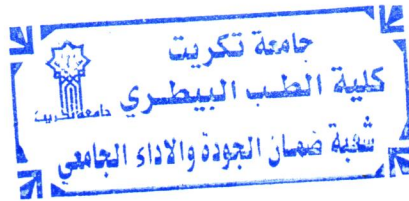


كيمياء حيوية بولونا

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



Academic Program and Course Description Guide



Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Academic Program Description Form

University Name: University of Tikrit.

Faculty/Institute: College of Veterinary Medicine,

Scientific Department: Department of Physiology, Pharmacology and Biochemistry

Academic or Professional Program Name: Bachelor's

Final Certificate Name: Bachelor of Veterinary Medicine and Surgery .

Academic System: quarterly

Description Preparation Date: 5/10/2025

File Completion Date 6/11/2025

Signature: 

Head of Department

Buthaina Abdulhameed

Date:



Signature: 

Scientific Associate Name:

Montaser Mohamed helal

Date:



The file is checked by:

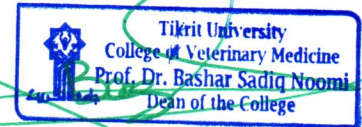
Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Ahmad Abdulla Sultan

Date: Date:

Signature:



Approval of the Dean

Dr. Bashar Sadaq

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

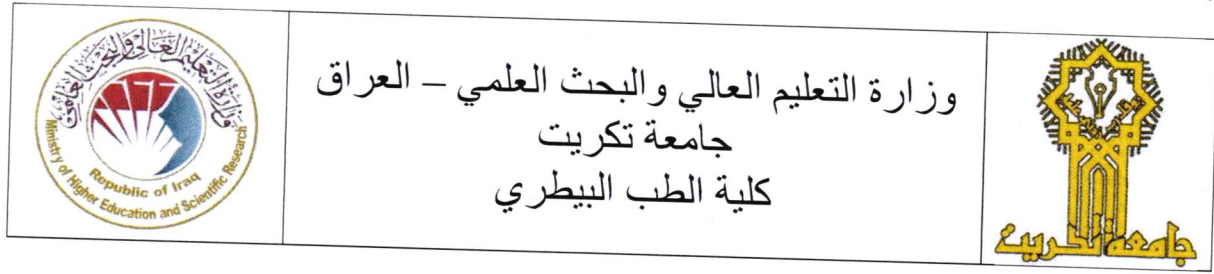
Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.



MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Basic biochemistry		Module Delivery
Module Type	Core Basic		<input type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Practical <input type="checkbox"/> Seminar
Module Code	VET204		
ECTS Credits	5		
SWL (hr./sem)	125		
Module Level	1	Semester of Delivery	
Administering Department	Physiology, pharmacology, and biochemistry	College	College of Veterinary Medicine
Module Leader	Huda ayad hameed	e-mail	hudahameed199222@tu.eud.iq
Module Leader's Acad. Title	lecturer	Module Leader's Qualification	MS.C
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	2026	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

<p>Module Objectives أهداف المادة الدراسية</p>	<ol style="list-style-type: none"> 1. To provide a fundamental understanding of the chemical principles that govern the structure, function, and interactions of biological molecules within living systems, forming the basis for understanding cellular processes and human physiology 2. Classify and Describe the Structure and Function of the Four Major Classes of Biomolecules(lipid , protein , carbohydrates , and nucleic acid) 3. Analyze Enzymes and Catalysis 4. Outline Core Metabolic Pathways
<p>Module Learning Outcomes مخرجات التعلم للمادة الدراسية</p>	<ol style="list-style-type: none"> 1. Foundational Principles <ul style="list-style-type: none"> • Explain the critical role of water, weak acids, and buffers in maintaining biological pH homeostasis. 2. Structure and Function of Biomolecules <ul style="list-style-type: none"> • Classify the major types of biological macromolecules (proteins, carbohydrates, lipids, nucleic acids) based on their structural components. • Differentiate between the structures and biological roles of key carbohydrates (e.g., starch vs. cellulose) and lipids (e.g., triglycerides vs. phospholipids). • understand the properties of an amino acid or a peptide (e.g., charge, solubility) at a given pH. • Correlate the four levels of protein structure with the chemical forces that stabilize them and their overall biological function. • Compare and contrast the structures and functions of DNA and RNA. 3. Enzymology and Catalysis <ul style="list-style-type: none"> • Describe the mechanism of enzyme action, including concepts of the active site and transition state stabilization. • Interpret enzyme kinetic data (e.g., Michaelis-Menten and Lineweaver-Burk plots) to determine K_m and V_{max}. • Explain how enzymes are regulated by inhibitors, allosteric effectors, and covalent modification.

Indicative Contents

المحتويات الإرشادية

4. Core Metabolism and Bioenergetics

- **Illustrate** the role of ATP as the primary energy currency and explain how it drives endergonic reactions through coupling.
- **Trace** the flow of energy and carbon through the central metabolic pathways: glycolysis, the citric acid cycle, and oxidative phosphorylation.
- **Summarize** the key control points and overall energy yield of major catabolic pathways.

5. Practical and Analytical Skills

- **Analyze** experimental data from core biochemical techniques such as spectrophotometry, chromatography, and electrophoresis

Structure and Function of Proteins

- **Amino Acids:**
 - Structure, stereochemistry, and classification of the 20 standard amino acids.
 - Acid-base properties, isoelectric point (pI).
- **Protein Structure:**
 - Primary structure: peptide bond formation.
 - Secondary structure: alpha-helices, beta-sheets, turns (forces involved: hydrogen bonding).
 - Tertiary structure: motifs, domains, and stabilizing forces (hydrophobic effect, van der Waals forces, disulfide bonds, ionic interactions).
 - Quaternary structure: assembly of subunits.

□ Enzyme Kinetics:

- Michaelis-Menten model (K_m , V_{max} , k_{cat}).
- Lineweaver-Burk plots and derivation of kinetic constants.

□ Enzyme Regulation:

- Reversible and irreversible inhibition (competitive, non-competitive, uncompetitive).
- Allosteric regulation and feedback inhibition.
- Covalent modification (e.g., phosphorylation)

Carbohydrates

- **Nomenclature and Structure:**
 - Classification: monosaccharides, disaccharides, oligosaccharides, polysaccharides.
 - Stereoisomers, anomers, cyclic forms (pyranose, furanose).
- **Biological Roles:**
 - Energy storage (starch, glycogen).

- Structural components (cellulose, chitin).
- Cell recognition and signaling (glycoproteins, glycolipids).

• **Lipid Diversity:**

- Fatty acids (saturated vs. unsaturated).
- Triacylglycerols (fats and oils).
- Phospholipids, sphingolipids, and glycolipids.
- Steroids (e.g., cholesterol) and isoprenoids.

The role of ATP as an energy currency.

- Phosphoryl group transfers and ATP hydrolysis.
- Redox reactions and electron carriers (NAD⁺, FAD).

□ **Overview of Key Metabolic Pathways:**

• **Catabolism:**

- Glycolysis: reactions, energy yield, and regulation.
- Pyruvate dehydrogenase complex (link reaction).
- Citric Acid Cycle (Krebs Cycle): reactions, amphibolic role, and regulation.
- Oxidative Phosphorylation: electron transport chain, chemiosmosis, and ATP synthesis

Anabolism

- Gluconeogenesis: bypass reactions and regulation.
- Glycogen metabolism (glycogenesis and glycogenolysis)

Nucleic Acids: An Introduction

• **Nucleotide Structure:**

- Components: nitrogenous bases, pentose sugars, phosphate groups.
- Differences between ribo- and deoxyribonucleotides.

• **DNA and RNA Structure:**

- DNA double helix (Watson-Crick model), base pairing, and forces stabilizing structure.
- Major types of RNA (mRNA, tRNA, rRNA) and their general functions.

Total hrs = 30 = (Time table 2 hr x 15 weeks)- theoretical

Total hrs = 30 = (Time table 2 hr x 15 weeks)- practical

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Explanation and clarification of the scientific material 2- Providing students with knowledge through homework 3- Encouraging students to visit websites 4- Linking the conclusions of the current lecture with the previous one 5- Show educational videos 6- Asking a set of thinking questions during lectures (why; how)

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	125	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	187		11

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab. Report	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Material Covered	
Week 1	Amino Acids & Proteins I • Amino Acids: Structure, Stereochemistry, and Classification.

	<ul style="list-style-type: none"> • Acid-Base Properties of Amino Acids. • Peptide Bonds and the Primary Structure of Proteins.
Week 2	<ul style="list-style-type: none"> • Protein Architecture: Secondary Structure (α-helices, β-sheets). • Tertiary and Quaternary Structure. • Forces Stabilizing Protein Structure
Week 3	<ul style="list-style-type: none"> • Introduction to Enzymes: Catalytic Power and Specificity. • Introduction to Enzyme Kinetics. • The Michaelis-Menten Model (K_m, V_{max})
Week 4	<p>Enzymes II</p> <ul style="list-style-type: none"> • Lineweaver-Burk Plots and Deriving Kinetic Constants. • Enzyme Inhibition: Reversible (Competitive, Non-competitive). • Regulation: Allosteric Control, Covalent Modification
Week 5	<p>Carbohydrates</p> <ul style="list-style-type: none"> • Monosaccharides: Structure and Stereoisomers. • Disaccharides and Polysaccharides. • Roles: Energy Storage (Glycogen, Starch) and Structure (Cellulose)
Week 6	<p>Lipids & Membranes</p> <ul style="list-style-type: none"> • Lipid Classes: Fatty Acids, Triacylglycerols, Phospholipids
Week 7	<p>Metabolism & Bioenergetics</p> <ul style="list-style-type: none"> • Metabolism Overview: Catabolism vs. Anabolism. • Bioenergetics: ATP as Energy Currency. • Principles of Metabolic Regulation
Week 8	<p>Carbohydrate Catabolism I</p> <ul style="list-style-type: none"> • Glycolysis: Reaction Steps and Mechanism. • The Fates of Pyruvate. • Energetics and Regulation of Glycolysis
Week 9	<p>Carbohydrate Catabolism II</p> <ul style="list-style-type: none"> • Pyruvate Dehydrogenase Complex. • Citric Acid (Krebs) Cycle: Steps, Energetics, and Regulation. • The Amphibolic Nature of the Cycle.
Week 10	<p>Oxidative Phosphorylation</p> <ul style="list-style-type: none"> • Electron Transport Chain: Components and Proton Pumping. • Chemiosmotic Theory. • ATP Synthase Mechanism and P/O Ratios
Week 11	<ul style="list-style-type: none"> • Citric Acid Cycle (Krebs Cycle): reactions, amphibolic role, and regulation.
Week 12	<ul style="list-style-type: none"> • Gluconeogenesis: bypass reactions and regulation. • Glycogen metabolism (glycogenesis and glycogenolysis)
Week 13	<ol style="list-style-type: none"> 1. Lipolysis: Mobilization of triglycerides from adipose tissue. 2. Activation and Transport: Preparing fatty acids for degradation and transporting them into the mitochondrion. 3. Beta-Oxidation: The cyclic process of breaking down the fatty acid chain.
Week 14	<p>Nucleic Acids</p> <ul style="list-style-type: none"> • Name the nitrogenous bases and classify them. • Describe the DNA double helix structure. • Differentiate between DNA and RNA
Week 15	Transcription and translation
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Safety & Spectrophotometry Objective: To understand lab safety protocols and the principle of spectrophotometry for quantitative analysis
Week 2	Lab 2: General carbohydrates instruction
Week 3	Lab 3: Urine ;physical properties of urine
Week 4	Lab 4: Normal and abnormal constituents of urine.
Week 5	Lab 5: Enzymatic methods for glucose
Week 6	Lab 6: Determination of serum total protein
Week 7	Lab 7: Determination of serum cholestrol
Week 8	Lab 8: Determination serum total protein
Week 9	Lab 9: Determination serum urea
Week 10	Lab 10: Determination serum uric acid
Week 11	Lab 11: Determination serum creatinine
Week 12	Lab 12: Determination of serum bilirubin
Week 13	Lab 13: Determination of serum total calcium
Week 14	Lab 14: Determination of serum inorganic phosphate
Week 15	Lab 15: exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	biochemistry (Solomon adugna , Lakshmi Medical Ahuja mekonnen alemu)	Yes
Recommended Texts	Textbook book of veterinary chemistry second edition (larry R.Engelking)	yes
Websites		

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.

