	Ministry of Higher Education and Scientific Research - Iraq Al-Nahrain University College of Science Medical Physics	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Physiology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code					
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UG– Year 2	**Semester of Delivery**		Semester 2
Administering Department		Medical Physics	**College**	College of Science	
Module Leader	Dr. Ruaa Hameed Abdulridha		**e-mail**	ruaa.hameed@nahrainuniv.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph. D.
Module Tutor	Nada Mohammed Aliwi		**e-mail**	nada.csc23@nahrinuniv.edu.iq	
Peer Reviewer Name		Nada Mohammed Aliwi	**e-mail**	nada.csc23@nahrinuniv.edu.iq	
Scientific Committee Approval Date			**Version Number**		1.0
Laboratory Staff	Dr. Ruaa Hameed Abdulridha, MSc. Nada Mohammed Aliwi, MSc. Tabark Mohammed Khalid, MSc. Al-Mustafa Mahdi Salih				

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	
Module Aims أهداف المادة الدراسية	This module aims to provide students with a comprehensive understanding of the fundamental principles of human physiology, with emphasis on the integration of biological functions and their physical foundations. The module introduces the physiological mechanisms of major body systems and highlights the role of physical principles and medical applications in physiological processes. It also aims to develop students' analytical skills through laboratory experiments and the interpretation of physiological data.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	At the end of this module, students will be able to: **1.** Explain the basic concepts of physiology, levels of biological organization, and the importance of homeostasis in maintaining internal balance. **2.** Describe the structure and function of neurons and explain the mechanisms of nerve impulse generation and transmission. **3.** Analyze synaptic transmission and the role of neurotransmitters in neural communication. **4.** Distinguish between different types of muscles and explain the physiological mechanisms of muscle contraction. **5.** Interpret the relationship between neural control and muscle activity, including basic applications of electromyography (EMG). **6.** Describe the structure and function of the heart and explain the electrical activity of the cardiac cycle using ECG principles. **7.** Explain blood circulation dynamics, arterial blood pressure, and their relationship to physical laws of fluid flow. **8.** Describe the mechanisms of respiration, gas exchange, and lung volumes, and interpret basic spirometry measurements. **9.** Explain the physiological functions of the digestive, urinary, and endocrine systems and their regulatory mechanisms. **10.** Integrate knowledge of different physiological systems and relate physiological concepts to medical and physical applications.

	11. Perform basic physiological laboratory measurements safely and accurately and analyze experimental data effectively.
Indicative Contents المحتويات الإرشادية	**1. Introduction to Physiology** • Definition and scope of physiology • Levels of biological organization • Principles of biological regulation • Homeostasis and feedback mechanisms **2. Nervous System Physiology** • Structure and function of neurons • Resting membrane potential and action potential • Neural signal conduction **3. Synaptic Transmission** • Chemical synapses • Neurotransmitters and receptors • Regulation of neural signaling **4. Muscle Physiology** • Types of muscles: skeletal, smooth, and cardiac • Mechanism of muscle contraction • Excitation–contraction coupling **5. Neuromuscular Function** • Neural control of muscle activity • Force transmission • Introduction to EMG and physical applications **6. Cardiovascular System** • Structure and function of the heart • Electrical activity of the heart • Cardiac cycle and ECG principles **7. Blood Circulation and Blood Pressure** • Blood flow and resistance • Arterial blood pressure • Relationship with fluid physics

	8. Respiratory System • Mechanisms of breathing • Gas exchange and partial pressures • Lung volumes and capacities **9. Physics of Respiration** • Spirometry measurements • Lung compliance and respiratory adaptation **10. Digestive System** • Digestion and absorption of nutrients • Enzymatic activity • Neural and hormonal regulation **11. Urinary System** • Kidney structure and function • Filtration, reabsorption, and secretion • Physical principles of filtration **12. Endocrine System** • Hormones and mechanisms of action • Regulation of physiological functions **13. System Integration** • Interaction between body systems • Comparative physiology • Medical and physical applications **14. Review and Assessment** • Integration of physiological concepts • Preparation for final examination

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Learning Strategies:** The module is delivered using a combination of student-centered and instructor-guided teaching strategies designed to promote active learning and conceptual

	understanding. Teaching strategies include: • Interactive Lectures: Structured lectures supported by visual aids and real-life medical and physical examples to introduce core physiological concepts and theoretical foundations. • Problem-Based Learning: Use of applied physiological problems and clinical/biophysical scenarios to enhance analytical thinking and conceptual integration. • Laboratory Demonstrations and Practical Sessions: Hands-on laboratory experiments (e.g., ECG, EMG, spirometry) to reinforce theoretical knowledge through direct observation and measurement. • Discussion Sessions: Guided discussions to encourage student participation, critical thinking, and clarification of complex physiological mechanisms. • Case-Based Teaching: Analysis of integrated physiological case studies to demonstrate interaction between body systems and real-world applications. • Use of Educational Technology: Multimedia presentations, simulation tools, and data acquisition systems to support visualization and understanding of physiological processes. • Continuous Feedback: Ongoing formative feedback during lectures, labs, and assessments to support student progress and learning improvement. **Teaching Strategies:** Students are encouraged to adopt active and self-directed learning strategies throughout the module. Learning strategies include: • Active Participation: Engagement in lectures, discussions, and laboratory sessions to enhance understanding and retention of physiological concepts. • Independent Study: Regular review of lecture materials, textbooks, and recommended scientific resources to reinforce theoretical knowledge.

	• Practical Skill Development: Active involvement in laboratory experiments to develop measurement, observation, and data interpretation skills. • Collaborative Learning: Group work during practical sessions and case discussions to promote teamwork and peer learning. • Problem Solving: Practice in analyzing physiological data and solving applied problems related to biological and physical principles. • Reflective Learning: Reflection on experimental results and feedback to improve understanding and practical performance. • Integration of Knowledge: Linking concepts across different physiological systems to achieve a holistic understanding of human physiology.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/Sem) الحمل الدراسي المنتظم للطالب خلال الفصل	80	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/Sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	70	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.6
Total SWL (h/Sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
As		**Time/Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	Continuous	All
	Assignments & H. W	2	10% (10)	Continuous	All
	Projects\Lab	1	15% (15)	Continuous	All
	Seminar	1	5% (5)	Continuous	All
Summative assessment	**Midterm Exam**	1 hr.	10% (10)	Continuous	All
	Final Exam	3 hr.	50% (50)	Continuous	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to Physiology and Principles of Biological Regulation** Concept of physiology, levels of biological organization, and importance of homeostasis.
Week 2	**Nervous System — Fundamentals** Structure and function of the neuron, resting potential, and action potential.
Week 3	**Neural Reception and Transmission** Synaptic transmission, neurotransmitters, and signal regulation.
Week 4	**Muscles — Basic Physiology** Types of muscles (skeletal, smooth, cardiac), mechanism of contraction.
Week 5	**Muscles — Structure and Function in the Body** Force transmission, neural control of muscles, and physical applications (EMG).
Week 6	**Cardiovascular System — The Heart** Structure of the heart, electrical cardiac cycle, ECG (physical applications).
Week 7	**Mid-term Exam**
Week 8	**Blood Circulation and Arterial Blood Pressure** Blood flow, resistance, pressure factors, and relationship with fluid physics.
Week 9	**Respiratory System — Basic Principles** Gas exchange, mechanisms of breathing, and partial pressure of gases.
Week 10	**Physics of Respiration and Adaptation** Lung capacities, lung fibers, and respiratory measurements (spirometry).
Week 11	**Digestive System and Organ Functions** Nutrient absorption, enzymes, neural, and hormonal regulation.
Week 12	**Urinary System and Urine Formation** Kidney function, filtration, reabsorption, physics of filtration.
Week 13	**Endocrine System** Hormones, mechanisms of action, and regulation of vital functions.
Week 14	**Preparatory Week**
Week 15	**Comparative Physiology and System Integration** General review, integration between systems, medical and physical applications.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Lab 1:** Laboratory Orientation & Safety Familiarization with laboratory equipment, biosafety rules, and ethical guidelines.
Week 2	**Lab 2:** Measurement of Vital Signs Measurement of heart rate, respiratory rate, body temperature, and blood pressure.

Week 3	**Lab 3:** Blood Pressure Measurement Determination of systolic and diastolic blood pressure and interpretation of results.
Week 4	**Lab 4:** Electrocardiography (ECG) Recording Recording ECG signals and identification of P, QRS, and T waves.
Week 5	**Lab 5:** ECG Analysis Calculation of heart rate, rhythm analysis, and assessment of normal ECG patterns.
Week 6	**Lab 6:** Electromyography (EMG) Recording and interpretation of skeletal muscle electrical activity.
Week 7	**Lab 7:** Reaction Time Experiment Measurement of neural reaction time and evaluation of nervous system response.
Week 8	**Lab 8:** Spirometry Measurement of lung volumes and capacities (VC, TV, IRV, ERV).
Week 9	**Lab 9:** Exercise Physiology Effect of Physical Exercise on Heart Rate and Respiratory Rate
Week 10	**Lab 10:** Pulse Oximetry Measurement of oxygen saturation and understanding the principles of optical absorption.
Week 11	**Lab 11:** Hematological Tests (Demonstration) Hemoglobin estimation and ESR measurement.
Week 12	**Lab 12:** Sensory Physiology Hearing or vision tests (Audiometry or Visual Acuity).
Week 13	**Lab 13:** Integrated Practical Session Interpretation of combined physiological data (case-based learning).
Week 14	**Lab 14:** Revision & Practical Examination Assessment of experimental skills and data analysis.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Color Atlas of Physiology, 5th edition	No
Recommended Texts	Human Physiology - Softcover	No
Websites		

APPENDIX:

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	مقبول بقرار	(45-49)	More work required, but credit awarded
	F – Fail	راسب	(0-44)	A considerable amount of work required

Note:

NB 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.



ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي