	b/4	c/2, 3	d/2, 3
6-Pigments and structure of photosynthetic apparatus	11&12	a5	b/4	c/4	d/3
7-Applications of enzyme		a 3	b/4	c/4	d/3

Course coordinator **Dr. Awatef Badr-Elden**
Head of the department council: **Prof. Haroun Abou Shama**
Date:

Department: Plant Biotechnology

Course Specifications

38. Course information:							
Course Code:	**B3-6**	**Course Title:**	**Analysis of natural products**				
No. units	**3**	**Lec.**	**3**	**App.**	**-**	**Level**	**Ph.D**
Department	**Plant Biotechnology**						

39. Course Aims	
	1- Preparing highly qualified and market-ready graduates in analysis of natural products competitive at the national and international level, in both academic and applied fields. 2-Applying and able to handling the changeable requirements of the field of plant natural products analysis. 3- Enhancing students and researches capabilities and storming their intellectual and practical skills. 4- Transfering the most updated skills and technologies in the area of chromatography and spectroscopy analysis.

40. Intended Learning Outcomes of Course (ILO's)	
q. Knowledge and Understanding:	a/1 Describe the different methods of analysis for the plant natural products a/2 Summarize the basics of scientific research and different research methodology (approaches) adopted to solve scientific problems. a/3 Summarize the basic rules of phytochemistry and its biological impacts and application. a/4 Main scientific advances of plant biotechnology practice
r. Intellectual skills:	b/1 Compare between the analysis methods of natural products by using different chemical methods. b/2 Interpret the various methods of natural product analysis. b/3 Analyze the natural product by different techniques. b/4 Plan for improving performance in the field of phytochemistry.

s. Professional Skills:	c/1- Estimate various methods for evaluation and preparation of different samples for analysis. c/2 theoretical work for chemical analysis of medicinal plants.
t. General and Transferable Skills	d/1 Use internet to collect the knowledge from data sources, e.g., text books, scientific journals, ……etc. d2 Communicate with others to organize and manage scientific seminars and presentation. d/3 Use Application of Computer in the Field of Interest D/4 Appear self learning abilities in phytochemical analysis trends

	41. Course Contents:
No.	**Topic**
1	Preparation of plant samples Screening of natural products
2	Chromatography; PC and TLC Planar Chromatography
3	Flash Chromatography High-pressure Liquid Chromatography
4	Biochromatography
5	Combination of Methods Spectroscopy
6	Ultra Violet, IR NMR, 1D and 2D
7	Analysis of Volatile oil GC and its applications

42. Teaching and Learning Methods	
	- Lectures - scientific seminars and presentation - Students activity -Discusion / Reports
43. Teaching and Learning Methods (for	Not applicable

students with special needs)	

7. Student Assessment:		
a. Assessment Methods:	* Oral exam, * Written (Final) exam.	
b. Assessment Schedule	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam	5th &10th works 8th week, 16th week, 16th week.
c. Weighting of Assessments	Oral exam Semester work Written exam Total	20 degrees 20 degrees 60 degrees 100 degrees
		Ratios 20%, Ratios 20%, Ratios 60%, Ratios 100%.

44. List of References:	
r. Notes	
s. Essential Books (Text Books)	-Chemical Analysis -Modern Instrumentation Methods and Techniques. (2007) John Wiley & Sons Ltd, - HPLC A practical User's Guide. 2007, WILEY-INTERSCIENCE
t. Suggested Books	-Studies in Natural products chemistry. 2001, ELSEVIER - Modern Phytomedicine. 2006, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim - Medicinal chemistry of bioactive natural products. 2006 by John Wiley & Sons, Inc.
u. Periodicals, Web Sites, … etc ...	-Phytotherapy journal - Records of natural products - Natural products - Natural product reports - Phytochemistry

Course coordinator: **Dr. Emad Ata**
Head of the department council: **Prof. Haroun Abou Sham**

Matrix of Knowledge and skills of the educational course targeted

Course name: Analysis of natural products (B3-6)
Department: Plant Biotechnology
Ph.D. Course

No.	Course topic	Knowledge and understanding	Intellectual abilities	Professional skills	General and transferable skills
1	Preparation of plant samples Screening of natural products	a/1,4	b/1,2	c/1	d/1,4
2	Chromatography; PC and TLC Planar Chromatography	a/1,2,3	b/3	c/2	d/1,3,4
3	Flash Chromatography High-pressure Liquid Chromatography	a/1,4	b/2,3	c2	d/2,4
4	Biochromatography	a/2,3	b/2	c/2	d/1,4
5	Combination of Methods Spectroscopy	a/1,3	b/3,4	c/2	d/3,4
6	Ultra Violet, IR NMR, 1D and 2D	a/1,2	3.b/1,3,4	c/1,2	d/3,4
7	Analysis of Volatile oil GC and its applications	a/1,2	b/1,3,4	c/1	d/3,4

Course coordinator: **Dr. Emad Ata**
Head of the department council: **Prof. Haroun Abou Shama**
Date:

Department: Plant Biotechnology

Course Specifications

45. Course information:							
Course Code:	**B3-8**	**Course Title:**	**Biotechnology of Medicinal and aromatic plant.**				
No. units	**3**	**Lec.**	**3**	**App.**	**-**	**Level**	**PhD**
Department	**Plant Biotechnology**						

46. Course Aims	
	1-Transferring the most updated skills and technologies in the area of medicinal and aromatic plants production, extraction, and conservation. **2**-Enhancing students and researches capabilities and storming their Knowledge**,** intellectual and practical skills. **3**-Providing training in scientific skills of problem analysis, research design, evaluation empirical evidence and dissemination in the context of biological sciences. **4**-Determining the professional problems and find innovative solutions to solve them in the field of medicinal and aromatic plant biotechnology.

47. Intended Learning Outcomes of Course (ILO's)	
u. Knowledge and Understanding:	a1-Explain the basic rules of biotechnology in medicinal and aromatic plants, propagation. a2- Divide the importance of medicinal and aromatic plants in various pharmaceutical, perfume, and food industries. a3- Clairly differences the methods of secondary metabolites production in vivo and in vitro. a4- Summarize the different methods of analysis for the plant natural products.
v. Intellectual skills:	b1- Determination problems of medicinal and aromatic plants production either in vivo or in vitro and find

	solutions. b2- Distinguish the general methods of medicinal and aromatic plants propagation. b3- Suggest protocol to produce and enhance the major active constituent in medicinal and aromatic plants b4- Evaluate the different methods of volatile oils extractio
w. Professional Skills:	c1- Select technological means serving professional practice in medicinal and aromatic plants biotechnology trends. c2-Select the different theoretical formula for growth media of specific biological plant organs to enhance natural products
x. General and Transferable Skills	d1- Use internet to collect the knowledge from data sources, e.g., text books, scientific journals, ….etc d2- Appear management skills to acquire of self confidence and leadership skills d3-Use audio & video means for displaying information and manage scientific seminars and presentation d4- Appear self-learning capabilities in biotechnology field.

	48. Course Contents:
No.	**Topic**
1	Introduction of medicinal and aromatic plants biotechnology course and its content. Micropropagation of medicinal and aromatic plant
2	Natural products production through plant cell culture. biosyntheses and extraction of volatile oils from aromatic plants
3	Bio-fertilization of medicinal and aromatic plants. Production of virus-free plants through tissue culture
4	Factors affecting production of sec. metabolites in vivo and in vitro"
5	Genetically modified plants. Germplasm conservation of medicinal plants
6	Phytochemical analysis of medicinal and aromatic plants. Applications; selection of plant cell desirable characteristics
7	Topics in medicinal and aromatic biotechnology" student's presentation". Case studies

49. Teaching and Learning Methods	
	- Lectures - scientific seminars and presentation - Students activity -Discussion / Reports

50. Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:			
a. Assessment Methods:	* Oral exam, * Written (Final) exam.		
b. Assessment Schedule	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam	5th &10th works 8th week, 16th week, 16th week.	
c. Weighting of Assessments	Oral exam Semester work Written exam Total	20 degrees 20 degrees 60 degrees 100 degrees	Ratios 20%, Ratios 20%, Ratios 60%, Ratios 100%.

51. List of References:	
v. Notes	Uses of plant tissue culture(Dr Ibrahim A Almaksoud, unpublished)
w. Essential Books (Text Books)	- An introduction to plant tissue culture (1993)byM.K.Razdan, Oxford, Newdelhi - Hand Book of Medicinal herbs (2002) CRC Press LLC - Medicinal plant biotechnology (2007) WILEY-VCH Verlag GmbH & Co.
x. Suggested Books	- Medicinal Natural products (2002) by John Wiley & Sons Ltd - Studies in natural product chemistry (2001) ELSEVIER 3- Natural products from plants, second edition (2006), by Taylor & Francis group, LLC. **-Biotechnology in Agriculture and Forestry 4 Medicinal and Aromatic Plants I** **Edited by Y. P. S. Bajaj 1988** **Springer-Verlag** **Berlin Heidelberg New York** **London Paris Tokyo**

y. Periodicals, Web Sites, … etc ...	-Medicinal & Aromatic plant science and Biotechnology -Plant physiology - Planta medica -In Vitro Cell.Dev.Biol.---plant - Phytotherapy journal - Natural products - Plant,cell, tissue and organ culture - Plant cell reports, -http://en.wikipedia.org/wiki

Course coordinator: **Dr. Metwally Hassan**
Head of the department council: **Prof. Haroun Abou Shama**
Date:

Matrix of Knowledge and skills of the educational course targeted
Course name: Medicinal and aromatic plant biotechnology (B3-8)
Department: Plant Biotechnology
PhD Course

No.	Course topic	Knowledge and understanding	Intellectual abilities	Professional skills	General and transferable skills
1	Introduction of medicinal and aromatic plants biotechnology course and its content, Micropropagation of medicinal and aromatic plant	3.a/2,4	3.b/2	3.c1	3.d/1
2	Natural products production through plant cell culture. .biosyntheses and extraction of volatile oils from aromatic plants	3.a/3	3.b/3,4	3c2	3.d/4
3	Bio-fertilization of medicinal and aromatic plants Production of virus-free plants through tissue culture	3.a/1	3.b/1,2	3.c/2	3.d/4
4	Factors affecting production of sec. metabolites in vivo and in vitro"	3.a/3	3.b/1,3	3.c/2	---
5	Genetically modified plants. Germplasm conservation of medicinal plants	3.a/4	3.b/2	3.c/2	---
6	Phytochemical analysis of medicinal and aromatic plants Applications; selection of plant cell desirable characteristics	3.a/4	3.b/4	3.c/2	3.d/2
7	Topics in medicinal and aromatic biotechnology" student's presentation"	----	---	-	3.d/1,2,3

Course coordinator: **Dr. Metwally Hassan**

Head of the department council: **Prof. Haroun Abou Shama**

Department: **Plant Biotechnology**

Course Specifications

52. Course information:							
Course Code:	B3-13	**Course Title:**	**Breeding of disease resistant plants**				
No. units	3	**Lec.**	3	**App.**		**Level**	PhD
Department	**Plant Biotechnology**						

53. Course Aims	
	1. Theories and principles of breeding for disease resistance in plants. 2. Experimental approaches for examining genetics of host-parasite interactions, expression and stability of disease resistance and breeding strategies for developing disease resistant cultivars.

54. Intended Learning Outcomes of Course (ILO's)	
y. Knowledge and Understanding:	a1) Recognize the basic rules of plant tissue culture, plant pathology, plant breeding, biotechnology of secondary products, breeding of disease-resistant plants, plant physiology, biotechnology of field, horticulture, vegetable and ornamental crops, and mushroom propagation. a2) Understand the scientific basics of breeding of disease resistant plants and its application in agricultural systems. a3) Describe the methods of plant breeding for pest and disease resistance.
z. Intellectual skills:	b1) Classify the different methods of plant disease free production. b2) Discuss the different methods of plant breeding and its application.
aa. Professional Skills of course:	c1) Apply the genetic modified plants for improving the high yield and plant disease and insect resistances.
bb. General and Transferable Skills	d1) Acquire of self confidence and leadership skills. d2) Organize and manage scientific seminars and presentation. d3) Create thinking skills through analysis of data.

	55. Course Contents:
No.	Topic
1	Introduction, Losses due to diseases, History of breeding for disease resistance
2	Generation of variability in pathogen, Physiological races and pathogens
3	Genetics of pathogenicty, Disease development
4	Disease escape, Disease resistance, Varietals and horizontal resistance
5	Mechanism of disease resistance, Genetic of disease resistance, Source of disease resistance
6	Methods of breeding for disease resistance
7	Testing for disease resistance

56. Teaching and Learning Methods	
	Theoretical lectures, Practical works Lab experiments, Scientific trips

57. Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:		
essment Methods:	er works, n exam, am, (Final) exam.	
essment Schedule	5th &10th works, 6th week, ek, 15th week.	
ighting of Assessments	10degrees 10 degrees 20 degrees 60 degrees Total 100 degrees	Ratios 10%, Ratios 10%, Ratios 20%, Ratios 60%, Ratios 100%.

58. List of References:	
z. Notes	Lectures written by course coordinator(s)

aa. Essential Books (Text Books)	R. Johnson and G. J. Jellis. (1992). Breeding For Disease Resistance.
bb. Suggested Books	Singh, B. D., Plant Breeding
cc. Periodicals, Web Sites, … etc ...	Plant Breeding J., Crop Science J., plant pathology J.

Course coordinator: **Dr. Khaled F. M. Salem**
Head of the department council **Prof. Haroun Abou Shama**
Date:

resistant plants

Course Contents	Week No.	a-Knowledge and Understanding	b- Intellectual skills	c- Professional Skills	d-General and Transferable Skills
Introduction, Losses due to diseases, History of breeding for disease resistance	**1&2**	**a/1,2,3**	**b/1,2**	**c/1**	**d/1**
Generation of variability in pathogen, Physiological races and pathogens	**3&4**	**a/1,2,3**	**b/1,2**	**c/1**	**d/2**
Genetics of pathogenicty, Disease development	**5&6**	**a/1,2,3**	**b/1,2**	**c/1**	**d/3**
Disease escape, Disease resistance, Varietals and horizontal resistance	**7&8**	**a/1,2,3**	**b/1,2**	**c/1**	**d/3**
Mechanism of disease resistance, Genetic of disease resistance, Source of disease resistance	**9&10**	**a/1,2,3**	**b/1,2**	**c/1**	**d/1**
Methods of breeding for disease resistance	**11&12**	**a/1,2,3**	**b/1,2**	**c/1**	**d/2**
Testing for disease resistance	**13&14**	**a/1,2,3**	**b/1,2**	**c/1**	**d/3**

Course coordinator: **Dr. Khaled F. M. Salem**
Head of the department council **Prof. Haroun Abou Shama**
Date:

Department: **Plant Biotechnology**

Course Specifications

59. Course information:

Course Code:	**B3-14**	**Course Title:**	**Breeding of Insect Resistant Plants**				
No. units	**3**	**Lec.**	**3**	**App.**		**Level**	**PhD**
Department	**Plant Biotechnology**						

60. Course Aims

	• Studying the Resistance in the host structurally and genetically • Assessment of Insect-Pest resistance and management of disease and Insect Resistance • Preparing well-qualified students and researches in both academic and applied levels in order to have the ability to meet the changeable requirements of the field of plant biotechnology.

61. Intended Learning Outcomes of Course (ILO's)

cc.Knowledge and Understanding: --	a/1) Express the host Plant Selection and The Value of Insect Resistance, in addition to Crop Plant and Insect Diversity and the Concepts in Insect-Pest Resistance. a/2) Summarize Insect-Plant Interactions and the Mechanisms of Resistance as for as Sources of Resistance and Methods of Testing for Resistance. a/3)Divide Breeding and Stability of Resistance to Insects Production of Insect-Resistant Plants by Unconventional Breeding a/4) Explain the manipulation of plant to be resistant to insect by the main of genetic transformation.

dd. Intellectual skills:	b/1) Investigate the biological effects of using plant free pathogens, the different methods of plant breeding and its applications. b/2) Suggest programs for breeding to produce plants resistant to insects and different methods of plant transformation and its field performance
ee. Professional Skills:	c/1) Perform laboratory and field tests for plant biotechnology.
ff. General and Transferable Skills	d/1) Collect the knowledge from data sources, *e.g.*, text books, scientific journals, internet, multimedia…etc d/2) Acquire of self confidence and leadership skills, Self-learn and distance learn capabilities. d/3) Organize and manage scientific seminars and presentation, work effectively in teamwork.

62. Course Contents:

No.	Topic
1	Host Plant Selection and The Value of Insect Resistance
2	Crop Plant and Insect Diversity and the Concepts in Insect-Pest Resistance
3	Insect-Plant Interactions and the Mechanisms of Resistance
4	Sources of Resistance and Methods of Testing for Resistance
5	Breeding and Stability of Resistance to Insects
6	Production of Insect-Resistant Plants by Unconventional Breeding
7	Transformation for production of insect resistant plants

63. Teaching and Learning Methods	
	5. Data show 6. Scientific Journals 7. Text books 8. Internet

64. Teaching and Learning Methods (for	Not applicable

students with special needs)	

7. Student Assessment:		
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.	
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.	
c. Weighting of Assessments	10degrees 10 degrees 20 degrees 60 degrees Total 100 degrees	Ratios 10%, Ratios 10%, Ratios 20%, Ratios 60%, Ratios 100%.

65. List of References:	
dd. Essential Books (Text Books)	1. Breeding plants resistant to insects Maxwell, F. E., Jennings, P. R. 2. Disease and Insect Resistance in Plants D.P. Singh and Arti Singh ISBN 978-1-57808-412-8; 2005 3. Host Plant Resistance to Insects *by* Gurdev S. Khush, Niranjan Panda
4. Periodicals, Web Sites, … etc ...	• J. Plant Breeding • Crop Sceince

Course Coordinator: **Dr. Kamal F. Abdellatif**
Head of the department council: **Prof. Haroun Abou Shama**
Date:

Matrix of Knowledge and skills of the educational course targeted

Course name: Breeding of Insect Resistant Plants (B3-14)

No.	Course topic	Knowledge and understanding	Intellectual abilities	Professional skills	General and transferable skills
1	**Host Plant Selection and The Value of Insect Resistance**	a/1	b/1,2	c/1	d/1
2	**Crop Plant and Insect Diversity and Concepts in Insect-Pest Resistance**	a/1	b/1,2	-	d/2
3	**Insect-Plant Interactions and the Mechanisms of Resistance**	a/2	b/1,2	-	d/3
4	**Sources of Resistance and Methods of Testing for Resistance**	a/2	b/1,2	c/1	d/1
5	**Breeding and Stability of Resistance to Insects**	a/3	b/1,2	c/1	d/2
6	**Production of Insect-Resistant Plants by Unconventional Breeding**	a/3	b/1,2	c/1	d/3
7	**Transformation for production of insect resistant plants**	a/4	b/1,2	c/1	d/3

Course Coordinator: **Dr. Kamal F. Abdellatif**
Head of the department council: **Prof. Haroun Abou Shama**
Date:

Department: **Plant Biotechnology**

Course Specifications

66. Course information:							
Course Code:	**B3-18**	**Course Title:**	**Evolution of Crop Plants**				
No. units	**3**	**Lec.**	**3**	**App.**		**Level**	**PhD**
Department	**Plant Biotechnology**						

67. Course Aims	
	• Providing comprehensive evolution of major economically significant crop plants and their wild ancestors. • "Evolution of Crop Plants" is an excellent resource for plant breeders and biotechnologists, seed producers, plant pathologists and researchers in agriculture, crop evolution and conservation. • Preparing well-qualified students and researches in both academic and applied levels in order to have the ability to meet the changeable requirements of the field of plant biotechnology.

68. Intended Learning Outcomes of Course (ILO's)	
gg. Knowledge and Understanding:	a/1) Express cytotaxonomic background and molecular markers in plants and their applications. a/2) Summarize plant transformation and production of transgenic crops. a/3) Clarify difference between evolution of wheat and cotton. a/4) Explain evolution of temperate forage grasses and minor crops and the relationship between the

	morphology and the evolution of the plants.
hh. Intellectual skills:	b/1) Suggest programs for evolution of plants using Cytotaxonomic and Molecular Markers in Plants and their applications. b/2) Evaluate Plant Transformation and production of transgenic crops b/3) Distinguish between Evolution of Cotton and wheat
ii. Professional Skills:	c/1) Monitor and analyze different methods of plant morphology and evolution. c/2) Apply the various methods biotechnology in the Evolution of Crop Plants.
jj. General and Transferable Skills	d/1) Collect the knowledge from data sources, *e.g.*, text books, scientific journals, internet, multimedia…etc d/2) Acquire of self confidence and leadership skills, Self-learn and distance learn capabilities. d/3) Create thinking skills through analysis of data, participate in workshops and training courses and experience in the plant biotechnology.

69. Course Contents:

No.	Topic
1	**Cytotaxonomic Background**
2	**Molecular Markers in Plants and their applications**
3	**Plant Transformation and production of transgenic crops**
4	**Evolution of Wheat**
5	**Evolution of Cotton**
6	**Evolution of Cotton**
7	**Evolution of temperate forage grasses and minor crops**

70. Teaching and Learning Methods	
	9. Data show 10. Scientific Journals 11. Text books 12. Internet
71. Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:	
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.
c. Weighting of Assessments	10degrees Ratios 10%, 10 degrees Ratios 10%, 20 degrees Ratios 20%, 60 degrees Ratios 60%, Total 100 degree Ratios 100%

72. List of References:	
ee. Essential Books (Text Books)	1. Evolution Of Crop Plants ISBN-13:9780582086432, 2. Crop evolution, adaptation, and yield L. T. Evans Publisher: Cambridge; Cambridge University Press, 1993. ISBN: 052122571X
5. Periodicals, Web Sites, … etc ...	• Crop Science • Plant Breeding • TAG • Genome • Genetic revolution and crop evolution

Course Coordinator: **Dr. Kamal F. Abdellatif**
Head of the department council: **Prof. Haroun Abou Shama**
Date:

Matrix of Knowledge and skills of the educational course targeted
Course name: Evolution of Crop Plants (B3-18)

No.	Course topic	Knowledge and understanding	Intellectual abilities	Professional skills	General and transferable skills
1	**Cytotaxonomic Background**	a/1	b/1	c/1,2	d/1
2	**Molecular Markers in Plants and their applications**	a/1	b/1	c/1,2	d/2
3	**Plant Transformation and production of transgenic crops**	a/2	b/2	c/1,2	d/3
4	**Evolution of Wheat**	a/3	b/3	c/1,2	d/1
5	**Evolution of Cotton**	a/3	b/3	c/1,2	d/2
6	**Evolution of Maize**	a/3	b/3	c/1,2	d/3
7	**Evolution of temperate forage grasses and minor crops**	a/4	b/3	c/1,2	d/3

Course Coordinator: **Dr. Kamal F. Abdellatif**
Head of the department council: **Prof. Haroun Abou Shama**
Date:

Department: **Plant Biotechnology**

Course Specifications

73. Course information:							
Course Code:	B3-21	**Course Title:**	**Field crop biotechnology II**				
No. units	3	**Lec.**	3	**App.**		**Level**	PhD.
Department	**Plant Biotechnology**						

74. Course Aims	
	Preparing students and researchers in both academic and applied levels in order to have the ability to meet the changeable requirements of the field of plant biotechnology.

75. Intended Learning Outcomes of Course (ILO's)	
kk. Knowledge and Understanding:	a1) Express the general issues and application of plant biotechnology, historical perspective**,** DNA revolution, Making Genetic map**,** Mapping genes responsible for differences in phenotype . a2) Summarize the general concept of agricultural biotechnology and its impact on environment and application DNA marker assisted crop improvement**,** Molecular characterization for plant genetic resources conservation DNA fingerprinting and plant variety protection**,** Application of repetitive DNA sequences in plant genome analysis. a3) Recognize the basic rules of plant tissue culture, Cloning of plant genes based on genetic map location**,** Genome mapping in Legumes Genome mapping in Legumes**,** Genome mapping in grains and grasses. a4) Explain the production of transgenic plants against diseases and insects attack.
ll. Intellectual skills:	b1) Link between the plant biotechnology and the application under Egyptian environment. b2) Explain the various types of field crop biotechnology.
mm. Professional Skills:	c1) Perform laboratory and field tests for molecular markers for plant breeding. c2) Apply the genetic modified plants for improving the

	high yield and plant disease and insect resistances. c3) Perform laboratories practical work necessary for plant transformation.
nn. General and Transferable Skills	d1) Acquire of self confidence and leadership skills. d2) Organize and manage scientific seminars and presentation. d3) Self-learn and distance learn capabilities. d4) Participate in workshops and training courses. d5) Experience in the plant biotechnology, transformation, breeding and crop evolution.

	76. Course Contents:
No.	**Topic**
1	Historical perspective**,** DNA revolution**,** Making Genetic map**,** Mapping genes responsible for differences in phenotype
2	DNA marker assisted crop improvement**,** Molecular characterization for plant genetic resources conservation
3	DNA fingerprinting and plant variety protection**,** Application of repetitive DNA sequences in plant genome analysis
4	Cloning of plant genes based on genetic map location**,** Genome mapping in Legumes
5	Genome mapping in Legumes**,** Genome mapping in grains and grasses**,** Genome mapping in tropical grains
6	Breeding for disease resistant by production of transgenic plants
7	Breeding for insect resistant by production of transgenic plants

77. Teaching and Learning Methods	
	Theoretical lectures, Practical works Lab experiments, Scientific trips

78. Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:	
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.

b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.	
c. Weighting of Assessments	10degrees	Ratios 10%,
	10 degrees	Ratios 10%,
	20 degrees	Ratios 20%,
	60 degrees	Ratios 60%,
	Total 100 degrees	Ratios 100%.

79. List of References:	
ff. Notes	Lectures written by course coordinator(s)
gg. Essential Books (Text Books)	Genome mapping in plants, A. H. Paterson
hh. Suggested Books	Singh, B. D., Plant Breeding
ii. Periodicals, Web Sites, … etc ...	Plant Breeding J., Crop Science J., plant biotechnology, Euphytica, Crop science and Biotechnology

Course coordinator: **Dr. Khaled F. M. Salem**
Head of the department council: **Prof Haroun Abou Shama**
Date:

Matrix of Knowledge and skills of the educational course targeted
Course name: Field Crop Biotechnology II (B3-21)
Department: Plant Biotechnology
PhD Course

No.	Course topic	Knowledge and understanding	Intellectual abilities	Professional skills	General and transferable skills
1	Historical perspective, DNA revolution, Making Genetic map, Mapping genes responsible for differences in phenotype	a/1	b/1,2	c/1	d/1,5
2	DNA marker assisted crop improvement, Molecular characterization for plant genetic resources conservation	a/2	b/1,2	c/2	d/2,3
3	DNA fingerprinting and plant variety protection, Application of repetitive DNA sequences in plant genome analysis	a/2	b/1,2	c/3	d/3,4
4	Cloning of plant genes based on genetic map location, Genome mapping in Legumes	a/3	b/1,2	c/1	d/1,2
5	Genome mapping in Legumes, Genome mapping in grains and grasses, Genome mapping in tropical grains	a/3	b/1,2	c/1	d/2,4
6	Breeding for disease resistant by production of transgenic plants	a/4	b/1,2	c/2	d/3,5
7	Breeding for insect resistant by production of transgenic plants	a/4	b/1,2	c/3	d/3,5

Course coordinator: **Dr. Khaled F. M. Salem**
Head of the department council: **Prof Haroun Abou Shama**
Date:

Department: **Plant Biotechnology**

Course Specifications

80. Course information:

Course Code:	**B3-22**	**Course Title:**	**Field Crop Biotechnology III**				
No. units	**3**	**Lec.**	**3**	**App.**		**Level**	**PhD**
Department	**Plant Biotechnology**						

81. Course Aims

	1. Showing how biotechnology is becoming part of agriculture and for an innovative course in plant biology where the instructor wants to deal with the societal issues that flow from agriculture (environmental concerns, GM crops, food sufficiency, etc). 2. Preparing well-qualified students and researches in both academic and applied levels in order to have the ability to meet the changeable requirements of the field of plant biotechnology.

82. Intended Learning Outcomes of Course (ILO's)

oo. Knowledge and Understanding:	a/1) Express the genetic engineering and biotechnology of crop improvement, food crops improvements by biotechnology means. a/2) Summarize the Advance toward producing biofuels without stressing global food supply, Blue biotechnology: application of molecular biological methods to marine and freshwater organisms. a/3)Explain Green biotechnology: use of environmentally-friendly solutions as an alternative to traditional agriculture, horticulture, and animal breeding processes, Red biotechnology: use of organisms for the improvement of Crop medical processes. a/4) Divide White biotechnology: biotechnology applied to industrial processes**.**
pp. Intellectual skills:	b/1) Investigate the biological effects of using plant free pathogens, the various types of field crop

	biotechnology, the different methods of micro-propagation in plants, the various types of diagnosis and control of plant diseases, the different methods of plant breeding and its applications and the analysis methods of natural products by using different chemical methods. b/2) Suggest programs for breeding to produce plants resistant or tolerant to different stresses, biotic or abiotic, explain how crop plants developed and the role of the morphology in the evolution of those plants, different methods of plant transformation and its field performance
qq. Professional Skills:	c/1) Perform laboratory and field tests for plant biotechnology. c/2) Apply the various methods for plant biotechnology.
rr. General and Transferable Skills	d/1) Collect the knowledge from data sources, e.g., text books, scientific journals, internet, multimedia…etc d/2) Acquire of self confidence and leadership skills, Self-learn and distance learn capabilities. d/3) Create thinking skills through analysis of data, participate in workshops and training courses and experience in the plant biotechnology.

83. Course Contents:

No.	Topic
1	**Genetic Engineering and biotechnology of crop improvement**
2	**Food crops improvements by biotechnology means**
3	**Advance toward producing biofuels without stressing global food supply**
4	**Blue biotechnology: application of molecular biological methods to marine and freshwater organisms.**
5	**Green biotechnology: use of environmentally-friendly solutions as an alternative to traditional agriculture, horticulture, and animal breeding processes.**
6	**Red biotechnology: use of organisms for the improvement of Crop medical processes.**
7	**White biotechnology: biotechnology applied to industrial processes.**

84. Teaching and Learning Methods

	13. Data show 14. Scientific Journals

	15. Text books 16. Internet

85. Teaching and Learning Methods (for students with special needs)	**Not applicable**

7. Student Assessment:	
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.
c. Weighting of Assessments	10degrees Ratios 10%, 10 degrees Ratios 10%, 20 degrees Ratios 20%, 60 degrees Ratios 60%, Total 100 degrees Ratios 100%.

86. List of References:	
jj. Essential Books (Text Books)	1. Plants, genes, and crop biotechnology by Maarten J. Chrispeels, David E. Sadava. Edition: 2 - 2002 - 562 pages 2. Adoption of Genetically Engineered Crops in the U.S. USDA. Economic Research Service. Summarizes the extent of adoption (1996-2009) 3. Biotechnology of Food Crops in Developing Countriesr - Nov 1999).

kk. Periodicals, Web Sites, … etc ...	• Journal of the American College of Nutrition, Vol. 21, No. 90003, 157S-160S (2002). • J. Plant Breeding • Crop Sceince

Course coordinator: **Dr. Kamal F. Abdellatif**
Head of the department council: **Prof. Haroun Abou Shama**

Matrix of Knowledge and skills of the educational course targeted
Course name: Field Crop Biotechnology III (B3-22)
Department: Plant Biotechnology
PhD Course

No.	Course topic	Knowledge and understanding	Intellectual abilities	Professional skills	General and transferable skills
1	**Genetic Engineering and biotechnology of crop improvement**	a/1	b/1	c/1	d/1
2	**Food crops improvements by biotechnology means**	a/1	b/2	c/1	d/2
3	**Advance toward producing biofuels without stressing global food supply**	a/2	b/1	c/2	d/3
4	**Blue biotechnology: application of molecular biological methods to marine and freshwater organisms.**	a/2	b/2	c/1	d/1
5	**Green biotechnology: use of environmentally-friendly solutions as an alternative to traditional agriculture, horticulture, and animal breeding processes.**	a/3	b/2	c/1	d/2
6	**Red biotechnology: use of organisms for the improvement of Crop medical processes.**	a/3	b/1	c/2	d/3
7	**White biotechnology: biotechnology applied to industrial processes.**	a/4	b/2	c/1	d/3

Course coordinator: **Dr. Kamal F. Abdellatif**
Head of the department council: **Prof. Haroun Abou Shama**

Date

Department: Plant Biotechnology

Course Specifications

87. Course information:							
Course Code:	**B3-24**	**Course Title:**	Fruit biotechnology				
No. units	3	**Lec.**	3	**App.**	-----	**Level**	PhD
Department	Plant Biotechnology						

88. Course Aims	
	1.1. Preparing distinguished graduates capable to apply the most recent techniques in the field of plant biotechnology 1.2. Developing student knowledge and skills to solve the theoretical and practical biotechnological problems in fruits by plants tissue culture applications. 1.3. training in scientific analysis of problems dealing with fruits and employing the biotechnological techniques in solve problems

89. Intended Learning Outcomes of Course (ILO's)	
a. Knowledge and Understanding:	a1- Divide the different methods of micropropagation, production plant disease-free and the main scientific parts of using molecular biology, biotechnology plant tissue culture and genetic engineering on the field of plant biotechnology. a2-Summarize basics of the various types of fruit crops biotechnology, plant breeding and protoplast fusion a3-Explain methods production protoplast, haploid plants and somatic hybridization
b- Intellectual skills:	b1 Determine problems in different fields related to plant biotechnology. b2- Find solution for the majority of problems using biotechnology in different applications. b3-Evaluate information in plant biotechnology and biological methods and techniques of tissue culture

	b4 -Innovate induction somaclonal variation and introduce it in plant breeding. b 5 -Evaluate the methods of somatic hybridizatio
c- Professional Skills:	C1 -Prepare professional development to improve and enhance performance in plant biotechnology branches. **c2 -**Select and produce free virus plants *in vitro* and somatic embryos c3 -prepare a protocol for solving problem using biotechnological techniques c4 -Estimate methods of *in vitro* production of somatic hybrids and haploid plants.
d- General and Transferable Skills	d1 -Use different sources of information to obtain data for a given course topics. d2- Communicate with others and manage time effectively. d3 -Show self learning abilities in situation comparable to his/her level. d4 -Appear management skills in scientific seminars and presentation d5 -Treat by efficiency in self-learn and distance learn capabilities

	2 Course Contents: Fruit Biotechnology (B3-24)
No.	**Topic**
1	Biotechnology faces in agriculture. Introduction in plant tissue culture (advantage and disadvantage, stages of tissue culture and problem expected in each stage)
2	Applications of tissue culture of horticulture: a) Micropropagation and b) Synthetic seed as method of conservation)
3	c) Production of virus free plants d) Induction somaclonal variation as a method of horticulture plant breeding
4	e)Micrografting techniques and applications
5	f)Protoplast isolation methods
6	Protoplast fusion and producing of somatic hybrids and polyploidy
7	Production of haploid plants as an aid tool in horticulture plant breeding

3 Teaching and Learning Methods	
	- Lectures - scientific seminars and presentation - Libraries and internet research (self learning)

4 Teaching and Learning Methods (for students with special needs)	Not applicable

5 Student Assessment:	
d. Assessment Methods:	- Activities (seminar and term paper -Mid. Term exam Oral Exam -Written Exam -
e. Assessment Schedule	Semester Works (5th&10th), Midterm Exam (6th) Week, oral Exam (14th) Week, Written (Final) Exam (15th) Week.
f. Weighting of Assessments	10/100… 10/100 20/100. 60/100

6 List of References:	
ll. Notes	lectures
mm. Essential Books (Text Books)	- Eexperiments in tissue culture. -Plant cell and tissue culture.
nn. Suggested Books	Pajaj group - Periodicals, Web sites, etc - Plant cell tissue and organ culture journal
oo. Periodicals, Web Sites, … etc ...	

Course coordinator: **Dr. Ebtsam moubark**
Head of Department **Prof. Haroun Abou Shama**
Date:

Matrix of Knowledge, Skills ILOs for Fruit Biotechnology B3-24 Course

Course Contents	Week No.	a Knowledge and Understanding	b Intellectual skills	c Practical and Professional Skills of course	d General and Transferable Skills
Biotechnology faces in agriculture. Introduction in plant tissue culture (advantage and disadvantage, stages of tissue culture and problem expected in each stage)	**1&2**	**a/1**	**b/1**	**c/1**	**d/1**
Applications of tissue culture of horticulture: a)Micropropagation and b) Synthetic seed as method of conservation	**3&4**	**a/2**	**b/3,2**	**c/3,4**	**d/2**
c)Production of virus free plants d) Horticulture plant breeding through somaclonal variation induction	**5&6**	**a/2**	**b/3,4**	**c/2**	**d/2**
e)Micrografting techniques and applications	**7&8**	**a/2**	**b/3**	**c/3**	**d/3**
f)Protoplast isolation methods	**9&10**	**a/3**	**b/3,5**	**c/4**	**d/4**
Protoplast fusion and producing of somatic hybrids and polyploidy	**11&12**	**a/3**	**b/3,5**	**c/4**	**d/5**
g)Production of haploid plants as an aid tool in horticulture plant breeding	**13&14**	**a/3**	**b/3,5**	**c/4**	**d/4**

Course coordinator: **Dr. Ebtsam moubark**
Head of Department **Prof. Haroun Abou Shama**
Date:

Department: **Plant biotechnology**

Course Specifications

90. Course information:

Course Code:	**B3-25**	**Course Title:**	**Gene manipulation in plants**				
No. units	3	**Lec.**	3	**App.**		**Level**	PhD
Department	**Plant Biotechnology**						

Course Aims	
	2/1 introducing students to the principles, practices and application of plant gene manipulation. **2/2** acquainting students with experimental design and analysis of gene manipulation in plants. **2/3** exposing students to issues and challenges encountered in the area of plant genetic manipulation.

91. Intended Learning Outcomes of Course (ILO's)	
ss. Knowledge and Understanding:	a/1 Express knowledge of genetic manipulation for biotic and abiotic stress. a/2 Summarize how to produce transgenic plants for the production of biodegradable plastics a/3 Divide the application of molecular farming. a/4 Clarify difference between genetically modified plants and the nature one. a/5 Explain how to engineer plants for metabolic pathway.
tt. Intellectual skills:	b/1 Suggest solution for problems facing plant manipulation. b/2 Evaluate critically research and advance scholarship in the discipline.

	b/3 Determine Problems and Find Solutions at a professional level to solve problems related to the discipline
uu. Professional Skills:	c/1 Test and diagnose a variety of experimental procedures in the laboratory. c/2 Prepare practical work necessary for gene manipulation of plant. c/3 Select appropriate methods to manipulate plants.
vv. General and Transferable Skills	d/1 make use of IT (word processing, spreadsheets and databases, web sources) d/2 communicate scientific ideas and give oral presentations d/3 work as part of a team, use library resources and mange time

	92. Course Contents:
No.	**Topic**
1	Manipulation of plant development.
2	Genetic manipulation for biotic and abiotic stress.
3	Genetic Engineering of polyamine metabolism.
4	Genetic Engineering of metabolic pathway in plants.
5	Manipulation of Chalcone synthase pathway.
6	Transgenic plants for the production of biodegradable plastics.
7	Molecular Pharming.

93. Teaching and Learning Methods	
	1. Lectures 2. Data show 3. Scientific Journals

	4. Text books

94. Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:	
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.
c. Weighting of Assessments	10degrees Ratios 10%, 10 degrees Ratios 10%, 20 degrees Ratios 20%, 60 degrees Ratios 60%, Total 100 degrees Ratios 100%.

95. List of References:	
pp. Notes	-
qq. Essential Books (Text Books)	Plant Genetic Engineering Series Vol 7 : Metabolic Engineering and Molecular Farming I. Pawan k Jaiwal, 2006
rr. Suggested Books	-
ss. Periodicals, Web Sites, … etc ...	-

Course Coordinator: **Dr. Yehia A. Khidr**
Head of the department: **Prof. Haroun Abou Shama**
Date:

Matrix of Knowledge, Skills ILOs for Education Course
(B3-25)

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Professional Skills of course	d-General and Transferable Skills
Manipulation of plant development.	1&2	a/4	b/1, b/2	c/1, c/2	d/1, d/2
Genetic manipulation for biotic and abiotic stress.	3&4	a/1	b/1, b/3	c/1, c/3	d/1, d/3
Genetic Engineering of polyamine metabolism.	5&6	a/5	b/2, b/3	c2/ c/3	d/2/d3
Genetic Engineering of metabolic pathway in plants.	7&8	a/5	b/1, b/3	c/1, c/2	d/1, d/2
Manipulation of Chalcone synthase pathway.	9&10	a/5	b/1, b/2	c/1, c/3	d/1, d/3
Transgenic plants for the production of biodegradable plastics.	11&12	a/2	b/2, b/3	c2/ c/3	d/2/d3
Molecular Pharming.	13&14	a/3	b/1, b/3	c/1, c/3	d/1, d/2

Course Coordinator: **Dr. Yehia A. Khidr**
Head of the department: **Prof. Haroun Abou Shama**
Date:

Department: PLANT BIOTECHNOLOGY

Course Specifications

96. Course information:

Course Code:	**B3-34**	**Course Title:**	Micropropagation				
No. units	3	**Lec.**	3	**App.**	-	**Level**	PhD
Department	Plant Biotechnology						

97. Course Aims	
	h. Dividing the different methods of miropropagation, and the main scientific parts of using molecular biology and genetics stability i. Developing student knowledge and skills to solve the theoretical and practical micropropagation problems. j. Enhancing students and storming their intellectual and practical skills and select method of propagation suit for each case

98. Intended Learning Outcomes of Course (ILO's)

a. Knowledge and Understanding:	a1-. Divide the different methods of miropropagation, and the main scientific parts of using molecular biology and genetic engineering on the field of plant biotechnology. a2-Clarify difference the genetic stability of different micropropagation methods. a3 -Summarize problems of tissue culture techniques; especially somaclonal variation, and its solution which may be used. a4- Explain methods production of direct and indirect organogenesis and embryogenesis, micrografting, microtuber and photoautotrophic .
b. Intellectual skills:	b1- Evaluate methods of micropropagation b2 -Innovate a protocol for quality assurance of micropropagation system. **b3-** Determine problem of plant propagation which lead to replace traditional propagation methods with micropropagation. b4 -Evaluate photoautotrophic system as a method of micropropagatio
c. Professional Skills	c1- Evaluate advanced professional methods in plant micropropagation **c2-** Estimate information of production free virus plants, microtuber *in vitro* and somatic embryos.

	c3- prepare a protocol for solving problem related with micropropagation techniques c4-Test photoautotrophic method as a method may be suitable in our country.
d. General and Transferable Skills	d1-Show management skills for using information technology to improve his professional practice in internet and relative information. **d2-** Acquire of self confidence and leadership skills d3-Appear management skills in scientific seminars and presentation d4-Treat by Efficiency in self-learn

	99. Course Contents:
No.	**Topic**
1	Introduction in micropropagation.
2	Micropropagation through direct and indirect organogenesis
3	Genetic stability in commercial micropropagation and production free - disease plant
4	Synthetic seeds as a technique of micropropagation
5	Indirect method of micropropagation -Micro grafting as a method of micropropagation.
6	Methods of production of microtubers as a method of micropropagation
7	Photoautotrophic as a method for micropropagation

100. Teaching and Learning Methods	
	- Lectures - scientific seminars and presentation - self learning through Internet facilities and training to be in team work

101. Teaching and Learning Methods (for students with special needs)	**Not applicable**

102. Student Assessment:	
g. Assessment Methods:	- Activities (seminar and term paper -Mid. Term exam -Oral Exam -Written Exam -
h. Assessment Schedule	Semester Works (5th&10th), Midterm Exam (6th) Week, oral Exam (14th) Week, Written (Final) Exam (15th) Week.
i. Weighting of Assessments	**10/100…** **10/100** **20/100.** **60/100**

103. List of References:	
tt. Notes	**مذكرة غير منشورة**
uu. Essential Books (Text Books)	-A handbook of plant tissue culture by White, Philip R. (Philip Rodney), 1901- -An introduction to plant tissue culture (1993)by M.K.Razdan, Oxford, Newdelhi - Micropropagation (Bajaj). -Plant cell and tissue culture.
vv. Suggested Books	Pajaj group - Periodicals, Web sites, etc - Plant cell tissue and organ culture journal
ww. Periodicals, Web Sites, … etc …	

Course coordinator : **Dr Ebtsam moubark Hamza**
Head of Department: **Prof Dr. Haroun Abou Shama**
Date:

Matrix of Knowledge, Skills ILOs for Micropropagation Course (B3-34)

Course Contents	Week No.	a- Knowledge and Understanding	b- Intellectual skills	c- Professional Skills of course	d- General and Transferable Skills
1. Introduction in micropropagation.	1&2	a/1	b/1	c/1	d/4
2. Methods of micropropagation	3&4	a/1	b/1,2	c/1,3	d/2
3. . Genetic stability in commercial micropropagation and production free - disease plant	5&6	a/2,3	b/2,3	c/2	d/1
4. Synthetic seeds as a technique of micropropagation.	7&8	a/1	b/1,2	c/1,3	d/1
5. Indirect method of micropropagation - Micro grafting as a method of micropropagation	9&10	a/1,2	b/1,2	c/1,3	d/3
6. Methods of production of microtubers as a method of micropropagation	11&12	a/1	b/1,2	c/2	d/4
7. Photoautotrophic as a method for micropropagation	13&14	a/4	b/4	c/1,4	d/4

Course coordinator: Dr Ebtsam moubark Hamza
Head of Department: Prof Dr. Haroun Abou Shama
Date:

Department: **Plant Biotechnology**

Course Specifications

104. Course information:							
Course Code:	B3-39	**Course Title:**	**Mutation breeding**				
No. units	3	**Lec.**	3	**App.**		**Level**	PhD
Department	**Plant Biotechnology**						

105. Course Aims	
	-Imparting the knowledge about general principles of radiation and various tests/methods for detection of radiation effects on the living cells, genetic risks involved and perspectives advances made.

06. Intended Learning Outcomes of Course (ILO's)	
ww. Knowledge and Understanding:	a/1. Express the general concept of the role of mutation breeding in crop improvement. a/2. Summarize the nature and classification of mutations and radiation types and sources. a/3 Divide the chemical mutagens and effect of mutations on DNA, factors influencing the mutant spectrum. a/4 Explain the observing mutagen effects in M2 generation, use of mutagens in creating oligogenic and polygenic variations, use of mutagens in genomics, allele mining, tilling.
b- Intellectual skills:	b/1 suggest program for breeding using mutagens. b/2 Evaluate M2 generation produced from mutagen effects. b/3 Determine problems and find solutions in the field of mutation breeding.
yy. Professional Skills:	c/1 Select the appropriate method to improve crops using mutation c/2 Test the generated plant produced from mutation c/3 Estimate the degree or ratio of improvements of generated plants.
d-General and	d/1 Acquire of self confidence and leadership skills

Transferable Skills:	d/2 Organize and manage scientific seminars and presentation d/3 Work effectively in team work d/4 Use different resources for obtaining information & knowledge.

	c- Course Contents:
No.	Topics
1	Mutation and its history. Nature and classification of mutations:
2	Mutagenic agents: physical -- Radiation types and sources:
3	Effect of mutations on DNA
4	Chemical mutagens
5	Observing mutagen effects in M2 generation:
6	Factors influencing the mutant spectrum:
7	Use of mutagens in creating oligogenic and polygenic variations, Use of mutagens in genomics, allele mining, TILLING.

d- Teaching and Learning Methods	
	Lectures Class activities Discussion Presentation Reports

e- Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:	
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.

b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.	
c. Weighting of Assessments	10degrees 10 degrees 20 degrees 60 degrees Total 100 degrees	Ratios 10%, Ratios 10%, Ratios 20%, Ratios 60%, Ratios 100%.

f- List of References:	
xx. Notes	
yy. Essential Books (Text Books)	• Strickberger MW. 2005. *Genetics*. 3rd Ed. Prentice Hall.
zz. Suggested Books	• Singh BD. 2003. *Genetics*.Kalyani. • Cotton RGH, Edkin E & Forrest S. 2000. *Mutation Detection: A Practical Approach*. •Chadwick KH & Leenhouts HP. 1981. *The Molecular Theory of Radiation Biology*.Springer-Verlag.ford Univ. Press.
aaa. Periodicals, Web Sites, … etc ...	

Course coordinator: **Dr. Yehia Khidr**
Head of the department: **Prof. Dr. Haroun abou Shama**
Date:

Matrix of Knowledge, Skills ILOs for Education Course
Mutation breeding
(B3-39)

Course Contents	Week No.	a-Knowledge and Understanding	b- Intellectual skills	c- Professional Skills	d-General and Transferable Skills
Mutation and its history. Nature and classification of mutations:	1&2	a/1	b/1,2,3	c/1,2,3	1,2d
Mutagenic agents: physical -- Radiation types and sources:	3&4	a/1	b/1,2,3	c/1,2,3	d/1,3
Effect of mutations on DNA	5&6	a/1,3	b/1,2,3	c/1,2,3	d/1,4
Chemical mutagens	7&8	a/1,3	b/1,2,3	c/1,2,3	d /1,2
Observing mutagen effects in M2 generation:	9&10	a/1,4	b/1,2,3	c/1,2,3	d/ 1,2
Factors influencing the mutant spectrum:	11&12	a/1,3	b/1,2,3	c/1,2,3	d/ 2,3
Use of mutagens in creating oligogenic and polygenic variations, Use of mutagens in genomics, allele mining, TILLING.	13&14	a/1,4	b/1,2,3	c/1,2,3	d/ 2,4

Course coordinator: **Dr. Yehia Khidr**
Head of the department: **Prof. Dr. Haroun abou Shama**
Date:

Department: Plant biotechnology

Course Specifications

107. Course information:							
Course Code:	**B3-41**	**Course Title:**	**Plant biotechnology**				
No. units	3	**Lec.**	3	**App.**		**Level**	Ph.D
Department	**Plant Biotechnology**						

108. Course Aims	
	2/1 introducing students to the principles, practices and application of plant tissue culture and transformation in science, agriculture and industry. 2/2 acquainting students with experimental design and analysis of plant biotechnology experiments. 2/3 giving students hands-on experience and training in representative plant tissue culture and genetic engineering techniques. 2/4 exposing students to issues and challenges encountered in the area of plant biotechnology.

09. Intended Learning Outcomes of Course (ILO's)	
aaa. Knowledge and Understanding:	a/1 Express concept of plant biotechnology and summarize the technology of plant quality and crop improvement. a/2 Summarize the principle of tissue culture and its application. a/3) Divide production of secondary metabolites and transformation technology and their uses in plant biotechnology. a/4) Clarify difference between molecular markers and molecular farming and their benefits in plant biotechnology.
bbb. Intellectual skills:	b/1 Suggest method to improve crop yields and quality using genetic modifications thought tissue culture and evaluate methodologies. b/2. Determine Problems and Find Solutions in improving

	crop plant via molecular markers and molecular farming.
ccc. Professional Skills:	c/1 Implement tasks at a professional level to solve problems related to the discipline and write a report on an independent practical project c/2 Execute a variety of experimental procedures in the laboratory, form and devise experimental methods appropriate for tackling a particular problem
ddd. General and Transferable Skills	d/1 make use of IT (word processing, spreadsheets and databases, web sources) and communicate scientific ideas d/2 give oral presentations and work as part of a team and use library resources and manage time

	110. Course Contents:
No.	**Topics**
1	TISSUE CULTURE: Introduction to cells and tissue culture, concept of totipotency, laboratory requirements and general techniques. Tissue culture media, constituents and preparation. Initiation of aseptic culture.
2	TISSUE CULTURE APPLICATION: Suspension culture, somatic embryogenesis, organogenesis, Micro propagation (clonal propagation) Haploid production ands its application & limitations. Protoplast isolation, culture & regeneration, short term & long term germplasm conservation, somaclonal variations.
3	PRODUCTION OF SECONDARY METABOLITES: Production of chemicals and other important compounds from plants. Strategies for enhancing the product yield. Bioreactor models for commercialization of product.
4	TRANSFORMATION TECHNOLOGY: Agrobacterium mediated transformation, direct gene transfer methods, chemical methods, electroporation, microinjection and particle bombardment. Basic concept and essential steps of the genetic transformation process.
5	TRANSGENSIS: Production of transgenic plants for biotic and Abiotic stress tolerance (Drought, temperature, salt). (Herbicide resistance, insect resistance, disease resistance, Virus resistance).
6	MOLECULAR MARKERS: Concept of molecular DNA markers – RFLP, RAPD, AFLP, SNPs, SSRs, SSCPs and their role in crop improvement.
7	MOLECULAR FARMING AND APPLICATIONS: Plant biotechnology applications for production of industrial enzymes and therapeutic proteins, antigens, antibodies etc.

111. Teaching and Learning Methods	
	Lectures Discussion Presentation Reports

112. Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:

a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.
c. Weighting of Assessments	10degrees Ratios 10%, 10 degrees Ratios 10%, 20 degrees Ratios 20%, 60 degrees Ratios 60%, Total 100 degrees Ratios 100%.

113. List of References:	
bbb. Notes	-
ccc. Essential Books (Text Books)	1. Bhojwani, S.S. and Rajdan, Plant Tissue Culture: Theory and Practice. 2004 2. Chawla, H.S. Introduction to plant biotechnology. 2nd Edition. USA. Science Publisher. 2002.
ddd. Suggested Books	1. Crispeels, M.J. and Sadava, D.E., Plants, Genes and Crop Biotechnology, Jones and Bartlett Publishers (2nd Edition), 2003. 2. Gupta, P.K., "Elements of Biotechnology", Rastogi Publications
eee. Periodicals, Web Sites, … etc ...	**Selection of the newly scientific paper**

Course coordinator: **Dr. Yehia Khidr**
Head of the department: **Prof. Haroun Abou Shama**
Date:

Matrix of Knowledge, Skills ILOs for Education Course
Plant biotechnology (B3-41)

Course Contents	Week No.	a-Knowledge and Understanding	b- Intellectual skills	c- Professional Skills	d-General and Transferable Skills
TISSUE CULTURE:	1&2	a/1, 2	b/1	c/1, 2	d/1, 2
TISSUE CULTURE APPLICATION:.	3&4	a/1, 2	b/1	c/1, 2	d/1, 2
PRODUCTION OF SECONDARY METABOLITES:	5&6	a/1, 3	b/1	c/1, 2	d/1, 2
TRANSFORMATION TECHNOLOGY:.	7&8	a/1, 3	b/1	c/1, 2	d/1, 2
TRANSGENSIS:	9&10	a/1, 3	b/1	c1, 2	d/1, 2
MOLECULAR MARKERS:	11&12	a/1, 4	b/ 2	c/1, 2	d/1, 2
MOLECULAR FARMING AND APPLICATIONS:	13&14	a/1, 4	b/2	c/1, 2	d/1, 2

Course coordinator: **Dr. Yehia Khidr**
Head of the department council: **Prof. Dr. Haroun Abou Shama**
Date:

Department **PLANT BIOTECHNOLOGY**

Course Specifications

5. Course information:							
Course Code:	**B3 -44**	**Course Title:**	**Plant cell culture**				
No. units	3	**Lec.**	3	**App.**	-	**Level**	PhD.
Department	Plant Biotechnology						

e. Course Aims	
1. Development the students to understand plant cell culture and plant cell structure. 2. Determining professional problems and propose solutions in plant tissue and organ culture field. 3. Enhancing the students to understand cell suspension culture, protoplast isolation and fusion. 4. Handling methods in which explants for protoplasts transformation	

f. Intended Learning Outcomes of Course (ILO's)	
a-Knowledge and Understanding:	a/1-Express and outline the structure of plant cell. a/2-Summarize and know the physiological functions of plant cell. a/3-Basic facts, theories and recent advances of the plant protoplasts isolation, fusion, culture and related subjects. a/4-Basics , methodologies and scientific research ethics as its different tools
b-Intellectual skills:	b/1- Suggest the information through physiological function of plant cell b/2-Evaluate different cell culture stages, protoplasts fusion and applications. b/3- Find solution to solve professional problems according to available data of plant cell culture. b-4-Determine problems in different fields related to plant biotechnology.
c-Professional Skills:	c/1- Select required professional reports of methods in, protoplasts isolation, protoplasts transformation and protoplasts culture. c/2 Prepare computer for data collection in plant cell culture. c/3 Diagnose basic professional skills for determination applications of plant cell culture. c/4 Working knowledge of laboratory techniques used in plant biotechnology.

d-General and Transferable Skills	d/1 Communicate effectively using all methods with public, colleagues and appropriate authorities d/2 Manage time effectively. d/3 Use information technology to improve his/her professional practice. d/4Work in team with public, collegeous and appropriate authorities.

5. Teaching and Learning Methods	
	- Lectures - scientific seminars and presentation
	- Laboratory training -Laboratory facilities

6. Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:		
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.	
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.	
c. Weighting of Assessments		10degrees Ratios 10 % 10 degrees Ratios 10 % 20 degrees Ratios 20 % 60 degrees Ratios 60 % Total 100 degrees

8. List of References:	
a. Notes	
b. Essential Books (Text Books)	-Trigiano, R.N.and Gray, D.G.(2000): Plant tissue culture concepts and laboratory exercises.

	CRC Press, London. -Kumar U. (2001): Methods in plant tissue culture. -Narayanaswamy,S(2002): Plant cell and tissue culture Hall, R. D. 1999. Plant Cell Culture protocols. Human Press Inc. Totowa, New Jersy..
c. Suggested Books	-Pajaj group -Periodicals, Web sites, etc - Plant cell tissue and organ culture journal
d. Periodicals, Web Sites, … etc ...	

Course coordinator: **Ass. Prof. Dr Awatef M. BadrElden**

Head of the department council: **Prof. Dr. Haroun Abou Shama**

Date:

Matrix of Knowledge, Skills ILOs for Education Course
(B3-44)

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Professional Skills	d-General and Transferable Skills
1-Introduction in plant cell culture and Plant cell structure	1&2	a/1,2	b/3	c/1	d/3,4
2-Physiological functions of plant cell	3&4	a/2	b/1	c/2	d/2,4
3-Cell culture stages (Induction, multiplication and differentiation of callus)	5&6	a/3	b/2,3	c/1,2,3	d/3,4
4-Cell suspension culture and bioreactor	7&8	a/3	b/2	c/3	d/2,4
5-Applications of cell culture	9&10	a/3	b/2	c/3,4	d/1,2,3
6-Protoplasts isolation and culture	11&12	a/3	b/2,4	c/1,c/3	d3,4
7-Protoplast fusion	13&14	a/3,4	b/2	c/1	d1,2,3

Course coordinator: **Ass. Prof. Dr. Awatef M. BadrElden**

Head of the department council: **Prof. Dr. Haroun Abou Shama**

Date:

Department: Plant biotechnology

Course Specifications

114. Course information:							
Course Code:	B3-47	**Course Title:**	**Plant eco-physiology**				
No. units	3	**Lec.**	3	**App.**		**Level**	Ph. D
Department	**Plant biotechnology**						

115. Course Aims	
Course Objectives: Environmental plant physiology is concerned fundamentally with the physiology of crops as affected by ambient, but fluctuating environmental factors; physical, chemical and biotic environments. It centers on developing an understanding of the relationships and interactions of species or crops within communities, and the physiological mechanisms involved in crop responses to environmental conditions and how plants/crops acquire the resources needed for establishing and building the canopies through the growth of various organs.	

116. Intended Learning Outcomes of Course (ILO's)	
eee. Knowledge and Understanding:	a/1 Recognize the scope of physiological mechanisms and processes relevant to plant ecology, including but not limited to plant molecular biology, genetics, biochemistry, cellular biology, biophysics, anatomy, and physiology; a/2 Identify relevant concepts from these and other disciplines and integrate those concepts into a composite that increases their understanding of the breadth and depth of plant ecological processes; a/3 Critically examine plant ecological processes to identify the biotic and abiotic factors and mechanisms that shape or influence that process;
fff. Intellectual skills:	b/1 Distinguish the various roles and impact of stress on plants, plant populations, and communities while evaluating the positive and negative impacts of stress of growth, development, reproduction, survival, adaptation, evolution, and distribution; b/2 Apply physiological concepts and processes to understand and describe ecological processes at the population and community level.
ggg. Professional Skills:	c/1 Select the various environmental impacts that affect plant development. c/2 Prepare professional reports related to environmental plant physiology.

hhh. General and Transferable Skills	d/1 Work on team in a familiar professional work level. d/2 Appear management skills to obtain data for a given course topics. d/3 Use information technology to improve his professional practice in internet and relative information. d/4 Appear self-learning abilities in and determines his learning needs.

	117. Course Contents:
No.	**Topic**
1	- Introduction and Plant responses to overcome air pollution.
2	- Physiological effects of the pollution on plants 1. Nitrogen fertilization in the agriculture 2. Phosphate- potassium fertilization in the agriculture.
3	- Physiological effects in the pollution on plants 3. Sulfur- Magnesium fertilization in the agriculture. 4. Minor and rare elements. Waste industry, pesticides and radiation
4	- Physiology of toxic materials. - Mechanisms of drought tolerance and biodiversity to drought tolerance.
5	- Effect of environmental factors on flowering and seed production. - Methods used in biotic stress resistance.
6	- Breeding for different environmental problems (Low and high temperature, light period, salts, fertilization, drought,
7	- Breeding for different environmental problems increased irrigation water, wind, raining, humidity and gases).

118. Teaching and Learning Methods	
	Lectures Class activities Discussion Presentation Reports

119. Teaching and Learning Methods (for	**Not applicable**

students with special needs)	

7. Student Assessment:		
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.	
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.	
c. Weighting of Assessments	10 degrees 10 degrees 20 degrees 60 degrees Total 100 degrees	Ratios 10%, Ratios 10%, Ratios 20%, Ratios 60%, Ratios 100%.

120. List of References:	
fff. Notes	
ggg.Essential Books (Text Books)	Salem Mohamed salem hammaad
hhh. Suggested Books	
iii. Periodicals, Web Sites, … etc ...	Selected topics from published papers on the internet.

Course coordinator:	**Prof. Adel Hegazy and Yehia Khidr**
Head of the department council:	**Prof. Haroun Abou Shama**
Date:	

Matrix of Knowledge, Skills ILOs for Education Course (B3-47)

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c- Professional Skills	d-General and Transferable Skills
1 - Introduction and Plant responses to overcome air pollution.	1&2	a1,a2	b1	c1, c2	D2,d4
2- Physiological effects of the pollution on plants. Nitrogen fertilization in the agriculture Phosphate- potassium fertilization in the agriculture	3&4	A1, a2	b1	c1	d2,d3
3- Physiological effects in the pollution on plants Sulfur-Magnesium fertilization in the agriculture. Minor and rare elements. Waste industry, pesticides and radiation	5&6	a2,a3	b2	c1, c2	d2,d3
4- Physiology of toxic materials. - Mechanisms of drought tolerance and biodiversity to drought tolerance.	7&8	a3	b2,	c1	d2,d4
5- Effect of environmental factors on flowering and seed production. - Methods used in biotic stress resistance.	9&10	a3	b1,b2	c2	d2
6- - Breeding for different environmental problems (Low and high temperature, light period, salts, fertilization, drought,	11&12	-	B2	c2	d3,d4
7- Breeding for different environmental problems increased irrigation water, wind, raining, humidity and gases).	13&14	a3	B2	c2	d2,d3

Course coordinator:	**Prof. Adel Hegazy**
Head of the department council:	**Prof. Haroun Abo Shama**
Date:	

Department: **Plant biotechnology**

Course Specifications

121. Course information:							
Course Code:	**B3-49**	**Course Title:**	**Plant genetic protection**				
No. units	3	**Lec.**	3	**App.**		**Level**	Ph. D.
Department	**Plant Biotechnology**						

122. Course Aims	
	2/1 introducing students to the principles, practices and application of plant plant genetic protection 2/2 acquainting students with knowledge of how plants protect themselves. 2/3 exposing students to issues and challenges encountered in the area of plant genetic protection.

123. Intended Learning Outcomes of Course (ILO's)	
iii. Knowledge and Understanding:	a/1 Describe concept of plant genetic protection, genetic weapons and plant resistance genes . a/2 Summarize the types of plant genetic resistance and gene-for-gene theory. a/3 Classify the mobile genetic elements , transposons , overview of immune system and hyper sensitive reaction and systemic acquired resistance. a/4 Express various aspects the basics of genetic protection and mechanism of gene silencing
jjj. Intellectual skills:	b/1. Plan, conduct and write a report on plant genetic protection. b/2. Analyze hyper sensitive reaction and systemic acquired resistance. b/3. Interpret and evaluate methodologies of gene silencing b/4. Derive logically and evaluate critically research and advance scholarship in the discipline.
kkk. Professional Skills of	c/1 apply, or adapt, practical instructions safely and

course:	accurately c/2 Execute a variety of experimental procedures in the laboratory. c/3 Form and devise experimental methods appropriate for tackling a particular problem c/4 interpret quantitatively the results of experiments undertaken by themselves or others
lll. General and Transferable Skills	d/1 make use of IT (word processing, spreadsheets and databases, web sources) and communicate scientific ideas d/2 give oral presentations and work as part of a team d/3 use library resources and manage time

	124. Course Contents:
No.	**Topic**
1	Genetic weapons and plant resistance genes
2	Type of resistance: horizontal and vertical, nature of resistance. The gene-for-gene theory
3	Hyper sensitive reaction and systemic acquired resistance.
4	Mobile genetic elements & transposons , overview of immune system
5	Genetic protection of plant from fungal, bacterial and viral diseases and induced resistance
6	Mechanism of gene silencing.
7	Protection of plant genetic resources

125. Teaching and Learning Methods	
	17. Data show 18. Scientific Journals 19. Text books 20. lectures

126. Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:	
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.
c. Weighting of Assessments	10degrees Ratios 10%, 10 degrees Ratios 10%, 20 degrees Ratios 20%, 60 degrees Ratios 60%, Total 100 degrees Ratios 100%.

127. List of References:	
jjj. Notes	-
kkk. Essential Books (Text Books)	
lll. Suggested Books	-
mmm. Periodicals, Web Sites, … etc ...	**http://www.apsnet.org/publications/phytopathology/backissues/Documents/1989Articles/phyto79n01_38.PDF** - Morgounov, A. et al 2010

Course Coordinator: **Dr. Yehia A. Khidr**
Head of the department council: **Prof. Dr. Haroun Abou Shama**
Date:

Matrix of Knowledge, Skills ILOs for Education Course
Plant genetic protection (B3-49)

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c- Professional Skills of course	d-General and Transferable Skills
Genetic weapons and plant resistance genes	**1&2**	**a/1**	**b/1**	**c/1,3**	**d/1,2**
Type of resistance: horizontal and vertical, nature of resistance. The gene-for-gene theory	**3&4**	**a/2**	**b/2**	**c/2,4**	**d/2,3**
Hyper sensitive reaction and systemic acquired resistance.	**5&6**	**a/3**	**b/2**	**c/1,2**	**d/1,3**
Mobile genetic elements & Transposons , Overview of immune system a) History b) Adaptive immunity c) Innate immunity.	**7&8**	**a/3**	**b/2,4**	**c/3,4**	**d/2,3**
Genetic protection of plant from fungal, bacterial and viral diseases and Induced resistance	**9&10**	**a/1**	**b/1**	**c/1,3**	**d/1,2**
Mechanism of gene silencing.	**11&12**	**a/4**	**b/3**	**c/3,4**	**d/1,2**
Protection of plant genetic resources	**13&14**	**a/1**	**b/1**	**c/1,2**	**d/1,2**

Course Coordinator: **Dr. Yehia A. Khidr**
Head of the department council: **Prof. Dr. Haroun Abou Shama**
Date:

Department: Plant Biotechnology

Course Specifications

Course information:							
Course Code:	B3-53	**Course Title:**	Plant protoplasts and genetic engineering				
No. units	3	**Lec.**	3	**App.**		**Level**	PhD.
Department	**Plant Biotechnology**						

7. Course Aims	
2/1 providing students with the methods of protoplast isolation, fusion, genetic engineering and applied field of handing with the changeable requirements of the field of plant protoplasts. 2/2 Introducing students to fundamentals of protoplasts transformation protocols 2/3 Investigating the protoplasts transformation and its application for plants improvement.	

g. Intended Learning Outcomes of Course (ILO's)	
6. Knowledge and Understanding:	a/1 Express and Outline the fundamentals of plant protoplasts. a/2 Explain the methods of protoplasts isolation application of protoplast. a/3 Summarize Protoplast fusion technique and selection of hybrids, Liposome mediated gene transfer, Microinjection. a/4 Summarize basics of Evaluate electroporation, ultrasonication and, different methods of protoplasts transformation.
7. Intellectual skills:	b/1Distinguish the different methods of protoplasts isolation and transformation and its application. b/2 Design different methods of fusion and their application in plant biotechnology. b/3 Evaluate electroporation, ultrasonication and different methods of protoplasts transformation, and protoplasts development.
8. Professional Skills :	c/1 apply transformation methods to modify protoplasts for improving the high yield, disease and insect resistances. c/2 Prepare the various methods for liposome transformation and culture of protoplasts. c/3 Prepare computer for data collection in plant cell culture.
9. General and Transferable Skills	d/1 Work effectively in a team. d/2 Acquire of self confidence and leadership skills . d/3 in workshops and training courses.

	h. Course Contents:
No.	**Topics**
1	**Introduction in protoplasts**
2	**protoplasts isolation and culture**
3	**Protoplast fusion technique and selection of hybrids**
4	**Liposome mediated gene transfer, Microinjection**
5	**Electroporation, Ultrasonication mediated transformation of protoplasts**
6	**Agrobacterium mediated transformation of protoplasts**
7	**Application of Protoplasts**

d. Teaching and Learning Methods	
	Lectures **Class activities** **Discussion** **Presentation** **Reports**

d. Teaching and Learning Methods (for students with special needs)	**Not applicable**

7. Student Assessment:	
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.
c. Weighting of Assessments	10degrees Ratios 10%, 10 degrees Ratios 10%, 20 degrees Ratios 20%, 60 degrees Ratios 60%,

	Total 100 degrees Ratios 100%.

e. List of References:	
a. Notes	
b. Essential Books (Text Books)	**-kumar, U.2001:.**Methods in plant tissue culture **- Trigiano R. N. and Gray, D. j. 2000:**Plant tissue culture concepts and laboratory exercises.
c. Suggested Books	**Hall, R. D. 1999. Plant** Cell Culture protocols. Human Press Inc. Totowa, New Jersy.
	-Jones, H.1995. Plant gene transfer and expression protocol. Human Press Inc. Totowa, New Jersey.
d. Periodicals, Web Sites, … etc ...	**Plant cell report, Bajaj group**

Course coordinator: **Prof. Dr. Hamdy Emara**
Head of the department council: **Prof. Dr. Haroun Abou Shama**
Date:

Matrix of Knowledge, Skills ILOs for Education Course
Plant protoplasts and genetic engineering (B-53)

Course Contents	Week No.	a- Knowledge and Understanding	b- Intellectual skills	c- Professional Skills	d- General and Transferable Skills
Introduction in protoplasts	1&2	a/1,2	b/1	c/3	d/3
protoplasts isolation and culture	3&4	a/1	b/1	c/1	d/3
Protoplast fusion technique and selection of hybrids	5&6	a/2,3	b/2	c/2	d/3
Liposome mediated gene transfer, Microinjection	7&8	a/3	b/3	c/1	d/1,3
Electroporation, Ultrasonication mediated transformation of protoplasts	9&10	a/4	b/3	c/1	d/1
Agrobacterium mediated transformation of protoplasts	11&12	a/4	b/3	c/1,2	d/3
Application of Protoplasts	13&14	a/2	b/1,2	c/1	d/1

Course coordinator: **Prof. Dr. Hamdy Emara**
Head of the department council: **Prof. Dr. Haroun Abou Shama**
Date:

Department: **Plant Biotechnology**

Course Specifications

128. Course information:							
Course Code:	**B3 -60**	**Course Title:**	**Tissue culture of horticulture crops**				
No. units	3	**Lec.**	3	**App.**		**Level**	Ph.D.
Department	Plant Biotechnology						

129. Course Aims	
	a) Employment of tissue culture techniques in improvement and production of horticultural plants. b) Determining professional problems and propose solutions in horticultural crops via plant tissue and organ culture techniques c) Transferring the most updated skills and technologies in the area of plant biotechnology to graduated students. d) developing scientific theories and analysis horticulture crops problems, research design, evaluation empirical evidence and dissemination in the context of biological sciences

130. Intended Learning Outcomes of Course (ILO's)	
k. Knowledge and Understanding:	a/1 Know basics of the various types of field crop biotechnology, plant breeding and protoplast fusion. a/2 Gather Basics , methodologies and scientific research ethics as its different tools a/3 List of Basic facts, theories and recent advances of the plant biotechnology and related subjects a/4 Enumerate and choose tissue culture applications and medium types
b. Intellectual skills:	b/1 Collect evidences of solutions regarding to plant biotechnology.

	b/2 Compare different tissue culture techniques b/3 Appoint Information to solve professional problems according to available data. b/4 Link Between tissue culture techniques and employ it in solving problems of horticulture crops.
c. Professional Skills:	c/1 Prepare professional development to improve practice and enhance performance in plant biotechnology branches c/2 Use computer for data collection in plant cell culture. c/3 Practice basic professional skills for determination and treatment of plant tissue culture c/4 Perform laboratories practical work necessary for plant cell culture techniques
d. General and Transferable Skills	d/1 Communicate effectively using all methods with public, colleagues and appropriate authorities d/2 Manage time effectively. d/3 Use information technology to improve his/her professional practice. d/4 Work in team.

	e) Course Contents:
No.	**Topic**
1	Introduction in tissue culture of horticulture crops (Advantage and challenges of plant culture horticulture plants, stages and methods, problems)
2	a) Media composition of callus culture (macro and micro nutrient elements, growth regulators, carbon sources and gelling agents) b) Physical and chemical incubation conditions of cell culture
3	Techniques of improve horticulture crops via tissue culture : a) Somaclonal variation b) Synthetic seed
4	c) Micrografting
5	d) Transformation
6	e) Protoplast induction and fusion
7	*In vitro* conservation of horticulture crops

f) Teaching and Learning Methods	

	- Lectures - scientific seminars and presentation - self learning

g) Teaching and Learning Methods (for students with special needs)	**Not applicable**

h) Student Assessment:		
j. Assessment Methods:	-Oral Exam…… …. to assess General and Transferable skills, Intellectual skills, understanding & knowledge -Written Exam to assess Intellectual skills, understanding & knowledge. -semester works	
k. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.	
l. Weighting of Assessments	10degrees 10 degrees 20 degrees 60 degrees Total 100 degrees	Ratios 10%, Ratios 10%, Ratios 20%, Ratios 60%, Ratios 100%.

i) List of References:	
nnn. Notes	**مذكرة غير منشورة**
ooo.Essential Books (Text Books)	- Eexperiments in tissue culture. -Plant cell and tissue culture.
ppp. Suggested Books	Pajaj group - Periodicals, Web sites, etc - Plant cell tissue and organ culture journal
qqq. Periodicals, Web Sites, … etc ...	

Course coordinator: **Dr. Ebtsam moubark**
Head of the department council: **Prof. Dr. Haroun Abou Shama**
Date:

Matrix of Knowledge, Skills ILOs for Education Course
Tissue culture of horticulture crops (B3 -60)

Course Contents	Week No.	a- Knowledge and Understanding	b- Intellectual skills	c- Professional Skills	d- General and Transferable Skills
Introduction in tissue culture of horticulture crops (Advantage and challenges of plant culture horticulture plants, stages and methods, problems)	**1&2**	**a/1,2**	**b/4**	**c/2,4**	**d/1**
a) Media composition of callus culture (macro and micro nutrient elements, growth regulators, carbon sources and gelling agents) b) Physical and chemical incubation conditions of cell culture	**3&4**	**a/3**	**b/4**	**c/2**	**d/2**
Techniques of improve horticulture crops via tissue culture : a) Somaclonal variation b) Synthetic seed	**5&6**	**a/4**	**b/1**	**c/4**	**d/2**
c) Micro grafting	**7&8**	**a/1,4**	**b/3**	**c/3**	**d/3**
d) Transformation	**9&10**	**a/4**	**b/3**	**c/3,4**	**d/3**
e) Protoplast induction and fusion	**11&12**	**a/4**	**b/3**	**c/1,2**	**d/4**
In vitro conservation of horticulture crops	**13&14**	**a/4**	**b/3,4**	**c/1,2**	**d/4**

Course coordinator: **Dr. Ebtsam moubark**
Head of the department council: **Prof. Dr. Haroun Abou Shama**
Date:

Department: **Plant Biotechnology**

Course Specifications

131. Course information:							
Course Code:	**B3-65**	**Course Title:**	**Special Topics**				
No. units	3	**Lec.**	3	**App.**	-	**Level**	Ph. D
Department	**Plant Biotechnology**						

132. Course Aims	
	This special course will provide the fundamental knowledge and skills that are required to each candidate according to his/her thesis. The topics selected by the advisor will cover and enhance different fields and multidiscipline areas of the candidate's thesis in order to fulfil a complete comprehension and mastering of the research point.

133. Intended Learning Outcomes of Course (ILO's)	
mmm. Knowledge and Understanding:	Selected according to the candidate's thesis
nnn. Intellectual skills:	Selected according to the candidate's thesis
ooo. Professional Skills of course:	Selected according to the candidate's thesis
ppp. General and Transferable Skills	d/1- Use Internet to get knowledge from data sources, e.g., text books, scientific journals, internet, multimedia……etc. d/2- Treat with efficiency through analysis of data. d/3- Appear self learning abilities in workshops and training courses. d/4- Use Application of Computer in the field of biotechnology.

	d/5- Appear managements skills to manage scientific seminars and presentation. d/6- Work on team effectively. d/7- Use Audio & Video Means For Displaying Information.

	134. Course Contents:
Week No.	**Topic**
1, 2	The topics of this course will be selected according to each candidate to enhance the multi disciplines in his/her Ph.D thesis.
3&4	
5&6	Student presentations
7&8	
9&10	Mid term
11&12	
13&14	Revision, Problems and answers

135. Teaching and Learning Methods	
	1- Presentations 2- Projector slides 3- Data show 4- Lectures

136. Teaching and Learning Methods (for students with special needs)	**Not applicable**

137. Student Assessment:	
m. Assessment Methods:	*Semester works, *Midterm exam, *Oral exam**,** *Written (Final) exam**.**
n. Assessment Schedule	* (5^{th}&10^{th} weeks)**,** * (6^{th}) Week**,**

	* (14th) Week, * (15th) Week.
o. Weighting of Assessments	10 degrees ratios 10%, 10 degrees ratios 10%, 20 degrees ratios 20 %, 60 degrees ratios 60% Total 100 degrees ratios 100%

138. List of References:	
rrr. Essential Books (Text Books)	According to the course topics
sss. Periodicals, Web Sites, … etc ...	According to the course topics.

Course coordinator: **Dr. Yehia Khidr** & Thesis Advisor

Head of department council: **Prof. Haroun Abou Shama**
Date: 14/6/2011

Matrix of Knowledge and skills of Special Topics course (B3-65)

No.	Course topic	Week No.	Knowledge and understanding	Intellectual abilities	Professional and practical skills	General and transferable skills
1		**1&2**				
2		**3&4**				
3		**5&6**				
4		**7&8**				
5		**9&10**				
6	Student presentations	**11&12**				
7	Revision, Problems and answers	**13&14**				

Course coordinator: **Dr. Yehia Khidr** &Thesis Advisor

Head of department council: **Prof. Haroun Abou Shama**
Date: / /20

Department: Plant biotechnology

Course Specifications

139. Course information:							
Course Code:	B3-66	**Course Title:**	**Seminars**				
No. units	3	**Lec.**	2	**App.**	2	**Level**	Ph.D
Department	**Plant biotechnology**						

140. Course Aims	
	1- Providing the fundamental knowledge of seminars required to analyze and present scientific research. 2- Studying how to prepare handouts and visual aids; structuring the Oral Presentation in his thesis. 3- Dealing with the proper own conclusions about the tutorial readings, and additional relevant information 4- Providing the main divisions of the fundamental concepts of presentation topic, Observation; repetition, and pre-evaluation

141. Intended Learning Outcomes of Course (ILO's)	
qqq. Knowledge and Understanding:	a/1- Express the basic rules of basic seminar skills as understanding, Talking, presentation and conversation. a/2- Remodel the basic rules of talking, demonstrating and understanding of the main points of tutorial readings. a/3- Divide the fundamentals of structuring the Oral Presentation. a/4- Explain the difference between various types of handouts and visual aids; structuring the Oral Presentation. a/5- Clarify difference between various methods of preparation seminars.
rrr. Intellectual skills:	b/1- Distinguish methods for reading background materials. b/2- Determine problems of the various kinds of preparing and delivering presentations. b/3- Interpret the main points of tutorial readings, and additional

	relevant information. b/4- Design seminars in the field of molecular diagnostics and therapeutics.
sss. Practical and Professional Skills of course:	c/1- Prepare remarks about observation; repetition, and pre-evaluation of other students in the English course. c/2- Select and evaluate of different seminar skills c/3- Prepare various methods for reading background seminar materials. c/4- Excute some different handouts and visual aids related to seminars.
ttt. General and Transferable Skills	d/1- Use Internet to get knowledge from data sources, e.g., text books, scientific journals, internet, multimedia……etc. d/2- Read with Efficiency through different seminars backgrounds. d/3- Appear self learning abilities in seminars preparation. d/4- Use Application of Computer in the field of seminars. d/5- Appear managements skills to manage scientific seminars and presentation. d/6- Work on team effectively. d/7- Use Audio & Video Means For Displaying Information.

	142. Course Contents:
Week No.	**Topic**
1&2	Reading background material; how to analyze the audience; What are their needs, constraints, knowledge level? a assignment criteria
3&4	Preparing and delivering a talk , demonstrate an understanding of the main points of tutorial readings, and additional relevant information
5&6	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.
7&8	Preparing handouts and visual aids; Structuring the Oral Presentation in his thesis
9&10	Preparing relevant and thought-provoking questions and leading a group discussion
11&12	Submitting a written assignment based on the presentation topic, estimating timing and tutorial discussion, and how to answer questions.
13&14	Observation; repetition, and pre-evaluation.

143. Teaching and Learning Methods	

	1- Presentations 2- Projector slides 3- Data show 4- Lectures

144. Teaching and Learning Methods (for students with special needs)	**Not applicable**

145. Student Assessment:	
p. Assessment Methods:	*Semester works, *Midterm exam, *Oral exam, *Written (Final) exam.
q. Assessment Schedule	* (5^{th}&10^{th} weeks), * (6^{th}) Week, * (14^{th}) Week, * (15^{th}) Week.
r. Weighting of Assessments	10 degrees ratios 10%, 10 degrees ratios 10%, 20 degrees ratios 20 %, 60 degrees ratios 60% Total 100 degrees ratios 100%

146. List of References:	
ttt. Essential Books (Text Books)	1- Robert L. Jolles (2005) How to Run Seminars & Workshops: Presentation Skills for Consultants, Trainers and Teachers. PP 320. 2- Terry Adams (2006) Start Your Own Seminar Production Business: your Step-by-step guide to Success. 3- Jennifer Rotondo and Mike Rotondo (2011) Presentation skills for managers. McGraw-Hill.
uuu. Periodicals, Web Sites, … etc ...	**http://www.books.google.com.eg** **http://www.Josseybass.com**

Course coordinator: & Thesis Advisor
Dr. Yehia Khidr

Head of the department: **Prof. Haroun Abou Shama**
Date:

Matrix of Knowledge and skills of Seminar course (B3-66)

No.	Course topic	Week No.	Knowledge and understanding	Intellectual abilities	Prof. skills	General and transferable skills
1	Reading background material; how to analyze the audience; What are their needs, constraints, knowledge level? a assignment criteria	**1&2**	**a/1, a/2**	**b/1**	**c/1**	**d/1, d/3,**
2	Preparing and delivering a talk , demonstrate an understanding of the main points of tutorial readings, and additional relevant information	**3&4**	**a/3**	**b/2**	**c/2**	**d/2**
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.	**5&6**	**a/4, a/5**	**b/3**	**c/3, c/4**	**d/2, d/3**
4	Preparing handouts and visual aids; Structuring the Oral Presentation in his thesis	**7&8**	**a/3**	**b/1, b/4**	**c/3**	**d/1, d/4**
5	Preparing relevant and thought-provoking questions and leading a group discussion	**9&10**	**a/4**	**b/3**	**c/1**	**d/2, d/5**
6	Submitting a written assignment based on the presentation topic, estimating timing and tutorial discussion, and how to answer questions.	**11&12**	**a/5**	**b/4**	**c/2**	**d/1, d/6**
7	Observation; repetition, and pre-evaluation.	**13&14**	**a/2**	**b/2**	**c/3, c/4**	**d/1, d/7**

Course coordinator:

Head of the department:
Date: 14/6/2011

Thesis Advisor
Dr. Yehia Khidr
Prof. Haroun Abopu Shama

Department: Plant biotechnology

Course Specifications

147. Course information:							
Course Code:	C-90	**Course Title:**	Molecular methods in plant pathology II				
No. units	3	**Lec.**	2	**App.**	2	**Level**	PhD
Department	**Plant biotechnology**						

148. Course Aims	
	2/1 Determining different genes related to pathogencity and resistance 2/2 Understanding host-pathogen interaction 2/3 Explaining computational analysis of plant defense 2/4 Determining research subjects, collecting & developing information and applying analytical and critical approach to knowledge in the field of plant biotechnology.

149. Intended Learning Outcomes of Course (ILO's)	
uuu. Knowledge and Understanding:	a/1 clarify difference between pathogen derived resistance and non pathogen derived resistance a/2 Explain pathogen evolution under the Egyptian environment a/3 Express the fundamental of ethical and legal practice and their use in genetically modified plants a/4 Remolding the actual quality standards of the practical analysis and determination of plant biotechnology. a/5 Summarize basics of the various pathogen control methods.
vvv. Intellectual skills:	b/1 Determine problems in pathogen resistance related to plant biotechnology. b/2 Find solution for the majority of pathogens using biotechnology in different applications. b/3 Suggest research studies that add knowledge to the

	existing plant biotechnology. b/4 Innovate solutions regarding to pathogen variability.
www. Practical and Professional Skills of course:	c/1 Select advanced professional skills in pathogen-host interaction c/2 Estimate methods to evaluate pathogenicity related to host plant. c/3 Test the different analytical methods for analysis of pathogen genes. c/4 Diagnose of the plant diseases and different scientific problems in the field of plant biotechnology.
xxx. General and Transferable Skills	d/1 Active communication by its different & effective methods. d/2 Using different resources for obtaining data, knowledge, and information in the field of plant biotechnology. d/3 Work in team; manage teams in different professional trends. d/4 Continuous self learning.

	3- Course Contents:
No.	**Topic**
1	Pathogenicity I
2	Pathogenicity II
3	Pathogen-host interaction
4	Molecular genetics of plant disease resistance
5	RNAi mechanisms and research applications.
6	Computational identification and analysis of Plant defense
7	Molecular variability of plant pathogens

4- Teaching and Learning Methods	
	4.1- Lectures 4.2- oral presentation 4.3- discussion 4.4- Laboratory Assignments

5- Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:		
a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.	
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.	
c. Weighting of Assessments	10degrees 10 degrees 20 degrees 60 degrees Total 100 degrees	Ratios 10%, Ratios 10%, Ratios 20%, Ratios 60%, Ratios 100%.

6- List of References:	
vvv.Notes	
www. Essential Books (Text Books)	Dickinson, M. 2003. Molecular Plant Pathology (Advanced Texts).
xxx.Suggested Books	AGRIO, G. N. 2005. Plant pathology. Fifth edition.
yyy.Periodicals, Web Sites, … etc ...	Plant pathology journal http://www.bspp.org.uk/publications/molecular-plant-pathology/index.php

Course coordinator: Dr. Amal Mahmoud and Dr.Mostafa Alansary

Head of department council: Prof. Haroun Abou Shama

Matrix of Knowledge, Skills ILOs for Education Course (C-90)

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Pathogenicity I	**1&2**	a/2, 3, 4	b/2, 4	c/1, 2	d/1, d/3, d/4
Pathogenicity II	**3&4**	a/2, 3, 4	b/2, 4	c/1, 2	d/3, d/4
Pathogen-host interaction	**5&6**	a/1, 3	b/1,2	c/1	d/3, d/4
Molecular genetics of plant disease resistance	**7&8**	a/1, 3	b/1,2	c/1,3,4	d/3, d/4
RNAi mechanisms and research applications.	**9&10**	a/1, 3	b/1,2	c/1,3,4	d/3, d/4
Computational identification and analysis of Plant defense	**11&12**	a/2,4	b/3,4	c/3	d/2, d/3, d/4
Molecular variability of plant pathogens	**13&14**	a/2,4,5	b/3,4	c/3	d/2, d/3, d/4

Course Coordinator: Dr. Amal Mahmoud and Dr. Mostafa Alansary
Head of Department: Prof. Haroun Abo Shama

Date:

Department: **Plant Biotechnology**

Course Specifications

150. Course information:							
Course Code:	**C-95**	**Course Title:**	**Plant gene transfer and expression protocols**				
No. units	**3**	**Lec.**	**2**	**App.**	**2**	**Level**	**Ph.D**
Department	**Plant Biotechnology**						

151. Course Aims	
	2/1 introducing students to fundamentals of Plant gene transfer and expression protocols 2/2 investigating the plant genetic transformation and its application for crop improvement. 2/3 acquainting students with knowledge of laboratory techniques used in analysis and expression of transformed genes in plants

152. Intended Learning Outcomes of Course (ILO's)	
i. Knowledge and Understanding:	a/1. Summarize the basic of plant gene transfer and expression a/2. Express the basic of cloning plasmids into Agrobacterium tumefaciens. Leaf disc transformation using Agrobacterium tumefaciens a3. Explain various aspects of Gene characterization by southern analysis. Isolation and characterization of plant genomic DNA sequences via PCR amplification
ii. Intellectual skills:	b/1. Distinguish among various transformation systems and the application of plant transformation. b/2. Determine Problems and Find Solutions in the plant gene transfer and expression b/3. Evaluate methodologies of the analysis of transgenic plants and various analysis of gene expression.
ii. Practical and Professional Skills of course:	c/1. Practice laboratory and plant gene transfer and expression c/2. Use some PCR machine and DNA analysis.

. **General and Transferable Skills**	d/1. Collect the knowledge from data sources, e.g., text books, scientific journals, internet, multimedia…etc d/2. Acquire of self confidence and leadership skills, Self-learn and distance learn capabilities.

153. Course Contents:

No.	Topic
1	Tools for expressing foreign genes in plants
2	Introduction of cloning plasmids into Agrobacterium tumefaciens. Leaf disc transformation using Agrobacterium tumefaciens.
3	Stable transformation of plant via direct DNA uptake, gene transfer into plant protoplasts by electroporation. Transformation of plants by microprojectile bombardment.
4	The Gus reporter gene system, NPT II assays for measuring gene expression and enzyme activity in transgenic plants.
5	Gene characterization by southern analysis. Isolation and characterization of plant genomic DNA sequences via PCR amplification.
6	Isolation of whole cell (total) RNA. Isolation of intact chloroplasts. Isolation of mitochondria.
7	Targeting of foreign protein to the chloroplasts. Northern analysis and nucleic acid probes. Analysis of plant gene expression by RT-PCR.

154. Teaching and Learning Methods

	21. Data show 22. Scientific Journals 23. Text books 24. Internet

155. Teaching and Learning Methods (for students with special needs):	Not applicable

156. Student Assessment:

a. Assessment Methods:	* Semester works, * Midterm exam, * Oral exam, * Written (Final) exam.
b. Assessment Schedule	* 5th &10th works, * 6th week, * 14th week, * 15th week.
c. Weighting of Assessments	10degrees Ratios 10%, 10 degrees Ratios 10%, 20 degrees Ratios 20%, 60 degrees Ratios 60%, Total 100 degrees Ratios 100%.

157. List of References:

zzz. Essential Books (Text Books)	Methods in molecular biology vol. 49. Plant gene transfer and expression protocols. Edited by H. Jones Humann press inc, Totawa
aaaa. Periodicals, Web Sites, … etc ...	• Crop Science • Plant Breeding • TAG • Genome

Course Coordinator: **Dr. Yehia A. Khidr**
Head of the department council: **Prof. Dr. Haroun Abou Shama**
Date:

Matrix of Knowledge and skills of the educational course targeted
Course name: Plant gene transfer and expression protocols (C-95)
Department: Plant Biotechnology

No.	Course topic	Knowledge and understanding	Intellectual abilities	Professional and practical skills	General and transferable skills
1	Tools for expressing foreign genes in plants	a/1	b/1,2,3	c/1	d/1
2	Introduction of cloning plasmids into Agrobacterium tumefaciens. Leaf disc transformation using Agrobacterium tumefaciens.	a/2	b/1,2,3	c/2	d/2
3	Stable transformation of plant via direct DNA uptake, gene transfer into plant protoplasts by electroporation. Transformation of plants by microprojectile bombardment.	a/1	b/1,2,3	c/1	d/1
4	The Gus reporter gene system, NPT II assays for measuring gene expression and enzyme activity in transgenic plants.	a/1	b/1,2,3	c/2	d/2
5	Gene characterization by southern analysis. Isolation and characterization of plant genomic DNA sequences via PCR amplification.	a/3	b/1,2,3	c/1	d/1
6	Isolation of whole cell (total) RNA. Poly (A) RNA isolation. Isolation of intact chloroplasts. Isolation of mitochondria.	a/3	b/1,2,3	c/2	d/2
7	Targeting of foreign protein to the chloroplasts. Northern analysis and nucleic acid probes. Analysis of plant gene expression by RT-PCR.	a/3	b/1,2,3	c/2	d/2

Course Coordinator: **Dr. Yehia A. Khidr**
Head of the department: **Prof. Dr. Haroun Abou Shama**
Date: