MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

		Module Delivery		
Module Title	Biochemistry	**Method**	**h/week**	**Frequency**
Module Type	Basic	**Theory**	**3**	**15**
Module Code	NUR111002	**Lecture**	**-**	**-**
ECTS Credits	6 ECTS	**Lab**	**2**	**15**
SWL (hr/sem)	150	**Tutorial**	**-**	**-**
		Practical	**-**	**-**
		Seminar	**-**	**-**

Module Level	UG I	**Semester of Delivery**	1st Semester
Administering Branch	Basic Sciences	**College**	NUR
Module Leader	Zahraa A. ALthabet	**e-mail**	Zahraa.abdali@uowa.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Zahraa A. ALthabet	**e-mail**	Zahraa.abdali@uowa.edu.iq
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Scientific Committee Approval Date	November 2, 2025	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	None
Co-requisites module	None	**Semester**	None

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To provide students with fundamental knowledge of the biochemical processes essential for life. 2. To explain the structure and function of biological molecules and their roles in human physiology. 3. To describe the major metabolic pathways and their regulation in the human body. 4. To relate biochemical principles to clinical and nutritional aspects of nursing care. 5. To understand the biochemical basis of common diseases and laboratory diagnostic tests. 6. To develop students' ability to interpret biochemical data relevant to patient health. 7. To enhance awareness of the role of enzymes, vitamins, and minerals in metabolism. 8. To integrate biochemical concepts with other nursing and medical sciences. 9. To encourage critical thinking and scientific reasoning in clinical situations. 10. To provide basic laboratory experience in biochemical analysis and interpretation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the chemical composition and structure of major biomolecules such as carbohydrates, lipids, proteins, and nucleic acids. 2. Explain the basic principles of enzymatic activity and factors affecting enzyme function. 3. Illustrate the main metabolic pathways and their role in energy production and regulation. 4. Discuss the biochemical roles of vitamins and minerals and their importance in maintaining health. 5. Interpret biochemical data related to common clinical conditions such as diabetes, liver disease, and renal disorders. 6. Apply biochemical knowledge to understand the physiological and pathological processes in nursing practice. 7. Demonstrate the ability to connect biochemical concepts with nutrition and patient care. 8. Perform and interpret basic biochemical laboratory tests safely and accurately. 9. Analyze the biochemical basis of hormonal regulation and acid-base balance in the human body.
Indicative Contents المحتويات الإرشادية	**Theory Lectures** **Lecture 1: Introduction to Biochemistry [SSWL = 3 hrs]** • **Definition and branches of biochemistry** • **Importance of biochemistry in nursing practice** • **Biological molecules overview (carbohydrates, lipids, proteins, enzymes, nucleic acids)**

	Lecture 2: Chemistry of Carbohydrates [SSWL = 3 hrs] • **Structure and classification of carbohydrates** • **Biological importance and functions of mono-, di-, and polysaccharides** • **Chemical reactions and physiological significance**
	Lecture 3: Metabolism of Carbohydrates (Glycolysis & Gluconeogenesis) [SSWL = 3 hrs] • **Steps of glycolysis and gluconeogenesis** • **Energy yield and regulation** • **Clinical correlation with metabolic disorders**
	Lecture 4: Glycogenesis and Glycogenolysis [SSWL = 3 hrs] • **Pathways and regulation** • **Hormonal control (insulin, glucagon, epinephrine)** • **Disorders such as glycogen storage diseases and diabetes mellitus**
	Lecture 5: Krebs Cycle and Energy Production [SSWL = 3 hrs] • **Steps and significance of Krebs cycle** • **Role of coenzymes and electron transport chain** • **Integration of carbohydrate, lipid, and protein metabolism**
	Lecture 6: Chemistry of Lipids [SSWL = 3 hrs] • **Classification and structure of lipids** • **Biological roles of fatty acids, triglycerides, phospholipids, cholesterol** • **Clinical aspects of lipid imbalance**
	Lecture 7: Digestion, Absorption, and Transport of Lipids [SSWL = 3 hrs] • **Digestive enzymes and bile salts** • **Lipid absorption and transport (lipoproteins, chylomicrons)** • **Lipid malabsorption and clinical significance**
	Lecture 8: Chemistry of Proteins [SSWL = 3 hrs] • **Amino acids, peptide bonds, and protein structure** • **Classification and biological functions of proteins** • **Denaturation and clinical relevance**
	Lecture 9: Enzymes: Structure and Function [SSWL = 3 hrs] • **Definition and chemical nature of enzymes** • **Mechanism of enzyme action and active sites** • **Factors influencing enzyme activity**
	Lecture 10: Enzyme Kinetics and Classification [SSWL = 3 hrs] • **IUB classification of enzymes** • **Enzyme kinetics and Michaelis-Menten concept** • **Enzyme inhibition and diagnostic uses**
	Lecture 11: Liver Enzymes and Liver Function Tests [SSWL = 3 hrs] • **Major liver enzymes (ALT, AST, ALP, GGT)** • **Interpretation of enzyme levels in liver disease**

	• **Clinical case discussions**
	Lecture 12: Kidney Function and Biochemical Assessment [SSWL = 3 hrs] • **Role of the kidney in homeostasis** • **Mechanisms of filtration and reabsorption** • **Biochemical markers (urea, creatinine, uric acid)**
	Lecture 13: General Examination of Urine [SSWL = 3 hrs] • **Physical, chemical, and microscopic urine examination** • **Normal and abnormal findings** • **Clinical importance in nursing diagnosis**
	Lecture 14: Acid-Base Balance and Blood Gases [SSWL = 3 hrs] • **Buffer systems in the body** • **Respiratory and metabolic acidosis/alkalosis** • **Interpretation of arterial blood gases (ABG)**
	Lecture 15: Clinical Biochemistry in Nursing Practice [SSWL = 2 hrs] • **Integration of biochemical knowledge in patient care** • **Interpretation of lab results in nursing context** • **Case-based learning and review.**
	<u>Lab Lecturers</u> **Lab 1: Introduction to Biochemistry [SSWL = 2 hrs]** • **Identify laboratory safety rules and symbols.** • **Learn correct use of laboratory glassware and equipment.** • **Practice accurate measurement of liquids and solutions.** • **Understand preparation of buffers and basic solutions.**
	Lab 2: Qualitative Tests for Carbohydrates [SSWL = 2 hrs] • **Perform chemical tests for detection of carbohydrates.** • **Identify monosaccharides, disaccharides, and polysaccharides experimentally.** • **Observe color reactions using Benedict's, Barfoed's, and Molisch tests.** • **Record and interpret laboratory results accurately.**
	Lab 3: Glycolysis Experiment (Carbohydrate Metabolism) [SSWL = 2 hrs] • **Demonstrate glucose breakdown using enzyme-based reactions.** • **Observe CO_2 evolution or color change as an indicator of glycolysis.** • **Interpret experimental data on energy production from glucose.**
	Lab 4: Glycogenesis and Glycogenolysis Demonstration [SSWL = 2 hrs] • **Examine glycogen presence in tissue samples using iodine staining.** • **Understand principles of glycogen synthesis and degradation.** • **Relate laboratory findings to metabolic disorders (e.g., diabetes).**
	Lab 5: Krebs Cycle and Energy Measurement [SSWL = 2 hrs] • **Illustrate steps of the Krebs cycle using a model or chart.** • **Demonstrate the use of coenzymes (NAD^+, FAD) in energy production.**

	• **Calculate ATP yield and interpret biochemical significance.**
	Lab 6: Qualitative Tests for Lipids [SSWL = 2 hrs] • **Detect the presence of lipids using solubility and staining tests.** • **Identify different types of lipids through chemical reactions.** • **Understand the principles of lipid extraction and characterization.** • **Relate laboratory findings to clinical lipid disorders.**
	Lab 7: Lipid Digestion and Absorption [SSWL = 2 hrs] • **Observe lipid emulsification using bile salt solutions.** • **Demonstrate enzyme action of lipase on fats.** • **Explain lipid transport mechanisms (micelles and lipoproteins).**
	Lab 8: Chemistry of Enzymes [SSWL = 2 hrs] • **Study enzyme structure and function using a model.** • **Observe effect of temperature and pH on enzyme activity.** • **Discuss enzyme specificity and active sites.**
	Lab 9: Enzyme Activity and Measurement [SSWL = 2 hrs] • **Measure enzyme activity using biochemical assays.** • **Determine reaction rates and calculate enzyme units.** • **Analyze the effect of inhibitors on enzyme reactions.**
	Lab 10: Liver Enzymes and Function Tests [SSWL = 2 hrs] • **Perform biochemical tests for liver enzymes (ALT, AST, ALP).** • **Interpret the relationship between enzyme activity and liver function.** • **Report findings in a professional laboratory format.**
	Lab 11: Renal Function Tests [SSWL = 2 hrs] • **Perform tests to estimate urea, creatinine, and uric acid.** • **Correlate biochemical results with kidney function.** • **Understand principles of sample handling and interpretation.**
	Lab 12: General Examination of Urine [SSWL = 2 hrs] • **Perform physical and chemical examination of urine.** • **Identify abnormal constituents (glucose, protein, ketones).** • **Record findings and correlate with clinical cases.**
	Lab 13: Acid-Base Balance and Blood Buffering [SSWL = 2 hrs] • **Demonstrate buffer action using acid and base titration.** • **Measure pH using indicators and pH meter.** • **Discuss clinical relevance of acidosis and alkalosis.**
	Lab 14: Blood Glucose and Lipid Profile Tests [SSWL = 2 hrs] • **Estimate blood glucose using glucose oxidase method.** • **Determine total cholesterol and triglycerides.** • **Interpret normal and abnormal values in clinical context.**

	Lab 15: Clinical Biochemistry Case Interpretation [SSWL = 2 hrs] • **Analyze sample laboratory reports (liver, renal, lipid, glucose).** • **Correlate lab data with patient symptoms.** • **Practice interpretation and nursing documentation.** Total hrs = ∑SSWL + (Mid Exam hrs+ Final Exam hrs) = 75+4=79

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1- Using cooperative learning style. 2- Discussion sessions on different topics. 3- Clinical training. 4- Theoretical and practical lectures. 5- Modern means related to education. 6- Student researches and participation in scientific trips 7- Accreditation the exams Daily ,monthly and quarterly.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.73
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

		Time Number	Weight (Marks)	Week Due														Relevant Learning Outcome									
				W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
Formative	Quizzes	2	5%			x							x						X									
	Report	1	10%								x									x	x							
	Lab Report	1	5%				x															X						
	Project	-	-																									
	Online Assig.	1	5%					X															X					
	Onsite Assig.	1	10%											x										X				
	Seminar	-	-																									
Summative	Mid. Exam	1H	10% (10)							x									X	X	X	X	X	X				
	Final Exam	3H	50% (50)	Week 15															X	X	X	X	X	X	X	X	X	X
Total assessment			100%																									

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Biochemistry**
Week 2	**Chemistry of Carbohydrates**
Week 3	**Metabolism of Carbohydrates (Glycolysis & Gluconeogenesis)**
Week 4	**Glycogenesis and Glycogenolysis**
Week 5	**Krebs Cycle and Energy Production**
Week 6	**Chemistry of Lipids**
Week 7	**Digestion, Absorption, and Transport of Lipids**
Week 8	**Chemistry of Proteins**
Week 9	**Enzymes: Structure and Function**
Week 10	**Enzyme Kinetics and Classification**
Week 11	**Liver Enzymes and Liver Function Tests**
Week 12	**Kidney Function and Biochemical Assessment**
Week 13	**General Examination of Urine**
Week 14	**Acid-Base Balance and Blood Gases**
Week 15	**Clinical Biochemistry in Nursing Practice**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Introduction to Biochemistry Laboratory**
Week 2	**Qualitative Tests for Carbohydrates**
Week 3	**Glycolysis Experiment (Carbohydrate Metabolism)**
Week 4	**Glycogenesis and Glycogenolysis Demonstration**
Week 5	**Krebs Cycle and Energy Measurement**
Week 6	**Qualitative Tests for Lipids**
Week 7	**Lipid Digestion and Absorption**
Week 8	**Chemistry of Enzymes**
Week 9	**Enzyme Activity and Measurement**
Week 10	**Liver Enzymes and Function Tests**
Week 11	**Renal Function Tests**
Week 12	**General Examination of Urine**
Week 13	**Acid-Base Balance and Blood Buffering**
Week 14	**Blood Glucose and Lipid Profile Tests**

Week 15	Clinical Biochemistry Case Interpretation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Jacob Anthikad, Nutrition and Biochemistry for Nurses, 1st Ed., 2009.	Yes
Recommended Texts	1- Jaroslav Racek and Daniel Rajdl , Clinical Biochemistry, first ed ,2016 2- Herbert Fromm and Mark Hargrove, Essentials of Biochemistry, 2012 3- Vijay Kumar Kiran Dip Gill, Basic Concepts in Clinical Biochemistry: A Practical Guide,2018 4- Uma Bhardwaj & Ravindra Bhardwa, Biochemistry for Nurses,2012 5-DM Vasudevan , Sreekumari S &Kannan Vaidyanathan,Textbook of Biochemistry for Medical Students,2013	No
Websites	Web sites of Biochemistry	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.