Program SPECIFICATION FOR

Doctor of Philosophy Degree in Applied Medical Chemistry Code: 1702800

University: Alexandria **Faculty:** Medical Research Institute

Program Specification

A- Basic information

1- Program title: Doctor of Philosophy Degree in Applied Medical Chemistry

2- Program type: single [√] double [ ] multiple [ ]

3- Department(s): Applied Medical Chemistry

4- Coordinator: Professor / Ashraf Aly Hassan

5- External evaluator(s): Prof. Saad Abdel Fattah Abu-Noeman
Professor of Medical Biochemistry,
Medical Biochemistry Department
Faculty of Medicine
Tanta University

6- Last date of program specification approval: 5/6/2014

B- Professional Information

1- Program aims:

By the end of the program, the student should:

1. Propose and carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field.
2. Provide updated data and researches concerned with metabolic and chronic diseases, their molecular causes, as well as laboratory investigations of those diseases
3. Apply basic and advanced bioanalytical methods relevant to medical biochemistry
4. Have an adequate knowledge and skills in research methodology that enable them to design experiments, analyze data, and review literature critically
5. Carry out academic and professional self-development and be capable of continuous learning
6. Acquire the ability to use transferable skills in oral presentations, report writing, and the use of information technology
7. Communicate effectively and the ability to lead work teams

8. Have the ability to decision in professional contexts

9- Describe the basic ethical principles relevant medical biochemistry

10. Use systematic approaches to design and conduct scientific research.

11. Conduct research studies that add to the existing specialty knowledge.

2- Intended learning outcomes (ILOs)

a- knowledge and understanding:

a1- Discuss the digestion and absorption of both micro- and macronutrients and the metabolic interrelationships, metabolic fuel, integration between different organs
a2- List perfectly the updates related to different metabolic disorders
a3- Describe the advances in molecular biology and biochemical aspects of tumor proliferation and progression as well as cancer prevention
a4- Discuss sufficient knowledge of molecular biochemistry
a5- Recall the principles and applications of genetic engineering
a6- Describe the principles and different biochemical applications of the chromatographic and molecular biology techniques in the field of medical biochemistry
a7- Mention ethics and scientific principles of research methodology

a8- Design, conduction & explore publishing of scientific research

b- Intellectual skills:

b1- Assess the nutritional values of macro and micronutrients and their metabolic interrelationship, metabolic fuel and integration between different organs
b2- Analyze biochemical and molecular bases human metabolic diseases
b3- Assess the principles of cancer molecular biology and cancer prevention
b4- Evaluate the importance of molecular biochemistry and genetic engineering
b5- Analyze the data of chromatographic and molecular biology techniques
b6- Analyze information in the field of specialization to solve professional problems
b7- Construct research projects

b8- Prepare scientific articles/papers to be published in indexed journal

c- Professional and practical skills:

c1- Manage and run bioanalytical and clinical laboratories
c2- Gain experience in sample extraction and dealing with problems affecting obtaining good chromatographic separation by HPLC or GC

c3- Apply different types of nucleic acids extraction and gain experience in PCR instrument programming and use
c4- Perform basic competencies in a range of practical biochemical techniques including data collection, analysis and interpretation
c5- Practice safely in a laboratory environment
c6- Write competently and evaluate all forms of professional reports related to medical biochemistry
c7- Interpret data with appropriate statistical tests.
c8- Apply different types of computer programs

d- General and transferable skills:

d1- Work independently or in a team
d2- Communicate orally, in writing or electronically
d3- Plan, manage time and make a decision
d4- Solve problems

3- Academic standards

3a. External references for standards (Benchmarks)

Generic Academic Reference Standards if the National Authority for Quality Assurance and Accreditation of Education (NAQAAE)
Adopted at MRI Council 12/2/2014 and readopted at 15/1/2023
Last Date of Academic Reference standards (ARS) approval by Institute Council: 15/1/2023

3b. Comparison of provision to selected external references

Generic Academic Standards	ARS of Ph.D. of Applied Medical Chemistry
A1- Basic facts, theories, of the specialty and related subjects/fields	a1- Discuss established basic and molecular knowledge of medical biochemistry and related sciences a2- Recognize established basic and molecular knowledge of cancer biology a3- List the basic and advanced techniques applied in the field of medical biochemistry
A2- Mutual relation between professional practice and effects on environment	a4- Describe the principals of different basic and advanced techniques related to the field of medical biochemistry a5- Recall the different types of molecular biomarkers and tumor markers and their clinical applications

A3- Recent advances in the field of practice	a6- Recognize recent advances in the field of molecular medical biochemistry
A4- Details of ethical & legal practice	a7- Recognize ethical and legal principles relevant to practice medical biochemistry
A5- Quality standards of the practice	a8- Understand principles of quality assurance related to practice medical biochemistry
A6- Design, conduction & publishing of scientific research	a9- Design, conduction and publishing of scientific research through thesis
A7- Ethical considerations in different types of scientific research	a10- Ethical considerations in different types of scientific research through thesis
B1- Analyze, deduce, extrapolate & evaluation of information	b1- Demonstrate laboratory skills relevant to medical biochemistry b2- Evaluate the value of different bioanalytical techniques b3- Analyze on the basic concept of molecular medical biochemistry
B2- Solve the majority of problems in the specialty according to the available data (complete or incomplete)	b4- Distinguish the elements of the scientific problems through data analysis and evaluation (even in the absence of some data) of similar conditions related to medical biochemistry
B3- Conduct research studies that add to the existing specialty knowledge	b5- Conduct research studies that add to the existing specialty knowledge through thesis and assignment
B4- Publish scientific articles/papers (in indexed journals)	b6- Prepare scientific articles/papers to be published (in indexed journals) through thesis
B5- Plan and implement (or supervise implementation of) enhancement & Improvement approaches to practice	b7- Plan and implement (or supervise implementation of) enhancement & Improvement approaches to practice through student questionnaire
B6- Take decisions in various professional situations (including dilemmas & controversial issues)	b8- Prepare alternative decisions in different situations in the field of medical biochemistry
B7- Add to the specialty field through creativity & innovation	b9- Add to the specialty field through creativity & innovation through thesis
B8- Manage discussions on basis of evidence and proofs	b10- Take decisions in various situations of different issues covering the field of medical biochemistry on the basis of evidence and proofs

C1- Competent in all basic and all required advanced professional skills (to be determined according to the specialty board/ department)	c1- Perform different biochemical analysis and improve methods and tools used
C2- Write and appraise reports	c2- Write and comment on reports related to medical biochemistry
C3- Evaluate and improve methods and tools used in specialty	c3- Evaluate *and improve* methods and tools used in medical biochemistry through student questionnaire
C4- Use technology to advance practice	c4- Use technology to advance practice in medical biochemistry
C5- Plan professional development courses to improve practice and enhance performance of juniors	C5- Evaluate *and improve* methods and tools used in medical biochemistry through student questionnaire
D1- Communicate effectively using all methods	d1- Develop skills in communication using all methods
D2- Use information technology to improve his/her professional practice	d2- Use different sources of information to obtain data relevant to medical biochemistry and/or related sciences to improve professional practice in the field of medical biochemistry
D3- Teach and evaluate others	d3- Apply skills of teaching and evaluating others
D4- Perform self appraisal & seek continuous learning	d4- Develop skills in self appraisal & seek continuous learning
D5- Use different sources of information to obtain data	d2- Use different sources of information to obtain data relevant to medical biochemistry and/or related sciences to improve professional practice in the field of medical biochemistry
D6- Work in teams as well as a member in larger teams	d5- Work independently or in a team d6- Manage time and work to deadline d7- Learn skills for interaction
D7- Manage scientific meetings and appropriately utilize time	d6- Manage time and work to deadlines

4- Curriculum structure and contents

4.a. Program duration: 5 years

4.b. Program structure:

4.b.i- No. of hours per week in each year/semester:

Semester	Core Courses	Elective Courses
	No. of hours	No. of hours
First semester	$7\ (3 + 2^{a} + 2^{b})$	6
Second semester	4	
Third semester	3	3
Fourth semester	1	

a: Medical Statistics **b: Computer**

4.b.ii- No. of credit hours Lectures [17] Practical [7] Thesis [24] Total [48]

Compulsory [15] Elective [9] Optional [0]

4.b.iii- No. of credit hours of specialized courses No. [11] % [45.8]

4.b.iv- No. of credit hours of other courses No. [13] % [54.2]

4.b.v- Program levels (in credit-hours system)

Student is required to pass at least 12 credit hours with CGPA not less than C+ before submitting a thesis proposal.

5- Program Courses

5.1- Compulsory

Code No.	Course Title	No. of credit hours	No. of hours /week	
			Lecture	Practical
1702801	Applied Medical Chemistry IV	2	2	----
1702802	Applied Medical Chemistry V	2	2	----
1702803	Cancer Chemistry III	2	2	----
1702804	Molecular Biochemistry II	2	2	----
1702805	Molecular Biochemistry III	1	1	----
1702806	Laboratory Techniques III	1	----	2
1702807	Laboratory Techniques IV	1	----	2
1721822	Medical Statistics	2	1	2
1721823	Computer	2	1	2
	Total	15	11	8

5.2- Elective I

Code No.	Course Title	No. of credit hours	No. of hours /week	
			Lecture	Practical
1703820	Physiology	3	2	2
1704820	Pharmacology	3	2	2
1705820	Hematology	3	2	2
1706820	Bacteriology	3	2	2
1707820	Parasitology	3	2	2
1708820	Immunology	3	2	2
1709820	Histology and Cell Biology	3	2	2
1710820	Pathology	3	2	2

5.3- Elective II

Code No.	Course Title	No. of credit hours	No. of hours /week	
			Lecture	Practical
	None	----	----	----

5.4- Optional – (none)

6- Program admission requirements

Postgraduate students with a M.Sc. of Applied Medical Chemistry or an equivalent degree of Faculties of Science, Pharmacy, Medicine or High Studies Institute

7- Teaching and learning methods

- Lecture
- Practical
- Brainstorming
- Discussion Groups
- Problem Solving
- Project

8- Regulations for progression and program completion

For the progression and completion of the program to obtain the degree of Doctor Philosophy in Applied Medical Chemistry, the student must:

1- Complete 24 credit hours with CGPA of at least C+ through courses.
2- Complete 24 credit hours through thesis.
3- Submit a thesis validity report by an examination committee approved by the department council and their members include at least two external examiners.

9- Evaluation of Students enrolled in the program.

Tool evaluation	Intended learning outcomes being assessed
Written	ILOs a &b
Practical	ILOs c
Oral	ILOs a ,b &d
Semester Work	ILOs b & d

Evaluation of the Program

Evaluator	Tool	Sample
1- Senior students	Questionnaire	At least 50 %
2- Alumni	Questionnaire	Representative sample
3- Stakeholders (Employers)	Meeting	Representative sample
4- External Evaluator(S) or External Examiner (s)	Reports	Prof. Saad Abdel Fattah Abu-Noeman Professor of Medical Biochemistry, Medical Biochemistry Department Faculty of Medicine Tanta University
5- Other	-	-

Program coordinator:

Name: Professor / Ashraf Aly Hassan

Signature: Dr. Ashraf Hasan

Department Head:

Name: Dr/ Neveen Abd El Moneim Hussein

Signature: Neveen Hussein

Date of Department Council Approval: 29/8/2023

Program Aims vs Graduate Attribute matrix

Generic Graduate Attributes of NAQAAE	Graduate Attributes of Doctor of Philosophy in Applied Medical Chemistry By the end of this program, graduate should be able to	Program Aims
Master the basics and methodologies of scientific research.	Master the basics and methodologies of scientific research.	3. Apply basic and advanced bioanalytical methods relevant to medical biochemistry
Work continuously to add to his/her knowledge in the field of specialty.	Work continuously to add to his/her knowledge in the field of medical biochemistry and cancer biology.	11. Conduct research studies that add to the existing specialty knowledge
Apply the analytical and critical approach to knowledge in the field of specialty and related fields.	Apply the analytical and critical approach to knowledge in the field of medical biochemistry and cancer biology and related fields.	3. Apply basic and advanced bioanalytical methods relevant to medical biochemistry 11. Conduct research studies that add to the existing specialty knowledge

Integrate knowledge in the field of specialty with related knowledge, deduce and develop relationships between them.	Integrate knowledge in the field of medical biochemistry and cancer biology with related knowledge, deduce and develop relationships between them.	2. Provide updated data and researches concerned with metabolic and chronic diseases, their molecular causes, as well as laboratory investigations of those diseases
Demonstrate a deep awareness of current problems and modern theories in the field of specialty.	Demonstrate a deep awareness of current problems and modern theories in the field of medical biochemistry and cancer biology.	6. Acquire the ability to use transferable skills in oral presentations, report writing, and the use of information technology
Identify professional problems and find innovative solutions to solve them.	Identify professional problems and find innovative solutions to solve them.	8. Have the ability to decision in professional contexts
Master a wide range of professional skills in the field of specialty.	Master a wide range of professional skills in the field of medical biochemistry and cancer biology.	4. Have an adequate knowledge and skills in research methodology that enable them to design experiments, analyze data, and review literature critically
Develop new methods, tools and methods for professional practice.	Develop new methods, tools and methods for professional practice.	2. Provide updated data and researches concerned with metabolic and chronic diseases, their molecular

		causes, as well as laboratory investigations of those diseases 3. Apply basic and advanced bioanalytical methods relevant to medical biochemistry
Use appropriate technological means to serve his professional practice.	Use appropriate technological means to serve his professional practice.	4. Have an adequate knowledge and skills in research methodology that enable them to design experiments, analyze data, and review literature critically
Communicate efficiently and lead work teams in various professional scenarios.	Communicate efficiently and lead work teams in various professional scenarios.	7. Communicate effectively and the ability to lead work teams
Take Decision in light of available data.	Take Decision in light of available data.	8. Have the ability to decision in professional contexts
Employ and develop available resources efficiently and work to find new resources.	Employ and develop available resources efficiently and work to find new resources.	4. Have an adequate knowledge and skills in research methodology that enable them to design experiments, analyze data, and review literature critically

Show awareness of his/her role in community development and environmental preservation.	Show awareness of his/her role in community development and environmental preservation	1. Propose and carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field.
Act in a manner that reflects a commitment to integrity, credibility, and professionalism.	Act in a manner that reflects a commitment to integrity, credibility, and professionalism.	8. Have the ability to decision in professional contexts
Commit to continuous self-development and transfer his/her knowledge and experiences to others.	Commit to continuous self-development and transfer his/her knowledge and experiences to others.	7. Communicate effectively and the ability to lead work teams

Program Aims vs ILOs matrix

Knowledge and Understanding

	a1	a2	a3	a4	a5	a6	a7	a8
1. Propose and carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field								
2. Provide updated data and researches concerned with metabolic and chronic diseases, their molecular causes, as well as laboratory investigations of those diseases		X	X	X	X			
3. Apply basic and advanced bioanalytical methods relevant to medical biochemistry						X		
4. Have an adequate knowledge and skills in research methodology that enable them to design experiments, analyze data, and review literature critically						X		
5. Carry out academic and professional self development and be capable of continuous learning							X	
6. Acquire the ability to use transferable skills in oral presentations, report writing, and the use of information technology								
7. Communicate effectively and the ability to lead work teams								
8. Have the ability to decision in professional contexts								
9- Describe the basic ethical principles relevant medical biochemistry							X	
10. Use systematic approaches to design and conduct scientific research.								X

11. Conduct research studies that add to the existing specialty knowledge								X

Intellectual Skills

	b1	b2	b3	b4	b5	b6	b7	b8
1. Propose and carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field							X	
2. Provide updated data and researches concerned with metabolic and chronic diseases, their molecular causes, as well as laboratory investigations of those diseases	X	X	X					
3. Apply basic and advanced bioanalytical methods relevant to medical biochemistry				X				
4. Have an adequate knowledge and skills in research methodology that enable them to design experiments, analyze data, and review literature critically					X			
5. Carry out academic and professional self development and be capable of continuous learning								
6. Acquire the ability to use transferable skills in oral presentations, report writing, and the use of information technology						X		
7. Communicate effectively and the ability to lead work teams								
8. Have the ability to decision in professional contexts						X		
9- Describe the basic ethical principles relevant medical biochemistry								

10. Use systematic approaches to design and conduct scientific research.								X
11. Conduct research studies that add to the existing specialty knowledge								X

Professional and Practical Skills

	c1	c2	c3	c4	c5	c6	c7	c8
1. Propose and carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field	X			X				
2. Provide updated data and researches concerned with metabolic and chronic diseases, their molecular causes, as well as laboratory investigations of those diseases								
3. Apply basic and advanced bioanalytical methods relevant to medical biochemistry		X	X	X	X			
4. Have an adequate knowledge and skills in research methodology that enable them to design experiments, analyze data, and review literature critically				X		X		
5. Carry out academic and professional self-development and be capable of continuous learning				X	X	X		
6. Acquire the ability to use transferable skills in oral presentations, report writing, and the use of information technology						X	X	X

7. Communicate effectively and the ability to lead work teams								
8. Have the ability to decision in professional contexts				**X**				
9- Describe the basic ethical principles relevant medical biochemistry								
10. Use systematic approaches to design and conduct scientific research.								
11. Conduct research studies that add to the existing specialty knowledge								

General and Transferable Skills

	d1	d2	d3	d4
1. Propose and carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field				**X**
2. Provide updated data and researches concerned with metabolic and chronic diseases, their molecular causes, as well as laboratory investigations of those diseases				
3. Apply basic and advanced bioanalytical methods relevant to medical biochemistry				
4. Have an adequate knowledge and skills in research methodology that enable them to design experiments, analyze data, and review literature critically				

5. Carry out academic and professional self development and be capable of continuous learning				
6. Acquire the ability to use transferable skills in oral presentations, report writing, and the use of information technology				
7. Communicate effectively and the ability to lead work teams	**X**	**X**		
8. Have the ability to decision in professional contexts			**X**	**X**
9- Describe the basic ethical principles relevant medical biochemistry				
10. Use systematic approaches to design and conduct scientific research.				
11. Conduct research studies that add to the existing specialty knowledge				

Courses vs Program ILOs matrix

Knowledge and Understanding

	a1	a2	a3	a4	a5	a6	a7	a8
Applied Medical Chemistry IV	X							
Applied Medical Chemistry V		X						
Cancer Chemistry III			X					
Molecular Biochemistry II				X				
Molecular Biochemistry III					X			
Laboratory Techniques III						X		
Laboratory Techniques IV						X		
Thesis							X	X

Intellectual Skills

	b1	b2	b3	b4	b5	b6	b7	b8
Applied Medical Chemistry IV	X							
Applied Medical Chemistry V		X						
Cancer Chemistry III			X					
Molecular Biochemistry II				X				
Molecular Biochemistry III				X				
Laboratory Techniques III					X			
Laboratory Techniques IV					X			
Thesis						X	X	X

Professional and Practical Skills

	c1	c2	c3	c4	c5	c6	c7	c8
Applied Medical Chemistry IV								
Applied Medical Chemistry V								
Cancer Chemistry III								
Molecular Biochemistry II								
Molecular Biochemistry III								
Laboratory Techniques III	X	X		X	X	X		
Laboratory Techniques IV	X		X	X	X	X		
Thesis	X			X	X	X	X	X

General and Transferable Skills

	d1	d2	d3	d4
Applied Medical Chemistry IV				
Applied Medical Chemistry V				
Cancer Chemistry III				
Molecular Biochemistry II				
Molecular Biochemistry III				
Laboratory Techniques III	X			X
Laboratory Techniques IV	X			X
Thesis	X	X	X	X

ARS vs ILOs matrix

Knowledge and Understanding

ARS of Ph.D. of Applied Medical Chemistry	**a1**	**a2**	**a3**	**a4**	**a5**	**a6**	**a7**	**a8**
a1- Discuss established basic and molecular knowledge of medical biochemistry and related sciences	X	X		X	X			
a2- Recognize established basic and molecular knowledge of cancer biology			X		X			
a3- List the basic and advanced techniques applied in the field of medical biochemistry					X	X		
a4- Describe the principals of different basic and advanced techniques related to the field of medical biochemistry						X		
a5- Recall the different types of molecular biomarkers and tumor markers and their clinical applications			X					
a6- Recognize recent advances in the field of molecular medical biochemistry				X	X			
a7- Recognize ethical and legal principles relevant to practice medical biochemistry							X	
a8- Understand principles of quality assurance related to practice medical biochemistry				X	X			
a9- Design, conduction and publishing of scientific research through thesis							X	X
a10- Ethical considerations in different types of scientific research through thesis							X	

Intellectual Skills

ARS of Ph.D. of Applied Medical Chemistry	b1	b2	b3	b4	b5	b6	b7	b8
b1- Demonstrate laboratory skills relevant to medical biochemistry					X			
b2- Evaluate the value of different bioanalytical techniques					X			
b3- Analyze on the basic concept of molecular medical biochemistry	X	X	X	X				
b4- Distinguish the elements of the scientific problems through data analysis and evaluation (even in the absence of some data) of similar conditions related to medical biochemistry				X	X			
b5- Conduct research studies that add to the existing specialty knowledge through thesis and assignment							X	X
b6- Publish scientific articles/papers (in indexed journals) through thesis							X	X
b7- Plan and implement (or supervise implementation of) enhancement & Improvement approaches to practice through student questionnaire							X	
b8- Prepare alternative decisions in different situations in the field of medical biochemistry						X		
b9- Add to the specialty field through creativity & innovation through thesis							X	
b10- Take decisions in various situations of different issues covering the field of medical biochemistry on the basis of evidence and proofs				X	X	X		

Professional and Practical Skills

ARS of Ph.D. of Applied Medical Chemistry	**c1**	**c2**	**c3**	**c4**	**c5**	**c6**	**c7**	**c8**
c1- Perform different biochemical analysis and improve methods and tools used	X	X	X	X				
c2- Write and comment on reports related to medical biochemistry					X	X	X	X
c3- Evaluate *and improve* methods and tools used in medical biochemistry through student questionnaire	X	X	X	X				
c4- Use technology to advance practice in medical biochemistry	X	X	X	X				X
c5- Evaluate *and improve* methods and tools used in medical biochemistry through student questionnaire	X	X	X	X				

General and transferable Skills

ARS of Ph.D. of Applied Medical Chemistry	d1	d2	d3	d4
d1-- Develop skills in communication using all methods	X	X		
d2- Use different sources of information to obtain data relevant to medical biochemistry and/or related sciences to improve professional practice in the field of medical biochemistry		X		
d3- Apply skills of teaching and evaluating others	X			
d4- Develop skills in self appraisal & seek continuous learning			X	
d5- Work independently or in a team	X			
d6- Manage time and work to deadline			X	X
d7- Learn skills for interaction	X			X

Teaching and Learning Methods Vs Courses Matrix (Degree: PhD) Code: 1702800

Courses Teaching Methods	801	802	803	804	805	806	807
Lecture	X	X	X	X	X	X	X
Practical/Clinical						X	X
Brainstorming						X	X
Discussion Groups	X	X	X	X	X	X	X
Problem Solving						X	X
Case Study							
Field Training							
Role playing							
Training Workshops							
Self-Directed Learning							
e-learning							
Project	X	X	X	X	X	X	X