



**Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department**

University of Warith Al-Anbiyaa College of Medicine

Academic Program Description Form

BIOCHEMISTRY

2024

وزارة التعليم العالي والبحث العلمي
جهاز الاشراف والتقويم العلمي
دائرة ضمان الجودة والاعتمادية
الاكاديمية

استمارة وصف البرنامج الاكاديمي للكليات والمعاهد

الجامعة وارث الانبياء
الكلية/ المعهد: الطب
القسم العلمي: الكيمياء
الحياتيه والطبيه

تاريخ الانجاز الملف: 20/4/2024



التوقيع:

اسم المعاون العلمي:

أ.د علي منصور جاسم

التاريخ: ٢٠٢٤/٤/٢٠



توقيع:

اسم رئيس القسم:

م د رياض عبد الرسول حنيوه

التاريخ: ٢٠٢٤/٤/٢٠

دقق الملف من

قبل شعبة ضمان الجودة

والاداء الجامعي

اسم مدير شعبة ضمان الجودة والأداء الجامعي:

التاريخ:

التوقيع:



مصادقة السيد العميد
الطبيب الاخصائي
أ.د علي عبد مطهر الفزري



وصف البرنامج الاكاديمي

كلية الطب / جامعة وارث الأنبياء	1. المؤسسة التعليمية
الكيمياء الحياتيه والطبيه	2. القسم العلمي / المركز
الكيمياء الحياتيه والطبيه	3. اسم البرنامج الاكاديمي
طب وجراحة عامة	4. اسم الشهادة النهائية
سنوي	5. النظام الدراسي : سنوي /مقررات /أخرى
WFME	6. برنامج الاعتماد المعتمد
	7. المؤثرات الخارجية الأخرى
20/4/2024	8. تاريخ إعداد الوصف
9. أهداف البرنامج الاكاديمي	
<p>تعريف الطالب بدراسة التركيب الكيماوي لجسم الانسان والتغيرات التي تحدث في هذا التركيب في الحالة الطبيعية والحالات المرضية. اجراء بعض التجارب المختبرية على بعض مركبات الجسم الطبيعية مع إجراء تجارب أخرى بسيطة للكشف عن بعض الحالات المرضية. ربط النتائج المختبرية في مجال الكيمياء الحياتية بتشخيص الأمراض.</p> <p>وضع أساس علمي بحث على أن مادة الكيمياء هي أساس العلوم وتثقيف الطالب وتعليمه كيفية التعامل مع الادوات والاجهزة المختبرية واطلاعه على مبادئ أساسية لمختبرات تحاليل أخرى وكذلك جعل مادة الكيمياء الحياتية مهمة في دعم الاختصاصات الاخرى ودعم نشاط الطلبة العلمي في مضمار الكيمياء ودفع الاطباء لآكمال دراستهم العليا في هذا المجال.</p>	

10. مخرجات البرنامج المطلوبة وطرائق التعليم والتعلم والتقييم

1- الأهداف المعرفية

- أ-1 الحصول على المعلومات الأساسية لعلم الكيمياء الحياتية
أ-2 توفير قاعدة واسعة من المعرفة والفهم لمختلف أنواع العمليات الأيضية والتغيرات البيوكيميائية
أ-3 تطوير مهارات الحصول على المعلومات
أ-4 تشجيع وتدريب الطالب حول كيفية التعامل مع الحقائق العلمية التي تخص هذا المجال
أ-5 تشجيع الطلبة على الاستنتاج وتفسير النتائج وكيفية عرضها ومناقشتها.

طرائق التعليم والتعلم

طرائق التقييم

ب - الأهداف المهاراتية الخاصة بالبرنامج

- ب 1 - استخدام التطبيقي للمادة العلمية في مجال علم الكيمياء الحياتية
ب 2 - التعرف على مختلف أنواع العمليات الأيضية والتغيرات البيوكيميائية
ب 3 - التعرف على الاستخدام الامثل للتحاليل الكيميائية في تشخيص مختلف الأمراض
ب 4- التعرف على طرق عمل التحاليل الكيميائية
ب-5 التعرف على عمل للتحاليل الكيميائية والتفاعلات بينها.

طرائق التعليم والتعلم

القاء المحاضرات النظرية باستخدام تقنيات العرض المتوفرة (أجهزة العرض و السبورة الذكية)
واستخدام التعليم الإلكتروني في المختبر

طرائق التقييم

1. امتحانات نظرية (شهرية + نصف السنة + نهاية السنة)
2. امتحانات قصيرة
3. امتحان العملي : OSPE (امتحان شفهي , امتحان المهارة , امتحان للمعلومات العملية)

ج- الاهداف الوجدانية والقيمية:

- ج- 1 الحفاظ على سرية المعلومات الشخصية للمريض
ج- 2 الحرص على عمل التحاليل التي يحتاجها المريض
ج- 3 الامانة بالعمل وعدم تجريح الكسب المادي على الجانب الاخلاقي للمهنة

طرائق التعليم والتعلم

- اعطاء تعليمات وتوجيهات تخص سلوكيات واهداف المهنة الطبية -
الاطلاع الميداني على الطرق العملية للتعامل مع المرضى في مواقع العمل -
عرض افلام وفيديوهات تثقيفية تخص الاهداف الوجدانية والقيمية

طرائق التقييم

- تضمين اسئلة شفوية ونظرية في الامتحانات اليومية والفصلية تخص ادأب وسلوكيات المهنة و
الاستخدام الامثل للتحاليل الكيميائية المختلفة.
-اعداد سمنارات تخص موضوع مختلف أنواع العمليات الأيضية والتغيرات البيوكيميائية

د -المهارات العامة والتأهيلية المنقولة (المهارات الاخرى المتعلقة بقابلية التوصيف والتطور الشخصي).

- د-1 كتابه التحاليل الكيميائية اعتمادا على التشخيص الصحيح
د-2 تعلم كتابة لتحاليل الكيميائية حسب و اختيار التحليل
المناسب لكل حالة مرضية
د-3 تعلم طرق التعامل مع زملاء العمل والمرضى.
د-4 اكتساب مهارات ادارة المختبر.

طرائق التعليم والتعلم

- التدريب على معرفة مختلف أنواع لمختلف أنواع العمليات الأيضية والتغيرات
البيوكيميائية
-اعطاء محاضرات تتضمن توجيهات عامة عن ادارة المختبر ووسائل الاتصال.

طرائق التقييم				
<p>امتحانات الOSPE العملية. التدريب على كتابة التقارير او السمنارات تضمين الامتحانات بالأسئلة النظرية متعلقة بوسائل الاتصال مع المرضى وزملاء العمل</p>				
11. بنية البرنامج				
الساعات المعتمدة		اسم المقرر أو المساق	رمز المقرر أو المساق	المرحلة الدراسية
عملي	نظري			
40	60	الكيمياء الطبيه		الاولى
40	60	الكيمياء الحياتيه		الثانيه

12. التخطيط للتطور الشخصي
<p>- تعزيز مهارات التعلم الذاتي . -التدريب على التقنيات الإلكترونية للحصول على المعلومات Technology Internet . -تعزيز مهارات التعلم الجماعي . -تعزيز مهارات القدرة على القيادة وتحفيز الاخرين .</p>
13. معيار القبول (وضع الأنظمة المتعلقة بالالتحاق بالكلية أو المعهد)

القبول مركزي عن طريق خطة سنوية توضع من قبل وزارة التعليم العالي والبحث العلمي وتستحدث سنويا طبقا لنتائج

الامتحانات المركزية للدراسة الإعدادية وعادة يكون القبول ضمن المجموعة الطبية للمعدلات العالية (أكثر من % 98 .)

14. أهم مصادر المعلومات عن البرنامج

-الكتاب المنهجي المقرر:

1- Textbook of BIOCHEMISTRY
for Medical Students

2- Quick Review of Biochemistry for Undergraduates Questions and Answers

3-CLINICAL BIOCHEMISTRY & METABOLIC MEDICINE

مخطط مهارات المنهج

يرجى وضع اشارة في المربعات المقابلة لمخرجات التعلم الفردية من البرنامج الخاضعة للتقييم

مخرجات التعلم المطلوبة من البرنامج

المهارات العامة والتأهيلية (المنقولة) المهارات الأخرى المتعلقة بقبالية التوظيف والتطور (الشخصي)				الأهداف الوجدانية والقيمية				الأهداف المهاراتية الخاصة بالبرنامج				الأهداف المعرفية				أساسي أم اختياري	اسم المقرر	رمز المقرر	السنة/ المستوى
4		2	1	4	3	2	1	4	3	2	1	4	3	2	1	أساسي	علم الكيمياء الطبيه		
√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	اساسي	علم الكيمياء الحياتيه		

biochemistry course 1st year

1W	Chemistry of Carbohydrates (I)	Define carbohydrates, Classification of carbohydrates types, Stereoisomerism and stereoisomers, types of carbohydrates stereoisomers, Explain optical isomers, D and L isomers, α and β isomers, Outline the meaning of glycosides, Mention their medical importance.	Lec1
		Define aminosugars, Indicate the biomedical importance, Reactions of carbohydrates, Name the oxidation products of glucose, and Identify the reduction products of glucose and fructose	Lec2
		Draw the structure of 3 disaccharides of biological importance, State the biomedical importance of maltose and lactose.	Lec3
2W	Chemistry of Carbohydrates (II)	Examples of polysaccharides, Describe the structure of starch, the role of α -amylase enzyme on starch hydrolysis, Differentiate among inulin, cellulose, dextran and glycogen, Distinguish among Dextrose, Dextrin and Dextran, State the biochemical importance of glycogen, Define Agar and its biomedical importance, Draw the repeated unit of cellulose, state its biomedical importance.	Lec4
		Define mucopolysaccharides and glycosaminoglycans, Explain the biomedical importance of hyaluronic acid, heparin, dermatan sulfate, keratan sulphate and chondroitin sulphate, types of mucopolysaccharides	Lec5
		Name the sugars included in blood group substances, Illustrate the essential difference between glycoproteins and mucoproteins, List common sugar substitutes	Lec6
3W	Chemistry of Lipids (I)	Define lipids, state the biochemical importance of lipids, Classify the types of lipids, Identify the types of fatty acids, Classify fatty acids, Describe essential fatty acids, Write on natural lipids (fat, oil and waxes), Explain the biochemical and clinical use of glycerol, Differentiate between saturated and unsaturated fatty acids.	Lec7
		Indicate the sources of Trans fatty acids (TFA), Explain how TFA affects risk factors, Name The carbon atoms of glycerol	Lec8
		Illustrate the transport and hydrolysis of TG by different lipase enzymes, Discuss the rancidity of fats, Identify the markers for rancidity,	Lec9

		(hexanal and peroxide), and Review the method rancidification.	
4W	Chemistry of Lipids (II)	Micelles role in the digestion and absorption of lipids, Define phospholipids, list the types of phospholipids, Demonstrate the biochemical role of Lecithine, Cephaline, phosphatidyl inositol and sphingomyelins, Compare the different phospholipases enzymes, Define Eicosanoids, Explain with diagram the synthesis of prostaglandins, thromboxans and leukatriens, List the biochemical role of prostaglandins, thromboxans and leukotriens.	Lec10
		Define lipoproteins, name the types of lipoproteins, and discuss the function of each lipoprotein, Explain the sources of cholesterol, transport the dietary cholesterol into the tissues, function of free cholesterol inside the cell, enzymes participate in cholesterol esterification, importance of cholesterol esterification.	Lec11
		Explain the Lipid bilayers and their properties. Plasma Membrane, structure Types of transport process, Demonstrate the Solute transport mechanisms, Membrane transport facilitators, Cotransport: Symport, Antiport, Endocytosis and Exocytosis Discuss the Membrane dynamics and membrane channels	Lec12
5W	Chemistry of Amino acid	Define amino acids, essential and non- essential amino acids, List the aliphatic, aromatic, acidic and basic amino acids. Name essential amino acids, Classify amino acids based on structure, based on side chain character, based on metabolic fate, based on nutritional requirements, Describe the basic structure and general properties of amino acids, Explain the Isoelectric point	Lec13
		State amino acids properties, Select amino acids which produce specific biological compounds, Explain the biomedical importance of amino acids decarboxylation, Define transamination. State the clinical value of transamination, List the reactions due to carboxyl group, reactions due to amino group and reactions of SH group, Match the clinical applications to the type of amino acids, Account for some of the typical properties of amino acids (e.g., high melting points, solubility in water) in terms of zwitterion formation.	Lec14

		<p>Illustrate disulfide bond formation, Explain disulfide bond importance, Define peptide bond, dipeptide, tripeptide and polypeptide, expressing how they are formed? Draw and name, the six possible isomeric tripeptides that can be formed by combining three different amino acid residues (amino acid units) of given structure, Illustrate the formation of a disulfide linkage between two cysteine residues, and how such bonds can link together two separate peptide chains or can provide a bridge between two cysteine residues present in a single peptide molecule</p>	Lec15
6W	Chemistry of Proteins	<p>State the different structural organization of proteins, Describe the basic structure of protein, including both simple and conjugated proteins, Give example on the protein's structure-function relationship, Describe the main physical properties of proteins</p>	Lec16
		<p>Classify proteins, select suitable examples of such group, Describe the basic structure of simple and conjugated proteins, Differentiate fibrous proteins and globular proteins; Give an example of the primary structure of a protein.</p>	Lec17
		<p>Discuss the function and clinical significance of proteins, Review general causes of abnormal serum or plasma protein concentration, and Explain the non-pathological factors that influence serum or plasma protein concentration.</p>	Lec18
7W	Chemistry of Nucleotides and Nucleic acid (I)	<p>List and illustrate the main bases present in the nucleic acids, Distinguish between purine and pyrimidine bases. Give examples on purine and pyrimidine bases, List the types of purine and pyrimidine bases, Define the purine and pyrimidine bases, State the nitrogenous bases involved in nucleosides and nucleotides formation, Describe the formation of nucleoside and nucleotide, Differentiate between nucleotides and nucleosides, Explain the properties of nucleotides and nucleosides.</p>	Lec19
		<p>Identify, in general terms, the enzymatic hydrolysis products of nucleosides, Draw the general structure of a nucleoside, Indicate the nitrogen atom by which a given purine or pyrimidine base attaches to the sugar component in the nucleosides.</p>	Lec20

		Identify, in general terms, the enzymatic hydrolysis products of nucleotides, Draw the general structure of a nucleotide, Indicate the nitrogen atom by which a given purine or pyrimidine base attaches to the sugar component in the nucleotides	Lec21
8W	Chemistry of Nucleotides and Nucleic acid (II)	Define nucleic acids, Classify nucleic acids, Identify types of nucleic acids , Describe the differences in the structure and function of DNA and RNA, Draw the structure of RNA, Differentiate between primary and secondary structures of DNA, Describe the three types of RNA in relation to their structure and function, Explain the structural difference between the sugar components in DNA and in RNA	Lec22
		Identify by name the four heterocyclic amine bases found in DNA and RNA. Sketch a section of nucleic acid to show how the nucleotide units are joined together, Indicate the main biochemical roles of DNA and RNA in human body. Discuss transcription, translation and replication.	Lec23
		Outline the relationship between nucleic acids, nucleotides and nucleosides, Outline basic protein synthesis, Explain the denaturation of protein, Explain DNA technology used in the prenatal diagnosis of sickle cell anemia, PCR is the method of choice or use Hemoglobin electrophoresis or immunoassay method.	Lec24
9W	Chemistry of Enzymes (I)	Define enzymes, List the property of enzymes, Write on specificity of enzymes, Demonstrate the different types of enzyme specificity, Give an example on each type, Explain the mechanism of action of enzymes	Lec25
		Classify the enzymes according to IUB system, Give an example of enzyme on each class, Relate each enzyme to its class, Define different glossary as: cofactor, coenzyme, holoenzyme, etc	Lec26
		Define Isoenzymes, give examples. Enumerate Co-enzymes and Co-factors. Name some group transferring Co-enzymes; Name some hydrogen transferring Co-enzymes	Lec27
10W	Chemistry of Enzymes (II)	State and Enumerate the important factors influence enzyme activity, Apply Michaelis-Menten equation. Define km value, Explain the importance of km in enzyme action, Explain in	Lec28

		<p>detail the factors affecting the velocity of a reaction.</p> <p>Review the different types of enzyme inhibition. Explain with examples, Discuss with diagram and example the competitive and non-competitive enzyme inhibition, State the clinical importance of each of competitive and noncompetitive enzyme inhibition, Compare among different types of enzymatic inhibition mechanism, Explain feedback inhibition, Describe suicide inhibition with example, Define allosteric inhibition, features and mechanism with examples.</p> <p>Illustrate the covalent modification of enzymes, Demonstrate the importance of the covalent modification of enzymes with examples, Explain the mechanism of allosteric regulation using phosphofructokinase as an example, Define induction. Give an example, Discuss the constitutive enzyme, its repression, and give an example</p>	<p>Lec29</p> <p>Lec30</p>
11W	Chemistry of Vitamins and Coenzymes	<p>Define the micro and macronutrients, Classification of vitamins, State the sources of different vitamins, Watersoluble vitamins, Fat-soluble vitamins Biochemical functions, properties, active forms, coenzymes, Explain the causes of vitamins deficiency and their manifestations.</p>	<p>Lec31</p> <p>Lec32</p> <p>Lec33</p>
12W	Chemistry of Biological oxidation	<p>Define the oxidative phosphorylation, Explain the ATP production for the common metabolic pathway, and Outline the Non-ETC oxygen-consuming reactions</p>	<p>Lec34</p> <p>Lec35</p> <p>Lec36</p>
13W	Electron transport chain	<p>Define the electron transport chain Explain the Complex I: NADH–Coenzyme Q Reductase, Explain the Complex II: Succinate–Coenzyme Q Reductase, Explain the Complex III: Coenzyme Q– Cytochrome c Reductase , Explain the Complex IV: Cytochrome c Oxidase.</p>	<p>Lec37</p> <p>Lec38</p> <p>Lec39</p>
14W	Chemistry of Hormones	<p>Classification of hormones, Second messengers and Gproteins, Mechanisms of hormonal action and signaling molecules.</p>	<p>Lec40</p> <p>Lec41</p> <p>Lec42</p>
15W	Chemistry of Bioenergetics	<p>What is bioenergetics with their sources? Explain the terms free energy, entropy, enthalpy, exergonic, and endergonic, State the first and second laws of thermodynamics and understand how they apply to biologic systems, How does the energy converted to different</p>	<p>Lec43</p>

		forms? How do chemical energy source metabolized? Where does the bioenergetics conversion take place? What is cellular respiration?	
		Appreciate how reactions that are endergonic may be driven by coupling to those that are exergonic in biologic systems, Understand the role of high-energy phosphates, ATP, and other nucleotide triphosphates in the transfer of free energy from exergonic to endergonic processes, enabling them to act as the “energy currency” of cells	Lec44
		Bioenergetics calculations.	Lec 45

Syllabus of Course in ((unite one “Biochemistry subject”)) For First year

Week	Topics	Details
1	Overview of Metabolism	Metabolism, catabolism and anabolism, Metabolic pathways and control mechanisms Metabolic profile of organs, Digestion and Absorption of Carbohydrates, Transport of monosaccharides, Glucose transporters, Insulin effect on different transporters.
2	Carbohydrate Metabolism (Glycolysis)	Steps and key enzymes of glycolysis, Aerobic and anaerobic glycolysis, pyruvate and lactate as end products of glycolysis, Calculation of energy obtained by glycolytic pathway, Inhibitors of glycolysis, Comparison of hexokinase and glucokinase, Factors affecting glycolysis, regulation, Catabolism of monosaccharaides and disaccharides.
3	Oxidative Decarboxylation of Pyruvate	Pyruvate dehydrogenase complex, enzymes and coenzymes, Fate of pyruvate , acetyl-CoA biosynthesis, regulation of pyruvate dehydrogenase complex, Citric acid cycle or tricarboxylic acid cycle, Biochemical roles, Enzymatic steps Regulation, energetic and inhibitors of TCA cycle.
4	Gluconeogenesis	Definition and Importance, Reactions and irreversibility, Hormonal regulation, Factors affecting gluconeogenesis, Pentose Phosphate Pathway, Two phases of pentose phosphate pathway or hexose mono-phosphate shunt (HMP-shunt), oxidative and interconversion phase, Biochemical significance of HMP-shunt in certain tissues, Biosynthesis of NADPH and ribose-5-phosphate.

5	Glycogen Metabolism, Regulation	Glycogen biosynthesis (glycogenesis), steps, key enzymes, Glycogen degradation (glycogenolysis), steps, key enzymes, Regulation of each of glycogenesis and glycogenolysis. Hormonal and allosteric regulation of glycogenesis and glycogenolysis
6	Digestion and Absorption, Storage and Mobilization of fats	Digestion of lipid, lingual and gastric lipase, Pancreatic lipase and formation of micelle, Role of bile salts and bile acids, emulsification of fats, Absorption of lipid from intestinal cells and release as chylomicron into lymphatic system. Site and biosynthesis of TAG: liver and adipose tissues, Steps and regulation of storage of fats.
7	Lipid Metabolism	β -Oxidation of Fatty acids, Transportation of fatty acids into mitochondria, β -Oxidation of fatty acid, steps, energetic, regulation, Saturated, unsaturated and odd carbon fatty acid oxidation, Lipolysis : steps and key enzyme, Hormone sensitive lipase, regulation of lipolysis.
8	Ketone Body Metabolism	Ketogenesis, site, steps, Ketolysis, site, steps for utilization, ketonemia, ketonuria, Regulation of ketogenesis and ketolysis, Starvation and ketosis. Fatty Acid Biosynthesis, Transportation of acetyl-CoA from mitochondria into the cytosol.
9	Fatty acid synthase complex	Energetics, mechanism of regulation of fatty acid biosynthesis, Elongation reactions of palmitic acid, desaturation of fatty acids, Polyunsaturated fatty acids.
10	Phospholipids, Triacylglycerol Metabolism	Cholesterol Metabolism, Regulation, Bile Acids, Structure, sources, distribution, and balance in tissues. Cholesterol biosynthesis, Key enzyme, HMG-CoA reductase and regulation. Factors regulating cholesterol biosynthesis and degradation, Bile acid and bile salts.
11	Lipoprotein Metabolism	Hyperlipoproteinemia, Transport of lipids, lipoproteins, Classification and functions of lipoproteins and apoproteins, Metabolism and degradation of chylomicron and VLDL. Metabolism and uptake of LDL, HDL metabolism, Ethanol Metabolism

12	<p style="text-align: center;">Digestion and Absorption of Protein, Catabolism of Tissue Protein, Protein Degradation</p>	<p>Digestion of protein, absorption of amino acids, Gastric and intestinal peptidases, pancreatic peptidases.</p> <p>Amino acids transport across intestinal cells, Nitrogen balance, positive and negative nitrogen balance, causes, Degradation and transport of intracellular and tissue protein, Amino acid Metabolism, Essential and non-essential amino acids, Amino acid biosynthesis, Transamination reactions, role of pyridoxal-5- phosphate, Amino acid catabolism, Ketogenic and glucogenic aminoacids, Transport of ammonia to the liver and kidney, neurotoxicity associated with ammonia. Urea cycle, transport of urea and excretion, regulation, Metabolic fate of some amino acids, amino acids and TCA cycle.</p>
----	--	--

13	Biosynthesis of some important of amino acids derivatives	Tyrosine - derived neurotransmitters. Tryptophan-derived neurotransmitters. Creatine, Glutathione, polyamines, biosynthesis an functions, Nitric oxide, biosynthesis and functions.
14	Nucleotides Metabolism	Biosynthesis of purine nucleotides, de novo and salvage pathways.Regulation of purine biosynthesis, degradation of purines.Biosynthesis of pyrimidine nucleotides, regulation, orotic aciduria. Degradation of pyrimidine nucleotides. Deoxyribonucleotide biosynthesis.
15	Review	All subjects above

Practical Biochemistry for 1st year			
1	Biomedical Instruments and Techniques	1w	
2	Biochemical Lab. Safety	2w	
3	Solutions	3w	
4	Sample type	4w	
5	Sample Collection and Separation	5w	
6	Sample Collection and Separation	6w	
7	Carbohydrates	7w	
8	Carbohydrates	8w	
9	Lipids	9w	

10	Lipids	10w	
11	Proteins	11w	
12	Proteins	12w	
13	Proteins	13w	
14	Enzymes	14w	
15	Enzymes	15w	

Theoretical biochemistry course 2nd year			
الأسبوع	المادة	Objective	المحاضرات
CHO metabolism & disorders +DM			
1	-CHO digestion & absorption Glycolysis and glycogenesis - Glycogenolysis - Gluconeogenesis	<u>The student will be able to answer questions on the following topic</u> Digestion of carbohydrates Absorption of glucose and glucose transporters Glycolysis pathway and its regulation Energy yield from glycolysis Cori's cycle Pyruvate as a junction point Gluconeogenesis and malate shuttle Glucose alanine cycle Pathogenesis of DM , diagnosis & complication Type of hypoglycaemia	LEC 1 LEC 2 LEC 3
2	-citric acid cycle - Biological oxidation Oxidative phosphorylation , Respiratory chain, Pentose phosphate pathway -Glycogen storage diseases		LEC 1 LEC 2 LEC 3
3	- hyperglycaemia (DM) - hyperglycaemia (DM) cont. - hypoglycaemia		LEC 1 LEC 2 LEC 3

Lipid metabolism disorders +ACS+hyperlipidemia				
4	<ul style="list-style-type: none"> - Digestion and absorption of lipids. - Fatty acid synthesis - Fatty acid oxidation 	<p>The student will be able to answer questions on the following topic</p> <ul style="list-style-type: none"> Digestion of lipids Absorption of lipids Beta oxidation of fatty acids Oxidation of odd chain fatty acids Alpha oxidation & Omega oxidation De novo synthesis of fatty acids Synthesis of triglycerides Metabolism of adipose tissue Fatty liver and lipotropic factors Ketogenesis and ketolysis Structure of cholesterol Biosynthesis of cholesterol Plasma lipids Chylomicrons Very low density lipoproteins Low density lipoproteins High density lipoproteins Free fatty acid Formation of bile acids and bile salts Hyperlipidemias Atherosclerosis and coronary artery disease Risk factors for coronary artery disease Preventions of atherosclerosis Hypolipoproteinemia 	<p>LEC 1</p> <p>LEC 2</p> <p>LEC 3</p>	
5	<ul style="list-style-type: none"> - Ketogenesis & ketogenolysis - Cholesterol metabolism - plasma lipoprotein 		<p>LEC 1</p> <p>LEC 2</p> <p>LEC 3</p>	
6	<ul style="list-style-type: none"> - lipoprotein metabolism - lipoprotein metabolism cont. - Hyperlipidemias 		<p>LEC 1</p> <p>LEC 2</p> <p>LEC 3</p>	
7	<ul style="list-style-type: none"> cardiovascular disease - ACS -Heart failure -fatty liver 		<p>LEC 1</p> <p>LEC 2</p> <p>LEC 3</p>	
Protein metabolism& disorders				
8	<ul style="list-style-type: none"> -Digestion of protein - absorption of protein - Catabolism of amino acids - Urea cycle Detoxification of ammonia 		<p>The student will be able to answer questions on the following topic</p> <ul style="list-style-type: none"> Digestion of proteins Absorption & digestion of amino acids Interorgan transport of amino acids 	<p>LEC 1</p> <p>LEC 2</p> <p>LEC 3</p>

		<p>Transamination and deamination Formation of ammonia Urea cycle & Urea cycle disorders Urea level in blood Hyperammonemia</p>	
9	<p>-serum protein electrophoresis - Inborn errors of amino acid metabolism.</p>	<p><u>The student will be able to answer questions on the following topic</u> Plasma proteins Electrophoresis Albumin, functions, clinical significance Hypoalbuminemia Globulins, alpha, beta, gamma Transport proteins in blood Acute phase proteins in blood Ceruloplasmin Alpha-1 antitrypsin</p>	<p>LEC 1 LEC 2 LEC 3</p>
10	<p>-Clinical Enzymology -Clinical Enzymology conti. -tumours markers</p>	<p><u>The student will be able to answer questions on the following topic</u> Aminotransferase Lactate dehydrogenase Creatine kinase Alkaline phosphatase Acid phosphatase Prostate specific antigen Cholinesterase Glucose-6-phosphate dehydrogenase Amylase and lipase Enzymes used as therapeutic agents</p>	<p>LEC 1 LEC 2 LEC 3</p>
11	<p>-chemical neurotransmitters chemical neurotransmitters conti. - CSF</p>	<p><u>The student will be able to answer questions on the following topic</u> - role of chemical neurotransmitters in disease - clinical importance of CSF study</p>	<p>LEC 1 LEC 2 LEC 3</p>
12	<p>-Liver disease -Liver disease -Liver disease</p>	<p><u>The student will be able to answer questions on the following topic</u> Serum and urine bilirubin</p>	<p>LEC 1 LEC 2 LEC 3</p>

		<p>Tests based on synthetic function</p> <p>Enzymes indicating hepatocellular damage</p>	
13	<p>- Renal disease</p> <p>-Renal disease conti.</p> <p>- water & Na disturbance</p>	<p><u>The student will be able to answer questions on the following topic</u></p> <p>Glomerular functions</p> <p>Tubular functions</p>	<p>LEC 1</p> <p>LEC 2</p> <p>LEC 3</p>
14	<p>- potassium disturbance</p> <p>- PTH & calcitonin</p> <p>-Ca& Po4 disturbance</p>	<p>Abnormal constituents of urine</p> <p>Clearance tests: Inulin, creatinine and urea</p> <p>Proteinuria</p> <p>Tests for tubular function</p> <p>Intake and output of water</p> <p>Osmolality of extracellular fluid</p> <p>Electrolyte composition of body fluids</p> <p>Regulation of sodium and water balance</p> <p>Renin-angiotensin system</p> <p>Isotonic/hypotonic/hypertonic contraction, ECF</p> <p>Isotonic/hypotonic/hypertonic expansion, ECF</p> <p>Sodium metabolism ¼ Potassium metabolism</p> <p>Chloride metabolism</p>	<p>LEC 1</p> <p>LEC 2</p> <p>LEC 3</p>
15	<p>-acid base disorders</p> <p>- acid base disorders conti.</p> <p>- acid base disorders conti.</p>	<p><u>The student will be able to answer questions on the following topic</u></p> <p>Acids and bases</p> <p>Ph</p> <p>Buffers</p> <p>Acid base balance in the body</p> <p>Bicarbonate buffer system</p> <p>Respiratory regulation of pH</p> <p>Renal regulation of pH</p> <p>Relation of pH and potassium</p> <p>Respiratory acidosis</p> <p>Metabolic acidosis</p>	<p>LEC 1</p> <p>LEC 2</p> <p>LEC 3</p>

		Respiratory alkalosis Metabolic alkalosis	
Endocrinology			
1	Mechanism of action of hormones - Cell signalling - Hypothalamic and posterior pituitary Hormones	The student will be able to answer questions on the following topic Signal transduction Cyclic AMP and G-proteins Protein kinases Hormones acting through calcium Hormones acting through PIP2 cascade Cyclic GMP Hormone response element Antidiuretic hormone Oxytocin Hypothalamic releasing factors Growth hormone Adrenocorticotrophic hormone Thyroid stimulating hormone Gonadotropins	LEC 1 LEC 2 LEC 3
2	- Anterior pituitary Hormones - Thyroid hormones	The student will be able to answer questions on the following topic Synthesis of thyroxine Metabolic effect of thyroid hormones Assessment of thyroid function Hyperthyroidism Hypothyroidism	LEC 1 LEC 2 LEC 3
3	- Male reproductive system hormone - Female reproductive system hormone - Infertility & pregnancy	The student will be able to answer questions on the following topic - Synthesis, and secretion , function of Ovarian hormones & Testicular hormones - biochemical causes infertility - biochemical change during pregnancy	LEC 1 LEC 2 LEC 3

4	<ul style="list-style-type: none"> - Steroid hormones -adrenal gland 	<p><u>The student will be able to answer questions on the following topic</u></p> <ul style="list-style-type: none"> Synthesis of steroid hormones 17-ketosteroids Biological effects of glucocorticoids Assessment of glucocorticoid secretion Adrenal hyper and hypofunction CAH 	<p>LEC 1 LEC 2 LEC 3</p>
5	<ul style="list-style-type: none"> - GIT disease - obesity - Human nutrition 	<p><u>The student will be able to answer questions on the following topic</u></p> <ul style="list-style-type: none"> Gastric function and HCl secretion Gastric juice analysis Basal metabolic rate (BMR) Nitrogen balance Nutritional values of proteins Limiting amino acids, supplementation Kwashiorkor and marasmus Prescription of the diet Glycemic index 	<p>LEC 1 LEC 2 LEC 3</p>
Nucleotides metabolism& disorders			
6	<ul style="list-style-type: none"> - Metabolism of purine - pyrimiding nucleotides - Hyperuricemias&Gout 	<p><u>The student will be able to answer questions on the following topic</u></p> <ul style="list-style-type: none"> Purines and pyrimidines Nucleosides and nucleotides De novo synthesis of purine nucleotides Degradation of purine nucleotides Uric acid and gout De novo synthesis of pyrimidines Disorders of pyrimidine metabolism 	<p>LEC 1 LEC 2 LEC 3</p>
Molecular biology			
7	<ul style="list-style-type: none"> -DNA replication -Transcription - Protein synthesis 	<p><u>The student will be able to answer questions on the following topic</u></p> <ul style="list-style-type: none"> Watson-Crick model of DNA structure 	<p>LEC 1 LEC 2 LEC 3</p>

		<p>Chromosomes Replication of DNA DNA polymerase Okazaki pieces DNA repair mechanisms Ribonucleic acid Messenger RNA Transcription Post-transcriptional processing Reverse transcriptase</p>	
8	-DNA biochemical mutations ,repair	<p><u>The student will be able to answer questions on the following topic</u> Mutagens and carcinogens Oncogenic viruses Oncogenes and oncosuppressor genes Oncofetal antigens</p>	<p>LEC 1 LEC 2 LEC 3</p>
Vitamins			
9	<p>- The fat soluble vitamins - Vitamin A - Vitamin D metabolism - Vitamin E - vitamin K</p>	<p><u>The student will be able to answer questions on the following topic</u> Vitamin A & Wald’s visual cycle Deficiency of vitamin A Vitamin D & Deficiency of vitamin D Vitamin E Vitamin K</p>	<p>LEC 1 LEC 2 LEC 3</p>
10	<p>- The water soluble vitamins Ascorbic acid - Thiamin Riboflavin Niacin - Pyridoxine - pantothenic - Biotin - Folic acid, function - Vitamin B12</p>	<p><u>The student will be able to answer questions on the following topic</u> Thiamine (Vitamin B1) Riboflavin (Vitamin B2) and FAD Niacin, NAD+ and NADP+ Pyridoxine (Vitamin B6) Pantothenic acid and co-enzyme A Biotin Folic acid Vitamin B12</p>	<p>LEC 1 LEC 2 LEC 3</p>

		Ascorbic acid (Vitamin C)	
11	-Metabolism of iron - Porphyrin metabolism and porphyrin disorders	The student will be able to answer questions on the following topic - Understanding iron metabolism Chemical basis of hem degradation and disorder	LEC 1 LEC 2 LEC 3
12	- metabolic aspect of malignancy	The student will be able to answer questions on the following topic Mutagens and carcinogens Oncogenic viruses Oncogenes and oncosuppressor genes Oncofetal antigens Anticancer drugs Tumor immunology	LEC 1 LEC 2 LEC 3
13		Review	
14		Review	
15		Review	

Practical biochemistry course 2nd year			
الأسبوع	Technique	Topics	
1	<i>Full chemistry automation</i>	-GFR ,CCL	
2	<i>Full chemistry automation</i>	-FENa%	
3	<i>Full chemistry automation</i>	- GTT	
4	<i>Full chemistry automation</i>	-SAAG	
5	<i>Full chemistry automation</i>	-Penicillamine test	
6	<i>Chromatography</i>		

7	<i>Hba1c</i>	HPLC	
8	<i>Chemiluminescent immunoassay</i>	-growth hormone assay	
9	<i>Chemiluminescent immunoassay</i>	-insulin stimulation test	
10	<i>Chemiluminescent immunoassay</i>	-water deprivation test	
11	<i>Chemiluminescent immunoassay</i>	-dexamethasone suppression test	
12	<i>Chemiluminescent immunoassay</i>	-synactin stimulation test	
13		Review & examination	
14		Review & examination	
15		Review & examination	
1	<i>Electrolytes analysis</i>	ISE	
2	<i>Blood gas analysis</i>		
3	<i>Protein electrophoresis</i>	Cellulose acetate	
4	<i>Protein immunofixation</i>	Cellulose acetate	
5	<i>IBM</i>	Basic screen	
6	<i>IBM</i>	MS-MS	
7	<i>Tumour marker</i>		
8	<i>Examination of CSF</i>		
9	<i>Chemical urine examination</i>		
10	<i>Chemical pleural fluid examination</i>		

11	<i>Chemical ascitic fluid examination</i>		
12	<i>Urinary stone analysis</i>		
13		Review & examination	
14		Review & examination	
15		Review & examination	

