PROGRAMME SPECIFICATION
(PhD Programme of Basic Medical Sciences in Biochemistry)
Faculty of Medicine- Mansoura University

(A) Administrativeinformation

(1) Programme Title& Code	**Post graduate PhD Degree of Basic Medical Sciences in Biochemistry /BIC 600**
(2) Final award/degree	**PhD**
(3) Department (s)	**Medical Biochemistry Department**
(4) Coordinator	**Staff members of credit members of the department**
(5) External evaluator (s)	**Prof. Dr/Mohammed Saed Elsayed Oraby Faculty of Medicine, AlAzher University**
(6) Date of approval by the Department`s council	**29/4/2018**
(7) Date of last approval of programme specification by Faculty council	

(B) Professional information

(1) Programme Aims:
The broad aims of the programme are to :

1. Educate students about the recent issues of Medical Biochemistry and provide students with an understanding updated data about cell chemistry and metabolism of all elements in the body.

2. Educate students about the recent issues of Molecular Biology to provide students with an understanding updated data about the genetic system in the cell.

3. Provide the students with updated data and researches concerned with metabolic and genetic diseases, their molecular causes, as well as laboratory diagnosis of those diseases.
4. Provide the students with the basic principles of nanotechnology and its applications in nanomedecine.

5. Educate the students about the nutritional state & energy -nutrient requirements with a special focusing on the nutritional disorders. Also to allow student to discover the potential diet therapies that cure nutritional & non- nutritional diseases.

6. Educate the students the principles of reproductive biology with a special focusing on the molecular mechanisms of ovulation, fertilization &implantation. Also to provide students with assessment techniques of sperm function & oocyte quality.

7. Enable the students to practice the principles of measuring some chemical substances in serum, extract DNA, analyze genes and practice new technologies in the field of medical biochemistry to use those techniques in doing scientific researches.

8. Allow students to have the experience in collecting scientific data, how to prepare a research project, writing essays and scientific papers.

(2) Intended Learning Outcomes (ILOs):

A- Knowledge and Understanding:

On successful completion of the programme, the candidate will be able to:

AI-1	**Discuss genetics as an important science and classification of genetic diseases**
AI-2	**Explain cell division, cell cycle, human chromosomes and possible chromosomal abnormalities**
AI-3	**Discuss principles of Mendelian's laws of inheritance**
AI-4	**Explain the basics of molecular genetics including organization of human genome and**

	genetic code
AI-5	**Discuss modes of inheritance including monogenic, polygenic and multifactorial inheritance**
AI-6	**Explain the relationship between genes & biochemistry in the form of studying the genetic basis of these diseases**
AI-7	**Explain genetics &haemoglobin disorders such as thalassemia and sickle cell anemia**
AI-8	**Explain role of genes in carcinogenesis including oncogenes, tumor suppressor genes, DNA repair genes and genetics of apoptosis.**
AI-9	**Discuss genetic counseling including methods of diagnosis and management of genetic diseases.**
AI-10	**Explain prenatal diagnosis (indications, techniques) and treatment of genetic diseases.**
AI-11	**Discuss the process of aging in human including aging theories and how to retard the aging process.**
AI-12	**Explain basics of stem cells and stem cell signaling pathways.**
AI-13	**Explain the basics of bioinformatics and computational biology.**
AI-14	**Discuss obesity as a serious condition having implications & associations with multiple diseases.**
AI-15	**Discuss principal basics of nanotechnology and its applications in medicine.**
AII-1	**Explain the biomedical importance & properties of amino acids & peptides.**
AII-2	**Explain both the primary &higher structures of protein including methods of their determination and protein folding.**
AII-3	**Discuss characters of fibrous proteins such as collagen.**
AII-4	**Explain characters of globular proteins as hemoglobin and myoglobin.**
AII-5	**Discuss updates of enzymes, their classification, mechanism of action and regulation of their activity.**
AII-6	**Discuss updates of biological oxidation including electron transport chain and bioenergetics.**
AII-7	**Discuss updates of oxidative phosphorylation and electron transport chain.**
AII-8	**Explain updates of different pathways of carbohydrate & glycoprotein metabolism and their regulation.**
AII-9	**Discuss updates of different pathways of lipid metabolism, fatty liver & ecosanoids.**
AII-10	**Explain updates of general protein metabolism and individual amino acid metabolism including biosynthetic and catabolic pathways of essential and non-essential amino acids.**

AII-11	**Explain updates of purine & pyrimidine chemistry & metabolism; including synthesis and degradation of purines and pyrimidines and their metabolic disorders**.
AII-12	**Explain updates of metabolic integration and provision of metabolic fuels.**
AII-13	**Discuss updates of nucleic acid structure & function including levels of DNA structure and methods of its denaturation.**
AII-14	**Discuss updates of DNA organization, replication, mutation & repair**
AII-15	**Discuss molecular basis of RNA synthesis, processing & modification.**
AII-16	**Explain molecular basis of protein synthesis and how to determine the expression of certain proteomics in diseased cells.**
AII-17	**Discuss updates of the regulation of gene expression**
AII-18	**Describe the basis of determining genes and methods of amplification of those genes.**
AII-19	**Discuss diversity of endocrine glands including synthesis of different types of hormones, secretion, transport and storage.**
A II-20	**Discuss biochemistry of cellular communication and signal transduction pathways .**
A II-21	**Discuss digestion, absorption of carbohydrates, lipids, proteins and vitamins & nutrition**
A II-22	**Discuss micronutrients (vitamins; functions and deficiency of fat- and water-soluble vitamins& minerals)**
A II-23	**Discuss intracellular sorting & trafficking of proteins including the cytosolic and ER branches.**
AII-24	**Discuss muscle and the extracellular matrix.**
A II-25	**Understand Blood (plasma proteins & homeostasis) including different functions of plasma proteins, phases of hemostasis and thrombosis, laboratory tests used for assessment and the general structure and major disorders of red and white blood cells .**
A II-26	**Discuss reproductive biochemistry including molecular view of ovulation, human fertilization, implantation and reproductive messengers.**
AII-27	**Discuss nutritional biochemistry including classification of nutrients, energy aspects of food, balanced diet and disorders of nutrition.**

AII-28	**Discuss Organ system function assessment including the principal tests used to assess liver, kidney, adrenal and thyroid function, their biomedical importance in clinical medicine, their reference value and abnormal results of different organ function tests.**

B- Intellectual skills:

On successful completion of the programme, the candidate will be able to:

B1	Interpret results of colorimetric and molecular tests.
B2	Interpret laboratory reports.
B3	Formulate a systematic approach for laboratory diagnosis of metabolic and genetic diseases
B4	Make oral presentation and open discussions about scientific issues in a professional way.
B5	Analyze the electrophoresis bands by image analysis
B6	Analyze Statistical data properly.
B7	Estimate the risks of handling and use of chemical agents on community and environment as a part of their ethical heritage and consequently implement the standard guidelines of chemist and environmental safety.

C- Professional/practical skills:

On successful completion of the programme, the candidate will be able to:

C1	Separate some biological parameters by chromatography (HPLC).
C2	Perform RNA extraction.
C3	Perform reverse transcriptase PCR (RT-PCR).
C4	Perform quantitative real-time PCR (qRT-PCR).
C5	Extract protein from biological samples by trizol.
C6	Analyze gene expression using Western blot technique.
C7	Use Gel documentation system to analyze digital image of the electrophoresis gel bands.

D- Communication &Transferable skills:

On successful completion of the programme, the candidate will be able to:

D1	Demonstrate competence in data presentation. Statistical analysis and interpretation.
D2	Demonstrate key skills in the retrieval, preparation, analysis and interpretation of information from different sources.
D3	Make effective use of information technology e.g. web and internet. Database work
D4	Demonstrate self-direction and some originality in tackling and solving problems
D5	Work effectively both individually and in team and making appropriate use of the capacities of group members
D6	Communicate effectively, using the appropriate method with audiences of different levels of knowledge or experience.
D7	Conduct thesis and scientific paper.

(3) Academic standards:

Academic standards for the programme are attached in Appendix I. in which **NARS** issued by the National Authority for Quality Assurance & Accreditation in Education are used being approved by the Faculty council on 14/7/2010. External reference points/Benchmarks are attached in Appendix II.

3.a-External reference points/benchmarks are selected to confirm the appropriateness of the objectives, and ILOs.

- The biochemistry department select the PhD biochemistry graduate programme,
  school of medicine, University of Michigan as an external reference point approved
  by the Department' council on 29/7/2010 and by the Faculty council on 17/8/2010 .

https://www.lsa.umich.edu/UMICH/chem/Home/Undergraduate/Advising/Biochemistry%20worksheet.pdf.

3.b- Comparison of the specification to the selected external reference/ benchmark:

- At least 85% programme aims of the Benchmark are covered by the current programme.
- Assessment method and timing are differing from the structure of the programme specification of the benchmark.

(4) Curriculum structure and contents:

4.a- Duration of the programme: 6 terms (60 credit hours)

- First part : 1st term (2 semesters, 5 credit hours),
- Second part :(3rd, 4th, 5thand 6th terms) (25 credit hours)
  - Medical biochemistry & Molecular biology (advanced course):

(23 credit hours).
- Elective course: (2 credit hours).

- Thesis: 15 credit hours (starts at the 2nd term for registration and lasts for the 3rd, 4th , 5th and 6thterms).
- Log book: 15 credit hours.

4.b-programme structure:

should fulfill a total of **60** credit hours.

●4.b.1: Number of credit hours:

Candidates

First part: 5 credit hours + 0.34 credit hours log book activities.

Second part:

-25credit hours (2 elective& 23advanced course),

- Log book (14.66 credit hours): (Practical: 10 credit hours & other activities: 4.66 credit hours)

Thesis: 15 credit hours.

●4.b.2: Teaching hours/week:

- 1st part: Lectures: 3h/week & total teaching hours: 72 hr+ 3h tutorials + 10 hours log book activities..
- 2nd part :

-Courses:

(Lectures:375 contact hours +Logbook: (**Laboratory** skills and activities)**:** 440 contact hours + Thesis 450h) in 120 weeks.

Total contact hours: 1275 h.

●4.b.3: Number of contact hours for Basic science (Teached in the first part) = 85 contact hours represents6.66% of total hours.

●4.b.4: Number of contact hours for Specialized science (Teached in the second part) =815 Contact hours represents63.9% of total hours.

●4.b.5: Number of contact hours for Thesis = 450 hours represents 35.3% of total hours.

(5) Programme courses:

I. First part

Compulsory courses: (24 weeks over a period of 6 month)

Course Title	**Course Code**	**Teaching hours**			**Programme ILOs covered (REFERRING TO MATRIX)**
		Lectures	**Laboratory /practical**	**Log book activities**	
Genetic course	BIC 604 GE	60	------	5	AI-1, AI-2, AI-3, AI-4, A5, AI-6 , AI-7, AI-8, AI-9 & AI-10. B3, B6 D2,D3,D4,D5,D6
Special courses	BIC 604SB	15	------	5	AI-11, AI-12, AI-13, AI-14, AI-15 B3, B6 D2,D3,D4,D5,D6

Total hours		75	------	10	

II. Second part

a- Compulsory courses

Course Title	Course Cod	Teaching hours				Programme ILOs covered (REFERRIN MATRIX)
		Lectures	Log book		Total	
			practical	Other activities		
Medical Biochemistry & Molecular Biology (Advanced Level)	BIC 604					
Module1: Protein structure ar function &Biochemistry of i cellular, extra-cellular communication	BIC 604	65	65	35	165	AII-(1-5), AII-(19-20) B1,2,3,4,7,8 C1,6 D1,2,3,4,5,6
Module2: Bioenergetics & metabolism	BIC 604	120	110	35	265	AII- (6-12). B1,2,3,7,8 C1 D1,2,3,5,6
Module3: Molecular biology & informational macromolecules	BIC604	95	100	35	230	AII- (13-18) B1,3,4,7,8 C2,3,4,5,6 D1,2,3,4,5,6,
Module4:Special topics	BIC 604	65	25	35	125	AII-(21-25) B2,3 C1,6 D1,2,3,4,5,6
total		345	300	140	785	

b- Elective courses:

b.I. Reproductive biochemistry

Subjects	No. of Teaching Hours		Programme ILOs covered (REFERRING TO MATRIX)
	Lectures	Laboratory	
1- A molecular view of ovulation	4	_	AII-26
2-An overview of the molecular mechanisms involved in human fertilization	7	_	AII-26
3- Molecular mechanisms of implantation	7	_	AII-26
4- Reproductive messengers	4	_	AII-26

5- Evaluation of sperm function	4		AII-26
6- The assessment of oocyte quality	4		AII-26
Total Teaching hours	30	_	

b.II.Nutritional biochemistry

Subjects	No. of Teaching Hours		Programme ILOs covered (REFERRING TO MATRIX)
	Lectures	Laboratory	
1- definition	2	_	AII-27
2- classification of nutrients	10	_	AII-27
3- energy aspects of food	4	_	AII-27
4- balanced diet	5	_	AII-27
5- disorders of nutrition (applied nutrition I)	4		AII-27
6- diet therapy (applied nutrition II)	5		AII-27
Total Teaching hours	30	_	

b.III.Organ system function assessment

Subjects	No. of teaching hours		Programme ILOs covered (REFERRING TO MATRIX)
	Lectures	Laboratory	
Liver function tests:	9	-	AII-28
Renal function tests	9	-	AII-28
Adreno-cortical function tests	6	-	AII-28
Thyroid function tests	6	-	AII-28
Total teaching hours	30	-	

III. **PhD Thesis:**(4 terms)

Course Title

	Laboratory /practical	Total
PhD thesis	Credit h: 15	Contact h. : 450h

Programme Aims	Programme ILOs																				
	AI														AII						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7
1											*	*		*	*	*	*	*	*	*	*
2																					
3	*	*	*	*	*	*	*	*	*	*											
4																					
5																					
6													*								
7																					

Programme Aims	Programme ILOs																	
	AII																	
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	*	*	*	*	*	*						*	*	*	*	*	*	
2							*	*	*	*	*							

3																		
4																		
5																		*
6																		
7																		

Programme Aims	**Programme ILOs**																	
	AII		**B1**	**B2**	**B3**	**B4**	**B5**	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**D1**	**D2**	**D3**	**D4**	**D5**
	26	**27**																
1																		
2																		
3																		
4	*																	
5																		
6		*						*	*	*	*	*						
7			*	*	*	*	*						*	*	*	*	*	*

Programme Aims	**Programme ILOs**			
	D6	**D7**	**D8**	**D9**
1				
2				
3				
4				
5				

6				
7	*	*	*	*

Course title	Programm ILOs																			
	B					C						D								
Course title	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5	6	7	8	9
Medical Biochemistry & Molecular Biology **(Advanced level)**	All •	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	All •	•
Elective course																				
1- Reproductive biochemistry			•		•											•	•	•	•	•
2- Nutritional biochemistry			•		•											•	•	•	•	•
3-Organ system function assessm						•	•	•	•							•	•	•	•	•

Course title																																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Medical Biochemistry & Molecular Biology **(Advanced level)**																																						
1st part Course																																						
1- Genetics	•	•	•	•	•	•	•																															
2- Special topics											•	•	•	•																								
2nd part Course																																						
Modlule1															•	•	•	•	•														•	•				
Module 2																				•	•	•	•	•	•	•												
Module3																											•	•	•	•	•	•						
Module4																																			•	•	•	•

jCourse title	Programm ILOs		
	All		
	25	26	27
Elective course			
1- Reproductive bioch	•		
2- Nutritional biochem		•	
3-Organ system functi assessment			•

IV. programme admission requirements:

●General requirements:

By laws regulating post graduate Studies.

V. Regulations for progression and programme completion:

First part :

- **Minimally accepted attendance is 75%.**

Second part

1- Attendance Criteria:

-Minimally accepted attendance in each course is 75%.

2-Log book :

-for attending

- Conferences: at least 3 conferences
- Seminars: at least 75% of biochemistry department seminars
- Workshops: at least 2 workshops related to the research field

-The log should be fulfilled and signed by Head of the department.

3-Practical work:

-lab rotation according to the schedule determined by the supervisors

4- Seminars:

-At least 2 seminars in topics determined by the supervisors must be prepared and presented by each candidate.

5- PhD Thesis

-At least 75% of thesis discussed in the department

Assessment method:

1st part exam:

Genetics	Written exam (80 mark)	MCQ (20 mark)
Special topics in medical	Written exam (80 mark)	MCQ (20 mark)

biochemistry and molecular biology		

2nd part exam

Advanced medical biochemistry and molecular biology	Written exam	MCQ	oral	practical	total
	80 + 80	40	100	100	400
Elective course	48	12	------	------	60

I) MCQ assessment (four exams every 6 months after1st part exam.).
II) Final written exam
-1st part (paper and paper 2):
After 6 months from PhD registration
-2nd part (paper1, paper 2 and elective course paper):
After 36 months from PhD registration.
III) Final Practical exam (OSPE): five stations exam.
IV) Final oral exam (OSCE): Five stations exam.

Percentage of each Assessment to the total mark:

Written exam: **50%**
Practical exam: **25%**
Oral exam: **25%**
Other assessment without marks: practical tests and exam, seminars and log book assessment are requirement of the 2nd part exam.

VI. Evaluation of Programme's intended learning outcomes (ILOs):

Evaluator	Tools*
Internal evaluators : 1- **Dr/** Lamiaa Elmetwally Elabbasy 2-Prof. Ayman El-Baz (Head of the Department)	Observation Questionnaire Workshops Group discussion

External Evaluator**:** **Prof. Dr/Mohammed Saed Elsayed Oraby** **Faculty of Medicine,AlAzher University**	Questionnaire Communication Email
Senior student **:** **None**	
Alumni: **None**	
Stakeholder: **None**	

We certify that all information required to deliver this programme is contained in the above specification and will be implemented. All course specification for this programmeare in place.	
Programme coordinator: **Dr/** Lamiaa Elmetwally Elabbasy	Signature & date:
Dean: Name: Prof Dr/ El-Said Abd-el-Hady	Signature & date:
Executive director of the quality assurance unit: Name: Prof. / Nesreen Salah	Signature & date: