



**Program Specification for Master Degree in Biochemistry Code:  
1701700**

**University:** Alexandria

**Faculty:** Medical Research Institute

**Program Specification**

**A-**

**Basic information**

**1- Program title: Master Degree in Biochemistry**

**2- Program type:** single  double  multiple

**3- Department(s): Biochemistry**

**4- Coordinator: Dr. Rasha El-Tahan**

**5- External evaluator(s): Dr. Mohamed El-Kersh**

**6- Last date of program specification approval: 8/1/2017**

**B-**

**Professional Information**

**1- Program aims:**

- Acquire basic knowledge in all areas of biochemistry in order to understand biochemical and molecular processes.
- Work safely in laboratories and possess basic requirements for practical molecular and biochemical techniques.
- Apply statistical skills; analyze and present the obtained biochemical and molecular data.
- Improve scientific and communications skills.
- Participate in a multidisciplinary teamwork.
- Possess broad ethical principles.
- Criticize, postulate solutions, and deduces the solutions mechanisms and develops judgments in scientific bases.

**2- Intended learning outcomes (ILOS)**

**a- knowledge and understanding:**

- a1- Review enzymes and coenzymes, hormones, chemistry of blood, fluid, electrolytes and acid-base balance.
- a2- Recall biochemical calculation, carbohydrates, lipid, proteins and nucleic acid metabolism, and metabolic disorders.
- a3- Describe free radicals, antioxidants, implications of free radical in diseases, and laboratory medicine.



- a4- Recall nutrition, malnutrition, vitamins in health and disease, minerals and trace elements, and nanomedicine.
- a5- Explain the general principles of central dogma of molecular biology including DNA replication, mutation, repair, transcription and translation.
- a6- Discuss genetic recombination in prokaryotes and eukaryotes, and the basic principle and application of telomeres, telomerases and reverse transcriptase.
- a7- Describe regulation of gene expression in prokaryotes and eukaryotes.
- a8- Recall the role of oncogenes and tumor suppressor genes in cell cycle control, cell growth and signaling and in carcinogenesis.

**b- Intellectual skills:**

- b1- Categorize blood constituents according to function.
- b2- Distinguish between different metabolic pathways.
- b3- Distinguish the implication of reactive oxygen species in different diseases.
- b4- Appraise a suitable nanomaterial design for successful biomedical application.
- b5- Analyze the steps of replication, transcription, and translation and mechanisms of DNA repair.
- b6- Compare between genetic recombination in prokaryotes and eukaryotes
- b7- Examine the different mechanisms of transcriptional, posttranscriptional and translational control of gene expression in prokaryotes and eukaryotes.
- b8- Contrast the role of oncogenes and tumor suppressor during the normal cell growth and carcinogenesis process.

**c- Professional and practical skills:**

- c1- Illustrate laboratory safety and techniques.
- c2- Practice the use of laboratory equipment as pipettes, spectrophotometer and centrifuges.
- c3- Demonstrate animal dissection.
- c4- Interpret biochemical calculations for normality and molarity.
- c5- Apply buffer preparation and protein determination.
- c6- Apply spectrophotometer to determine the protein contents.
- c7- Apply Colorimetric assays to determine lipid profile (Cholesterol, triglycerides, and lipoproteins).
- c8- Apply appropriate tests to determine kidney functions (urea by colorimetric urease enzyme, creatinine by buffer kinetic reaction).
- c9- Apply appropriate tests to determine liver functions (SGPT and SGOT by ALT and AST enzymatic kinetic reaction, bilirubin by colorimetric enzymatic method for direct and total bilirubin and by calculations for indirect bilirubin, ALP by kinetic alkaline phosphatase enzyme) and blood glucose level (Glucose by colorimetric glucose oxidase enzyme).
- c10- Interpret the obtained data to present it in its appropriate format.



- c11- Apply the safety precautions in molecular biology labs (includes handling of samples and chemicals and General Housekeeping).
- c12- Practice techniques to isolate DNA and RNA such as solvent extraction and spin column extraction.
- c13- Apply appropriate method to determine purity and integration of nucleic acid such as spectrophotometric method and agarose electrophoresis.
- c14- Practice the technique of polymerase chain reaction (PCR).
- c15- Perform reverse transcriptase-PCR protocol (RT-PCR).
- c16- Use RT-PCR to assess gene expression level.

#### **d- General and transferable skills:**

- d1- Develop the communication skills through group discussion and lectures, and share discussion about other's work.
- d2- Use different sources to extract information and knowledge e.g. books, research articles, thesis, academic websites, etc.
- d3- Assess his learning needs through exams, assignments and discussions.
- d4- Design a time plan for his work during practical sessions and work in group.
- d5- Solve problems on ethical scientific basis will pave the ways to be an effective team leader during practical session and seminars.
- d6- Develop independent learning skills through assignments and seminars.

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### **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)

**Date of Academic Reference standards (ARS) approval by Institute Council:  
12/2/2014**

#### **3b- Comparison of provision to selected external references**

<b>Generic Academic Standards of NAQAAE</b>	<b>ARS of MSc. of Biochemistry</b>
A1-Basic facts, theories, of the specialty and related subjects/ fields.	a1-Recognize the basic knowledge of enzymology, hormones, nutrition and nutrition related diseases, metabolism and metabolic disorders and molecular biology. a2- List the principles and methods related to practical biochemical and molecular biology techniques. a3- Recall the free radicals and its implications in different diseases.
A2-Mutual relation between professional practice and effects on environment.	a4-Memorize the fundamental role of vitamins in health and disease. a5-Explain enzymes in clinical practice. a6-Discuss the laboratory medicine.



	<p>a7-Recognize the effect of minerals on health and disease.</p> <p>a8- Explain the toxic effects of nanomaterials.</p> <p>a9-Review the basic knowledge of gene expression, its regulation and implications in different diseases.</p> <p>a10-Review the concepts of proto-oncogenes and tumor suppressor genes and their role in cell growth, apoptosis and cell signaling.</p>
A3-Main scientific advances in the field of practice.	a11-Recognize the recent advances in biochemistry and molecular biology fields.
A4-Fundamentals of ethical & legal practice.	a12- State the details of ethical and legal practice and quality standards of the practice.
A5-Quality standards of the practice.	a13- State the details of ethical and legal practice and quality standards of the practice.
A6-Basics and ethics of scientific research.	a14- Recall the basics of research ethics.
B1-Interpret, analyze & evaluate the information to solve problems.	b1- Analyze the basic biochemical information to solve problems through thesis.
B2-Solve some problems that do not conform to classic data (incomplete data).	b2- Appraise the resulting data through thesis.
B3-Integrate different information to solve professional problems.	b3- Differentiate between different biochemical or molecular pathways in different diseases.
B4-Conduct a scientific research &/Or write scientific systematic approach to a research problem (hypothesis).	b4- Compare between obtained data and recent scientific publications through thesis.
B5-Evaluate risks imposed during professional practice.	b5- Examine safety instructions during practical sessions.
B6-Plan for professional improvement.	b6- Analysis of student questionnaire for professional improvement plan
B7-Take professional decisions in wide range of professional situations.	b7- Criticize the problems faced during the thesis work to take decisions based on scientific concepts.
C1-Competent in all basic and some of the advanced professional skills ( to be determined according to the specialty board/ department).	c1-Apply different techniques related to biochemical and molecular biology tests.
C2-Write and appraise reports.	c2- Interpret the obtained data to present it in its appropriate format.
C3-Evaluate methods and tools used in specialty.	c3- Correspond the used methods to the recent and applicable techniques.
D1-Communicate effectively using all methods.	d1- Develop the communication skills through group discussions, lectures and training



	workshops.
D2-Use information technology to improve his/her professional practice.	d2- Use information technology to improve his professional practice (e.g. statistics programs, bioinformatics, etc.).
D3-Practice self appraisal and determines his learning needs.	d3-Determine students learning needs through student questionnaire .
D4-Share in determination of standards for evaluation of others (e.g.: subordinates/ trainees etc.).	d4- Discuss different topics through assignments and lectures.
D5-Use different sources of information to obtain data.	d5- Use different sources of information to obtained data e.g. books, research articles, thesis, academic websites, etc.
D6-Work in teams.	d6- Work in group through practical session and workshops, and communicate with others positively.
D7-Manage time effectively.	d7-Set a time plan for his work during practical sessions and thesis work.
D8-Work as team leader in situations comparable to his work level.	d7- Think independently to solve problems paves the ways to be an effective team leader during practical sessions and seminars.
D9-Learn independently and seek continuous learning.	d8-Learn independently through assignments, seminars and e-learning use.

## 4- Curriculum structure and contents

### 4.a Program duration: 3-5 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	6	2
Second semester	6	2
Third semester	6	2
Fourth semester	6	





### 5.3- Elective II (6Cr)

Code No.	Course Title	No. of credit hours	No. of hours /week	
			Lecture	Practical
1703720	Physiology	2	1	2
1704720	Pharmacology	2	1	2
1705720	Hematology	2	1	2
1717720	Chemical Pathology	2	1	2
1706720	Bacteriology	2	1	2
1707720	Parasitology	2	1	2
1708720	Immunology	2	1	2
1709720	Histochemistry and cell biology	2	1	2
1712720	Medical biophysics	2	1	2
1721720	Medical statistics	2	1	2

### 5.4- Optional – (none)

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## 6- Program admission requirements

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

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## 7- Regulations for progression and program completion

For the progression and completion of the program to obtain the degree of Master in Biochemistry the student must:

- 1- Complete 30 credit hours with CGPA of at least C+
- 2- Submit a thesis validity report by an examination committee approved by the department council and their members include at least two external examiners.

**8- Evaluation of Students enrolled in the program.**

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

**Evaluation of the Program**

<b>Evaluator</b>	<b>Tool</b>	<b>Sample</b>
1- Senior students	Interview	At least 50 %
2- Alumni	Interview	Representative sample
3- Stakeholders (Employers)	Interview	Representative sample
4- External Evaluator(S) or External Examiner (s)	Reports	Name of evaluator or examiner
5- Other		

**Dates of Previous editions/revisions:**

<b>Editions/Revisions Number</b>	<b>Date</b>
Edition no.1	2009
Edition no. 2	2011
Edition no.3	5/6/2014
Edition no.3, revision no.1	12/2014
Edition no.3, revision no.2	10/2016

**Program coordinator:**

Name: Dr. Rasha EL-Tahan Signature: .....

**Department Head:**

Name: Prof Maher A Kamel Signature: .....

**Date of Department Council Approval:6-9-2017**







**Program Aims vs ILOs matrix**

ILOS	A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	D1	D2	D3	D4	D5	D6
Acquire basic knowledge in all areas of biochemistry in order to understand biochemical and molecular processes.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x																						
Work safely in laboratories and possess basic requirements for practical molecular and biochemical techniques.																	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
Apply statistical skills; analyze and present the obtained biochemical and molecular data.																			x							x												
Improve scientific and communications skills.																																x		x	x	x	x	
Participate in a multidisciplinary teamwork.																															x			x				









