

## Course Specification

University: Al-Azhar

Faculty: Medicine

Department: **Medical Biochemistry**

### 1- Data of the course:

<b>Code of the course:</b> 201-Bio	<b>Title of the course:</b> medical biochemistry 2 <sup>nd</sup> course for MBBCh program	<b>Year:</b> 2 <sup>nd</sup> year of MBBCh program
<b>Specialty:</b> medical biochemistry	Number of teaching units: 12	Lectures: 150 hours    Total: 200 hrs Practical: 50 hours

<b>2-Objectives of the course:</b>	<p>II) The aim of this course is to enable the students to:</p> <ol style="list-style-type: none"> <li>1) Understand at molecular level the complex chemical structures and accompanying reactions that determine the biological processes.</li> <li>2) Integrate biochemical data with the ongoing basic medical sciences.</li> <li>3) Develop the basic scientific research skills as well as effective communication and team work attitudes.</li> </ol>
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### 3- ILOs

<b>A-Knowledge and understanding:</b>	By the end of the course the student will be able to:	
	Description	
	1.1.1	Describe anabolic pathways. The fate of dietary components after digestion and absorption and the metabolic pathways taken by individual molecules, their interrelationships, and the mechanisms that regulate the flow of metabolites through the pathways.
	1.1.2	Describe absorption of carbohydrates, active and passive mechanisms and factors inhibiting it.
	1.1.3	Describe different catabolic pathways of glucose, functions, regulation and medical aspects.
1.1.4	Describe different anabolic pathways of glucose, functions, regulation and medical aspects.	

	1.1.5	Describe glycogen metabolism.
	1.1.6	Describe metabolism of other hexoses: galactose and mannose.
	1.1.7	Describe blood glucose, level, regulation, determination and diabetes mellitus.
	1.1.8	Describe metabolism of other hexoses, pathway, importance, regulation, and clinical aspects.
	2.1.1	Describe Reactions occurring within the mitochondria and different types of oxidation and reduction.
	2.1.2	Describe what does oxidation mean?
	2.1.3	Describe classification of oxido-reductases
	2.1.4	Describe respiratory chain.
	2.1.5	Describe transport of substances into and out of the mitochondria
	2.1.6	Describe oxidative phosphorylation
	2.1.7	Describe inhibitor of respiratory chain
	2.1.8	Describe superoxide metabolism
	2.1.9	Describe shuttle mechanisms (glycerophosphate and malate aspartate shuttles).
	3.1.1	Describe different catabolic pathways of lipids, their functions, regulation and medical aspects.
	3.1.2	Describe different anabolic pathways of lipids, their functions, regulation and medical aspects.
	3.1.3	Describe digestion and absorption of lipid
	3.1.4	Describe Storage and mobilization of lipids.
	3.1.5	Describe lipogenesis (triglycerides synthesis)
	3.1.6	Describe lipolysis, mechanism, regulation and causes of excessive lipolysis.
	3.1.7	Describe fatty acid oxidation, types, functions, pathways and diseases related.
	3.1.8	Describe eicosanoids, structure, functions and deficiency.
	3.1.9	Describe metabolism of conjugated lipids pathways and

	diseases related.
3.1.10	Describe ketone bodies, types, functions, ketogenesis, Ketolysis, regulation, ketonemia, ketonuria and ketosis.
3.1.11	Describe cholesterol metabolism, synthesis, functions, regulation, blood cholesterol and causes of hyper & hypocholesterolemia.
3.1.12	Describe plasma lipoproteins, types, methods of separation, metabolism of each, and related diseases.
3.1.7	Describe apolipoproteins, types and importance.
3.1.13	Describe plasma lipoproteins and atherosclerosis.
3.1.14	Describe fatty liver, definition and causes.
3.1.15	Describe functions of lipids in relation to human body.
4.1.1	Describe General pathways for amino acid catabolism.
4.1.2	Describe Metabolic pathways of individual amino acids.
4.1.3	Describe Protein turn over and diseases related to protein metabolism.
4.1.4	Describe absorption and transport of amino acids
4.1.5	Describe general pathways for amino acid catabolism⊕ (transamination, deamination transdeamination and decarboxylation).
4.1.6	Describe nitrogen catabolism ammonia and urea formation
4.1.7	Describe catabolism of amino acids carbon chains.
4.1.8	Describe nitrogen catabolism ammonia and urea formation
4.1.9	Describe metabolism of amino acid carbon chain.
4.1.10	Describe metabolic pathways of individual amino acids including synthesis of physiologically important compounds derived from them and abnormalities in amino acid metabolism.
4.1.11	Describe protein turn over and nitrogen balance
4.1.12	Describe diseases related to protein metabolism
4.1.13	Describe neurotransmitters, types and mode of action.
4.1.14	Describe techniques used in the separation, purification and characterization of compounds of biochemical interest

	(chromatography, electrophoresis, precipitation, ultracentrifugation and dialysis).
5.1.1	Describe the hormonal actions, effect, site of secretion and factors affecting it.
5.1.2	Describe classification of hormones
5.1.3	Describe mechanism of action of hormones
6.1.1	Interconversion of food stuffs.
6.1.2	Fuels used by tissues.
6.1.3	Fed starvation cycle
7.1.1	Immunoglobulins: types, functions and basic structure.
7.1.2	Antigens, properties and structure
7.1.3	Principles of antigen – antibody reactions.
8.1.1	Describe heme synthesis, mechanism, regulation and related diseases.
8.1.2	Describe types of hemoglobin, factors affecting its functions, derivatives and hemoglobinopathies.
8.1.3	Describe heme catabolism, mechanism and related diseases.
8.1.4	Describe techniques used in the separation of hemoglobin.
9.1.1	Describe composition and functions of blood and lymph.
9.1.2	Describe composition and functions of Urine.
9.1.3	Describe composition and functions of Milk
9.1.4	Describe composition and functions of semen and lymph.
9.1.5	Describe composition and functions of Cerebrospinal fluids.
9.1.6	Describe composition and functions of Amniotic fluid.
9.1.7	Describe composition and functions of Sweat and tears, vitreous humor and synovial, ascetic and pleural fluids.
9.1.8	Describe composition and functions of blood and lymph.
10.1.1	Sources functions, deficiency and metabolism of calcium metabolism
10.1.2	Sources functions, deficiency and metabolism of phosphorus metabolism

	10.1.3	Sources functions, deficiency and metabolism of magnesium metabolism
	10.1.4	Sources functions, deficiency and metabolism of sodium metabolism
	10.1.5	Sources functions, deficiency and metabolism of potassium metabolism
	10.1.6	Sources functions, deficiency and metabolism of chloride metabolism
	10.1.7	Sources functions, deficiency and metabolism of iron metabolism
	10.1.8	Sources functions, deficiency and metabolism of trace elements.
	11.1.1	Classify functional blood enzymes.
	11.1.2	Classify non functional enzymes of medical and clinical importance.
	12.1.1	Describe energy value of foods, distribution of calories in the diet.
	12.1.2	Describe causes and dangers of obesity.
	12.1.3	Describe the basal metabolic rate,
	12.1.4	Describe functions of nutrients (diet)
	12.1.5	Describe body mass index.
	12.1.6	Describe nutrient requirements in human.
	12.1.7	Describe the recommended dietary allowance (RDA).
	12.1.8	Describe factors affecting nutrients requirements.
	12.1.9	Describe adequacy of diet.
	12.1.10	Describe energy requirements in human.
	12.1.11	Describe estimation of energy requirements.
	12.1.12	Describe macronutrients requirements in human.
	12.1.13	Describe micronutrients requirements in human.
	12.1.14	Describe dietary Recommendations.

<b>B-Intellectual Skills:</b>	<p>At the end of the course the students should able to:</p> <ol style="list-style-type: none"> <li>1) Assess the acid base state of an individual from his blood gases report.</li> <li>2) Interpret the results of biochemical tests to identify pathological constituents of urine, semen, enzymes of clinical importance.</li> <li>3) Identify and interpret bands of chromatography and electrophoresis and comment on them.</li> <li>4) Identify and interpret DNA bands separated by PCR.</li> </ol>
<b>C-Professional Skills:</b>	<p>At the end of the course the students should able to:</p> <ol style="list-style-type: none"> <li>1) Measure the biochemical parameter in blood as glucose, total proteins, cholesterol by colorimetry (level 5 competence).</li> <li>2) Perform some chemical tests to identify pathological constituents of urine (level 5 competence).</li> <li>3) Perform chemical tests to identify the action of rennin on milk clotting.</li> <li>4) Perform some chemical tests to identify chemical constituents of urinary calculi (level 5 competence).</li> </ol>
<b>D-General Skills:</b>	<p>At the end of the course the students should able to:</p> <ol style="list-style-type: none"> <li>1) Follow the rules of the lab.</li> <li>2) Appreciate the danger of handling chemical reagents on people and environment.</li> <li>3) Co-operate with others and help them.</li> <li>4) Present clearly and effectively a scientific topic (using computer facilities) in tutorial or a staff meeting or at the yearly scientific day.</li> <li>5) Deal with all staff and co-staff respectively, regardless of degree or occupation.</li> <li>6) Work effectively in groups.</li> <li>7) Maintain the professional image concerning behavior, dress, speech and communications.</li> <li>8) Maintain responsibility towards work.</li> </ol>

<b>4-Course Content:</b>	IV) Theoretical Course Contents:					
	Ser.	Subjects	Lectures hours	Practical and small group hours	Total hours	% total hours
	1	Basic concepts of metabolism and Carbohydrate metabolism	25	10	35	17.5%
	2	Bioenergetics and Biologic oxidation	10	2	12	6%
	3	Lipids metabolism	25	10	35	17.5%
	4	Amino acid metabolism	25	10	35	17.5%
	5	Hormones and biosignaling	5	2	7	3.5%
	6	Integration of metabolism	10	3	13	6.5%
	7	Immunochemistry	15	4	19	9.5%
	8	Heme metabolism	10	4	14	7%
	9	Body fluids	10	2	12	6%
	10	Minerals metabolism	15	3	18	9%
	11	Clinical enzymology				
	12	Clinical nutrition				
Total		150	50	200	100%	

<b>5-Methods of teaching:</b>	<ul style="list-style-type: none"> <li>A. Lectures</li> <li>B. Practical classes.</li> <li>C. Sinai group teaching (tutorials)</li> <li>D. A yearly scientific day for students in the form of student's presentations. The titles of the subjects are determined during several meeting with staff.</li> </ul>
<b>6-Methods of teaching of handicaps</b>	Not present

### 7- Students evaluation and assessment:

<b>A-Method of assessment:</b>	<p>I. <u>Attendance criteria:</u> The minimum acceptable attendance in the practical and tutorial classes is 75%. Students fail to attend the required percentage will not be allowed to attend the final practical exam.</p> <p>II. <u>Assessment tool:</u></p> <table border="1"> <thead> <tr> <th>Tool</th> <th>Purpose</th> </tr> </thead> <tbody> <tr> <td>Written examination</td> <td>Assessment of knowledge and understanding</td> </tr> <tr> <td>Practical examination</td> <td>Assessment of practical, intellectual and general skills</td> </tr> <tr> <td>Oral examination</td> <td>Assessment of knowledge and understanding</td> </tr> <tr> <td>Log book</td> <td>Assessment of sharing in the scientific day (once a year) and the overall activities during the academic year.</td> </tr> </tbody> </table>	Tool	Purpose	Written examination	Assessment of knowledge and understanding	Practical examination	Assessment of practical, intellectual and general skills	Oral examination	Assessment of knowledge and understanding	Log book	Assessment of sharing in the scientific day (once a year) and the overall activities during the academic year.
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<b>B-Time of assessment</b>	<ul style="list-style-type: none"> <li>A. Continuous assessments throughout the whole year</li> <li>B. Formative examination: Midyear exam: February. (Student knows his marks after the formative exam).</li> <li>C. Final examination: In June. Those who fail to pass the final exam or postpone it can enter the final exam re-held in September.</li> </ul>										



<b>C-Allocated marks/Distribution</b>	<b>III. <u>Grading system:</u></b>		
	<i>Examination</i>	<i>Marks allocated</i>	
	<i>Formative examinations</i>	<i>30</i>	
	<i>Final examination</i>	<i>Written</i>	<i>90</i>
		<i>Oral</i>	<i>15</i>
		<i>Practical</i>	<i>15</i>
<i>Total</i>	<i>150</i>		
The minimum passing score is 90 marks, provided at least 30 marks are obtained in the written exam.			

### **8- Teaching books, notebooks, and references:**

-Books/Notebooks:	A. Harper's illustrated biochemistry. B. Lippincott illustrated reviews of biochemistry. C. Oraby's illustrated review of biochemistry. D. Textbook of biochemistry with clinical correlations, 5 <sup>th</sup> Ed, Devlin TM Ed. Wiley-Liss, New York, 2002.
-References:	

**Head of the department**

**Course Coordinator:**