Academic Reference Standards (ARS)
for
PhD in Pharmaceutical Sciences
(*Biochemistry*)

Department of Biochemistry

ARS

Academic Year: 2021/2022

رئيس القسم
أ.م.د/ محمد السيد المسيري

signature

I. Attributes of the graduate:

The graduates of the Ph.D. Degree of Biochemistry should be capable of:

- Applying the basics and methodologies of scientific research and manipulating its various tools in the field of Biochemistry.
- Mastering of advanced knowledge, professional research skills, attitudes and values in the field of Biochemistry and integrating with the relevant subjects in his/her professional practice.
- Recognizing the current issues in Biochemical analysis
- Adopt different tools and techniques used in molecular biology such as PCR, electrophoresis and blotting to be applied in medical, genetic and environmental fields.
- Identifying and solving problems in the field of Biochemistry
- Mastering adequate range of specialized professional skills and using appropriate technology to improve his/her professional practice.
- Communicating effectively and having ability to participate and lead teamworks.
- Taking appropriate professional and scientific decisions in light of the available information.
- Providing the ability to critically analyze the impact and outcomes of research results.
- Training in ethical and legal aspects of scientific research.
- Employing the available resources to achieve and preserve the maximum benefit.
- Exhibiting awareness of his/her role in the community development and preservation of environment in response to regional global changes.
- Designing and conducting research projects
- Reflecting commitment to integrity, credibility and rules of the pharmacy profession.
- Developing continuous self academic and professional learning.

II. General Standards

Upon successful completion of the Program, graduates should be able to:

1. Knowledge and Understanding:

1.1 Identify the theories and fundamentals of Biochemistry and other related fields.

1.2 Recognize the recent and advanced scientific developments in the field of Biochemistry.
1.3 Define inherited human diseases and describe gene therapy of different diseases.
1.4 Distinguish the value of ethics and legal issues of research and professional practice in Biochemistry.
1.5 Utilize effectively all basic and recent techniques and technological tools used in the field of Biochemical analysis.

2. Intellectual Skills

2.1 Analyze and evaluate information in the field of Biochemistry
2.2 Deduce solutions for specialized problems in absence of some information
2.3 Integrate information to solve professional problems.
2.4 Develop methodological scientific studies on certain research problems.
2.5 Assess risk assessment of professional practice Biochemistry.
2.6 Plan for development in the field of Biochemistry.
2.7 Generate professional decision in response to various professional contexts.

3. Professionaland Practical Skills

3.1 Master basic and professional skills in Biochemistry and related fields.
3.2 Write thesis in a scientific and precise way.
3.3 Write and evaluate professional research reports in Biochemistry.

4. General and transferable skills:

4.1 Communicate effectively by various methods
4.2 Utilize effectively information technology in professional practice development.
4.3 Perform self assessment, continuous learning and identifying personal educational needs.
4.4 Use different resources to acquire knowledge and information.
4.5 Anticipate needs and risks in the research fields.
4.6 Work in a team and lead others in various professional contexts.
4.7 Manage time effectively.
4.8 Interpret and evaluate data available from scientific research.
4.9 Show awareness of ethics and legal issues of research and professional practice in Biochemistry.

Date of course specification approval: 8/11/2021

Program: Ph.D in Pharmaceutical Sciences (Biochemistry)(PBP- 300)

Biochemistry Department

Program Specification

Academic Year: *2021/2022*

رئيس القسم
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Signature

A-Basic Information

1	**Faculty**	**Pharmacy**
2	**Program Title:**	**PhD in Pharmaceutical Sciences (Biochemistry)**
3	**Program Type:**	**Single**
4	**Department (s):**	**Department of Biochemistry**
5	**Final award:**	**Ph D degree in Biochemistry**
6	**Coordinator:**	**Ass. Prof. Dr. Mohamed El Mesery**
7	**External Evaluator(s):**	**Prof. Dr. Sahar El Swefy**
8	**Date of Program Specification Approval:**	***Department council:*** **8/11/2021** ***Faculty council: / /2021***

B-Professional Information

1-Program Aims

Upon successful completion of the program, graduates should demonstrate comprehensive knowledge, clear understanding and outstanding skills in pharmaceutical sciences and biochemistry

1.1 Applying the basics and methodologies of scientific research and manipulating its various tools in the field of Biochemistry.

1.2 Master clinical research procedures according to the good laboratory practice (GLP) basics in biochemistry labs and perform experiments with safety guidelines.

1.3 Adopt different tools and techniques used in molecular biology such as PCR, electrophoresis and blotting to be applied in medical, genetic and environmental fields.

1.4 Applying the scientific thinking approaches and problem based learning in fields of biochemistry.

1.5 Formulating hypotheses based on current concepts in Biochemistry field.

1.6 Designingand conducting research projects.

1.7 Figure out the principles of disease pathophysiology and correlate between biochemical data and clinical outcome.

1.8 Manipulate computer program, online database, software and other information technology skills to get information and analyze the obtained research data.

1.9 Attaining communication skills, research ethics, time management, decision-making, and team-

working.

1.10 Have the advanced and in-depth knowledge and skills in areas related to clinical biochemistry, molecular biology, and biotechnology and gene expression.

2-Intended Learning Outcomes (ILOs)

a- Knowledge and Understanding:

By the end of this programthe graduate should be able to:

A1	Define inherited human diseases and describe gene therapy of different diseases.
A2	Define the principles of body function in health and diseases states as well as the etiology, epidemiology, laboratory diagnosis, clinical features of different diseases and their pharmacotherapeutic approaches.
A3	Recognize the current problems, the recent and advanced scientific development in fields of Biochemical analysis.
A4	Utilizeeffectively all basic and recent techniques and technological tools used in the field of Biochemical analysis.
A5	Describe the role of oncogenes and tumor suppressors in tumor initiation.
A6	Recall different metabolic pathways in some tissues and describe different metabolic disorders,
A7	Explain endocrinology of male and female reproductive systempediatric and aging and define endocrine diseases in different tissues.
A8	Determine the role of biotransformation reactions and its impact on public health.
A9	Spot the difference between gene expression in pro- and eukaryotes.
A10	Recognize the concept of cellular communication and signaling pathways that control gene expression.
A11	Explain the physiological contribution of hormones in normal and pathological conditions
A12	Explain the role of hormonal therapy in different diseases.
A13	Understand principles of quality assurance in Molecular Biology and endocrinology practice.
A14	Explain the legal and ethical principles for experiments using experimental animals and human volunteers.
A15	Effectively present scientific data based on knowledge of biostatistics.
A16	Identify the biochemical pathways for CHO, Lipids and amino acids & their abnormalities.

b- Intellectual Skills

By the end of this program the graduate should be able to:

B1	Justify proper test for diagnosis and assessment of metabolic disorders.
B2	Predict the type of tumor based on tumor marker analysis and signs.
B3	Demonstrate creativity and innovative scientific and professional approaches regarding Biochemistry.
B4	Utilize the available professional and scientific resources and research skills to solve problems.

B5	Analyze biochemical markers to relevant organs for accurate diagnosis and differentiation of diseases.
B6	Plan to improve performance and research in the field of Biochemistry.
B7	Analyze and interpret case study results.
B8	Recommend professional and scientific decisions based on proofs, evidences and available data.
B9	Participate in comprehensive scientific and professional discussions and communications based on scientific evidences and proofs.
B10	Select suitable genomic & proteomic tools for diagnosis of different types of cancer &hereditary disorders.
B11	select appropriate biochemical tests for screening diagnosis and prognosis of different disease at different stages.
B12	Professionally write a scientific paper in the fields of biochemistry and molecular biology.
B13	Perform scientific and professional discussion based on proves and evidences.
B14	Predict mechanism of action of drugs and the significance of biochemical markers.

c- Professionaland Practical Skills

By the end of this program the graduate should be able to:

C1	Apply different statistical methods for data analysis and validation.
C2	Develop different research methodologies and good experimental and reporting skills in biochemical analysis, prophylaxis and management of different diseases.
C3	Manage safely and efficiently advanced technological research tools and equipment relevant to biochemical analysis research.
C4	Carry out scientific research and contribute to the knowledge in the field of Biochemistry.
C5	Write accurately, evaluate professional reports and publish scientific research papers in scientific journals and conferences.
C6	Write thesis in a scientific and precise way.
C7	Illustrate the effect of his/her professional practice on the community in addition to different methods of environmental development and maintenance.

d. General and Transferable Skills

By the end of this program the graduate should be able to:

D1	Communicateclearly by verbal and written means.
D2	Manipulate computer program, online database, software and other IT to get information and analyze the obtained research data.
D3	Practice self- assessment and learning needed for continuous professional development.

D4	Utilize different available information resources relevant to Biochemistry.
D5	Promote critical thinking, problem-solving and decision-making capabilities.
D6	Deal with obstacles and problems.
D7	Work effectively in a team and offer expertise and advice to others
D8	Develop creativity and time management abilities.
D9	Evaluate and criticize scientific work, literature and research data.
D10	Adopt ethical, legal, professional responsibilities and safety guidelines.
D11	Develop presentation skills, give seminars and defend thesis in public.

3-Academic Reference Standards(ARS):

Approved by both the Department and Faculty Councils
Department council Approval Date: 9/3/2021,
Faculty council Approval Date: 20/3/2021

3a- Academic References Standards: (**Attached**)

3b-Comparison of provision to External References

Achievement of academic reference standards via program Intended Learning Outcomes.

ILOs	ARS	Program
1. **Knowledge and Understanding**	**1.1**	A1 to A16
	1.2	A3,A4
	1.3	A1.A5.A9,A10
	1.4	A14
	1.5	A4
2. **Intellectual Skills**	**2.1**	B1 TO B14
	2.2	B4,B7
	2.3	B9
	2.4	B7,B9
	2.5	B8,B9
	2.6	B6
	2.7	B1,B2,B4,B5,B7,B8
3. **Professionaland Practical Skills**	**3.1**	C1,C2,C3,C5, C7
	3.2	C5,C6
	3.3	C2,C4,C5,C6
4. **General and Transferable Skills**	**4.1**	D1
	4.2	D2
	4.3	D3,D11
	4.4	D4,D5
	4.5	D5, D6
	4.6	D7
	4.7	D8

	4.8	D9
	4.9	D10

4-Curriculum Structure and Contents

4A. Program duration: 2-5 years.

4B. Program structure:

a- The program consists of 50 credit hours of study (8 credit hours of courses and 42 credit hours for thesis).

b- Courses include 6 credit hours of obligatory courses, in addition to 2 credit hours for an elective course., All courses possess the code number [300], According to Faculty By-Law..

c- A scientific research thesis of 42 credit hours represent a main component of the program. It is achieved in a subject assigned by the supervision committee, endorsed by the Department Council, the committee of graduate studies & research and the Faculty Council.

d- The student should publish at least one scientific research paper in scientific journals before the public defense of the Thesis..

4c.ProgramComponents

1- Courses according to the By-law

Code number	Name of the course	Type	Credit Hours	Semester
PBP-301	Metabolism of Individual Tissues	Compulsory	2	Fall
PBP-302	Clinical Endocrinology	Compulsory	2	Fall
PBP-303	Biochemical Bases of Diseases	Compulsory	2	Spring
PBP-304	Applied Biochemistry	elective	2	Spring
PBP-305	Gene Therapy	elective	2	Spring
Total (Courses)			8	
	Thesis		42	
Total			50	

2- Achievement of Program Intended Learning Outcomesvia the courses

Course	C.H/ week	Program ILOs (by No.)			
		K.U*	IS**	P.P.S***	G.T.S****
Courses (8 C.H.)					
First Term					
*Metabolism of Individual Tissues**PBP-301***	**2**	A2,A6,A16	B1, B5, B6	C2,C3,C4	D2, D3, D5
Clinical Endocrinology PBP-302	**2**	A7,A11,A12	B3,B4,B6	C1, C3, C4	D1, D3, D5
Second Term					
Biochemical Bases of Diseases PBP-303	**2**	A1, A6	B2 B3	C7,C3	D4, D5
Elective course PBP-3EC **- Applied Biochemistry*PBP-304*** **- Gene Therapy *PBP-305***	**2**	A1, A2, A3,A5, A4, A6	B1, B2 B3, B4,B5,B6,B7,B8	C2, C3, C4, C5, C6.C7	D1, D3,D4, D5
Total	**8**				
Thesis	**42**	A1,A2,A3,A4,A5 A8,A9,A10, A13,A14,A15	B2 B3,B4,B5,B6,B7,B8,B9,B10,B11, B12,B13, B14	C1, C2, C3, C4, C5, C6, C7	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11
Total	**50**				

* ***K**nowledge and **U**nderstanding*
** ***I**ntellectual **S**kills*
*** ***P**rofessional and **P**ractical **S**kills*
**** ***G**eneral and **T**ransferable **S**kills*

Code	Course title	K.U*															
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16
PBP-301	*Metabolism of Individual Tissues*		√				√										√
PBP-302	*Clinical Endocrinology*							√				√	√				
PBP-303	*Biochemical Bases of Diseases*	√					√										
PBP-304	**Applied Biochemistry (E)**	√	√	√	√												
PBP-305	**Gene Therapy(E)**	√					√										
	Thesis	√	√	√	√	√			√	√	√			√	√	√	

* ***K**nowledge and **U**nderstanding*

E ***E**lective course*

Code	Course title	IS**													
		B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14
PBP-301	*Metabolism of Individual Tissues*	√				√	√								
PBP-302	*Clinical Endocrinology*			√	√		√								
PBP-303	*Biochemical Bases of Diseases*		√	√											
PBP-304	Applied Biochemistry (E)	√	√	√	√	√		√							
PBP-305	Gene Therapy(E)		√	√											
	Thesis		√	√	√	√	√	√	√	√	√	√	√	√	√

Code	Course title	P.P.S***							G.T.S****									
		C1	C2	C3	C4	C5	C6	C7	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
PBP-301	*Metabolism of Individual Tissues*		√	√	√					√	√		√						
PBP-302	*Clinical Endocrinology*		√	√	√				√		√		√						
PBP-303	*Biochemical Bases of Diseases*			√				√											
PBP-304	Applied Biochemistry (E)		√	√	√	√	√	√	√		√	√	√	√	√	√	√	√	√
PBP-305	Gene Therapy(E)			√				√				√	√						
	Thesis	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

** *Intellectual Skills*
*** *Professional and Practical Skills*
**** *General and Transferable Skills*
E *Elective course*

6- Student Assessment Methods

6.1- Written exam (special courses).	To assess Knowledge and Understanding and Intellectual Skills
6.2- Oral exam (special courses).	To assess Knowledge and Understanding, Intellectual Skills and General and transferable Skills
6.3- Scientific seminar for thesis registration	To assess Knowledge and Understanding, Intellectual Skills and General and transferable Skills
6.4- Published scientific research paper.	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills
6.5- Thesis writing	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills
6.5- Public presentation and discussion of the thesis.	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills

7- Program Admission Requirements

7.1- The candidate should hold a Master degree in pharmaceutical sciences in the same specialization from any faculty of pharmacy from Egypt or Arabian countries or foreign universities recognized by the Supreme Council of Universities.

7.2- The candidate should be available for study at least two days per week throughout the duration of study.

7.3- Thecandidate should follow postgraduate rules of by-law (**2014**) and its modified by-law **(2017)**of Faculty of Pharmacy-Mansoura University.

8-Regulations for progression and program completion

8.1- The minimum duration of time to gain the PhD degree is two years from the approval date of university council of graduate studies ad research on the registration of the PhD thesis.

8.2- The maximum duration of time to gain the PhD degree is 5 years from the date of registration, putting in consideration the periods of enrollment suspension. It is possible to extend this period up to two years (one year at a time) based on a request from the candidate's major supervisor, a suggestion from the department council and the committee of graduate studies & research and the approval of the faculty council. The final decision should be endorsed by the university council of graduate studies & research.

8.3- The student has to pass the assigned courses, and to practically do a scientifc research thesis for complete fulfilment of the PhD degree.

8.4- An annual progress report is presented by the supervisors of Thesis to the DeptCouncil by December.

8.5- The candidate should follow postgraduate rules of by-law (**2014**) and its modified by-law **(2017)** of Faculty of Pharmacy-Mansoura University.

9-Facilities Required for Search:

9.1- Computers.

9.2- Library and digital library supplied by recent scientific books and journals.

9.3- Laboratories with enough chemicals, apparatus and advanced instruments.

9.4- Access to research engines for scientific periodicals in the field of Biochemistry.

9.5-Access to research engines for scientific periodicals in the field of drug development and drug analysis

10-Thesis

A thesis should be prepared by the student for complete fulfilmentof the PhDdegree.

11- Evaluation of program

Evaluator	Method	Sample
Internal evaluator	Program evaluation Courses evaluation	Program report Courses report
External evaluator	Program evaluation Courses evaluation	Program report Courses report
Stakeholders	Questionnaires	To be Attached
Postgraduates	Questionnaires	To be Attached
Self-evaluation	Matrices	To be Attached
Supervisors of Thesis	Reports	Reports of staff members of committee to evaluate the thesis

Program Coordinator: Ass. Prof. Dr. Mohamed El Mesery

Head of Department:Ass. Prof. Dr. Mohamed El Mesery

Signature:

Date: 8/11/2021

Annex 1

Attach courses and thesis specifications.

Program: PhD in Pharmaceutical Sciences
(Biochemistry) (PBP- 300)

Biochemistry Department

PhD Thesis Specification

Academic Year: 2021/2022

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Signature

A-Basic Information

1	**Faculty**	**Pharmacy**
2	**Program Title:**	**PhD of Pharmaceutical Sciences (*Biochemistry*)**
3	**Program Type:**	**Single**
4	**Department (s):**	**Biochemistry**
	Total credits of the Thesis	**42 C. H.**
	Total credits of the Program	**50 C.H.**
5	**Final award of the Program:**	**PhD degree of Pharmaceutical Sciences (*Biochemistry*)**
6	**Coordinator:**	**Head of Department**
7	**External Evaluator(s):**	Prof. Dr. Sahar El Swefy
8	**Date of Program Specification Approval:**	***Department council:*** **8/11/2021** ***Faculty council: / /2021***

B-Professional Information

1-Aims

The overall aims of the thesis:

1.1 Applying the basics and methodologies of scientific research and manipulating its various tools in the field of Biochemistry.

1.2 Master clinical research procedures according to the good laboratory practice (GLP) basics in biochemistry labs and perform experiments with safety guidelines.

1.3 Adopt different tools and techniques used in molecular biology such as PCR, electrophoresis and blotting to be applied in medical, genetic and environmental fields.

1.4 Applying the scientific thinking approaches and problem based learning in fields of biochemistry.

1.5 Designing and conducting research projects.

1.6 Manipulate computer program, online database, software and other information technology skills to get information and analyze the obtained research data.

1.7 Attaining communication skills, research ethics, time management, decision-making, and team-

working.

1.8 Have the advanced and in-depth knowledge and skills in areas related to clinical biochemistry, molecular biology, and biotechnology and gene expression.

2-Intended Learning Outcomes (ILOs)

a- Knowledge and Understanding:

Upon successful completion of the thesis, the graduate should be able to efficiently demonstrate the essential knowledge and understanding of:

A1	a1	Define inherited human diseases and describe gene therapy of various diseases.
A2	a2	Define the principles of the etiology, epidemiology, laboratory diagnosis, clinical features of different diseases and their pharmacotherapeutic approaches.
A3	a3	Recognize the current problems, the recent and advanced scientific development in fields of Biochemical analysis.
A4	a4	Utilize effectively all basic and recent techniques used in the field of Biochemical analysis.
A5	a5	Describe the role of oncogenes and tumor suppressors in carcinogenesis.
A8	a6	Determine the role of biotransformation reactions and its impact on public health.
A9	a7	Spot the impact of different compunds on gene expression.
A10	a8	Recognize the concept of cell signaling pathways that control gene expression.
A13	a9	Understand principles of quality assurance in Molecular Biology.
A14	a10	Explain the legal and ethical principles for experiments using experimental animals and human volunteers.
A15	a11	Effectively present scientific data.

b- Intellectual Skills

By the end of this thesis, the graduate should be able to:

B2	b1	Predict the type of tumor based on tumor marker analysis.
B3	b2	Demonstrate creativity and innovative scientific approaches regarding Biochemistry.
B4	b3	Utilize the available professional and scientific resources and research skills to solve problems.
B5	b4	Analyze biochemical markers to relevant organs for accurate diagnosis of diseases.
B6	b5	Plan to improve performance and research in the field of Biochemistry.
B7	b6	Analyze and interpret study results.
B8	b7	Recommend scientific decisions based on proofs, evidences and available data.
B9	b8	Participate in comprehensive scientific and professional discussions and communications based on scientific evidences.
B10	b9	Select suitable tools for diagnosis of different diseases.
B11	b10	select appropriate biochemical tests for screening, diagnosis and prognosis of different

		diseases.
B12	b11	Professionally write a scientific paper in the fields of biochemistry.
B13	b12	Perform scientific and professional discussion based on evidences.
B14	b13	Predict mechanism of action of naturally- derived compounds.

c- Professional and Practical Skills

By the end of this thesis, the graduate should be able to:

C1	c1	Apply different statistical methods for data analysis and validation.
C2	c2	Develop different research methodologies and good reporting skills in biochemical analysis, prophylaxis and management of different diseases.
C3	c3	Manage safely and efficiently advanced technological research tools and equipment relevant to biochemical analysis research.
C4	c4	Carry out scientific research and contribute to the knowledge in the field of Biochemistry.
C5	c5	Write accurately, evaluate professional reports and publish scientific research papers in scientific journals and conferences.
C6	c6	Write thesis in a scientific and precise way.
C7	c7	Illustrate the effect of his/her professional practice on the community.

d. General and Transferable Skills

By the end of this thesis, the graduate should be able to:

D1	d1	Communicate clearly by verbal and written means.
D2	d2	Manipulate computer program, online database, software and other IT to get information and analyze the obtained research data.
D3	d3	Practice self- assessment and learning needed for continuous professional development.
D4	d4	Utilize different available information resources relevant to Biochemistry.
D5	d5	Promote critical thinking, problem-solving and decision-making capabilities.
D6	d6	Deal with obstacles and problems.
D7	d7	Work effectively in a team and offer expertise and advice to others
D8	d8	Develop creativity and time management abilities.
D9	d9	Evaluate and criticize scientific work, literature and research data.
D10	d10	Adopt ethical, legal, professional responsibilities and safety guidelines.
D11	d11	Develop presentation skills, give seminars and defend thesis in public.

3- Thesis Contents:

Part	Topics
1	Abstract (Arabic and English)
2	Introduction
3	Aims, Objectives and Rational of the work
4	Results and Discussion, covering all fields
5	Methodology and Experimental Work of all fields
6	Conclusion
7	References

4- Matrix of knowledge and skills of the Thesis:

Part	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
2	Introduction	a1, a2, a3,a5,a6,a7,a8	-	-	-
3	Objectives/Rational	a3,a4,a9,a10,a11	b2, b3,b5,b9,b10	c1,c4,c5	d1, d2
4	Results and Discussion	-	b1, b2, b3,b6,b7.b8	c1,c2,c5	d1, d2
5	Experimental Work	-	b3,b4,b5	c1, c2, c3,c5	d1, d2,d3,d4,d5,d6, d9,d10,d11
6	Conclusion	-	b1,b3,b9,b11,b12,b13	c3,c5,c6,c7	d1, d2,d8, d11

* ***K**nowledge and **U**nderstanding* *****I**ntellectual **S**kills* ******P**rofessional and **P**ractical **S**kills* *******G**eneral and **T**ransferable **S**kills*

5. Student Assessment:

A written Thesis
Published Research Paper(s)
Public Defense
Committee-in-Charge Report
Dept Council Approval

Guidelines of the Thesis (according to By-Law).

1- The minimum period for obtaining a PhD is two years from the date of approval of the University's Graduate Studies Council for registration.

2- The maximum limit for obtaining a doctoral degree is five years from the date of registration, taking into account cases of suspension of registration, and registration may be extended upon the request of

supervisors and the approval of the relevant department council, the Graduate Studies and Research Committee, and the College Board for an academic year with a maximum of two years.

3- The student must pass the English Language Examination with the minimum score specified by the University Studies Board to approve the PhD defense date.

4- The total number of credit hours for obtaining a doctoral degree is 50 credit hours (8 course hours, 42 credit hours per thesis).

5- The student conducts a research on a topic determined by the supervisory committee and approved by the relevant department council and the college, graduate studies and research councils.

6- The researcher submits, before registering for the academic degree, the research plan in a public discussion in the department to discuss the topic of the thesis, determine the objectives of the research, the extent of its application, potential problems and how to overcome them.

7- After the approval of the Graduate Studies and Research Committee and the College Board, the scientific departments develop specialized courses from code (300) whose number of credit hours does not exceed 8 hours, and their average points are not less than 2.00, and these hours are calculated within the hours prescribed for the program.

8- The scientific thesis is the responsibility of the relevant department council and is accomplished scientifically and technically under the responsibility of the supervisory committee. Scientific, technical and administrative support must be provided to the researcher for its completion, and the supervision committee is formed as follows:

9- The College Council, upon the proposal of the relevant Department Council, appoints a professor who supervises the thesis (principal supervisor). The council may entrust the supervision of the thesis to one of the assistant professors.

10- It is permissible for the supervisors to be many professors or assistant professors, and teachers may participate with a maximum of one in the same specialty.

11- A member from abroad who has experience in the specialty to which the dissertation belongs may be joined to the supervision committee.

12- The student should meet his main supervisor at least once monthly and a semi-annual report must be provided by the supervisor(s) on the progress of student to the department council and the Graduate Studies Committee and the graduate should be given a copy of the report. The annual report must be submitted to the college council in October each year.

13- A postgraduate student registered to obtain a master's degree or a doctorate degree, after completing the thesis preparation, holds a public discussion session on the thesis summary and the results he reached, during which the supervisors determine the extent to which the student fulfills the research point before submitting the thesis to the department council.

14- The principal supervisor submits an application that includes a proposal to form a discussion committee and judge the thesis after preparing it and preparing it for discussion in preparation for presentation to the Postgraduate Studies and Research Committee and then the College Board for approval and is supported by the following:

15- The report on the validity of the dissertation for discussion, signed by the majority of the members of the supervisory committee, one of whom is the main supervisor.

16- A copy of the thesis prepared according to the instructions for writing scientific theses in the faculty.

17- At least one research published in a scientific refereed journal.
18- The committee for discussion and judgment on the dissertation is formed of three members based on the proposal of the relevant department council, the graduate studies and research committee, and the approval of the college council, one of whom is the main supervisor or two members with one vote. And two other members from among the professors or assistant professors, at least one of them is from outside the college for master's theses, and at least one of them is from outside the university for doctoral theses (the two are from outside the college) according to the text of Article 153 of the Universities Organization Law.

19- The department council approves the individual reports, the group report, and what indicates that the student has made the proposed amendments from the discussion and judgment committee and submitted them to the Graduate Studies and Research Committee and the College Board in preparation for presentation to the University Council.
20- The date of awarding the academic degree is the date on which the University Council approved the College Board's recommendation for grants.
21- The college council, based on the proposal of the discussion and judgment committee, may return the message to the student to correct the errors and complete what the committee deems short of or submit another message in case the thesis is rejected.

6 – Facilities Required:

Laboratory	Laboratories with enough chemicals, apparatus and advanced instruments.
Library	Library and digital library supplied by recent scientific books and journals.
Others	Computers

Thesis Coordinator	Head of Department	Date
Ass.Prof. Dr. Mohamed El Mesery	Ass.Prof. Dr. Mohamed El Mesery	**8/11/2021**

* Date of Dept. Council Approval: **8/11/2021**

Dept. of Biochemistry	Course Specification	Biochemistry PhD

Biochemistry PhD

Course Specification

Academic year: 2021/2022

البرنامج	توصيف مقرر
دكتوراه الكيمياء الحيوية	Biochemical bases of disease

رئيس القسم	منسق المقرر
أ.م. د/ محمد المسيري	ا. د. امال الجيار

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Biochemistry
Department supervising the course	----
Program on which the course is given	Biochemistry PhD Program
Academic Level	Postgraduate
Academic year	2020/2021 - second semester
Date of course specification approval	14/12/2021

A.Basic Information :Course data :

Course Title	Biochemical bases of disease
Course Code	PBP-303
Prerequisite	------
Teaching Hours: Lecture	عدد الساعات الزمنية2
Practical:	عدد الساعات الزمنية0
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

1- .Applying the scientific thinking approaches and problem based learning in fields of biochemistry.
2- .Manipulate computer program, online database, software and other information technology skills to get information and analyze the obtained research data.
3- .Have the advanced and in-depth knowledge and skills in areas related to clinical biochemistry, molecular biology, and biotechnology and gene expression.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

(A1)	a1	Define the principles of body function in health and diseases states as well as the etiology, epidemiology, laboratory diagnosis, clinical features of different diseases and their pharmacotherapeutic approaches.

(A6)	a2	Describe the role of oncogenes and tumor suppressors in tumor initiation.
	a3	Recall different metabolic pathways in some tissues and describe different metabolic disorders

2.2. Intellectual Skills

After completion of the course, graduates will be able to

(B2)	b1	Justify proper test for diagnosis and assessment of metabolic disorders.
(B3)	b2	Predict the type of tumor based on tumor marker analysis and signs.
	b3	Analyze biochemical markers to relevant organs for accurate diagnosis and differentiation of diseases.
	b4	Select appropriate biochemical tests for screening diagnosis and prognosis of different disease at different stages.

2.3. Professional and Practical Skills

After completion of the course, graduates will be able to

(C3)	c1	Apply different statistical methods for data analysis and validation
(C8)	c2	Write thesis in a scientific and precise way.
	c3	Illustrate the effect of his/her professional practice on the community in addition to different methods of environmental development and maintenance.

2.4. General and Transferable Skills

After completion of the course, graduates will be able to

(D4)	d1	Utilize different available information resources relevant to Biochemistry.
(D5)	d2	Deal with obstacles and problems.
	d3	Work effectively in a team and offer expertise and advice to others

3. Course Contents

Week No.	Topics	Lecture Hours
1	Animal models of human disease: Atherosclerosis, Hypertension, Myocardial infarction, stroke	2
2,3	Metabolic diseases: Diabetes and liver disease	4
4	The genetics of simple and complex traits	2
5	Analysis and positional cloning	2
6	Genetic diagnosis	2
7	Infectious diseases including bacterial, viral and eukaryotic pathogens	2
8	The roles of oncogenes and tumor suppressors in tumor initiation, progression, and treatment	2
9	The interaction between genetics and environment	2
10	Animal models of human disease: Rheumatoid arthritis, Inflammatory bowel disease, liver diseases, cancer, Diabetes and diabetic complications	2
11,12	Cancer	4
Total: 12 weeks		**24**

4- Matrix of knowledge and skills of the course (contents versus ILOsof the course)

Week	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1	Animal models of human disease: Atherosclerosis, Hypertension, Myocardial infarction, stroke	a1,a2,a3	b1,b2,b3,b4	c1,c2,c3	d1,d2,d3

2	Metabolic diseases: Diabetes and liver disease	a1,a2,a3	b1,b2,b3,b4	c1,c2,c3	d1,d2,d3
3	The genetics of simple and complex traits	a1,a2,a3	b1,b2,b3,b4	c1,c2,c3	d1,d2,d3
4	Analysis and positional cloning	a1,a2,a3	b1,b2,b3,b4	c1,c2,c3	d1,d2,d3
5	Genetic diagnosis	a1,a2,a3	b1,b2,b3,b4	c1,c2,c3	d1,d2,d3
6	Infectious diseases including bacterial, viral and eukaryotic pathogens	a1,a2,a3	b1,b2,b3,b4	c1,c2,c3	d1,d2,d3
7	The roles of oncogenes and tumor suppressors in tumor initiation, progression, and treatment	a1,a2,a3	b1,b2,b3,b4	c1,c2,c3	d1,d2,d3
8	The interaction between genetics and environment	a1,a2,a3	b1,b2,b3,b4	c1,c2,c3	d1,d2,d3
9	Animal models of human disease: Rheumatoid arthritis, Inflammatory bowel disease, liver diseases, cancer, Diabetes and diabetic complications	a1,a2,a3	b1,b2,b3,b4	c1,c2,c3	d1,d2,d3
10	Cancer	a1,a2,a3	b1,b2,b3,b4	c1,c2,c3	d1,d2,d3

** Knowledge and Understanding* ***Intellectual Skills***Professional and Practical Skills*
*****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	**Lectures using Power Point**(PPT) presentations
5.2	**Lectures using whiteboard**
5.3	**Video-recorded lectures**, uploaded to the University Portal for Online learning
5.4	Activities and **tasks required to develop students' self-learning skills**.
5.5	**Tutorial**, **Class Activity** and **Group Discussion** to explain what has not been understood
5.6	**Interactive Sessions** using Microsoft Teams
5.7	Internet search and Research Assignments to design **Formative Assignments**
5.8	Practical Training / Laboratory
5.9	Seminar / Workshop

5.10	Case study
5.11	Role play

6- Student Assessment:

	Assessment Methods		Assessment Schedule	Weighing of Assessments
Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess understanding, intellectual, professional skills	Week 15	90
Assessment 3	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	Week 15	10
				100 %

7- List of References

	Reference	Type
1.	Advances in Genetics. Friedmann-2015	Books
2.	Clinical Biochemistry: Metabolic and Clinical Aspects. William J. Marshall, Márta Lapsley, Andrew Day, Ruth Ayling - Mar 5, 2014	Books

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet**
- Laboratory facilities	**Microscopes, equipment, tools**
- Library	
Others	

9. Signature

Course Coordinator	Acting Head of department	Date
Prof. Dr. Amal El Gayar	Assoc.Prof.Dr. Mohamed El-Mesery	14/12/2021

* Date of Dept. Council Approval: **14/12/2021**

Dept. of Biochemistry	Course Specification	Biochemistry PhD

Biochemistry PhD

Course Specification

Academic year: 2021/2022

البرنامج	توصيف مقرر
دكتوراه الكيمياء الحيوية	Metabolism of Individual Tissues

منسق المقرر	رئيس القسم
ا. د. امال الجيار	أ.م. د/ محمد المسيري

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Biochemistry
Department supervising the course	----
Program on which the course is given	Biochemistry PhD Program
Academic Level	Postgraduate
Academic year	2021/2022 - first semester
Date of course specification approval	**8/11/2021**

A.Basic Information :Course data :

Course Title	Metabolism of Individual Tissues
Course Code	PBP-301
Prerequisite	------
Teaching Hours: Lecture	عدد الساعات الزمنية2
Practical:	عدد الساعات الزمنية0
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

1- Master clinical research procedures
2- Applying the scientific thinking approaches and problem based learning in fields of biochemistry.
3- Formulating hypotheses based on current concepts in Biochemistry field.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

(A1)	a1	Define the principles of body function in health and diseases states as well as the etiology, epidemiology, laboratory diagnosis, clinical features of different diseases and their pharmacotherapeutic approaches
(A6)	a2	Recall different metabolic pathways in some tissues and describe different metabolic disorders.
	a3	Identify the biochemical pathways for CHO, Lipids and amino acids & their abnormalities.

2.2. Intellectual Skills

After completion of the course, graduates will be able to

(B2)	b1	Justify proper test for diagnosis and assessment of metabolic disorders.
(B3)	b2	Analyze biochemical markers to relevant organs for accurate diagnosis and differentiation of diseases.
	b3	Plan to improve performance and research in the field of Biochemistry.

2.3. Professional and Practical Skills

After completion of the course, graduates will be able to

(C3)	c1	Develop different research methodologies and good experimental and reporting skills in biochemical analysis, prophylaxis and management of different diseases.
(C8)	c2	Manage safely and efficiently advanced technological research tools and equipments relevant to biochemical analysis research.
	c3	Carry out scientific research and contribute to the knowledge in the field of Biochemistry.

2.4. General and Transferable Skills

After completion of the course, graduates will be able to

(D4)	d1	Manipulate computer program, online database, software and other IT to get information and analyze the obtained research data.
(D5)	d2	Practice self- assessment and learning needed for continuous professional development.
	d3	Promote critical thinking, problem-solving and decision-making capabilities.

3. Course Contents

Week No.	Topics	Lecture Hours

1	Introduction to different metabolic pathway in some tissues and Clinical correlations.	2
2	Regulation and integration of metabolism	2
3	Muscular dystrophy	2
4	Low serum potassium and Essential fructosuria	2
5	Diabetic ketoacidosis and Neonatal hyaline membrane disease (HMD)	2
6	Hemolytic anemia.	2
7	Disorders of platelet.	2
8	Vessel wall interaction	2
9	Hemorrhagic disease	2
10	Fasting cycles	2
11	Synthesis of different compounds	2
12	Heat production	2
Total: 12 weeks		**24**

4- Matrix of knowledge and skills of the course (contents versus ILOs of the course)

Week	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1	Introduction to different metabolic pathway in some tissues and Clinical correlations.	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
2	Regulation and integration of metabolism	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
3	Muscular dystrophy	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
4	Low serum potassium and Essential fructosuria	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3

5	Diabetic ketoacidosis and Neonatal hyaline membrane disease (HMD)	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
6	Hemolytic anemia.	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
7	Disorders of platelet.	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
8	Vessel wall interaction	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
9	Hemorrhagic disease	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
10	Fasting cycles	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
11	Synthesis of different compounds	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
12	Heat production	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3

** Knowledge and Understanding* ***Intellectual Skills***Professional and Practical Skills*
*****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	**Lectures using Power Point**(PPT) presentations
5.2	**Lectures using whiteboard**
5.3	**Video-recorded lectures**, uploaded to the University Portal for Online learning
5.4	Activities and **tasks required to develop students' self-learning skills**.
5.5	**Tutorial**, **Class Activity** and **Group Discussion** to explain what has not been understood
5.6	**Interactive Sessions** using Microsoft Teams
5.7	Internet search and Research Assignments to design **Formative Assignments**
5.8	Practical Training / Laboratory
5.9	Seminar / Workshop
5.10	Case study
5.11	Role play

6- Student Assessment:

	Assessment Methods		**Assessment Schedule**	**Weighing of Assessments**

Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess understanding, intellectual, professional skills	Week 15	90
Assessment 3	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	Week 15	10
				100 %

7- List of References

	Reference	Type
1.	Lippincott's Illustrated Reviews: Biochemistry. Pamela C. Champe, Richard A. Harvey, Denise R. Ferrier; 6th edition-2015.	Books
2.	Harper's Biochemistry. Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell 29th edition-2018.	Books

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet.**
- Laboratory facilities	**Microscopes, equipment, tools**
- Library	
Others	

9. Signature

Course Coordinator	Acting Head of department	Date
Prof. Dr. Amal M. El-Gayar	Assoc.Prof.Dr. Mohamed El-Mesery	8/11/2021

* Date of Dept. Council Approval: **8/11/2021**

Dept. of Biochemistry	Course Specification	Biochemistry PhD

Biochemistry PhD

Course Specification

Academic year: 2020/2021

البرنامج	توصيف مقرر
دكتوراه الكيمياء الحيوية	Clinical Endocrinology

رئيس القسم	منسق المقرر
أ.م. د/ محمد المسيري	ا. د. أمال الجيار

General

University	Mansoura		
Faculty	Pharmacy		
Department offering the course	Biochemistry		
Department supervising the course	----		
Program on which the course is given	Biochemistry PhD Program		
Academic Level	Postgraduate		
Academic year	2020/2021 – frist semester		
Date of course specification approval	**8/11/2021**		

A.Basic Information :Course data :

Course Title	Clinical Endocrinology
Course Code	PBP-302
Prerequisite	------
Teaching Hours: Lecture	عدد الساعات الزمنية2
Practical:	عدد الساعات الزمنية0
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

1- Applying the basics and methodologies of scientific research and manipulating its various tools in the field of Biochemistry.
2- Figure out the principles of disease pathophysiology and correlate between biochemical data and clinical outcome.
3- .Have the advanced and in-depth knowledge and skills in areas related to clinical biochemistry, molecular biology, and biotechnology and gene expression.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

(A7)	a1	Explain endocrinology of male and female reproductive system, pediatric and aging and

		define endocrine diseases in different tissues.
(A11)	a2	**Explain the physiological contribution of hormones in normal and pathological conditions**
(A12)	a3	**Explain the role of hormonal therapy in different diseases.**

2.2. Intellectual Skills

After completion of the course, graduates will be able to

(B3)	b1	Demonstrate creativity and innovative scientific and professional approaches regarding Biochemistry.
(B4)	b2	Utilize the available professional and scientific resources and research skills to solve problems.
(B6)	b3	Plan to improve performance and research in the field of Biochemistry.

2.3. Professional and Practical Skills

After completion of the course, graduates will be able to

(C1)	c1	Apply different statistical methods for data analysis and validation.
(C3)	c2	Manage safely and efficiently advanced technological research tools and equipments relevant to biochemical analysis research.
(C4)	c3	Carry out scientific research and contribute to the knowledge in the field of Biochemistry.

2.4. General and Transferable Skills

After completion of the course, graduates will be able to

(D1)	d1	Communicate clearly by verbal and written means.
(D2)	d2	Manipulate computer program, online database, software and other IT to get information and analyze the obtained research data.
(D3)	d3	Practice self- assessment and learning needed for continuous professional development.

3. Course Contents

Week No.	Topics	Lecture Hours
1	Pituitary and Neuroendocrinology	2
2,3	Diabetes mellitus& Carbohydrate metabolism	4
4	Male reproductive system	2
5	Femalereproductive system	2
6	Thyroid disease	2
7	Adrenal disease	2
8	Pediatric endocrinology	2
9	Endocrine disease and pregnancy	2
10	Endocrine tumor syndrome	2
11	Endocrine testing protocols	2
12	Endocrinology of aging	2
Total weeks		**24**

4- Matrix of knowledge and skills of the course(contents versus ILOsof the course)

Week	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1	Pituitary and Neuroendocrinology	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3

2,3	Diabetes mellitus& Carbohydrate metabolism	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
4	Male reproductive system	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
5	female reproductive system	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
6	Thyroid disease	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
7	Adrenal disease	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
8	Pediatric endocrinology	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
9	Endocrine disease and pregnancy	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
10	Endocrine tumor syndrome	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
11	Endocrine testing protocols	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
12	Endocrinology of aging	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3

** Knowledge and Understanding **Intellectual Skills***Professional and Practical Skills ****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	**Lecturesusing Power Point**(PPT) presentations
5.2	**Lectures using whiteboard**
5.3	**Video-recorded lectures**, uploaded to the University Portal for Online learning
5.4	Activities and **tasks required to develop students' self-learning skills**.
5.5	**Tutorial**, **Class Activity** and **Group Discussion** to explain what has not been understood
5.6	**Interactive Sessions** using Microsoft Teams

5.7	Internet search and Research Assignments to design **Formative Assignments**
5.8	Practical Training / Laboratory
5.9	Seminar / Workshop
5.10	Case study
5.11	Role play

6- Student Assessment:

	Assessment Methods		**Assessment Schedule**	**Weighing of Assessments**
Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess understanding, intellectual, professional skills	Week 15	90
Assessment 3	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	Week 15	10
				100 %

7- List of References

	Reference	**Type**
1.	Lippincott's Illustrated Reviews: Biochemistry. Pamela C. Champe, Richard A. Harvey, Denise R. Ferrier; 7th edition-2017.	Books
2.	Harper's Biochemistry. Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell31th edition-2018.	Books

8- Facilities required for teaching and learning

-Class room	**Data show- Computers, Internet**. ……..
- Laboratory facilities	**Microscopes, equipment, tools** …….
- Library	
Others	

9. Signature

Course Coordinator	Acting Head of department	Date
Prof. Dr. Amal Elgayar	Assoc.Prof.Dr. Mohamed El-Mesery	8/11/2021

* Date of Dept. Council Approval: **8/11/2021**

Dept. of Biochemistry	Course Specification	Biochemistry Ph.D.

Biochemistry Ph.D.

Course Specification

Academic year: 2021/2022

البرنامج
دكتوراه الكيمياء الحيوية

توصيف مقرر
Gene Therapy

رئيس القسم
د/ محمد المسيري

منسق المقرر
ا. د. ممدوح محمد الششتاوي

General

University	Mansoura
Faculty	Pharmacy
Department offering the course	Biochemistry
Department supervising the course	Biochemistry
Program on which the course is given	Biochemistry Ph.D. Program
Academic Level	Postgraduate
Academic year	2021/2022 - Second Semester
Date of course specification approval	**14/12/2021**

A.Basic Information: Course Data:

Course Title	**Gene Therapy**
Course Code	PBP-305
Prerequisite	------
Teaching Hours: Lecture	2 عدد الساعات الزمنية
Practical:	0 عدد الساعات الزمنية
Total Credit Hours	2

B. Professional Information

1- Overall Aims of Course:

1- Adopt different tools and techniques used in molecular biology such as PCR, electrophoresis and blotting to be applied in medical, genetic and environmental fields.
2- Designing and conducting research projects.
3- Attaining communication skills, research ethics, time management, decision-making, and team-working.

2- Intended Learning Outcomes (ILOs)

2.1. *Knowledge and Understanding*

After completion of the course, graduates will be able to

(A1)	a1	Define inherited human diseases and describe gene therapy of different diseases.
(A6)	a2	Spot the differences between gene expression in prokaryotes and eukaryotes.
	a3	Recognize the concept of cellular communication and signaling pathways that control

		gene expression.

2.2. Intellectual Skills

After completion of the course, graduates will be able to

(B2)	b1	Plan to improve performance and research in the field of Biochemistry and molecular biology.
(B3)	b2	Analyze and interpret case study results.
	b3	Select suitable genomic & proteomic tools for diagnosis of different types of cancer & hereditary disorders.

2.3. Professional and Practical Skills

After completion of the course, graduates will be able to

(C3)	c1	Write accurately, evaluate professional reports and publish scientific research papers in scientific journals and conferences.
(C7)	c2	Write thesis in a scientific and precise way.
	c3	Illustrate the effect of his/her professional practice on the community in addition to different methods of environmental development and maintenance.

2.4. General and Transferable Skills

After completion of the course, graduates will be able to

(D4)	d1	Evaluate and criticize scientific work, literature and research data.
(D5)	d2	Develop creativity and time management abilities.
	d3	Work effectively in a team and offer expertise and advice to others.

3. Course Contents

Week No.	Topics	Lecture Hours
1	Gene therapy of cardiovascular diseases: Atherosclerosis, Hypertension, Myocardial infarction, Stroke	2
2	Pro-angiogenic gene therapy	2
3	Inhibition of gene expression by nucleic acids: antisense oligonucleotides, DNA decoys, ribozymes, RNA interference	2
4	Gene therapy of other monogenic diseases (cystic fibrosis, Duchene muscular dystrophy, hemophilia A & B)	2
5	Cell-based gene therapy: therapeutic potentials of stem cells	2
6	Gene therapy and cloning	2
7	Ethical aspects of gene therapy (Ethical and political issues related to stem cell research)	2
8	Gene transfer *in vitro* and *in vivo*	2
9	Therapeutic genes and marker genes	2
10	Vectors: Plasmid vectors: construction and application and Viral vectors (retroviral, adenoviral, adeno-associated viral vectors, helper dependent vectors)	2
11	Gene therapy of cancer: immune gene therapy, suicide gene therapy: anti-angiogenic gene therapy.	2
12	Student presentation and Case study	2
Total: 12weeks		**24**

4- Matrix of knowledge and skills of the course (contents versus ILOs of the course)

Week	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
1	Gene therapy of cardiovascular diseases: Atherosclerosis, Hypertension, Myocardial infarction, Stroke	a1,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
2	Pro-angiogenic gene therapy	a1,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
3	Inhibition of gene expression by nucleic acids: antisense oligonucleotides, DNA decoys, ribozymes, RNA interference.	a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
4	Gene therapy of other monogenic diseases(cystic fibrosis, Duchenne muscular dystrophy, hemophilia A & B.	a1,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
5	Cell-based gene therapy:therapeutic potentials of stem cells	a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
6	Gene therapy and cloning	a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
7	Ethical aspects of gene therapy(Ethical and political issues related to stem cell research)	a1,a3	b1,b2	c1,c2,c3	d1,d2,d3
8	Gene transfer in vitro and in vivo	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
9	Therapeutic genes and marker genes	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
10	Vectors: Plasmid vectors: construction and application and Viral vectors (retroviral, adenoviral, adeno-associated viral vectors, helper dependent vectors	a1,a2,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3
11	Gene therapy of cancer: immune gene therapy, suicide gene therapy: anti-angiogenic gene therapy.	a1,a3	b1,b2,b3	c1,c2,c3	d1,d2,d3

** Knowledge and Understanding* ***Intellectual Skills***Professional and Practical Skills*
*****General and Transferable Skills*

5- Teaching and Learning Methods:

5.1	**Lectures using Power Point** (PPT) presentations
5.2	**Lectures using whiteboard**

5.3	**Video-recorded lectures**, uploaded to the University Portal for Online learning
5.4	Activities and **tasks required to develop students' self-learning skills**.
5.5	**Tutorial**, **Class Activity** and **Group Discussion** to explain what has not been understood
5.6	**Interactive Sessions** using Microsoft Teams
5.7	Internet search and Research Assignments to design **Formative Assignments**
5.8	Practical Training / Laboratory
5.9	Seminar / Workshop
5.10	Case study
5.11	Role play

6- Student Assessment:

	Assessment Methods		Assessment Schedule	Weighing of Assessments
Assessment 1	**Written Exam (Final)**	Paper exams that are corrected electronically and/or manually. To assess understanding, intellectual, professional skills	Week 15	90
Assessment 3	**Oral Exam**	To assess understanding, intellectual skills, General and Transferable skills	Week 15	10
				100 %

7- List of References

	Reference	Type
1.	Gene Therapy and Cell Therapy Through the Liver Paperback English by Shuji Terai - 2016	Books
2.	Genetic Testing and Gene Therapy , edited by James Wolfe, 2016	Books

8- Facilities required for teaching and learning

• **Class room**	**Data show, Computers, Internet**,
• **Library**	**……**
• **Others**	

9. Signature

Course Coordinator	Acting Head of department
Prof. Dr. Mamdouh M. El-Shishtawy	Dr. Mohamed El-Mesery

* Date of Dept. Council Approval: **14/12/2021**