Department of Molecular Biology

Diploma of Biochemistry and Molecular Biology

CONTENTS

Academic Reference Standards (ARS), NAQAAE (2009)

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

1. Attributes of the graduate:

The graduate of postgraduate diploma program of any specialty must:

1.1. Apply specialized knowledge gained in professional practice.

1.2. Determine professional problems and propose solutions.

1.3. Master professional skills and use appropriate technology.

1.4. Communicate and lead teams to work through systemic professional work.

1.5. Make decisions according to information available.

1.6. Employ resources efficiently.

1.7. Participate community development and biological diversity conservation.

1.8. Reflect commitment to integrity, credibility and profession rules accepting accountability.

1.9. Realize the need for self-development and continuous learning.

2. Academic Reference Standards (ARS)

2.1. Knowledge & Understanding

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

2.1.1. Theories and fundamentals of the field of specialization as well as subjects related to professional practice.

2.1.2. Ethical and legal regulations of profession practice in the field of specialization.

2.1.3. Fundamentals of quality standards of the professional practice in the field of specialization.

2.1.4. Impact of professional practice on the environment and its preservation and maintenance.

2.2. Intellectual Skills

By the end of the study of diploma of any specialty the graduate must be able to:

2.2.1. Identify, analyze and prioritize problems in the field of specialization.

2.2.2. Solve problems in the field of specialization.

2.2.3. Appraise and analyze researches and related subjects in the field of specialization.

2.2.4. Evaluate professional risks of the professional practice.

2.2.5. Propose solutions for professional problems according to available data of

2.3. Professional skills

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

2.3.1. Apply basic professional skills.

2.3.2. Write reports related to the profession.

2.4. General & Transferable skills

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

2.4.1. Communicate effectively using all means.

2.4.2. Utilize information technology to improve professional practice.

2.4.3. Perform Self –assessment and to identify his/her personal educational needs.

2.4.4. Use different information sources to obtain data.

2.4.5. Work in a team and manage time effectively.

2.4.6. Lead a team in familiar profession work level.

2.4.7. Learn independently and seek continuous learning.

Program Academic Reference Standards (ARS)

Academic Reference Standards (ARS) for

Biochemistry and Molecular Biology Diploma Program

1. Attributes of The Program Graduate

The graduate of the program must:

1.1. Apply specialized knowledge gained in professional practice of biochemistry and molecular biology

1.2. Determine professional problems and propose solutions in the field of biochemistry and molecular biology.

1.3. Master professional skills and use appropriate technology in biochemical and molecular analysis.

1.4. Communicate and lead teams to work through systemic professional work.

1.5. Make decisions according to information available.

1.6. Employ resources efficiently.

1.7. Be aware of its role in community development and biological diversity conservation.

1.8. Reflect commitment to integrity, credibility and profession rules accepting accountability.

1.9. Realize the need for self-development and continuous learning.

2. Program Academic Standards (ARS)

3.1 <u>Knowledge and understanding</u>

By the end of the study of postgraduate diploma students of Biochemistry and molecular biology specialty, graduate must have sufficient knowledge and understanding of:

3.1.1 Theories, Basic facts and special knowledge in the field of the biochemistry and molecular biology and related subjects.

3.1.2 Ethical and legal fundamental profession practice in the field of biochemistry and molecular biology researches.

3.1.3 Basic quality standards of the professional practice in the field of biochemistry and molecular biology.

3.1.4 Effect of professional practice on the environmental and environmental conservation rules.

3.2. <u>Intellectual Skills:</u>

By the end of the study of postgraduate diploma graduate of Biochemistry and molecular biology specialty, the graduate must be able to:

3.2.1 Determine and analyze problems in the field of biochemistry and molecular biology and arrange it according of its priorities.

3.2.2 Solve common professional problems in biochemistry and molecular biology effectively.

3.2.3 Appraise and analyze researches and related subjects in the field of biochemistry and molecular biology.
3.2.4 Evaluate professional risks in biochemistry and molecular biology fields.
3.2.5 Propose solutions for professional problems according to available data regarding biochemistry and molecular biology.

3.3. Practical and Professional skills:

By the end of the study of postgraduate diploma of Biochemistry and molecular biology specialty, the graduate must:

3.3.1 Apply basic professional skills in the field of biochemistry and molecular biology.
3.3.2 Prepare professional analyses' reports related to biochemistry and molecular biology.

3.4. General and transferable skills

By the end of the study of postgraduate diploma of Biochemistry and molecular biology specialty, the graduate must:

3.4.1 Communicate effectively using all means.
3.4.2 Use information technology to improve professional practice.
3.4.3 Practice self-appraisal and determines learning needs.
3.4.4 Use different information sources to obtain data.
3.4.5 Work in team and manage time.
3.4. 6. Lead a team in a familiar professional work level.

3.4.7 Learn independently

Matrix between Graduate Attributes of Biochemistry and Molecular Biology Diploma Program and Graduate Attributes from NAQAAE

Program Graduate Attributes	Graduate Attributes from NAQAAE								
	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
1.1	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

Matrix between Program Academic Standards and ARS from NAQAAE

2.1 Knowledge & Understanding

Program ARS	ARS from NAQAAE			
	2.1.1	2.1.2	2.1.3	2.1.4
3.1.1	X			
3.1.2		X		
3.1.3			X	
3.1.4				X

2.2. Intellectual Skills

Program ARS	ARS from NAQAAE				
	2.2.1	2.2.2	2.2.3	2.2.4	2.2.5
3.2.1	X				
3.2.2		X			
3.2.3			X		
3.2.4				X	
3.2.5					X

2.3.1 Professional Skills

Program ARS	ARS from NAQAAE	
	2.3.1	2.3.2
3.3.1	X	
3.3.2		X

2.3.2 General and Transferable skills

Program ARS	ARS from NAQAAE						
	2.4.1	2.4.2	2.4.3	2.4.4	2.4.5	2.4.6	2.4.7
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

Biochemistry and Molecular Biology Diploma Program Specification (2015/2016)

Diploma Program Specification
2015 / 2016

A-Basic Information

1. Program title: **Biochemistry and Molecular Biology Diploma**
2. Program type: Single √ Double Multiple

Department: **Molecular Biology**

Program coordinator**: Prof. Dr. Samir Elmasry**

Program approval date: ١٩/09/20١٥

B-Professional Information

1- Program aims

1/1 Prepare the graduate to be able to utilize gained knowledge and skills in the field of Biochemistry and Molecular Biology.

1/2 Qualify the graduate to be able to handle basics requirements of the field of Biochemistry and Molecular Biology.

1/3 Enhance knowledge and the practical skills in the field of Biochemistry and Molecular Biology.

1/4 Develop graduate how to apply transferable and the general skills in the field of Biochemistry and Molecular Biology and use educational technology devices.

2- Intended learning outcomes (ILOs):

2/1 Knowledge and understanding:

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

a- To recognize the basic theories and concepts of science molecular endocrinology in biochemistry and molecular biology.

b- To identify of the fundamentals of ethical and legal practice in determination and evaluation of cell membrane biochemistry and Molecular Biology.

c- To acknowledge the quality standards in analysis of biotechnology and molecular cloning of biochemistry and molecular biology.

d- To recognize the type of toxic agents, mechanisms of action, principles of radioisotopes in biology testing of clinical diagnosis and treatments.

e- Enumerate the effects of structure modification of protein from biochemistry & molecular biology practice on the clinical biochemistry

f- To specify the biochemistry parameter used in inherited metabolic diseases

g- To explore the molecular genetics alterations in cells biology and behavior enzyme system to understand arising and development of diseases.

h- To define the fundamental concepts of pathology, immunology and biochemistry and the technical methodology in these fields.

2/2 Intellectual abilities:

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

a- To relate alterations evidence and put the priorities of therapeutic effects in some diseases.
b- Appoint information about the types of genetic engineering in medicine and agriculture.
a. To link between disease progression and altered biochemical and molecular parameters
d- To predict the prognosis of diseases based on biochemical and molecular biomarkers
e- Evaluate professional risks during his treatment and determination pollution of some diseases.

2/3 Practical and Professional skills:

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

a- To practice some important methods of determination and analysis in biochemistry and molecular biology.
b- To practice calibration methods of instruments used in the analysis methodology of biochemical and molecular biology techniques.
c- To use biochemistry analysis in molecular biology determination by practical approach in essential molecular biology.
d- To prepare reports about biochemistry and molecular biology analyses and evaluations.

2/4 General and transferable skills:

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

a- Communicate effectively using all methods with public, collegeous and appropriate authorities.
b- Use information technology to improve his professional practice in internet and relative information.
c- Practice self appraisal and determines his/her learning needs.
d- Use different sources of information to obtain data for a given course topic.
e- Work in teams.
f- Manage time effectively.
g- Work as team leader in situation comparable to his level.

3. Program Academic Standards:

Department council prepared program academic reference standards (ARS) according to NAQAAE Academic reference standard (March 2009)

4- Bench Marks: ARS

Adopted from ARS of diploma program, NAQAA 2009 and approved by department council.

5. Curriculum Structure and Contents:

a. Program duration: 2 years

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

No. of hours/units:

Lectures	46	**Lab/Exercise**	2	**Total**	48
Compulsory	48	**Provisional**	------	**Elective x100**	----

	No.	**%**	
• **B**asic sciences	---	-----	courses

	No	**%**	
• Social sciences and humanity	--	---	courses

	No	**%**
• Specialized courses (16)	**46**	**100%**

	No	**%**
• Other sciences courses	--	---

	No	**%**
• Practical/Field Training	--	---

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

d. Program courses:

A-Compulsory:

No.	Code No.	Course Title	No. of Units	No. of hours / week			Year/ Level	Semester
				Lect.	Ex.	App.		
1	A-15	Biochemistry	**3**	**3**	----	---	1	1st
2	B1-5	Behavior and analysis of enzyme system	**3**	**3**	----	----	1	1st
3	B1-49	Molecular genetics I	**3**	**3**	----	---	1	1st
4	B1-8	Chemical modifications of proteins	**3**	**3**	----	---	1	1st
5	A-51	Immunology	**3**	**3**	----	---	1	2nd
6	A-28	Chemistry of protein structure	**3**	**3**	----	----	1	2nd
7	A-58	Membrane biochemistry	**3**	**3**	----	---	1	2nd
8	B1-40	Molecular cell biology	**3**	**3**	----	---	1	2nd
9	A-29	Clinical biochemistry	**3**	**3**	----	---	2	1st
10	B1-41	Molecular cloning 1	**3**	**3**	----	---	2	1st
11	A-22	Biotechnology (general)	**3**	**3**	----	---	2	1st
12	B1-45	Molecular endocrinology	**3**	**3**	----	---	2	1st
13	B1-57	Molecular pathology	**3**	**3**	----	---	2	2nd
14	B7-42	The inherited metabolic diseases	**3**	**3**	----	---	2	2nd
15	B1-82	Radioisotopes in biology	**3**	**3**	----	----	2	2nd
16	C-99	Practical approach in essential molecular biology	**3**	**2**	**2**	----	2	2nd
Total			**48**	**46**	**2**			

6- Program admission requirements:

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

7- Regulations for progression and program completion:

- The diploma study follows a 4- semester's system with 2 semesters per year. Each semester extends about 15 weeks.
- The student is promoted to the next academic year if he/she succeeds in all courses or he/she fails in not more than 2 courses of the 1st year. The student is entitled to be examined in courses he/she failed with semester students studying these courses. If this student scores 70% or above the course maximum mark, his/her mark is reduced to that of the upper limit of "Pass" grade.
- The mark and the grade remain the same without change for the students who failed to appear for
- a final written examination of a course due to an acceptable excuse.
- In November, an examination is held for the 2nd year students who fail in not more than 2 courses.

- 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

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8- Assessment methods of program intended learning outcomes:

No.	Method	intended learning outcomes
1	Semester Works (5^{th} to 10^{th})	Scientific Background and understanding -Knowledge and Understanding ,Intellectual Skills & General and Transferable Skills
2	Written Midterm Exam (6^{th}) Week.	-Knowledge and Understanding and Intellectual Skills
3	Practical Exam (13^{th}) Week.	To measure the practical and professional skills -Professional and practical Skills & General and Transferable Skills
4	Oral Exam (14^{th}) Week.	To measure analysis skill and presentation and discussion. Knowledge and Understanding ,Intellectual Skills and General and Transferable Skills
5	Written (Final) Exam (15^{th}) Week.	Knowledge and Understanding and Intellectual Skills

9- Program Evaluation methods:

No.	Evaluator	Tool	Sample
1	Senior students	Questionnaire and open discussions	20
2	Alumni	Depth meeting	5
3	Stakeholders (Employers)	Nucleus meeting	5
4	External Evaluator(s) (External Examiner(s))	Remarking questionnaire & nucleus meeting	2
5	Others	-	

Evaluator
Internal evaluator: Prof. Dr. Mohamed Elshal
External evaluator: Professor Dr. Magdy Mahfouz
Others methods

Program coordinator: Prof. Dr. Samir Elmasry

Head of Department: Prof. Dr. Ibrahim Helmy

Matrix between Program ILO's and courses

Matrix of Knowledge, Skills of biochemistry and Molecular Biology Diploma Program Targeted

No.	Course No.	Course title	2/1 Knowledge and understanding skills							
			a	b	c	d	e	f	g	h
1	A-15	Biochemistry	X							
2	B1-5	Behavior and analysis of enzyme system							X	
3	B1-49	Molecular genetics I							X	
4	B1-8	Chemical modifications of proteins					X			
5	A-51	Immunology								X
6	A-28	Chemistry of protein structure					X			
7	A-58	Membrane biochemistry		X						
8	B1-40	Molecular cell biology							X	
9	A-29	Clinical biochemistry					X			
10	B1-41	Molecular cloning 1			X					
11	A-22	Biotechnology (general)			X					
12	B1-45	Molecular endocrinology	X							
13	B1-57	Molecular pathology						X		X
14	B7-42	The inherited metabolic diseases					X	X		
15	B1-82	Radioisotopes in biology				X				
16	C-99	Practical approach in essential molecular biology								X

No.	Course No.	Course title	2/2 Intellectual skills			
			a	b	c	d
1	A-15	Biochemistry	X			
2	B1-5	Behavior and analysis of enzyme system				X
3	B1-49	Molecular genetics I		X		
4	B1-8	Chemical modifications of proteins				X
5	A-51	Immunology				X
6	A-28	Chemistry of protein structure	X			
7	A-58	Membrane biochemistry			X	
8	B1-40	Molecular cell biology			X	
9	A-29	Clinical biochemistry			X	
10	B1-41	Molecular cloning 1		X		
11	A-22	Biotechnology (general)		X		
12	B1-45	Molecular endocrinology				X
13	B1-58	Molecular pathology			X	
14	B7-42	The inherited metabolic diseases	X			
15	B1-82	Radioisotopes in biology	X			
16	C-99	Practical approach in essential molecular biology			X	

No.	Course No.	Course title	2/3/1 Professional Skills			
			a	b	c	d
1	A-15	Biochemistry				X
2	B1-5	Behavior and analysis of enzyme system		X		
3	B1-49	Molecular genetics I			X	
4	B1-8	Chemical modifications of proteins	X			
5	A-51	Immunology			X	
6	A-28	Chemistry of protein structure		X		
7	A-58	Membrane biochemistry			X	
8	B1-40	Molecular cell biology	X			
9	A-29	Clinical biochemistry				X
10	B1-41	Molecular cloning 1	X			
11	A-22	Biotechnology (general)	X			
12	B1-45	Molecular endocrinology		X		
13	B1-57	Molecular pathology		X		
14	B7-42	The inherited metabolic diseases	X			
15	B1-82	Radioisotopes in biology			X	
16	C-99	Practical approach in essential molecular biology				X

No.	Course No.	Course title	2/3/2 General and Transferable Skills						
			a	b	c	d	e	f	g
1	A-15	Biochemistry		X					
2	B1-5	Behavior and analysis of enzyme system			X				
3	B1-49	Molecular genetics I	X						
4	B1-8	Chemical modifications of proteins							X
5	A-51	Immunology					X		
6	A-28	Chemistry of protein structure				X			
7	A-58	Membrane biochemistry						X	
8	B1-40	Molecular cell biology							X
9	A-29	Clinical biochemistry	X						
10	B1-41	Molecular cloning 1			X				
11	A-22	Biotechnology (general)		X					
12	B1-45	Molecular endocrinology				X			
13	B1-57	Molecular pathology					X		
14	B7-42	The inherited metabolic diseases	X						
15	B1-82	Radioisotopes in biology				X			
16	C-99	Practical approach in essential molecular biology		X					

Matrix between program ARS and Program ILO's

The matrix between ARS and Diploma Program IL o's

2/1 (Knowledge & Understanding)

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

2/2 Intellectual Skills

Program ARS (Intellectual Skills)	Program ILO's (Intellectual Skills)					
	2/2a	2/2b	2/2c	2/2d	2/2e	2/2f
2.2.1	X					
2.2.2		X				
2.2.3			X			
2.2.4				X		
2.2.5					X	X

2/3/1 (Practical and professional Skills)

Program ARS (Practical and professional Skills)	Program ILO's (Practical and professional Skills)			
	2/3/1a	2/3/1b	2/3/1c	2/3/1d
2.3.1	X		X	
2.3.2		X		X

2/3/2 (General and Transferable skills)

Program ARS (General and Transferable skills)	Program ILO's (General and Transferable skills)						
	2/3/2a	2//32b	2/3/2c	2/3/2d	2/3/2e	2/3/2f	2/3/2g
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

Program Coordinator: **Prof. Dr. Samir Elmasry**

Head of Department: Prof. Dr. Ibrahim Helmy

Courses Specifications

Department: **Molecular Biology**

Course Specifications

1. Course information:							
Course Code:	**A-15**	**Course Title:**	**Biochemistry**				
No. units	3	**Lec.**	3	**App.**	-	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1 To acknowledge the basic requirements of the field of Biochemistry and Molecular Biology. 2/2 To recognize relationships between the structures and functions of biochemical molecules 2/3 To be familiar with the many clinical tests used to mechanisms of essential biochemical reactions 2/4 To understand the biochemical/physiological basis for a variety of **functional** proteins (synthesis & function). 2/5 To acknowledge the basic theories of biochemistry science and Cellular Basis of Biochemistry.

3. Intended Learning Outcomes of Course (ILO's)	
a. Knowledge and Understanding:	a/1. Identify the fundamental concepts of parasitological, immunology and biochemistry and the technical methodology in these fields. a/2. Know the fundamental biochemical structures of the molecules and compounds essential for vital body processes. a/3. Recognize the molecules of biochemical reaction in living cells a/4. Identify relationships between the structures and mechanisms of biochemical reaction.
b. Intellectual skills:	b/1 Appoint information by stimulating of students thinking with open discussion and brain-storm technique. b/2. Arrange the analyze many problems in treatment of some biochemical disorder of Cholesterol (synthesis & function) b/3. Recognize the different types of Monosaccharides,

	disaccharides, polysaccharides and ring structure of glucose. b/4. Link between the types of Lipids and rancidity.
c. Practical and Professional Skills of course:	Not Applicable
d. General and Transferable Skills	Qualified students will be able to: 1- Use different information sources in internet and /d relative communication technologies to improve his/her professional practice of biochemistry and clinical biochemistry. d/2- Practice self-assessment and determines his/her learning needs. d/3- Know how to obtain data for a given clinical biochemistry course topics. d/4- How to explain important modern techniques of presentation in clinical biochemistry. d/5- Manage time effectively & work in teams. d/6- Show leadership & administration skills in situation comparable to his level.

	4. Course Contents:
No.	**Topic**
1	**Cellular Basis of Biochemistry**
2	**Amino acids, protein structure and function**
3	**Enzymes (types & structure) and Enzymatic process**
4	**Monosaccharides, disaccharides, polysaccharides and ring structure of glucose**
5	**Lipids and rancidity**
6	**Cholesterol (synthesis & function)**
7	**Vitamins 1**

5. Teaching and Learning Methods	
	Lectures **Class activities** **Discussion** **Presentation** **Reports**
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	- Oral Exam - Mid-Term - Assignments - Final Exam.
c. Weighting of Assessments	**Degrees** **%** **15** **15%** **10** **10%** **15** **15%** **60** **60%** **Total=100** **100%**
8. List of References:	
a. Notes	
b. Essential Books (Text Books)	Clinical Chemistry: Principles, Procedures, Correlations by Michael L. Bishop, Edward P. Fody, Larry E. Schoeff Publisher: Lippincott Williams & Wilkins; 5th edition (July 6, 2004) ISBN: 0781746116.
c. Suggested Books	**1-***Text book of Biochemistry 2- Robert Aufreiter (2009). Structure and Function of Proteins. 3- Biochemistry, fundamental of biochemistry and clinical chemistry (2011).
1- Periodicals, Web Sites, … etc ...	1- Journal of Biological Chemistry(JBC).www.jbc.com 2- www.biochemistryonline.com.

Course Name	**Biochemistry**
Course Code	**A-15**

Prof. Dr. Samir Elmasry:Course coordinator

council: Prof. Dr. Ibrahim Helmy. Head of the department

Matrix of Knowledge, Skills ILOs for Biochemistry Course

Course Contents	Week No.	a-Knowledge and Understanding	b- Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Cellular Basis of Biochemistry	**1&2**	a/1, a/2	**b/1**	**N/A**	d/2
Amino acids, protein structure and function	**3&4**	a/1, a/2	b/1	**N/A**	d/1, d/2
Enzymes (types & structure) and Enzymatic process	**5&6**	a/1, a/2, a/3	b/1, b/2	**N/A**	d/2, d/5
Monosaccaharides, disaccaharides, polysaccahrides and ring structure of glucose	**7&8**	a/1, a/2**,** a/4	b/2, b/3	**N/A**	d/2,d/3,d/4
Lipids and rancidity	**9&10**	a/2, a/3, a/4	b/1, b/4	**N/A**	d/1, d/6
Cholesterol (synthesis & function)	**11&12**	a/1, a/2	b/3	**N/A**	d/4, d/5
Vitamins 1	**13&14**	a/1, a/2	b/2	**N/A**	d/2, d/4

Course coordinator: Prof. Dr. Samir Elmasry

Head of Department: Prof. Dr. Ibrahim Helmy

Department: **Molecular Biology**

Course Specifications

1. Course information:							
Course Code:	**A-51**	**Course Title:**	**Immunology**				
No. Units	**3**	**Lec.**	**3**	**App.**	**-**	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1 Qualifying Diploma Graduate able to handle basics requirements of the field of Immunology. 2/2 Introducing students to the immune system and how it distinguishes self from non-self and responds appropriately. 2/3 Explaining the importance of the immune system and how it can be usefully manipulated. 2/4 Linking between the structure and function of the immune cells and molecules. 2/5 Understanding the mechanism of body immune protection. 2/6 Illustrate how our bodies defense against pathogens and foreign organisms.

3. Intended Learning Outcomes of Course (ILO's)	
e. Knowledge and Understanding:	a/1- State the fundamental concepts of immunology and the technical methodology in these fields. 2- Recognize all types, nature and function of immune /a cells. **Recall** of different immune organs. 3-/a a/4- Know different types of antigens, antibody classes and their main properties and functions. a/5- Recall the body immune reactions with foreign molecules. a/6- Recognize different types of cytokines, types and functions.
f. Intellectual skills:	b/1 - Predict therapeutic effects in some diseases and link between immune system and pathogens. 2- Link between the structures and properties of /b immunoglobulin classes. 3- Link between the role of the innate and adaptive immune /b systems.

	4- Arrange the central role of cells in immune responses /b and cell mediated immunity. 5- Appoint information on the role of B and T cells in the /b immune system.
g. Practical and Professional Skills of course:	Not Applicable (N/A)
h. General and Transferable Skills	1- Use Audio and Video Means for Displaying immune /d cells and organs. d/2- Practice self appraisal and determines his/her learning needs. d/3- Use different sources of information to obtain data for a given immunology course topic. d/4- Enhance the oral communications and effective contacts with students. d/5- Manage time effectively and work in teams. d/6- Show leadership and administration skills in situation comparable to his level.

	4. Course Contents:
	Topic
1	Introduction to The Immune System
2	Innate Immune Response
3	Antibody Structure and Humoral Immune Response
4	Antigen-Antibody Reaction
5	T Cell Receptor Complex and MHC
6	Antigen Presentation and Cellular Immune Response
7	Cytokines

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

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

7. Student Assessment:	
d. Assessment Methods:	-Semester Works -Midterm Exam

	-Oral Exam - Written (Final) Exam
e. Assessment Schedule	- Oral Exam - Mid-Term - Assignments - Final Exam.
f. Weighting of Assessments	Degrees % 15 15% 10 10% 15 15% 60 60% Total=100 100%

8. List of References:	
d. Notes	
e. Essential Books (Text Books)	1- Abbas AK and Lichtman AH. (2006) Basic Immunology, 2nd edition (updated edition). Saunders Company. **2-** Paul WE. (2008) Fundamental Immunology, 6th edition. Lippincott Williams & Wilkins Company.
f. Suggested Books	**1-** Delves PJ; Martin SJ; Burton DR and Roitt IM (2011) Roitt's Essential Immunology. Wiley Company.
9. Periodicals, Web Sites, … etc ...	**a-** WWW.NCBI.NLM.NIH.GOV/PUBMED

Course Name	**Immunology**
Course Code	**A-51**

Course coordinator: Prof. Dr. Samir Ali Mohamed El-Masry
Ass. Prof. Dr. Roba Mohamed Talaat
Lecturer Dr. Sheriff Al-Sherbiny

Head of Department: Prof. Dr. **Ibrahim Helmy**

Matrix of Knowledge, Skills ILOs for Immunology Course

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Introduction to The Immune System	1&2	a/1, a/2, a/3	b/1, b2, b/3	N/A	d/1, d/2, d/4
Innate Immune Response and	3&4	a/3, a/5	b/2, b/3	N/A	d/1, d/3
Antibody Structure and Humoral Immune Response	5&6	a/2, a/5	b/1, b/2, b/4	N/A	d/1, d/4
Antigen-Antibody Reaction	7&8	a/2, a/4, a/5	b/1, b/2	N/A	d/1, d/5, d/6
T Cell Receptor Complex and MHC	9&10	a/2, a/5	b/4, b/5	N/A	d/1, d/4, d/5
Antigen Presentation and Cellular Immune Response	11&12	a/2,a/4, a/5	b/4, b/5	N/A	d/1, d/4, d/5
Cytokines	13&14	a/6	b/5	N/A	d/1, d/5, d/6

Course coordinator: Prof. Dr. Samir Ali Mohamed El-Masry
Ass. Prof. Dr. Roba Mohamed Talaat
Lecturer Dr. Sheriff Al-Sherbiny

Head of Department: Prof. Dr. **Ibrahim Helmy**

Department: **Molecular Biology**

Course Specifications

1. Course information:							
Course Code:	A-28	**Course Title:**	CHEMISTRY OF PROTEINS STRUCTURE				
No. units	3	**Lec.**	3	**App.**	-	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1- Qualifying Diploma Graduate able to handle basics requirements of the field of Biochemistry and Molecular Biology in chemistry of protein structure. 2/2- Linking between structure and function of the proteins. 2/3- Understanding and appreciation of current topics in protein structure chemistry. 2/4- Recognize basic properties of chemistry of protein structure. 2/5- Find out how our own protein structure influence in our lives.

3. Intended Learning Outcomes of Course (ILO's)	
i. Knowledge and Understanding:	1- State the fundamentals of ethical and legal practice in /a determination and evaluation of Biochemistry and Molecular Biology in chemistry of protein structure. Know the principles and concepts of protein structure. 2-/a a/3- Recall the relationship between the structure and chemistry of proteins. a/4- Write list of different structures of proteins.
j. Intellectual skills:	1- Assess the information about the amino acid /b configuration and their properties. 2- Link between the functions and chemistry of proteins./b 3- Link between the parameters of chemistry of proteins /b with the parameters of different biological sciences. 4- Predict the different relation between protein stability /b and protein synthesis.
k. Practical and Professional Skills of course:	Not Applicable (N/A)
l. General and Transferable Skills	1- Use audio and video means for displaying protein /d structures. d/2- Practice self appraisal and determines his/her learning needs.

	d/3- Use different sources of information to obtain data for a given biochemistry course topics. d/4- Enhance the oral communications and effective contacts with students. d/5- Manage time effectively and work in teams. d/6- Show leadership and administration skills in situation comparable to his level.

	4. Course Contents:
No.	Topic
1	Introduction to Amino acids and Protein structure
2	Amino Acid Configuration and their properties and Biological importance and functions of proteins
3	Nomenclature and structure of different amino acids and Classification of amino acids (Different views) ١.
4	Proteins and polypeptides and Levels of Protein Structure
5	Protein Stability and Protein synthesis and DNA central dogma
6	Post-Transitional Modifications in Protein synthesis
7	Protein assays and Biological protein forms.

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

6. Teaching and Learning Methods (for students with special needs)	**Not applicable**
7. Student Assessment:	
g. Assessment Methods:	-Semester Works -Midterm Exam -Oral Exam - Written (Final) Exam
h. Assessment Schedule	- Oral Exam - Mid-Term - Assignment - Final Exam
i. Weighting of Assessments	Degrees % 15 15% 10 10% 15 15% 60 60% Total=100 100%
8. List of References:	
g. Lecture notes	
h. Essential Books (Text Books)	1- The protein protocols hand book by John M. walke (2002), Humana Press Inc 2-Proteins structure and function by David Whitefor (2005) , printed by John Wiley & Sons, Ltd
i. Suggested Books	Proteomics of Biological Systems: Protein Phosphorylation Using Mass Spectrometry Techniques **by:** Bryan M. Ham , 2011 * Protein Purification Protocols by Paul Cutler from Methods in Molecular Biology, vol. 244 Humana Press Inc., Totowa, NJ
2- Periodicals, Web Sites, … etc ...	* Journal of Biological Chemistry(JBC).www.jbc.com

Course coordinator: Dr. Khalid Bassiouny
Dr. Mohamed Yonies

Head of the department council: Prof. Dr. Ibrahim Helmy

Matrix of Knowledge, Skills ILOs for CHEMISTRY OF PROTEINS STRUCTURE Course

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Introduction to Amino acids and Protein structure	**1&2**	**a/1, a/2**	**b/1, b/4**	**N/A**	**d/1, d/2, d/4**
Amino Acid Configuration and their properties and Biological importance and functions of proteins	**3&4**	**a/2, a/4**	**b/2, b/3**	**N/A**	**d/1, d/3**
٢. Nomenclature and structure of different amino acids and Classification of amino acids (Different views)	**5&6**	**a/3, a/4**	**b/2, b/4**	**N/A**	**d/1, d/4**
Proteins and polypeptides and Levels of Protein Structure	**7&8**	**a/1, a/3**	**b/4**	**N/A**	**d/1, d/3, d/4**
Protein Stability and Protein synthesis and DNA central dogma	**9&10**	**a/1, a/3, a/4**	**b/1, b/4**	**N/A**	**d/1, d/5, d/6**
Post-Transitional Modifications in Protein synthesis	**11&12**	**a/3, a/4**	**b/1, b/4**	**N/A**	**d/1, d/4, d/5**
Protein assays and Biological protein forms.	**13&14**	**a/1, a/3. a/4**	**b/4**	**N/A**	**d/1, d/5, d/6**

Course Teach: Dr. Khalid Bassiouny
Dr. Mohamed Yonies
Head of Department: Prof. Dr. Ibrahim elmy

Department: **Molecular Biology**

Course Specifications

1. Course information:							
Course Code:	A-57	**Course Title:**	Membrane biochemistry				
No. units	3	**Lecturers**	3	**App.**	-	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1 Qualifying Diploma Graduate able to handle basics requirements of the field of Biochemistry and Molecular Biology in membrane biochemistry. 2/2 Know the mechanism of ion channel in cellular membrane and molecular interaction related cellular membranes. 2/3 Appoint information about the types of the structure of cell receptors and cell-pathogen interaction. 2/4 Apply transferable and general skills in the field of biochemistry and innate immune response, secretion of cytokines, and initiation of signal transduction.

3. Intended Learning Outcomes of Course (ILO's)	
m. Knowledge and Understanding:	1 State the fundamentals of ethical and legal practice in /a determination and evaluation of Biochemistry and Molecular Biology in membrane biochemistry. a/2 Know the principles and concepts of cell membrane structure. 3 Enumerate the functions and contributions of cell /a membrane in molecular processes. a/4 Identify the chemical interaction involved in ions channel flow. 5 Write list of effects and causes that change cell /a membrane structures.
n. Intellectual skills:	1 Link between the physiological and pathological /b parameters that affect membrane biochemistry. 2 Illustrate in the critical role of host cell receptors in /b signals transduction.

	b/3 Represent information in the correlation between the cellular membrane structure and innate immune response. 4 Contrast the membrane modification during /b carcinogenesis and program of cell death.
o. Practical and Professional Skills of course:	**Not Applicable (N/A)**
p. General and Transferable Skills	1- Use audio and video means for displaying membrane /d structures. d/2- Practice self appraisal and determines his/her learning needs. d/3- Use different sources of information to obtain data for a given course topic. d/4- Enhance the oral communications and effective contacts with students. d/5- Manage time effectively and work in teams. d/6- Show leadership and administration skills in situation comparable to his level.

	4. Course Contents:
No.	**Topic**
1	Structure of plasma membrane
2	Specialized membrane identification
3	Biological function of cell membrane
4	Biochemistry of cellular communication
5	Receptors and intracellular signaling
6	Protein transport
7	Cell death

5. Teaching and Learning Methods	**Lectures** **Class activities** **Discussion** **Presentation** **Reports**
6. Teaching and Learning Methods (for students with special needs)	**Not applicable**
7. Student Assessment:	
j. Assessment Methods:	-Semester Works -Midterm Exam -Oral Exam - Written (Final) Exam
k. Assessment Schedule	- Oral Exam - Mid-Term - Assignments - Final Exam.
l. Weighting of Assessments	Degrees % 15 15% 10 10% 15 15% 60 60% Total=100 100%
8. List of References:	
j. Notes	
k. Essential Books (Text Books)	Clinical Chemistry: Principles, Procedures, Correlations by Michael L. Bishop, Edward P. Fody, Larry E. Schoeff Publisher: Lippincott Williams & Wilkins; 5th edition (July 6, 2004) ISBN: 0781746116.
l. Suggested Books	**1-***Text book of Biochemistry 2- Robert Aufreiter (2009). Structure and Function of Proteins. 3- David Whitford (2005). Protein structure and functions.
m. Periodicals, Web Sites, … etc ...	3- Journal of Biological Chemistry(JBC).www.jbc.com 4- www.biochemistryonline.com.

Coordinator: Prof.Dr. Shaden Muawia
Dr. Hany Kalil
Head of the department council: Prof. Dr. Ibrahim Helmy

Matrix of Knowledge, Skills ILOs for Membrane Biochemistry Course

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Structure of plasma membrane	**1&2**	**a/1**	**b/1**	**N/A**	**d/1**
Specialized membrane identification	**3&4**	**a/1, a/2**	**b/1**	**N/A**	**d/1**
Biological function of cell membrane	**5&6**	**a/2**	**b/1**	**N/A**	**d/2**
Biochemistry of cellular communication	**7&8**	**a/3**	**b/2**	**N/A**	**d/2**
Receptors and intracellular signaling	**9&10**	**a/4**	**b/3**	**N/A**	**d/3**
Protein transport	**11&12**	**a/4, a/5**	**b/4**	**N/A**	**d/3, d/5**
Cell death	**13&14**	**a/4, a/5**	**b/4**	**N/A**	**d/4, d/5**

Course coordinator: Prof.Dr. Shaden Muawia
Dr. Hany Kalil
Head of Department: Prof. Dr. Ibrahim Helmy

Department: **Molecular Biology**

Course Specifications

1. Course information:							
Course Code:	B1-5	**Course Title:**	Behavior and analysis of enzyme system				
No. units	3	**Lecturers.**	3	**App.**	-	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1- Recognize behavior and basics of enzyme system and how to analyze it. 2/2- Linking between the structure and physiology of the mechanism of enzyme synthesis and production 2/3- Recognize basic starting form gene expression system till enzyme structure and function.

3.Intended Learning Outcomes of Course (ILO's)	
q. Knowledge and Understanding:	a/1- Recognize the quality standards in analysis of Biochemistry and Molecular Biology in Behavior and analysis of enzyme system. a/2- Recall the principles and concepts of gene expression and enzyme structure. a/3- Be acquainted with the different isoforms of enzymes . a/3 Know the different chemical interactions involved in metabolism according to enzymes function. a/4- List the role of enzyme structure in metabolism and body interactions.
r. Intellectual skills:	b/1 - Link between the parameters of molecular biology with the parameters of different biological sciences in behavior and analysis of enzyme system. b/2- Identify the specific and sensitive assays for metabolism of enzymes. b/3- Deduce the crucial role of gene expression enzyme modification. b/4- **Illustrate** the relationship between the molecular alterations of enzymes and induced diseases b/5- Acquire the skills in modern laboratory techniques for

	isolation and identification of different proteins of the cells.
s. Practical and Professional Skills of course:	Not Applicable (N/A)
t. General and Transferable Skills	d/1- Work in a team and communicate orally by listening and writing English. d/2 - Demonstrate interpersonal skills and personal effectiveness of planning, handling, manipulating. d/3- Show competence in the use of information technology. d/4- Use the internet and acquire computer skills.

	4. Course Contents:
No.	**Topic**
1	**Introduction and enzyme structure & function**
2	**Enzymes classification**
3	**Enzymes inhibition**
4	**Enzymes kinetics**
5	**Mechanism of enzyme action**
6	**Enzyme in medicine**
7	**Enzyme in molecular biology**

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

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

7. Student Assessment:	
m. Assessment Methods:	-Semester Works -Midterm Exam -Oral Exam - Written (Final) Exam
n. Assessment Schedule	- Oral Exam - Mid-Term - Assignments - Final Exam.
o. Weighting of Assessments	Degrees %

	15 10 15 60 Total=100	15% 10% 15% 60% 100%

8. List of References:	
n. Notes	
o. Essential Books (Text Books)	3- Deutsch A (Ed.) (2003). Function and regulation of cellular systems: Experiments and models (Mathematics and Biosciences in interaction). Birkhauser (Architectural), ISBN 3764369256.
p. Suggested Books	**9. Molecular Biology of the Cell, 4th edition. Alberts, Johnson, Lewis, Raff, Roberts and Walter. Garland Pub. Co., 2010.**
q. Periodicals, Web Sites, … etc ...	…www.prenhall.com/lewin.

Course Name	Behavior and analysis of enzyme system
Course Code	**B1-5**

Course coordinator: Prof. Dr. Ibrahim Helmy
Dr. Mohamed Yonies
Dr. Haney Kalil

Head of the department council: Prof. Dr. Ibrahim Helmy

Matrix of Knowledge, Skills ILOs for Behavior and analysis of enzyme system Course

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Introduction and enzyme structure & function	1&2	a/1	b/1	N/A	d/1, d/2
Enzymes classification	3&4	a/2	b/1	N/A	d/1, d/3
Enzymes inhibition	5&6	a/2	b/1	N/A	d//2
Enzymes kinetics	7&8	a/3	b/2, b/5	N/A	d/2, d/4
Mechanism of enzyme action	9&10	a/4	b/3	N/A	d/3, d/4
Enzyme in medicine	11&12	a/4	b/4, b/5	N/A	d/2, d/3
Enzyme in molecular biology	13&14	a/4	b/2, b/4	N/A	d/1, d/4

Course coordinator: Prof. Dr. Ibrahim Helmy
Dr. Mohamed Yonies
Dr. Haney Kalil

Head of Department: Prof. Dr. Ibrahim Helmy

Department: **Molecular Biology**

Course Specifications

1. Course information:

Course Code:	**B1-49**	**Course Title:**	**Molecular Genetics I**				
No. units	3	**Lec.**	3	**App.**	-	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1-Qualifying Diploma Graduate able to handle basics requirements of the field of Biochemistry and Molecular Biology (Molecular Genetics I). 2/2- Linking between the structure and biochemistry of the eukaryotic cell. 2/3-Understanding and appreciation of current topics in molecular genetics. 2/4- Attaining basic properties of genes and genomes. 2/5- Gathering how our own genes influence our lives.

3. Intended Learning Outcomes of Course (ILO's)	
u. Knowledge and Understanding:	a/1- Gather the quality standards in analysis of Biochemistry and Molecular genetics. a/2- Know the principles and concepts of genetic engineering and molecular genetics. a/3 -Attain the relationship between the structure and function of cellular components. a/4- Write list of cellular processes at the cell membrane.
v. Intellectual skills:	b/1- Appoint information about the types of genetic engineering in medicine and agriculture. b/2- Link between the parameters of molecular genetics with the parameters of biological sciences b/3- Collect evidences the results of molecular genetic assays and solving problems. b/4- Arrange common problems in treatment systems of some diseases.
w. Practical and Professional Skills of course:	c/1- Practice some important methods determination & analysis of biochemistry and molecular genetics. c/2-Use molecular genetics in biochemistry analysis and

	determination. c/3 Calibrate instrumentals using in the analysis methodology of biochemistry and molecular biology. c/4- Calculate the instrumentals using in the analysis methodology of molecular genetics
x. General and Transferable Skills	d/1- Use information communication technology to improve his/her professional practice in internet and relative information of biochemistry and molecular genetics. d/2- Practice self appraisal and determines his/her learning needs. d/3-Use different sources of information to obtain data for a given molecular genetics course topics. d/4-Use educational technology displaying devices for explain important modern techniques of presentation in molecular genetics. d/5-Manage time effectively & work in teams. d/6-Show leadership & administration skills in situation comparable to his level.

	4. Course Contents:
No.	**Topic**
1	Introduction & structure DNA & RNA & chromosomes
2	Cell division
3	Prokaryotic Gene replication & Transcription & translation
4	Gene expression of prokaryotic
5	Cell Cycle
6	Genes and Immunity
7	Genes and Cancer

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

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

7. Student Assessment:	
p. Assessment Methods:	-Semester Works -Midterm Exam -Oral Exam - Written (Final) Exam
q. Assessment Schedule	- (5^{th}&10^{th}) - (6^{th}) Week - (14^{th}) Week - (15^{th}) Week.
r. Weighting of Assessments	Degrees % 10 10% 10 10% 20 20% 60 60% Total=100 100%

8. List of References:	
r. Notes	
s. Essential Books (Text Books)	4- Lewin B.(2006). Essential Genes. Published by Pearson Education, Inc. USA.(2006). 5- Deutsch A (Ed.)(2003). Function and regulation of cellular systems: Experiments and models (Mathematics and Biosciences in interaction). Birkhauser (Architectural), ISBN 3764369256. 6- De Jong H. (2002) "Modeling and simulation of genetic regulatory systems: A literature review", J. Computational Biology 9: 67-103.
t. Suggested Books	**9. Molecular Biology of the Cell, 4^{th} edition. Alberts, Johnson, Lewis, Raff, Roberts and Walter. Garland Pub. Co., 2010.** **10. Molecular Cell Biology, 5^{th} edition. Lodish, Berk, Matsudaira, Kaiser, Krieger, Scott, Zipursky, and Darnell. W.H. Freeman & Co., 2011.**
11. Periodicals, Web Sites, … etc ...	…www.prenhall.com/lewin. www.prancipal genetics.

Course Name	**Molecular Genetics I**
Course Code	**B1-49**

Course coordinator: Prof. Dr. Amal Abd El- Aziz.
Head of the department council: Prof. Dr Ibrahim Helmy

Matrix of Knowledge, Skills ILOs for Molecular Genetics I Course

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Introduction & structure DNA & RNA	1&2	a/1, a/2	b/1, b/4	c/1, c/4	d/1, d/2, d/4
Plasma Membrane	3&4	a/2, a/4	b/2, b/3	c/3	d/1, d/3
Prokaryotic Gene replication & Transcription & translation	5&6	a/3, a/4	b/2, b/4	c/2, c/4	d/1, d/4
Gene expression of prokaryotic	7&8	a/1, a/3	b/4	c/2, c/3	d/1, d/3, d/4
Cell Cycle	9&10	a/1, a/3, a/4	b/1, b/4	c/2, c/1	d/1, d/5, d/6
Genes and Immunity	11&12	a/3, a/4	b/1, b/4	c/2,	d/1, d/4, d/5
Genes and Cancer	13&14	a/3. a/4	b/4	c/3, c/4	d/1, d/5, d/6

Course coordinator: Prof. Dr. Amal Abd El-Aziz
Head of Department: Prof. Dr. Ibrahim Helmy

Department: **Molecular Biology**

Course Specifications

1. Course information:

Course Code:	**B1-8**	**Course Title:**	Chemical modifications of proteins				
No. units	3	**Lec.**	3	**App.**	-	**Level**	**Diploma**
Department	**Molecular Biology**						

2. Course Aims	
	2/1- Enhancing practical skills capabilities in determination and evaluation chemical modifications of proteins. 2/2- Linking between the structure and function of proteins. 2/3- Appointing information about the types of the chemical modifications of proteins. 2/4- Gatherings between the modification of Amino Groups and Carboxyl groups.

3. Intended Learning Outcomes of Course (ILO's)	
y. Knowledge and Understanding:	a/1- Know the basic theories about the chemical modifications of proteins a/2- List the principles and concepts of chemistry and structure of biological macromolecules such as proteins. a/3- Recall the properties of the major groups of biochemistry such as enzymes and proteins. a/4- Recognize different amino acids types, their nomenclature and properties. a/5- Be acquainted with the protein folding, its levels and post-transitional modifications.
z. Intellectual skills:	b/1- Link between causes and sources of the chemical modifications of proteins. b/2- Illustrate the chemical cleavage of peptide bonds and the chemical cross-linking of peptide chains b/3- Collect evidences the site-specific chemical modification of proteins b/4- Explain protein modifications caused by amino groups, Histidine residues and Arginine.
aa. Practical and Professional Skills of course:	**Not Applicable (N/A)**

bb. General and Transferable Skills	d/1- Use internet and relative information technologies to improve his/her professional practice of biochemistry and molecular genetics. d/2- Practice self appraisal and determines his/her learning needs. d/3-Use different sources of information to obtain data for a given molecular genetics course topics. d/4- Use variable educational devices and important modern techniques for data presentation in molecular genetics. d/5- Manage time effectively and work in teams. d/6- Show leadership and good administration skills.

	4. Course Contents:
No.	**Topic**
1	Introduction to Amino acids
2	Protein structure
3	The Site-Specific Chemical Modification of Proteins
4	The Modification of Amino Groups & Histidine Residues & Arginine
5	The Modification of Carboxyl Groups & Methionine
6	The Chemical Cleavage of Peptide Bonds
7	The Chemical Cross-Linking of Peptide Chains

5. Teaching and Learning Methods	
	Lectures **Class activities** **Discussion** **Presentation** **Reports**
6. Teaching and Learning Methods (for students with special needs)	**Not applicable**
7. Student Assessment:	
s. Assessment Methods:	-Semester Works -Midterm Exam -Oral Exam - Written (Final) Exam
t. Assessment Schedule	- Oral Exam - Mid-Term - Assignments - Final Exam.
u. Weighting of Assessments	Degrees % 15 15% 10 10%

	15 15% 60 60% Total=100 100%

8. List of References:	
u. Course Notes	
v. Essential Books (Text Books)	- Fundamentals of Protein Structure and Function - Protein Modification
w. Suggested Books	- Text book of Biochemistry - Protein analysis methods - Robert Aufreiter (2009). Structure and Function of Proteins. - David Whitford (2005). Protein structure and functions.
9. Periodicals, Web Sites, … etc ...	- Journal of Biological Chemistry(JBC).www.jbc.com …www.biochemistryonline.com.

Course Name Chemical modifications of proteins
Course Code B1-8

Course coordinator: Ass. Prof. Dr. Khalid Bassiouny
Dr. Aysam Fayed
Head of the department council: Prof. Dr. Ibrahim Helmy

Matrix of Knowledge, Skills ILOs for Chemical modifications of proteins Course

Course Contents	Week No.	a-Knowledge and Understanding	b- Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Introduction of Amino acids	**1&2**	**a/1, a/2**	**b/1**	**N/A**	**d/1, d/2, d/4**
Protein structure	**3&4**	**a/2**	**b/2, b/3**	**N/A**	**d/1, d/6**
The Site-Specific Chemical Modification of Proteins	**5&6**	**a/2**	**b/3**	**N/A**	**d/1, d/2**
The Modification of Amino Groups & Histidine Residues & Arginine	**7&8**	**a/1, a/3**	**b/1, b/2**	**N/A**	**d/3, d/4**
The Modification of Carboxyl Groups & Methionine	**9&10**	**a/1, a/3**	**b/1, b/3**	**N/A**	**d/3, d/2**
The Chemical Cleavage of Peptide Bonds	**11&12**	**a/4**	**b/2, b/4**	**N/A**	**d/1, d/5**
The Chemical Cross-Linking of Peptide Chains	**13&14**	**a/5**	**b/2, b/4**	**N/A**	**d/1, d/6**

Course coordinator: Ass. Prof. Khalid Bassiouny
Dr. Aisam M. Fayed
Head of Department: Prof. Dr. Ibrahim Helmy

Department: **Molecular Biology**

Course Specifications

1. Course information:							
Course Code:	**B1-40**	**Course Title:**	**Molecular Cell Biology**				
No. units	3	**Lec.**	3	**App.**	-	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	1- Applying transferable and general skills in the field of biochemistry and molecular biology via accomplishment of scientific workshop, meeting and seminars in molecular cell biology. **2-** Understanding the basic theories of biochemistry science and molecular cell biology. **3-** Linking between the structure and biochemistry of the eukaryotic cell. **4-** Understanding the cell/cell communication where are key elements in the development of the great range of multi-cellular organisms **5-** Listing basic information of the complex processes of life to the underlying molecular events.

١٠. Intended Learning Outcomes of Course (ILO's)	
cc. Knowledge and Understanding:	**a/1-** Gather the quality standards in analysis of Biochemistry and Molecular Biology in Molecular cell biology. **a/2-** Know the principles and concepts of genetic engineering and molecular cell biology. **a/3** -Attain the relationship between the structure and function of cellular components. **a/4-** Write list of cellular processes between the cell component.
dd. Intellectual skills:	**b/1-** Appoint information about the types of cell organelles and its impact upon everything from the environment to health and medical issues in molecular cell biology. **b/2-** Link and appreciate that our knowledge of even the most complex cellular functions is based on observation and experiment in molecular cell biology. b/**3-** Collect evidences the results of molecular cell biology

	assays and solving problems. **b/4**- Evaluate professional risks during treatment and determination pollution of some diseases
ee. Practical and Professional Skills of course:	c/1- Practice some important methods determination and analysis of biochemistry and molecular cell biology. c/2- Use molecular cell biology in analysis and determine the complex cellular behaviors. c/3 Prepare reports of biochemistry and molecular biology analysis and evaluations. c/4 Write instrumentals used in the analysis methodology of Cell cycle control and cell death.
ff. General and Transferable Skills	d/1- Use internet and relative information technologies to improve his/her professional practice of biochemistry and molecular cell biology. d/2- Practice self appraisal and determines his/her learning needs. d/3- Use different sources of information to obtain data for a given course topic. d/4- Enhance the oral communications and effective contacts with students. d/5- Manage time effectively and work in teams. d/6- Show leadership and administration skills in situation comparable to his level.

	Course Contents: .١١
No.	**Topic**
1&2	**Cellular Functioning & Composition**
3&4	**Chemical Foundations of the cell**
5&6	**DNA Properties**
7&8	**Protein Structure and Function**
9&10	**Cellular Membrane Structure and Function**
11&12	**Signaling at the Cell's Surface**
13&14	**Cell cycle control and cell death**

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

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

١٤. Student Assessment:	
v. Assessment Methods:	-Semester Works -Midterm Exam -Oral Exam - Written (Final) Exam
w. Assessment Schedule	- (5^{th}&10^{th}) - (6^{th}) Week - (14^{th}) Week - (15^{th}) Week.
x. Weighting of Assessments	Degrees % 15 15% 10 10% 15 15% 60 60% Total=100 100%

١٥. List of References:	
x. Notes	
y. Essential Books (Text Books)	7- Lewin B.(2006). Essential Genes. Published by Pearson Education, Inc. USA.(2006). 8- De Jong H. (2002) "Modeling and simulation of genetic regulatory systems: A literature review", J. Computational Biology 9: 67-103. **9-** Bolouri H, Davidson EH. (2002) "Modeling transcriptional regulatory networks", BioEssays 24: 1118-1129.

z. Suggested Books	١٦. Molecular Biology of the Cell, 4th edition. Alberts, Johnson, Lewis, Raff, Roberts and Walter. Garland Pub. Co., 2010. ١٧. Molecular Cell Biology, 5th edition. Lodish, Berk, Matsudaira, Kaiser, Krieger, Scott, Zipursky, and Darnell. W.H. Freeman & Co., 2011.
١٨. ...Periodicals, Web Sites, … etc	www.prenhall.com/lewin. www.prancipal genetics.

Course Name	**Molecular cell biology**
Course Code	**B1-40**

Course coordinator: Prof. Dr. Mohamed Farouk Elshal
Head of Department: Prof. Dr. Ibrahim Helmy

Matrix of Knowledge, Skills ILOs for Molecular cell biology Course

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Cellular Functioning & Composition	1&2	a/1, a/2	b/1, b/4	c/1, c/4	d/1, d/2, d/4
Chemical Foundations of the cell	3&4	a/2, a/4	b/2, b/3	c/3	d/1, d/3
DNA Properties	5&6	a/3, a/4	b/2, b/4	c/2, c/4	d/1, d/4
Protein Structure and Function	7&8	a/1, a/3	b/4	c/2, c/3	d/1, d/3, d/4
Cellular Membrane Structure and Function	9&10	a/1, a/3, a/4	b/1, b/3	c/2, c/1	d/1, d/5, d/6
Signaling at the Cell's Surface	11&12	a/3, a/4	b/1, b/4	c/2, c/5	d/1, d/4, d/5
Cell cycle control and cell death	13&14	a/1, a/3. a/4	b/4	c/3, c/5	d/1, d/5, d/6

Course coordinator: Prof. Dr. Mohamed Farouk Elshal

Head of Department: Prof. Dr. Ibrahim Helmy

Department: **Molecular Biology**

Course Specifications

1. Course information:

Course Code:	**A-29**	**Course Title:**	**Clinical Biochemistry**				
No. units	3	**Lec.**	3	**App.**	-	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1 Qualifying Diploma Graduate able to handle basics requirements of the field of Biochemistry and Molecular Biology (Clinical Biochemistry) 2/2 Appointing information about the types of Liver function and Laboratory diagnosis of liver disease 2/3 Knowing the many clinical tests used to diagnose a variety of diseases and disorders 2/4 Recognizing the biochemical/physiological basis for a variety of 2/5 Enumerating molecularly based of Tumor markers 2/6 Knowing the basic theories of biochemistry science and clinical biochemistry.

3. Intended Learning Outcomes of Course (ILO's)	
gg. Knowledge and Understanding:	a/1. Recognize the molecular alterations in cells and tissues to understand arising and development of diseases. a/2. Recall the type of toxic agents, mechanisms of action, principles of toxicity testing and clinical diagnosis and treatments. a/3. List the complexities involved in evaluating of Protein chemistry (structure & analysis) and the urea cycle a/4. Write on the different types of Triglycerides and Cholesterol and their relaions with hypercholesterolemia - atherosclerosis and Hyperlipoprotein **diseases.**
hh. Intellectual skills:	b/1. Link between the drug-DNA interaction and its application in controlling diseases b/2. Appoint the information to analyze many problems in treatment of some biochemical disorder of Carbohydrates chemistry and carbohydrates intolerance -Diabetes Mellitus

	b/3. Collect evidence and put the priorities of therapeutic effects in some diseases of Lipid Metabolism and Lipoproteins. b/4. Arrange the types of molecular Endocrinology hormones.
ii. Practical and Professional Skills of course:	**Not Applicable (N/A)**
jj. General and Transferable Skills	d/1- Use internet and relative information technologies to improve his/her professional practice of clinical biochemistry. d/2- Practice self appraisal and determines his/her learning needs. d/3- Use different sources of information to obtain data for a given course topic. d/4- Enhance the oral communications and effective contacts with students. d/5- Manage time effectively and work in teams. d/6- Show leadership and administration skills in situation comparable to his level.

	4. Course Contents:
No.	**Topic**
1	**Carbohydrates chemistry and carbohydrates intolerance -Diabetes Mellitus.**
2	**Protein chemistry (structure & analysis) and the urea cycle**
3	**Liver function and Laboratory diagnosis of liver disease**
4	**Lipid Metabolism and Lipoproteins**
5	**Tumor markers**
6	**Triglycerides and Cholesterol** **Hypercholesterolemia -Atherosclerosis – Hyper lipoprotein**
7	**Molecular Endocrinology hormones**

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

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

7. Student Assessment:	
y. Assessment Methods:	-Semester Works -Midterm Exam -Oral Exam - Written (Final) Exam
z. Assessment Schedule	- Oral Exam - Mid-Term - Assignments - Final Exam.
aa. Weighting of Assessments	Degrees % 15 15% 10 10% 15 15% 60 60% Total=100 100%

8. List of References:	
aa. Notes	
bb. Essential Books (Text Books)	Clinical Chemistry: Principles, Procedures, Correlations by Michael L. Bishop, Edward P. Fody, Larry E. Schoeff Publisher: Lippincott Williams & Wilkins; 5th edition (July 6, 2004) ISBN: 0781746116.
cc. Suggested Books	**1-***Text book of Biochemistry 2- Robert Aufreiter (2009). Structure and Function of Proteins. 3- David Whitford (2005). Protein structure and functions.
9. Periodicals, Web Sites, … etc ...	5- Journal of Biological Chemistry(JBC).www.jbc.com 6- www.biochemistryonline.com.

Course Name	**Clinical Biochemistry**
Course Code	**A-29**

Course coordinator: Prof. Dr. Ibrahim Helmy
Dr. Khalid Bassiouny
Dr. Mohamed Yonies

Head of the department council: Prof. Dr. Ibrahim Helmy

Matrix of Knowledge, Skills ILOs for Clinical Biochemistry Course

Course Contents	Week No.	a-Knowledge and Understanding	b- Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Carbohydrates chemistry and carbohydrates intolerance -Diabetes Mellitus	**1&2**	a/1, a/2	**b/1**	**N/A**	d/2
Protein chemistry (structure & analysis) and the urea cycle	**3&4**	a/1, a/2	b/1	**N/A**	d/1, d/5
Liver function and Laboratory diagnosis of liver disease	**5&6**	a/1, a/2, a/3	b/1	**N/A**	d/2
Lipid Metabolism and Lipoproteins	**7&8**	a/1, a/2**,** a/4	b/1, b/2, b/3	**N/A**	d/2,d/3,d/4
Tumor markers	**9&10**	a/2, a/3, a/4	b/1, b/4	**N/A**	d/1,d/6
Triglycerides and Cholesterol Hypercholesterolemia -Atherosclerosis – Hyperlipoprotein	**11&12**	a/1, a/2	b/3	**N/A**	d/4
Molecular Endocrinology hormones	**13&14**	a/1, a/2	b/2, b/4	**N/A**	d/2, d/5

Course coordinator: Prof. Dr. Ibrahim Helmly
Dr. Khalid Bassiouny
Dr. Mohamed Yonies

Head of Department: Prof. Dr. Ibrahim Helmly

Department: **Molecular Biology**

Course Specifications

1. Course information:							
Course Code:	B1-41	**Course Title:**	Molecular cloning I				
No. units	3	**Lec.**	3	**App.**	-	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1- Enhancing practical skills capabilities of determination & evaluation of Biochemistry and Molecular Biology in molecular cloning **2/2-** Appointing information about the types of genetic engineering in medicine and agriculture. **2/3-** Linking between the plasmid and phages of the prokaryotic cell. **2/4--** knowing The cloned gene can be recombined with other cloned genes to create genes with new properties 2/5- Attaining Plasmid, recombinant DNA and genetic engineering.

3. Intended Learning Outcomes of Course (ILO's)	
a. Knowledge and Understanding:	1- Attain the fundamentals of ethical and legal practice in /a determination and evaluation of Biochemistry and molecular cloning. Know the principles and concepts of genetic engineering and Cloning vectors . 2-/a a/3 - Recognize that PCR is a method that allows one to amplify a single specific piece of DNA, even from a complex mixture, in vitro. a/4- Write list of types of restriction enzymes isolated in bacterium.
b. Intellectual skills:	1- Appoint information about the types of genetic engineering in medicine and agriculture. /b 2- Link between the vectors in E. coli and vectors in eukaryotic cell. /b 3- Collect the evidence of DNA cloning in genetic engineering /b

	4- Identify different phases in recombinant DNA /b technology.
c. Practical and Professional Skills of course:	1- Form Quality written reports of DNA cloning analysis /c and risk assessment using English language in applications of recombinant DNA techniques. c/2- Enhancement of oral and written communication skills. c/3- Development of critical thinking and creativity in scientific research from transformation technologies
d. General and Transferable Skills	1- Use internet and relative information technologies to /d improve his/her professional practice of molecular cloning. d/2- Practice self appraisal and determines his/her learning needs. d/3- Use different sources of information to obtain data for a given course topic. d/4- Enhance the oral communications and effective contacts with students. d/5- Manage time effectively and work in teams. d/6- Show leadership and administration skills in situation comparable to his level.

	4. Course Contents:
No.	**Topic**
1	Overview of course. The beginnings of molecular biology
2	Types of plasmid
3	Manipulative enzymes of purified DNA
4	Cloning vectors for E. coli
5	Recombinant DNA techniques
6	Transformation Technologies
7	Application of grenetis engineering

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

6. 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	- Oral Exam - Mid-Term - Assignments - Final Exam.
c. Weighting of Assessments	Degrees % 15 15% 10 10% 15 15% 60 60% Total=100 100%

8. List of References:	
a. Notes	
b. Essential Books (Text Books)	1-Brown T.A.(2006). Gene cloning and DNA analysis. Library of Congress-in- Publication Data. 2-Lewin B.(2006). Essential Genes. Published by Pearson Education, Inc. USA.(2006). 3-Deutsch A (Ed.) (2003).Function and regulation of cellular systems: Experiments and models.
c. Suggested Books	**1-** Brown T.A.(2010). Gene cloning and DNA analysis. Library of Congress-in- Publication Data.
2- Periodicals, Web Sites, … etc ...	…www.prenhall.com/lewin. .www.clloning

Course coordinator: Prof. Dr. Amal Abd El- Aziz
Dr. Nasser Hussein Abbas
Head of the department council: Prof. Dr. Ibrahim Helmy

Course Name	**Molecular Cloning I**
Course Code	**B1-41**

Matrix of Knowledge, Skills ILOs for Molecular Cloning I Course

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Overview of course. The beginnings of molecular biology	**1&2**	**a/1, a/2**	**b/1, b/2**	**c/1**	**d/1, d/2**
Types of plasmid	**3&4**	**a/3**	**b/3**	**c/1**	**d/1, d/2**
Manipulative enzymes of purified DNA	**5&6**	**a/4**	**b/2, b/1**	**c/1, c/2**	**d/1, d/4**
Cloning vectors for E. coli	**7&8**	**a/2, a/3**	**b/2**	**c/1, c/2,c/3**	**d/1, d/3, d/4**
Recombinant DNA techniques	**9&10**	**a/3**	**b/3, b/4**	**c/1, c/3**	**d/5, d/6**
Transformation Technologies	**11&12**	**a/2, a/3**	**b/2, b/3**	**c/1, c/3**	**d/1, d/4, d/5**
Application of grenetis engineering	**13&14**	**a/1, a/3**	**b/4**	**c/1, c/3**	**d/2, d/3, d/6**

Course coordinator: Prof. Dr. Amal Abd El-Aziz
Dr. Nasser Hussein Abbas
Head of Department: Prof. Dr. Ibrahim Helmy

Department: Molecular Biology

Course Specifications

1. Course information:

Course Code:	**A-22**	**Course Title:**	**Biotechnology (general)**				
No. units	**3**	**Lec.**	**3**	**App.**	**-**	**Level**	**Diploma**
Institute:	**GEBRI**						

2. Aims of the course	
This course covers principles of General Biotechnology	1- Know the principle of Biotechnology and classify the different subfields of biotechnology 2- Classify the basics of different application of biotechnology in Agriculture – plant breeding, animal breeding and cloning, different vaccine products and diagnostics. 3- Know about the Environment and resources – pollution control, land bioremediation, water treatment, minerals extraction and processing and pest management. 4- Attain the basics of Industrial applications – further processing of agricultural products (e.g. oils, fibers), beverage processing-starters, enzymes, fermentation. 5- Explain the bio-processing and generation of industrial enzymes.

3. Intended Learning Outcomes of Course (ILO's)	
e. Knowledge and Understanding:	a/1.Know the definitions and different subfields of biotechnology. a/2.Write list of the general issues and applications of biotechnology. a/3.Gather the effects of recombinant DNA and Restriction enzymes a/4.Attain the different Plant transformation methodology and Agro-bacterium. a/5. Know Examples of genetically determinant traits on human, animal, environment, insects, forensics and plant. .

f. Intellectual skills:	b/1. Arrange the different subfields and its applications i biotechnology. b/2. Collective evidence of recombinant DNA and Restrictio enzymes b/3. Link between Different Plant transformation methodolog and Agro-bacterium b/4. Distinguish the use of genetic investigations in anima biotechnology practice.
g. Professional Skills:	Not Applicable (N/A)
h. General and Transferable Skills	d/1. Work in a team and communicate orally by listening o writing with different languages. d/2. Extract of knowledge from the text books and webs. d/3. Have self-confidence and leadership skills. d/4. Utilize modern techniques of presentation.

4. Course Contents:

No.	Topic
1	Introduction: Definition of biotechnology and different subfields in comparison with genetic engineering and basic sciences.
2	Basics of recombinant DNA and Restriction enzymes for Molecular cloning and library construction.
3	Examples of genetically determinant traits on human, animal, environment, insects, forensics and plant.
4	Different Plant transformation methodology and Agro-bacterium.
5	Basics and theory of Baculovirus expression vector and Use of immobilized cell system for production of vaccines and industrially important product.
6	Plant biotechnology methodology of tissue culture I, II.
7	Industrial biotechnology and bio-processing and generation of industrial enzymes.

5. Teaching and Learning Methods

5.1 Lectures.

5.2. Research assignment.

5.3 Oral presentation and brain storming.

5.4 Computer analysis.

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

7. Student Assessment:	
d. Assessment Methods:	*Semester works, *Midterm exam, *Oral exam**,** *Written (Final) exam**.**
e. Assessment Schedule	* (5th&10th weeks)**,** * (6th) Week**,** * (14th) Week, * (15th) Week.
f. Weighting of Assessments	**lecturer participation 10%** **-Midterm Exam 10%** **-Activities 10%** **-Oral Exam 10%** **- Written (Final) Exam 60%** **Total 100%**

8. List of References:	
a. Notes	**……**
b. Essential Books (Text Books)	8.b.1- The *Guide to Biotechnology* (2007) compiled by the Biotechnology Industry Organization (BIO) Debbie Strickland, BIO, Director of Marketing, Editor Contributors 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 8.b.2-Biotechnology Volume (1) Biological Fundamentals Edited by H. Sahm 1993 ISBN 3-527-28311-0 (Weinheim) ISBN 1-56081-151-X (New York) NE: Sahm, Hermann [Hrsg.] Completely Revised Edition Edited by

	H.-J. Rehm and G. Reed in cooperation with A. Piihler and F? Stadler 8.b.3- Overview of the Baculovirus Expression System Current Protocols in Molecular Biology
c. Suggested Books	8.c.1
d. Periodicals, Web Sites, … etc ...	8.d.1/ www.dbebooks.com - Free Books & magazines

Course Name	**General Biotechnology**
Course Code	A-22

Course coordinator: Prof.Dr. Omayma Khamiss

Head of the department council: Prof. Dr. Ibrahim Helmy

Matrix of Knowledge and skills of the educational course targeted A-22 Biotechnology (general)

No.	Course topic	Knowledge and understanding	Intellectual abilities	Professional and practical skills	General and transferable skills
1	Introduction: Definitions of biotechnology and different subfields in comparison with genetic engineering and basic sciences.	a/1,a/2	b/1	N/A	d/1, d/2
2	Basics of recombinant DNA and Restriction enzymes for Molecular cloning and library construction.	a/3	b/2	N/A	d/1, d/4
3	Examples of genetically determinant traits on human, animal, environment, insects, forensics and plant.	a/5	b/3	N/A	d/1, d/3
4	Different Plant transformation methodology and Agro-bacterium.	a/4	b/3	N/A	d/4, d/2
5	Basics and theory of Baculovirus expression vector and Use of immobilized cell system for production of vaccines and industrially important product.	a/3,a/1	b/4	N/A	d/3, d/2
6	Plant biotechnology methodology of tissue culture I, II.	-	b/3	N/A	d/1, d/4
7	Industrial biotechnology and bio-processing and generation of industrial enzymes.	a/	b/4	N/A	d/3, d/2

Course Teach: Prof.Dr: Omayma Khamiss
Prof. Dr. Ibrahim Helmy Head of Department:

Department: **Molecular Biology**

Course Specifications

1. Course information:							
Course Code:	**B1-45**	**Course Title:**	**Molecular Endocrinology**				
No. Units	**3**	**Lec.**	**3**	**App.**	**-**	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1- Qualifying Diploma Graduate able to handle basics requirements of the field of Molecular Endocrinology. 2/2- Introducing students to the Molecular Endocrinology system and how it distinguishes different types of human hormones. 2/3- Attaining basic the importance of the Endocrinology system and how it can be usefully manipulated. 2/4- Linking between the structure and function of the different types of human hormones. 2/5- Understanding the mechanism of actions of different types of hormones. 2/6- Recognizing how our bodies regulate and control different types of human hormones.

3. Intended Learning Outcomes of Course (ILO's)	
i. Knowledge and Understanding:	a/1- Attain the fundamentals of ethical and legal practice in determination and evaluation of Biochemistry and Molecular Endocrinology. a/2- Gather the fundamental concepts of Endocrines hormones concentrations and the technical methodology 3- Enumerate the nature and function of human hormones /a **N**ame of different types of human hormones. 4-/a a/5- Know types of human hormones and their main properties. a/6- Know the regulation of human hormones a/7- Write list of the control of all types and functions of the different human hormones.
j. Intellectual skills:	b/1- Collect the evidence and put the priorities of therapeutic effects in some diseases. b/2- Link between the parameters of molecular endocrinology with the parameters of different biological sciences.

	b/3- Collect evidence the concentrations of different hormones and human diseases. 4- Appoint information the structures and properties of the/b different human hormones. 5- Arrange the role of the different hormones in human /b body.
k. Practical and Professional Skills of course:	Not Applicable (N/A))
l. General and Transferable Skills	1- Use Audio & Video Means for Displaying Endocrines /d system and organs. d/2- Practice self appraisal and determines his/her learning needs. d/3- Use different sources of information to obtain data for a given molecular endocrinology course topic. d/4- Enhance the oral communications and effective contacts with students. d/5- Manage time effectively & work in teams. d/6- Show leadership and administration skills in situation comparable to his level.

	4. Course Contents:
	Topic
1	Introduction to the endocrine system , endocrine glands and human hormones
2	Types, structure, properties and functions of human hormones
3	Mechanisms of hormones actions and control of hormones activity
4	Hypothalamic hormones, anterior and posterior pituitary gland hormones
5	Thyroid gland hormones and parathyroid hormone
6	Adrenal gland hormones and endocrine pancreas hormones
7	Hormones of male and female reproductive system

5. Teaching and Learning Methods	
	Lectures Class activities Discussion Presentation Reports
6. Teaching and Learning Methods (for students with special needs)	Not applicable

7. Student Assessment:	

g. Assessment Methods:	-Semester Works -Midterm Exam -Oral Exam - Written (Final) Exam
h. Assessment Schedule	- Oral Exam - Mid-Term - Assignments - Final Exam.
i. Weighting of Assessments	Degrees % 15 15% 10 10% 15 15% 60 60% Total=100 100%
8. List of References:	
d. Notes	
e. Essential Books (Text Books)	1. Endocrinology. Mauricio,H; Pineda Michael,P and Doole,Y, 2003. Blackwell Publishing Iowa State Press (5th edition). 2. Reproductive endocrinology. Yen, SC and Jaffe, RB, 1991. W.C. Saunders company, 3rd edition.
f. Suggested Books	Experiments in Physiology 6th Edition. Gerard P. Tharp 1993. * Textbook of Medical Physiology. Guyton & Hall 9th Edition. 1996. W.B. Saunders Co. (Harcourt Brace I.E.) Philadelphia, USA
٥. ...Periodicals, Web Sites, … etc	WWW.NCBI.NLM.NIH.GOV/PUBMED *http://www.thyroidmanager.org/* [Accessed 21 July 2010].

Course Coordinator : Prof. Dr. Samir Ali Mohamed El-Masry
Head of Department : Prof. Dr. Ibrahim Helmy

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Introduction to the endocrine system, endocrine glands and human hormones	1&2	a/1, a/2, a/3	b/1, b2, b/3	N/A	d/1, d/2, d/4
Types, structure, properties and functions of human hormones	3&4	a/3, a/5	b/2, b/3	N/A	d/1, d/3
Mechanisms of hormones actions and control of hormones activity	5&6	a/2, a/5	b/1, b/2, b/4	N/A	d/1, d/4
Hypothalamic hormones, anterior and posterior pituitary gland hormones	7&8	a/2, a/4, a/5	b/1, b/2	N/A	d/1, d/5, d/6
Thyroid gland hormones and parathyroid hormone	9&10	a/2, a/5	b/4, b/5	N/A	d/1, d/4, d/5
Adrenal gland hormones and endocrine pancreas hormones	11&12	a/2,a/4, a/5	b/4, b/5	N/A	d/1, d/4, d/5
Hormones of male and female reproductive system	13&14	a/6, a/7	b/5	N/A	d/1, d/5, d/6

Course coordinator**: Prof. Dr. Samir Ali Mohamed El-Masry**
Head of Department: Prof. Dr. Ibrahim Helmy

Department: **Molecular Biology**

Course Specifications

1. Course information:							
Course Code:	**B1-57**	**Course Title:**	**Molecular Pathology**				
No. units	3	**Lec.**	3	**App.**	-	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1 Qualifying Diploma Graduate able to handle basics requirements of the field of Biochemistry and Molecular Biology in molecular pathology. 2/2 Appointing information about the types of molecular pathology and disease. 2/3 Knowing the many clinical tests used to mechanisms of essential biochemical reactions 2/4 Defining the biochemical/physiological basis for a variety of molecular pathology. 2/5 Understanding the basic theories of biochemistry science and Cellular Basis of molecular pathology.

3. Intended Learning Outcomes of Course (ILO's)	
m. Knowledge and Understanding:	a/1. Define the fundamental concepts of parasitological, immunology and biochemistry and the technical methodology in these fields. a/2. Know the cellular adaptation to disease & the cell apoptosis and death. a/3. List the developmental and genetic factors in disease. a/4. Write list of the molecular diagnosis of neoplasia & Basic immunopathology versus antigens.
n. Intellectual skills:	b/1 Collect the evidence and put the priorities of therapeutic effects in some diseases. b/2. Appoint information to analyze many problems in treatment of some biochemical and molecular diagnosis of neoplasia. b/3. Arrange and put the priorities of environmental and nutritional factors in disease. b/4. Appoint information about the evaluation and application of molecular pathology in diagnostic disease.

o. Practical and Professional Skills of course:	
p. General and Transferable Skills	1- Use internet and relative information technologies to /d improve his/her professional practice of biochemistry course. d/2- Practice self appraisal and determines his/her learning needs. d/3- Use different sources of information to obtain data for a given course topic. d/4- Enhance the oral communications and effective contacts with students. d/5- Manage time effectively and work in teams. d/6- Show leadership and administration skills in situation comparable to his level.

	4. Course Contents:
No.	**Topic**
1	The Cellular adaptation to disease
2	Developmental and genetic factors in disease
3	Molecular diagnosis of neoplasia
4	Basic immunopathology versus antigens
5	Environmental and nutritional factors in disease
6	Disease testing & The Cell apoptosis and death.
7	Evaluation and application of molecular pathology in diagnostic disease

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

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

7. Student Assessment:	
j. Assessment Methods:	-Semester Works -Midterm Exam -Oral Exam - Written (Final) Exam

k. Assessment Schedule	- Oral Exam - Mid-Term - Assignments - Final Exam.
l. Weighting of Assessments	Degrees % 15 15% 10 10% 15 15% 60 60% Total=100 100%

8. List of References:	
g. Notes	
h. Essential Books (Text Books)	Clinical Chemistry: Principles, Procedures, Correlations by Michael L. Bishop, Edward P. Fody, Larry E. Schoeff Publisher: Lippincott Williams & Wilkins; 5th edition (July 6, 2004)
i. Suggested Books	**1**-*Text book of Biochemistry 2- Robert Aufreiter (2009). Structure and Function of Proteins. 3- Biochemistry, fundamental of biochemistry and clinical chemistry (2011).
...Periodicals, Web Sites, … etc .٦	7- Journal of Biological Chemistry(JBC).www.jbc.com 8- www.biochemistryonline.com.

Course Name	**Molecular Pathology**
Course Code	**B1-57**

Course coordinator: Prof.Dr. Sabah Farouk

Head of the department council: Prof. Dr. Ibrahim Helmy

Matrix of Knowledge, Skills ILOs for Molecular Pathology Course

Course Contents	Week No.	a-Knowledge and Understanding	b- Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
The Cellular adaptation to disease	**1&2**	a/1, a/2	b/1,b/4	**N/A**	d/2
Developmental and genetic factors in disease	**3&4**	a/1, a/3	b/2	**N/A**	d/1, d/2
Molecular diagnosis of neoplasia	**5&6**	a/1	b/2	**N/A**	d/2, d/5
Basic immunopathology versus antigens	**7&8**	a/1, a/4	b/1, b/4	**N/A**	d/2,d/3,d/4
Environmental and nutritional factors in disease	**9&10**	a/2, a/4	b/2, b/3	**N/A**	d/1, d/6
Disease testing & The Cell apoptosis and death.	**11&12**	a/2	b/1, b/4	**N/A**	d/4, d/5
Evaluation and application of molecular pathology in diagnostic disease	**13&14**	a/1, a/3	b/2, b/1	**N/A**	d/2, d/4

Course coordinator: Prof. Dr. Sabah Farouk
Head of Department: Prof. Dr. Ibrahim Helmy

Department: **Molecular Biology**

Course Specifications

1. Course information:							
Course Code:	B7-42	**Course Title:**	The Inherited Metabolic Diseases				
No. units	3	**Lec.**	3	**App.**	-	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1- Qualifying Diploma Graduate able to handle basics requirements of the field of Biochemistry and Molecular Biology (The Inherited Metabolic Diseases). 2/2- Knowing the molecular basis of metabolic pathways. **2-** Linking between the change in DNA sequence and metabolic diseases. **3-** Gathering current trends in therapy of metabolic diseases. **4-** Attaining basic properties of genes and how they influence our Lives.

3. Intended Learning Outcomes of Course (ILO's)	
q. Knowledge and Understanding:	1- Know the different types of toxic agents, mechanisms /a of action, principles of toxicity testing and clinical diagnosis and treatments. a/2- Be acquainted with the principles of DNA and chromatin structure, DNA repair and imprinting. a/3- Recall basic concepts of metabolic processes and their defects. a/4 - Relate the function of cellular molecules to the ultrastructure. a/5- Enumerate the different types of metabolic disorders. a/6- Write short notes in metabolic disorders and their mechanisms.
r. Intellectual skills:	b/1- Collect evidence and put the priorities of therapeutic effects in some diseases. 2- Link between the parameters DNA repair, mutation and /b imprinting 3- Appoint information about the DNA repair, mutation /b and imprinting mechanisms.

	4- Adjust required professional reports of biochemistry /b and molecular biology analysis and evaluations in inherited metabolic diseases.
s. Practical and Professional Skills of course:	**Not Applicable (N/A)**
t. General and Transferable Skills	1- Use internet and relative information technologies to /d improve his/her professional practice of biochemistry course. d/2- Practice self appraisal and determines his/her learning needs. d/3- Use different sources of information to obtain data for a given course topic. d/4- Enhance the oral communications and effective contacts with students. d/5- Manage time effectively and work in teams. d/6- Show leadership and administration skills in situation comparable to his level.

	4. Course Contents:
No.	**Topic**
1	Nucleic acid and chromatin structure
2	DNA repair, mutation and imprinting
3	Human cell processes
4	Classification of metabolic diseases
5	DNA repair, mutation and imprinting
6	Defects in lipids and DNA
7	New trends for treatment of metabolic disorders

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

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

7. Student Assessment:	

m. Assessment Methods:	-Semester Works -Midterm Exam -Oral Exam - Written (Final) Exam
n. Assessment Schedule	- Oral Exam - Mid-Term - Assignments - Final Exam.
o. Weighting of Assessments	Degrees % 15 15% 10 10% 15 15% 60 60% Total=100 100%

8. List of References:	
j. Notes	**-**
k. Essential Books (Text Books)	**Emery's Elements of Medical genetics – Elsevier 14th edition (2008).** **Inborn Metabolic Diseases – Springer's forth edition**
l. Suggested Books	**- Emery's Elements of Medical genetics – Elsevier 15th edition (2010)**
9. Periodicals, Web Sites, … etc ...	**http://themedicalbiochemistrypage.org**

Course Name: The Inherited Metabolic Diseases
Course Code B7-42

Course coordinator: Prof. Dr. Shaden Muawia
Dr. Manal El Hamshary
Head of Department: Prof. Dr. Ibrahim Helmy El-Sayed

Matrix of Knowledge, Skills ILOs for The Inherited Metabolic Diseases Course

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Nucleic acid and chromatin structure	**1&2**	**a/1, a/2**	**b/1, b/4**	**N/A**	**d/1, d/2, d/4**
DNA repair, mutation and imprinting	**3&4**	**a/2, a/4**	**b/2, b/3**	**N/A**	**d/1, d/3**
Human cell processes	**5&6**	**a/3, a/4**	**b/2, b/4**	**N/A**	**d/1, d/7**
Classification of metabolic diseases	**7&8**	**a/1, a/3**	**b/4**	**N/A**	**d/1, d/3, d/4**
Defects in carbohydrates and proteins	**9&10**	**a/1, a/3, a/4**	**b/1, b/4**	**N/A**	**d/1, d/5, d/6**
Defects in lipids and DNA	**11&12**	**a/4, a/6**	**b/1, b/4**	**N/A**	**d/1, d/4, d/5**
New trends for treatment of metabolic diseases	**13&14**	**a/3. a/4,a/5**	**b/2, b/4**	**N/A**	**d/5, d/6, d/7**

Course coordinator: Prof. Dr. Shaden Muawia
Dr. Manal El Hamshary
Head of Department: Prof. Dr. Ibrahim Helmy El-Sayed

Department: **Molecular Biology**

Course Specifications

1. Course information:							
Course Code:	**B1-83**	**Course Title:**	**Radioisotopes in biology**				
No. units	3	**Lec.**	3	**App.**	-	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1- Enhancing practical skills capabilities of determination & evaluation of Biochemistry and Molecular Biology in Radioisotopes. 2/2- Linking between the basic difficulties in tracer methodology. 2/3- Understanding and appreciation of current topics in radioisotopes in biology. 2/4- Attaining properties and procedures for individual radioisotopes. 2/5- Be acquainted with radioisotope therapy and pharmaceutical grade radiochemical.

3. Intended Learning Outcomes of Course (ILO's)	
u. Knowledge and Understanding:	1- Gather the quality standards in analysis of Biochemistry /a and Radioisotopes in biology. 2-/a Know the principles and concepts of Facilities and Handling of Radioisotopes with Animals and Plants. a/3 -Attain the relationship between properties and procedures for individual radioisotopes. a/4- Write list of life of a radioisotope plays a role...chemistry**.**
v. Intellectual skills:	b/1- Collect the evidence and put the priorities of therapeutic effects in some diseases. 2- Link between the parameters of radioisotopes in biology /b with the parameters of biological sciences 3- Appoint information the results of radioisotope therapy /b assays and solving problems. 4- Arrange the risks during handling of radioisotopes with /b animals and plants.
w. Practical and Professional	**Not Applicable (N/A)**

Skills of course:	
x. General and Transferable Skills	1- Use internet and relative information technologies to /d improve his/her professional practice of biochemistry course. d/2- Practice self appraisal and determines his/her learning needs. d/3- Use different sources of information to obtain data for a given course topics. d/4- Enhance the oral communications and effective contacts with students. d/5- Manage time effectively and work in teams. d/6- Show leadership and administration skills in situation comparable to his level.

	4. Course Contents:
No.	Topic
1	Basic Difficulties and Principles in Tracer Methodology
2	Facilities and Handling of Radioisotopes with Animals and Plants
3	and Radio activation Analysis Properties and Procedures for Individual Radioisotopes
4	Radioisotope measured & life of a radioisotope plays a role...chemistry.
5	Radioisotope therapy
6	Identified more new radioisotopes
7	Pharmaceutical grade radiochemical

5. Teaching and Learning Methods	
	Lectures Class activities Discussion Presentation Reports
6. Teaching and Learning Methods (for students with special needs)	Not applicable
7. Student Assessment:	
p. Assessment Methods:	-Semester Works -Midterm Exam -Oral Exam - Written (Final) Exam
q. Assessment Schedule	- Oral Exam - Mid-Term

	- Assignments - Final Exam.
r. Weighting of Assessments	Degrees % 15 15% 10 10% 15 15% 60 60% Total=100 100%

8. List of References:	
m. Notes	
n. Essential Books (Text Books)	-Toshihiro Ohta, Shin-ichi Tokishita, Kayo Mochizuki, Jun Kawase, Masahide Sakahira and Hideo Yamagata, UV Sensitivity and Mutagenesis of the Extremely Thermophilic Eubacterium Thermus thermophilus HB27, Genes and Environment Vol. 28 (2006), No. 2 p.56–61. -DNA Lesions That Require Repair: -T Ikura, VV Ogryzko, M Grigoriev, R Groisman, J Wang, M Horikoshi, R Scully, J Qin, and Y Nakatani (2008) Involvement of the TIP60 Histone Acetylase Complex in DNA Repair and Apoptosis. Cell 102:463-473.
o. Suggested Books	-Molecular Biology of the Cell, 4th edition. Alberts, Johnson, Lewis, Raff, Roberts and Walter. Garland Pub. Co., 2010. -Molecular Cell Biology, 5th edition. Lodish, Berk, Matsudaira, Kaiser, Krieger, Scott, Zipursky, and Darnell. W.H. Freeman & Co., 2011.
9. Periodicals, Web Sites, … etc ...	www.mgrc.com.my www.topgenetech.com www.tauros-diagnostik.de http://www.ncbi.nlm.nih.gov/books/bv.fcgi?highlight=lesion&rid=mcb.table.3236

Course Name	**Radioisotopes in biology**
Course Code	**B1-83**

Course coordinator: Prof. Dr. Ibrahim Helmy
Dr. Mohamed Yonies
Head of Department: Prof. Dr. Ibrahim Helmy

Matrix of Knowledge, Skills ILOs for Radioisotopes in biology Course

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Basic Difficulties and Principles in Tracer Methodology	**1&2**	**a/1, a/2**	**b/1**	**N/A**	**d/1, d/2, d/4**
Facilities and Handling of Radioisotopes with Animals and Plants	**3&4**	**a/1, a/2**	**b/3, b/4**	**N/A**	**d/1, d/3**
Properties and Procedures for Individual Radioisotopes and Radio activation Analysis	**5&6**	**a/1**	**b/2**	**N/A**	**d/1, d/4**
Radioisotope measured Radioisotopes & life of a radioisotope plays a role...chemistry.	**7&8**	**a/2, a/4**	**b/2, b/4**	**N/A**	**d/1, d/3, d/4**
Radioisotope therapy	**9&10**	**a/1, a/3**	**b/1**	**N/A**	**d/1, d/5, d/6**
Identified more new radioisotopes	**11&12**	**a/3, a/4**	**b/3**	**N/A**	**d/1, d/5**
pharmaceutical grade radiochemical	**13&14**	**a/1, a/4**	**b/3, b/4**	**N/A**	**d/1, d/6**

Course coordinator: Prof. Dr. Ibrahim Helmy
Dr. Mohamed Yonies
Head of Department: Prof. Dr. Ibrahim Helmy

Department: **Molecular Biology**

Course Specifications

1. Course information:							
Course Code:	C-99	**Course Title:**	Practical approach in essential molecular biology				
No. units	3	**Lec.**	3	**App.**	-	**Level**	Diploma
Department	**Molecular Biology**						

2. Course Aims	
	2/1- Enhancing practical skills capabilities of determination & evaluation of Biochemistry and Molecular Biology. **2/2-** Appling transferable & general skills in the field of biochemistry and Practical approach in molecular biology via accomplishment of scientific workshop, meeting and seminars. **2/3-** Knowing and appreciation of current topics in Practical approach in essential molecular biology 2/4-Attaining basic properties of techniques used in the fields of polymorphism of DNA and biochemical markers and molecular markers e- Gatherings the measure of biochemical markers and DNA amplification

3. Intended Learning Outcomes of Course (ILO's)	
y. Knowledge and Understanding:	1- Gather the fundamental concepts of parasitological, /a immunology and biochemistry and the technical methodology in these fields. Know the principles and concepts of PCR methods. 2-/a a/3 -Attain the fundamentals of ethical and legal practice in determination and evaluation of biochemical markers and molecular markers a/4- Write list of DNA manipulation in today's world and detection in levier enzymes .
z. Intellectual skills:	1- Link between the parameters of molecular biology with /b the parameters of different biological sciences. 2- Appoint information the parameters of molecular biology /b with the PCR DNA. 3- Arrange common problems in treatment systems of /b some diseases in biochemical markers and molecular

	markers. b/4- Collect the evidence and put the priorities of therapeutic effects in some diseases.
aa. Practical and Professional Skills of course:	1- Practice some important methods determination & /c analysis of biochemistry and practical approach in essential molecular biology. c/2-Use molecular biology in PCR analysis and determination and DNA amplification. 3- Calculate and extract of the nucleic acids from different /c biological sources. c/4- Calibrate instrumentals using in the analysis methodology of practical approach in immune diagnostic proteins by ELAS.
bb. General and Transferable Skills	1- Use internet and relative information technologies to /d improve his/her professional practice in the field of human cell biology. d/2- Practice self appraisal and determines his/her learning needs. d/3- Use different sources of information to obtain data for a given course topics. d/4- Enhance the oral communications and effective contacts with students. d/5- Manage time effectively and work in teams. d/6- Show leadership and administration skills in situation comparable to his level.

	4. Course Contents:
No.	**Topic**
1	Introduction The basis of molecular biology (macromolecule structure of Proteins, DNAs and RNAs).
2	Biochemical markers and molecular markers
3	Measure of DNA & DNA amplification
4	Detection in levier enzymes
5	DNA amplification using the polymerase chain reaction (PCR).
6	Molecular markers as a tool for genome analysis.
7	cDNA preparation & DNA sequencing

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

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

7. Student Assessment:	
s. Assessment Methods:	-Semester Works -Midterm Exam -Oral Exam - Written (Final) Exam
t. Assessment Schedule	- (5^{th}&10^{th}) - (6^{th}) Week - (14^{th}) Week - (15^{th}) Week.
u. Weighting of Assessments	Degrees % 15 15% 10 10% 15 15% 60 60% Total=100 100%

8. List of References:	
7. Notes	
8. Essential Books (Text Books)	-Cell Biology-A laboratory Handbook,2006.Author(s)/Editor(s):Celis,Julio E. (ed.)Publisher: Amsterdam: Elsevier Academic Press -Deutsch A (Ed.)(2003). Function and regulation of cellular systems: Experiments and models (Mathematics and Biosciences in interaction). Birkhauser (Architectural).
9. Suggested Books	3- Molecular Biology of the Cell, 4^{th} edition. Alberts, Johnson, Lewis, Raff, Roberts and Walter. Garland Pub. Co., 2010. **4-** Genetics: Analysis and Principles by Robert J. Brooker, 3rd edition
5- Periodicals, Web Sites, … etc ...	- www.scincedirect.com

Course Name	Practical approach in essential molecular biology
Course Code	**C-99**

Course coordinator: Prof. Dr. Amal Ahmed Abd El- Aziz
Dr. Ahmed Salah
Head of the department: Prof. Dr. Ibrahim Helmy

Matrix of Knowledge, Skills ILOs for Practical approach in essential molecular biology Course

Course Contents	Week No.	a-Knowledge and Understanding	b-Intellectual skills	c-Practical and Professional Skills of course	d-General and Transferable Skills
Introduction, The basis of molecular biology (macromolecule structure of Proteins, DNAs and RNAs).	**1&2**	**a/1, a/2**	**b/1, b/4**	**c/1, c/4**	**d/1, d/2, d/4**
Biochemical markers and molecular markers	**3&4**	**a/2, a/4**	**b/2, b/3**	**c/3**	**d/1, d/3, d/7**
DNA & RNA extraction	**5&6**	**a/3, a/4**	**b/2, b/4**	**c/2, c/4**	**d/1, d/4, d/7**
DNA restriction & polymorphism	**7&8**	**a/1, a/3**	**b/4**	**c/2, c/3**	**d/1, d/3, d/4**
DNA amplification using the polymerase chain reaction (PCR).	**9&10**	**a/3, a/4**	**b/1, b/4**	**c/2, c/1**	**d/1, d/5, d/6**
Molecular markers as a tool for genome analysis.	**11&12**	**a/3, a/4**	**b/1, b/4**	**c/2, c/3**	**d/1, d/4, d/5**
cDNA preparation & DNA sequencing	**13&14**	**a/3. a/4**	**b/4**	**c/3, c/4**	**d/1, d/5, d/6**

Course coordinator: Prof. Dr. Amal Abd El-Aziz
Dr. Ahmed Salah

Head of Department: Prof. Dr. Ibrahim Helmy