Program SPECIFICATION FOR

Master Degree in Applied Medical Chemistry

Code: 1702700

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

Program Specification

A- Basic information

1- Program title: Master Degree in Applied Medical Chemistry

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

3- **Department(s):** Applied Medical Chemistry

4- **Coordinator:** Dr/ Samir Ali Abd El-Kareem

5- **External evaluator(s):** **Prof. Salah Ahmed Shewitta**
Professor of Biotechnology,
Department of Biotechnology,
Institute of Graduate Studies and Research,
Alexandria University

6- **Last date of program specification approval:** **05/6/2014**

B- Professional Information

1- Program aims:
By the end of the program the student should:

1. Carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field.
2. Have a thorough background in medical biochemistry and related sciences. This theoretical background provides the fundamental knowledge necessary for an understanding of the life sciences at the molecular level.
3. Apply analytical methods used in the field of 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. Provide a solid foundation for those who intend to go on to study for Ph. D.
6. Carry out academic and professional self development and be capable of continuous learning.
7. Acquire the ability to use transferable skills in oral presentations, report writing, and the use of information technology.

8. Communicate effectively and the ability to lead work teams.
9. Decision-making in his/her professional contexts.
10. Use systematic approaches to design and conduct scientific research.

2- Intended learning outcomes (ILOS)

a- knowledge and understanding:

a1- List the structure of the major classes of biochemical compounds and the relationship of these structural attributes to their function within a cell on molecular biochemical level.
a2- Describe the biochemical importance of hormones, vitamins, minerals and enzymes integrating in the metabolism.
a3- Identify the metabolic pathways of carbohydrates, lipids, proteins and nucleotides and their regulatory mechanisms.
a4- Describe the different environmental factors that are involved in the development of human cancers.
a5- Clarify the different aspects of cancer biology on molecular basis.
a6- Discuss the basics of molecular biochemistry (structure, function & synthesis).
a7- Describe the principles of the bioanalytical techniques used in medical biochemistry.
a8- List laboratory equipments and their applications in medical biochemistry including knowledge of safe working practices.
a9- Mention ethics and scientific principles of research methodology.

b- Intellectual skills:

b1- Assess the different metabolic pathways.
b2- Assess principles cancer biology.
b3- Analyze information in the field of specialization to solve professional problems.
b4- Analyze the principles of applied different laboratory techniques.
b5- Assess the different approaches taken in the various areas of biochemistry.
b6- Write a thesis protocol using a scientific systematic approach to a research problem.

c- Professional and practical skills:

c1- Perform basic laboratory techniques that are applied in medical biochemistry.
c2- Compute statistics and data processing.
c3- Apply the scientific research ethics.
c4- Gain skills of publishing and writing..

c5- Write and appraise reports.
c6- Appy health and safety procedures in the biochemical laboratory.

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 of the National Authority for Quality Assurance and Accreditation of Education (NAQAAE)
adopted at MRI council 12/2/2014 and re-adopted 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

Comparison between Generic Academic Standard of NAQAAE and ARS of M.Sc. of Applied Medical Chemistry

Generic Academic Standards	ARS of M.Sc. of Applied Medical Chemistry
a1- Basic facts, theories, of the specialty and related subjects/ fields	a1- Recognize established basic knowledge of medical biochemistry and related sciences a2- Recognize established basic knowledge of cancer biology a3- List the basic techniques applied in the field of medical biochemistry
a2- Mutual relation between professional practice and effects on environment	a4- Describe the principals of different techniques applied in field of medical biochemistry a5- Recall the different types of biomarkers and tumour markers and their clinical applications
a3- Main scientific advances in the field of practice	a6- Recognize up to date and recent developments in the field of medical biochemistry
a4- Fundamentals 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- Basics and ethics of scientific research	a9- Understand the ethical and scientific rules of medical research
b1- Interpret, analyze & evaluate the information to solve problems	b1- Distinguish the relationship between relevant sciences in solving and management of problems in various issues of medical biochemistry
b2- Solve some problems that do not conform to classic data (incomplete data)	b2- Differentiate the elements of the problems through data analysis and evaluation (even in the absence of some data) of similar conditions related to medical biochemistry
b3- Integrate different information to solve professional problems	b1- Distinguish the relationship between relevant sciences in solving and management of problems in various issues of medical biochemistry

b4- Conduct a scientific research &/Or write scientific systematic approach to a research problem (hypothesis)	b3- Represent systematic approach in conducting scientific research relevant to medical biochemistry through thesis
b5- Evaluate risks imposed during professional practice.	b4- Evaluate risks imposed during medical biochemistry practice
b6- Plan for professional improvement	b5- Employ practice-based learning and improvementskills that involves investigation and evaluation of practice, appraisal and assimilation of scientific evidence, improvements in provided services and risk management
b7- Take professional decisions in wide range of professional situations	b6- Prepare alternative decisions in different situations in the field of medical biochemistry
c1- Competent in all basic and some of the advanced professional skills (to be determined according to the specialty board/ department)	c1- Apply an integrative and multidisciplinary approach to research investigation c2- Apply laboratory techniques that are applied in medical biochemistry
c2- Write and appraise reports	c3- Write and comment on reports related to medical biochemistry
c3- Evaluate methods and tools used in specialty	c2- Apply laboratory techniques that are applied in medical biochemistry
d1- Communicate effectively using all methods	d1- Demonstrate interpersonal and communication skills that lead to effective information exchange
d2- Use information technology to improve his/her professional practice	d2- Use information technology to improve professional practice in field of medical biochemistry
d3- Practice self appraisal and determines his learning needs	b5- Employ practice-based learning and improvementskills that involves investigation and evaluation of practice, appraisal and assimilation of scientific evidence, improvements in provided services and risk management
d4- Share in determination of standards for evaluation of others (e.g.: subordinates/ trainees etc.)	d3- Apply skills of teaching and evaluating others
d5- Use different sources of information to obtain data	d4- 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 - Manage time effectively	d5- Work independently or in a team d6- Manage time and work to deadline d7- Learn skills for interaction
d7- Work as team leader in situations comparable to his work level	
d8- Learn independently and seek continuous learning	d8- Demonstrate skills for self and continuous learning

4- Curriculum structure and contents

4.a program duration: *3 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	4	
Second semester	9 (5 + 2^a +2^b)	4
Third semester	5	
Fourth semester	6	2

a: Medical Statistics b: Computer

4.b.ii- No. of credit hours Lectures 21 Practical 9 Thesis 8 Total 38

Compulsory 24 Elective 6 Optional 0

4.b.iii- No. of credit hours of specialized courses No. 20 % 66.67

4.b.iv- No. of credit hours of other courses No. 10 % 33.33

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
1702701	Applied Medical Chemistry I	2	2	-
1702702	Applied Medical Chemistry II	2	2	-
1702703	Applied Medical Chemistry III	2	2	-
1702704	Cancer Chemistry I	2	2	-
1702705	Cancer Chemistry II	3	3	-
1702706	Molecular Biochemistry I	3	3	-
1702707	Laboratory Techniques I	3	1	4
1702708	Laboratory Techniques II	3	1	4
1721720	Medical Statistics	2	1	2
1721721	Computer	2	1	2
	Total	24	18	12

5.2- Elective I

Code No.	Course Title	No. of credit hours	No. of hours /week	
			Lecture	Practical
1704720	Pharmacology	2	1	2
1705720	Hematology	2	1	2
1706720	Bacteriology	2	1	2
1707720	Parasitology	2	1	2
1708720	Immunology	2	1	2
1713720	Genetics	2	1	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

Graduate students with B.Sc. of Science, Pharmacy, or M.B.Ch.B of Medicine

7- Teaching and Learning Methods

- Lecture
- Practical
- Brainstorming
- Discussion Groups
- Self-DirectedLearning
- Project

8- Regulations for progression and program completion

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

1- Complete 30 credit hours with cGPA of at least C^{+} through courses.

2- Complete 8 credit hours with 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

10- 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)External Examiner (s)	Report	**Prof. Salah Ahmed Shewitta** Professor of Biotechnology, Department of Biotechnology, Institute of Graduate Studies andResearch, Alexandria University
5- Other	-	-

Program coordinator:
Name: Dr/ Samir Ali Abd El-Karеam

Signature: Samir Ali

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 Master of Science in Applied Medical Chemistry By the end of this program, graduate should be able to	Program Aims
Apply the basics and methodologies of scientific research and using its various tools proficiently.	Apply the basics and methodologies of scientific research and using its various tools proficiently.	4- Have an adequate knowledge and skills in research methodology that enable them to design experiments, analyze data, and review literature critically.
Use the analytical methods in the field of specialty.	Use the analytical methods in the field of medical biochemistry and cancer biology.	3- Apply analytical methods used in the field of medical biochemistry.
Apply specialized knowledge in the field of specialty and integrate it with relevant knowledge in his professional practice.	Apply specialized knowledge in the field of medical biochemistry and cancer biology and integrate it with relevant knowledge in his professional practice.	2- Have a thorough background in medical biochemistry and related sciences. This theoretical background provides the fundamental knowledge necessary for an understanding of the life sciences at the molecular level.
Demonstrate awareness of current problems and modern visions in the field of specialty.	Demonstrate awareness of current problems and modern visions in the field of medical biochemistry and cancer biology.	5- Provide a solid foundation for those who intend to go on to study for Ph. D.
Identify professional problems in the field of specialty and propose solutions to them.	Identify professional problems in the field of medical biochemistry and cancer biology and propose solutions to them.	10- Use systematic approaches to design and conduct scientific research.

Master an appropriate of professional skills in the field of specialty including use of technology.	Master an appropriate of professional skills in the field of medical biochemistry and cancer biology including use of technology.	7- Acquire the ability to use transferable skills in oral presentations, report writing, and the use of information technology.
Communicate efficiently and lead work teams.	Communicate efficiently and lead work teams.	8- Communicate effectively and the ability to lead work teams.
Take Decision in different professional contexts.	Take Decision in different professional contexts.	9- Decision-making in his/her professional contexts.
Employ the available resources to achieve the highest benefit and maintain them.	Employ the available resources to achieve the highest benefit and maintain them.	1- Carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field.
Show awareness of his/her role in community development and environmental preservation in light of global and regional changes.	Show awareness of his/her role in community development and environmental preservation in light of global and regional changes.	6- Carry out academic and professional self development and be capable ofcontinuous learning.
Act in a manner that reflects a commitment to integrity, credibility, professionality, and accountability.	Act in a manner that reflects a commitment to integrity, credibility, professionality, and accountability.	1- Carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field.
Realize the need for self-development and engaging in continuous learning.	Realize the need for self-development and engaging in continuous learning.	6- Carry out academic and professional self development and be capable ofcontinuous learning.

Program Aims vs ILOs matrix

Knowledge and Understanding

	a1	a2	a3	a4	a5	a6	a7	a8	a9
1. Carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field.									
2. Have a thorough background inmedical biochemistry and related sciences. This theoretical background provides the fundamental knowledge necessary for an understanding of the life sciences at the molecular level.	X	X	X	X	X	X			
3. Apply analytical method used in the field of medical biochemistry.							X	X	
4. Have an adequate knowledge and skills in research methodology that enablethem to design experiments, analyze data, and review literature critically									X
5. Provide a solid foundation for those who intend to go on to study for Ph. D.	X	X	X	X	X	X	X	X	X
6. Carry out academic and professional self development and be capable of continuous learning									
7. Acquire the ability to use transferableskills in oral presentations, reportwriting, and the use of information Technology									
8. Communicate effectively and the ability to lead work teams.									
9. Decision-making in his/her professional contexts.									
10. Use systematic approaches to design and conduct scientific research.									

Intellectual Skills

	b1	b2	b3	b4	b5	b6
1. Carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field.					X	
2. Have a thorough background in medical biochemistry and related sciences. This theoretical background provides the fundamental knowledge necessary for an understanding of the life sciences at the molecular level.	X	X				
3. Apply analytical method used in the field of 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						
5. Provide a solid foundation for those who intend to go on to study for Ph. D.	X	X	X	X	X	
6. Carry out academic and professional self development and be capable of continuous learning						
7. Acquire the ability to use transferable skills in oral presentations, report writing, and the use of information Technology			X			
8. Communicate effectively and the ability to lead work teams.						
9. Decision-making in his/her professional contexts.						X
10. Use systematic approaches to design and conduct scientific research.						X

Professional and Practical Skills

	c1	c2	c3	c4	c5	c6
1. Carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field.			X			X
2. Have a thorough background in medical biochemistry and related sciences. This theoretical background provides the fundamental knowledge necessary for an understanding of the life sciences at the molecular level.						
3. Apply analytical method used in the field of 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. Provide a solid foundation for those who intend to go on to study for Ph. D.	X	X	X	X	X	X
6. Carry out academic and professional self development and be capable of continuous Learning						
7. Acquire the ability to use transferable skills in oral presentations, report writing, and the use of information technology					X	X
8. Communicate effectively and the ability to lead work teams.						
9. Decision-making in his/her professional contexts.						
10. Use systematic approaches to design and conduct scientific research.						

General and Transferable Skills

	d1	d2	d3	d4
1. Carry out research, technical and supervisory positions in scientific laboratories in academic, government and the healthcare field.				X
2. Have a thorough background in medical biochemistry and related sciences. This theoretical background provides the fundamental knowledge necessary for an understanding of the life sciences at the molecular level.				
3. Apply analytical method used in the field of 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. Provide a solid foundation for those who intend to go on to study for Ph. D.	X	X	X	X
6. Carry out academic and professional self development and be capable of continuous learning			X	
7. Acquire the ability to use transferable skills in oral presentations, report writing, and the use of information technology	X	X	X	X
8. Communicate effectively and the ability to lead work teams.	X	X		
9. Decision-making in his/her professional contexts.			X	X
10. Use systematic approaches to design and conduct scientific research.				

Courses vs Program ILOs matrix

Knowledge and Understanding

	a1	a2	a3	a4	a5	a6	a7	a8	a9
Applied Medical Chemistry I	X								
Applied Medical Chemistry II		X							
Applied Medical Chemistry III			X						
Cancer Chemistry I				X					
Cancer Chemistry II					X				
Molecular Biochemistry I						X			
Laboratory Techniques I							X	X	
Laboratory Techniques II							X	X	
Thesis									X

Intellectual Skills

	b1	b2	b3	b4	b5	b6
Applied Medical Chemistry I	X					
Applied Medical Chemistry II	X					
Applied Medical Chemistry III	X					
Cancer Chemistry I		X				
Cancer Chemistry II		X				
Molecular Biochemistry I	X					
Laboratory Techniques I				X	X	
Laboratory Techniques II				X	X	
Thesis			X			X

Professional and Practical Skills

	c1	c2	c3	c4	c5	c6
Applied Medical Chemistry I						
Applied Medical ChemistryII						
Applied Medical ChemistryIII						
Cancer Chemistry I						
Cancer Chemistry II						
Molecular Biochemistry I						
Laboratory Techniques I	**X**					**X**
Laboratory Techniques II	**X**					**X**
Thesis		**X**	**X**	**X**	**X**	**X**

General and Transferable Skills

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

ARS vs ILOs matrix

Knowledge and Understanding

ARS of M.Sc. of Applied Medical Chemistry	a1	a2	a3	a4	a5	a6	a7	a8	a9
a1- Recognize established basic knowledge of medical biochemistry and related sciences	X	X	X						
a2- Recognize established basic knowledge of cancer biology				X	X				
a3- List the basic techniques applied in the field of medical biochemistry							X	X	
a4- Describe the principals of different techniques applied in field of medical biochemistry							X	X	
a5- Recall the different types of biomarkers and tumour markers and their clinical applications				X	X				
a6- Recognize up to date and recent developments in the field of medical biochemistry						X			
a7- Recognize ethical and legal principles relevant to practice medical biochemistry									X
a8- Understand principles of quality assurance relatedto practice medical biochemistry								X	
a9- Understand the ethical and scientific rules of medical research									X

Intellectual Skills

ARS of M.Sc. of Applied Medical Chemistry	b1	b2	b3	b4	b5	b6
b1- Distinguish the relationship between relevant sciences in solving and management of problems in various issues of medical biochemistry	X	X	X			
b2- Differentiate the elements of the problems through data analysis and evaluation (even in the absence of some data) of similar conditions related to medical biochemistry	X	X	X			
b3- Represent systematic approach in conducting scientific researchrelevant to medical biochemistry through thesis						X
b4- Evaluate risks imposed during medical biochemistry practice				X		
b5- Employ practice-based learning and improvement skills that involves investigation and evaluation of practice, appraisal and assimilation of scientific evidence, improvements in provided services and risk management				X	X	X
b6- Prepare alternative decisions in different situations in the field of medical biochemistry					X	X

Professional and Practical Skills

ARS of M.Sc. of Applied Medical Chemistry	c1	c2	c3	c4	c5	c6
c1- Apply an integrative and multidisciplinary approach to research investigation		X	X			X
c2- Apply laboratory techniques that are applied in medical biochemistry	X	X				
c3- Write and comment on reports related to medical biochemistry		X		X	X	X

General and Transferable Skills

ARS of M.Sc. of Applied Medical Chemistry	d1	d2	d3	d4
d1- Demonstrate interpersonal and communication skills that lead to effective information exchange	X	X		
d2- Use information technology to improve professional practice in field of medical biochemistry		X		
d3- Apply skills of teaching and evaluating others	X			
d4- 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	X	X	X
d5- Work independently or in a team	X			
d6- Manage time and work to deadline		X		
d7- Learn skills for interaction		X		
d8- Demonstrate skills for self and continuous learning				X

Teaching and Learning Methods Vs Courses Matrix
(Degree: Master) Code: 1702700

	701	702	703	704	705	706	707	708
Lecture	X	X	X	X	X	X	X	X
Practical							X	X
Brainstorming						X		
Discussion Groups	X	X	X	X	X	X	X	X
Problem Solving							X	X
Case Study								
Field Training								
Role playing								
Training Workshops								
Self-Directed Learning						X	X	X
e-learning								
Project	X	X	X	X	X	X	X	X