



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
العلمي والتقويم والإشراف جهاز
الأكاديمي والاعتماد الجودة ضمان إدارة
جامعة مدينة العلم
قسم ضمان الجودة وتقويم الأداء
شعبة ضمان الجودة
كلية العلوم
قسم الفيزياء الطبية
2026



اسم الجامعة: جامعة مدينة العلم

الكلية / المعهد: كلية العلوم

القسم العلمي: الفيزياء الطبية

اسم البرنامج الأكاديمي او المهني: بكالوريوس في علوم الفيزياء الطبية

اسم الشهادة النهائية: بكالوريوس في علوم الفيزياء الطبية

النظام الدراسي: فصلي - مسار بولونيا

تاريخ اعداد الوصف : 2026/2/7

تاريخ ملء الملف : 2026/2/7

دقق الملف من قبل شعبة ضمان الجودة والأداء الجامعي

اسم مسؤول شعبة ضمان الجودة والأداء الجامعي:

التاريخ 2026/7/2

التوقيع : م.م. علا جنان قاسم

مصادقة السيد العميد

ا.م.د. وليد نصار رجاء



1. الرؤية

“يسعى قسم الفيزياء الطبية إلى أن يكون مركزًا أكاديميًا رائدًا في التعليم والبحث العلمي، متميزًا في إعداد كوادر مؤهلة قادرة على توظيف مبادئ الفيزياء في التطبيقات الطبية، بما يساهم في تطوير الرعاية الصحية وخدمة المجتمع وفق المعايير العالمية.”

2. مهمة البرنامج

“يهدف برنامج الفيزياء الطبية إلى إعداد خريجين مؤهلين علميًا وعمليًا في تطبيقات الفيزياء في المجال الطبي، من خلال تقديم تعليم أكاديمي متميز، وتنمية مهارات البحث العلمي، وتعزيز القيم المهنية، بما يواكب التطورات الحديثة ويُلبي احتياجات القطاع الصحي والمجتمع.”

3. أهداف البرنامج

“إعداد كوادر مؤهلة في الفيزياء الطبية تمتلك المعرفة والمهارات التطبيقية والبحثية للعمل بكفاءة في القطاع الصحي ومواكبة التطورات الحديثة.”

4. الاعتماد البرامجي

وزارة التعليم العالي والبحث العلمي / مجالس اعتماد الكليات والكليات

5. مؤثرات خارجية

سوق العمل – الزيارات الميدانية للدوائر الحكومية - التطبيق -

6. هيكل البرنامج

هيكل البرنامج	عدد الدورات	الساعات المعتمدة	نسبة مئوية	ملاحظات*
متطلبات المؤسسة				
متطلبات الكلية				
متطلبات القسم	0	133	55.41%	
التدريب الصيفي	المرحلة الثالثة			
غير ذلك	التدريب في المستشفيات والمراكز الصحية الحكومية			



أهداف البرنامج الأكاديمي:

1. تحقيق الريادة في مجالات التعليم والتعلم والبحث العلمي لخدمة المجتمع.
2. الارتقاء بمستوى الخريجين من خلال تطبيق معايير الجودة الشاملة.
3. إعداد برامج تعليمية متطورة ومبتكرة تؤهل الخريجين لمواكبة متطلبات مجتمع المعرفة وسوق العمل.
4. تزويد الطلاب بالمعارف والمهارات الأساسية في مجال الفيزياء الطبية وتطبيقاتها المتنوعة.
5. تشجيع البحث العلمي وإعداد كوادر علمية ومهنية متخصصة للمساهمة في إجراء أبحاث علمية وعملية متميزة.
6. تنمية المهارات العملية من خلال التدريب على استخدام الأجهزة الطبية، مما يمنح تميزاً وسمعة طيبة، مع مراعاة أن يسبق الجانب النظري الجانب العملي.

أ- الأهداف المعرفية

- 1- فهم الأساسيات الفيزيائية: استيعاب المبادئ والنظريات الفيزيائية المتقدمة وتطبيقاتها في الأنظمة البيولوجية والطبية.
- 2- إدراك آلية عمل الأجهزة الطبية: معرفة المبادئ العلمية والتصميمية لمختلف الأجهزة التشخيصية والعلاجية (مثل الأشعة السينية، الرنين المغناطيسي، الطب النووي، وأجهزة العلاج الإشعاعي).
- 3- ربط الفيزياء بالعلوم البيولوجية: فهم تفاعل الإشعاع والمجالات المختلفة مع الأنسجة الحية وتأثيراتها البيولوجية على مستوى الخلايا والأعضاء.
- 4- التحليل وحل المشكلات: تطوير القدرة على تحليل البيانات الطبية والفيزيائية واستخدام النماذج الرياضية لفهم العمليات الفسيولوجية والمرضية.
- 5- معايير الأمان والسلامة: الإلمام النظري بقوانين الحماية الإشعاعية ومعايير السلامة المهنية لحماية المرضى والعاملين في المجال الطبي.

ب- أهداف التأهيل للبرنامج:

- 1- **التشغيل والصيانة السريرية:** تأهيل الخريج للتعامل المباشر مع الأجهزة الطبية المتقدمة في المستشفيات والمراكز العلاجية وتشغيلها بكفاءة عالية.
- 2- **ضبط الجودة وضمانها:** تدريب الطالب على إجراء الفحوصات الدورية واختبارات الجودة والمعايرة للأجهزة الطبية لضمان دقة التشخيص وسلامة الجرعات العلاجية.
- 3- **التخطيط الإشعاعي والعلاجي:** إكساب المهارات اللازمة للمساهمة في حساب وتخطيط الجرعات الإشعاعية للمرضى ضمن فرق العلاج الإشعاعي والأورام.
- 4- **العمل ضمن الفريق الطبي:** تأهيل الخريج للتكامل بفعالية مع الأطباء، تقنيي الأشعة، والمهندسين الطبيين لتقديم رعاية صحية متكاملة للمريض.
- 5- **البحث العلمي والتطوير:** تنمية القدرات البحثية لتطوير التقنيات الطبية الحديثة وإيجاد حلول مبتكرة للمشكلات التشخيصية والعلاجية في القطاع الصحي.

طرق التدريس والتعلم

المحاضرات النظرية والمختبرات العملية والندوات العلمية والدورات التدريبية والمعارض المتخصصة في مجال الأجهزة الطبية.

طرق التقييم

الامتحانات اليومية، والامتحانات الفصلية، والحضور اليومي، والتقارير المعملية، والتقييم السنوي.

ت - الأهداف الوجدانية والقيمية

- 1- **أخلاقيات المهنة والمسؤولية:** ترسيخ الالتزام بالمعايير الأخلاقية والإنسانية العالية عند التعامل مع المرضى، مع الإدراك التام للمسؤولية القانونية والأخلاقية المترتبة على دقة القياسات والجرعات الإشعاعية.
- 2- **الوعي بأمان وسلامة المريض:** تنمية الشعور بالحرص اليقظ والدائم على حماية المرضى، والزملاء، والذات من المخاطر الإشعاعية والبيولوجية عبر تطبيق أدق معايير السلامة المهنية.

- 3- **التعاطف والإنسانية في الرعاية الصحية:** غرس روح التعاطف، واحترام كرامة المريض ومشاعره، والتفهم الكامل لحالته النفسية والجسدية خلال عمليات التصوير الطبي أو العلاج الإشعاعي.
- 4- **العمل الجماعي والتكامل المهني:** تعزيز القدرة على التعاون الفعال وتقدير دور أعضاء الفريق الطبي المتكامل (الأطباء، الممرضين، والتقنيين) لضمان تقديم أفضل خدمة علاجية.
- 5- **التعلم المستمر والفضول العلمي:** إيجاد الدافع الذاتي لمواكبة التطورات السريعة والمتلاحقة في تكنولوجيا الأجهزة الطبية وعلوم الفيزياء الحيوية طوال المسار المهني.
- 6- **الشعور بالمسؤولية المجتمعية:** توجيه المعرفة العلمية لخدمة المجتمع المحلي من خلال نشر الوعي الصحي بمخاطر الإشعاع وكيفية الوقاية منها، والمساهمة في الارتقاء بمستوى الرعاية الصحية العامة.

ث- تخطيط التنمية الشخصية

الزيارات العلمية للمستشفيات والمراكز المتخصصة والمعارض المتخصصة والدورات التدريبية من قبل الشركات الخاصة

ح- معايير القبول

- خريجو الدورة الإعدادية السادسة للفرع الاحيائي والتطبيقية.
- خريجو المعاهد الفنية



المرحلة الاولى

UGI





Semester One

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Mechanics 1	Module Delivery	
Module Type	Core	☒ Theory	
Module Code	MPH1101	☒ Lecture	
ECTS Credit	7	☒ Lab	
SWL (hr/sem.)	175	☒ Tutorial	
		☐ Practical	
		☐ Seminar	
Module Level	1	Semester of Delivery	1
Administering Department	Medical Physics	College	Science
Module Leader	Dr. Waleed Nassar Raja	e-mail	
Module Leader's Acad. Title	Ass. P.	Module Leader's Qualification	Ph.D in Physics
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

Relation with other Modules			
العلاقة مع المواد الدراسية الاخرى			
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	1. The basic concepts of all the way to valid conclusion and discuss the fundamental concepts in classical mechanics (1) through a broad range of interesting application to the real world. 2. Clearly and logically discuss the scalar, vector, gradient, divergence, curl, application of operator, vector integration, and derivative of a vector. 3. Analyze coordinates systems (curvilinear, differential vector operator, Cartesian, spherical and cylindrical) in physics. 4. General motion of the particles in the three dimensions. 5. Discuss the non-inertial reference systems. 6. Discuss the gravitation and central forces.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- The first step in the development of the classical mechanics (I) was to examine the learning outcomes for the courses at the beginning of the semester. 2- The second step was to categorize the subject matter and identify the important concepts. These concepts were identified from the outlines of the physical laws, principles and the associated proofs. 3- The third step is to identify the misconceptions that students are likely to have about each of the concepts in the complete list. 4- The last step is highlighting the day life applications whenever exist and encourage the students to see more details in the international websites and reference books in the library, discussing some selected problems in each chapter, cooperate with a different institution to find how they deal with the subject.
Indicative Contents المحتويات الإرشادية	Newtonian Mechanics • Conservation of Energy & Momentum • Fluid Dynamics

Learning and Teaching Strategies استراتيجيات التعلم و التعليم



Strategies	Teaching and learning strategies for this course will include: A minimum of 50 contact hours, typically to include interactive group teaching, cocurriculars, individual meetings, in-class presentations, lab-based experiments and exams. Course 3 information and supplementary materials are available on the University's Virtual Learning Environment (VLE). Students will receive individualised developmental feedback on their work for this course. Students are required to attend and participate in all the formal and timetabled sessions for this course. Students are also expected to manage their directed learning and independent study in support of the course..
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	5
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	100	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	6.7
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	175		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects/Lab. Report	1 1	14%(14) 2%(2)	Continuous 13	All LO # 5, # 8 and #10
	Midterm Exam	2hr	10%(10)	7	LO # 1, # 7
Summative assessment	Final Exam	3hr	50%(50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الأسبوعي النظري	
	Material Covered
Week 1	Fundamental Concepts: Vectors.





Week 2	Fundamental Concepts: Position Vector of a Particle: Velocity and Acceleration in Rectangular Coordinates.
Week 3	Fundamental Concepts: Velocity and Acceleration in Plane Polar Coordinates.
Week 4	Newtonian Mechanics: Rectilinear Motion of a Particle.
Week 5	Newtonian Mechanics: Newton's Law of Motion.
Week 6	Newtonian Mechanics: Forces that Depend on Position: The Concepts of Kinetic and Potential Energy.
Week 7	Oscillations: Linear Resoring Force: Harmonic Motion& Energy Considerations in Harmonic Motion.
Week 8	Oscillations: Damped Harmonic Motion& Forced Harmonic Motion: Resonance.
Week 9	General Motion of a Particle in Three Dimensions: The Potential Energy Function n Three Dimensional Motion: The Del Operator.
Week 10	General Motion of a Particle in Three Dimensions: The Harmonic Oscillator in Two and Three Dimensions.
Week 11	Non-inertial Reference Systems: Accelerated Coordinate Systems and Interial Forces& Rotating Coordinate Systems.
Week 12	Non-inertial Reference Systems: Dynamics of a Particle in a Rotating Coordinate System. & Effects of Earth's Rotation.
Week 13	Gravitation and Central Forces: Gravitational Force between a Uniform Sphere and a Particle.
Week 14	Gravitation and Central Forces: Kepler's Laws& Potential Energy in a Gravitational Field.
Week 15	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: A) Measurement Principles and Errors. B) Accurate Measurements.
Week 2	Lab 2: Mathematical Pendulum.
Week 3	Lab 3: Laws of Collision/Air Track.
Week 4	Lab 4: Free Fall.
Week 5	Lab 5: Hooke's Law.
Week 6	Lab 6: Newton's Law.
Week 7	Lab 7: Uniformly Accelerated Motion.





Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Fundamentals of Physics by Halliday, Resnick & Walker 2001. John Wiley & Sons. Supplementary references	Yes
Recommended Texts	1- Physics for scientist and engineers with modern physics by Serway (1997), Saunders college publisher. 2- University Physics by Sears, Zemansky, and Young (1995).	Yes
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

GRADING SCHEME

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 – 100)	A – Excellent	امتياز	90 – 100	Outstanding Performance
	B - Very Good	جيد جداً	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	Works 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 with 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.

MODULE DESCRIPTION FORM





Module Information معلومات المادة الدراسية					
Module Title	Electricity and Magnetism		Module Delivery		
Module Type	Core		☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	MPH 1102				
ECTS Credit	7				
SWL (hr/sem.)	175				
Module Level		1	Semester of Delivery		2
Administering Department		Medical Physics	College	Science	
Module Leader	Dr. Waleed Nassar Raja		e-mail		
Module Leader's Acad. Title		Ass. Prof.	Module Leader's Qualification		Ph.D in Physics
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		1/9/2025	Version Number		2

Relation with other Modules العلاقة مع المواد الدراسية الاخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents اهداف المادة الدراسية ونتائج التعلم والمحتويات الارشادية	
Module Aims أهداف المادة الدراسية	The aim is to familiarize the students with the fundamental concepts and laws in electricity and magnetism, and establish a grounding in electromagnetism in preparation for more advanced electronic engineering courses. Also to provide them with analytical tools to understand and analyse the interactions between time varying electric and magnetic fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion, successful students will be able to: 1- Understand electricity and magnetism on a level that uses standard mathematical tools. 2- Develop a conception of space and time adequate for understanding electrodynamics.





	3- Develop and train problem- solving skills. 4- Establish the foundation for higher-level courses in physics, chemistry, and engineering.
Indicative Contents المحتويات الإرشادية	1- Observation and perception. 2- Analysis and interpretation. 3- Conclusion and evaluation. 4- Preparation and evaluation.

Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	At the beginning of the course, the instructor will detail the methods used to evaluate student progress and the criteria for assigning a course grade. The methods may include one or more of the following tools: examinations, quizzes, homework assignments, laboratory reports, research papers, small group problem solving of questions arising from application of course concepts and concerns to actual experience, oral presentations, or maintenance of a personal lab manual. Specific evaluation procedures will be given in class. In general, grading will be based on accumulated points from homework assignments, tests, final exam, and labs.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	5
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	100	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	6.7
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects/Lab.	1	14%(14)	Continuous	all





	Report	1	2%(2)	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	CHARGE AND MATTER.
Week 2	ELECTRIC FIELDS.
Week 3	GAUSS' LAW.
Week 4	ELECTRIC POTENTIAL.
Week 5	CAPACITANCE.
Week 6	CURRENT AND RESISTANCE.
Week 7	Mid-term Exam
Week 8	ELECTROMOTIVE FORCE AND CIRCUITS.
Week 9	MAGNETIC FIELDS.
Week 10	MAGNETIC FIELD DUE TO CURRENTS.
Week 11	INDUCTION AND INDUCTANCE.
Week 12	Faraday's Law.
Week 13	Lenz' Law.
Week 14	Biot-Savart Law.
Week 15	Thévenin's / Norton's Theorem and Kirchhoff's Laws)
Week 16	Preparatory week before the final Exam.

Delivery Plan (Weekly Lab. Syllabus)	
المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Error Analysis.
Week 2	Lab 2: Ohm's Law and RC Circuits.
Week 3	Lab 3: Faraday's Law.
Week 4	Lab 4: Wheatstone bridge.
Week 5	Lab 5: DC Circuits & Kirchhoff's Rules.
Week 6	Lab 6: Frequency Response of RLC Circuits.
Week 7	Lab 7: Electromagnetic Induction.





Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Serway, Raymond A., and John W. Jewett, Jr. Physics for Scientists and Engineers. Vol. 2. 6th ed. Belmont, CA: Thomson-Brooks/Cole, c2003. ISBN: 9780534408428. (Student ed.)	Yes
Recommended Texts	Electricity and Magnetism. Edward M. Purcell , 3 rd Edition, 2013	Yes
Websites	https://faculty.wcas.northwestern.edu/infocom/Ideas/electric.html	

GRADING SCHEME مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
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Note:				
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MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	Mathematics	Module Delivery	
Module Type	B	☒ Theory	
Module Code	MPH1103	☒ Lecture	
ECTS Credit	6	☐ Lab	
SWL (hr/sem.)	150	☒ Tutorial	
		☐ Practical	
		☐ Seminar	
Module Level	1	Semester of Delivery	1
Administering Department	Medical Physics	College	Science
Module Leader	Karar Kadum	e-mail	
Module Leader's Acad. Title	Ass. lec.	Module Leader's Qualification	Msc in physics
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

Relation with other Modules			
العلاقة مع المواد الدراسية الاخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
اهداف المادة الدراسية ونتائج التعلم والمحتويات الارشادية	
Module Aims أهداف المادة الدراسية	1. Learn the basic concepts of differential and integral calculus. 2. Identify the possibility of derivation of functions and the integration of different functions and their relationship to continuity.





	3. Applications in applied sciences such as physics, motion applications, and engineering in calculating volumes using the maxima and minima. 4. Know the applications of calculus and integration in various sciences. 5. Application of mathematical rules and laws and development of the students conclusion. 6. The ability to use calculus to solve mathematical problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge and understanding. 2. Gaining experience and knowledge in drawing mathematical functions. 3. Solutions of differential equations. 4. Finding areas under a curve and its applications in other sciences. 5. Calculating the surface areas and volumes of geometric shapes. 6. Developing the student's ability to perform assignments and deliver them on time. 7. Logical and mathematical thinking in finding solutions to problems. 8. Developing the student's ability to dialogue and discussion.
Indicative Contents المحتويات الارشادية	1-Developing the student's ability to deal with technical means. 2- Developing the student's ability to deal with the Internet. 3- Developing the student's ability to deal with multiple means. 4- Developing the student's ability to dialogue and discussion.

Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	• Managing the lecture in an applied manner linked to the reality of daily life in order to attract the student to the topic of the lesson without straying from the heart of the matter so that the material is flexible and subject to understanding and analysis. • Assigning the student some group activities and assignments. • Allocating a percentage of the mark for daily assignments and tests.





Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	4
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	90	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	6
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20%(20)	5 and 10	LO # 1, # 2 and #10, #11
	On line Assignments	4	8%(8)	2,5,8,11	LO # 3,# 4 and #6,#7
	Onside Assignments	4	8%(8)	3,6,9,12	LO # 3,# 4 and #6,#7
	Report	1	4%(4)	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	Introduction – what is Calculus, Real Numbers and the Real Line, Intervals.
Week 2	Solving Inequalities, Absolute Value, Cartesian Coordinates in the plane.
Week 3	Increments and Straight lines, distance between points in the plane.
Week 4	Slope, Parallel and Perpendicular Lines, Equation of a Straight line.





Week 5	Functions and Their Graphs, Even Functions and Odd Functions: Symmetry, Composite Functions.
Week 6	Limits, The Limit Laws, One-Sided Limits and Limits at Infinity.
Week 7	Continuity, Continuity Test.
Week 8	Mid-term Exam.
Week 9	Derivatives, Laws of Derivatives, Second-and Higher-Order Derivatives.
Week 10	Derivatives of Trigonometric Functions, The Chain Rule and Parametric Equations, Implicit Differentiation.
Week 11	Application of Derivatives, Velocity and Speed, Local (Relative) Extreme Value, Increasing Function and Decreasing Functions, Rolles Theorem, Related Rates.
Week 12	Integration, Indefinite Integrals, Integrals of Trigonometric Functions.
Week 13	Derivatives of inverse of Trigonometric Functions, Integrals of inverse of Trigonometric Functions, Logarithm Function, The natural logarithmic, Derivative of natural logarithmic, Integrals of natural logarithmic, Exponential Functions, Integrals of Exponential Functions.
Week 14	The Definite Integrals, Integration by Trigonometric Substitution, Integration of Rational Functions, Integration by Parts.
Week 15	Application of the integral, Area, Volume, Work.
Week 16	Final Exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Thomas. G. B., Calculus and Analytic Geomtry, 4 th , 1984	Yes
Recommended Texts	Durfee. W.H, Calculus and Analytic Geometric, New York, 1971.	Yes
Websites	https://www.tntech.edu/cas/math/what-is-mathematics.php . www. Freescience.info/math	

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	Works 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 with 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.				

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية		
Module Title	Arabic Language	Module Delivery
Module Type	Support	☒ Theory
Module Code	MUC1104	☒ Lecture
		☐ Lab





ECTS Credit	2			☐ Tutorial ☐ Practical ☒ Seminar	
SWL (hr/sem.)	50				
Module Level		1	Semester of Delivery		1
Administering Department		Medical Physics	College	Science	
Module Leader	Noor Ali		e-mail		
Module Leader's Acad. Title		Ass. Lec.	Module Leader's Qualification		Msc in Arabic Language
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		1/9/2025	Version Number		2

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 course aims to develop the primary linguistic skills of students, including reading, writing, and speaking skills. During this, students learn an appropriate amount of grammatical and functional rules and spelling regulations, mastering silent and aloud reading skills to be able to listen and related mental skills such as attention, tracking ideas, comprehension, and developing appropriate thinking skills such as accuracy of observation and organization of ideas. Thus, their linguistic store of vocabulary and structures grows, as well as their ability to employ them in various situations—such as the eloquence of Almighty God's speech, realizing its secrets, reviewing Arab heritage, expanding grammatical and literary culture, and increasing verbal wealth.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	<i>A. Cognitive Learning Outcomes:</i> 1. Studying the types of body movement - introducing students to the types of Hamza and how to write it.





	- Introducing students to the categories of Arabic sentences and how to distinguish between them. - Enabling students to read the Quranic text with the reading of one who contemplates the text and searches for its linguistic secrets. - Developing the faculty of appreciating Arabic texts when dealing with poetry in general and the Quran in particular. - Enabling students to understand the mechanism of parsing rules in conveying the intended meaning. - Introducing students to Quranic rhetoric through the wisdom and lessons derived from the Quranic text. <i>B. Course-Specific Skill Learning Outcomes:</i> - Developing the ability to pronounce correctly. - Developing the ability to write linguistically correct. - Developing the ability to analyze the Quranic text in a way that suits linguistic reality. - Developing the ability to compare between the mother tongue Arabic and the English language.
Indicative Contents المحتويات الارشادية	- Instilling the concept of cooperation and starting from the principle of love of goodness. - Enhancing spiritual interaction with the Holy Qur'an. - Linking Qur'anic wisdom and lessons to social reality. - Students' appreciation of the importance of the Arabic language as the mother tongue.

Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive classes and tutorials, and by reflecting on the type of simple experiments that involve some sampling activities of interest to students.





Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	45	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	3
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	5	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	0.3
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	50		

Module Evaluation تقييم المادة الدراسية					
Formative assessment		Quizzes	2	20%(20)	5 and 10
Summative assessment	On line Assignments	4	8%(8)	2,5,8,11	LO # 3,# 4 and #6,#7
	Onside Assignments	4	8%(8)	3,6,9,12	LO # 3,# 4 and #6,#7
	Report	1	4%(4)	13	
	Midterm Exam	2hr	10%(10)	7	LO # 5,# 8 and #10
Total assessment	Final Exam	3hr	50%(50)	16	LO # 1,# 7
	100% (100 Marks)				All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Scientific inimitability (I'jaz) in Surat Al-Kahf.
Week 2	The subject (Mubtada) and its types.
Week 3	The predicate (Khabar) and its types.
Week 4	Kana and its sisters.
Week 5	Inna and its sisters.
Week 6	A poem by Al-Jawahiri.
Week 7	Mid-term Exam.
Week 8	Dual noun (Muthanna).





Week 9	Sound masculine plural.
Week 10	Sound feminine plural.
Week 11	Broken plural.
Week 12	A poem.
Week 13	Intransitive and transitive verbs.
Week 14	Kanna and its sisters.
Week 15	Adverb of time and place (Zarf Al-Zaman wal-Makan).
Week 16	Final Exam. الامتحان النهائي

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Ibrahim Mustafa, "The Foundations of the Arabic Language, its Vocabulary, and the Significance of Words and Terms" (2016).	Yes
Recommended Texts	Ahmed Shalaby, "Arabic Language Rules and Application".	Yes
Websites	https://www.arab-books.com/books-pdf	

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	Works 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 with 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.				





MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	Human Rights & Democracy	Module Delivery	
Module Type	Support	☒ Theory	
Module Code	MUC1105	☐ Lecture	
ECTS Credit	2	☐ Lab	
SWL (hr/sem.)	50	☐ Tutorial	
		☐ Practical	
		☒ Seminar	
Module Level	1	Semester of Delivery	1
Administering Department	Medical Physics	College	Science
Module Leader	Dr. Hussain Mostaf	e-mail	
Module Leader's Acad. Title	Prof.	Module Leader's Qualification	Ph.D Management
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

Relation with other Modules			
العلاقة مع المواد الدراسية الاخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
اهداف المادة الدراسية ونتائج التعلم والمحتويات الارشادية	
Module Aims	1. Providing the student with knowledge of the fundamental concepts of human rights. 2. Introducing the student to the most important principles of human rights.



أهداف المادة الدراسية	3. Introducing the student to human rights laws. 4. Providing the student with knowledge of democratic concepts. 5. Introducing the student to the democratic system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- A. Cognitive Objectives: 1. Knowledge of human rights in general. 2. Reviewing laws and regulations related to human rights. 3. Building a generation aware of its rights globally and locally. 4. Identifying human rights in divine laws, especially Islamic law. 5. Recognizing the concept of democracy and knowing its characteristics. 6. Directly addressing the types of democracies in the world and benefiting from these experiences. B. Course-Specific Skill Objectives: • Comprehension, assimilation, and cognitive analysis. • Culture and awareness of rights.
Indicative Contents المحتويات الارشادية	1. • Observation and perception. 2. • Analysis and interpretation. 3. • Inference and evaluation. 4. • Preparation and assessment.

Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	The main strategy to be adopted in delivering this unit is to encourage students to participate in exercises while simultaneously improving and expanding their critical thinking skills. This will be achieved through interactive classes and tutorials, and by reflecting on the type of simple experiments that involve some sampling activities of interest to students.



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Student Workload (SWL) الحمل الدراسي للطالب					
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	45	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	3		
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	5	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	0.3		
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	50				
Module Evaluation تقييم المادة الدراسية					
	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome	
Formative assessment Summative assessment	Quizzes	2	20%(20)	5 and 10	LO # 1, # 2 and #10, #11
	On line Assignments	4	8%(8)	2,5,8,11	LO # 3,# 4 and #6,#7
	Onside Assignments	4	8%(8)	3,6,9,12	LO # 3,# 4 and #6,#7
	Report	1	4%(4)	13	LO # 5,# 8 and #10
	Midterm Exam	2hr	10%(10)	7	LO # 1,# 7
Total assessment	Final Exam	3hr	50%(50)	16	All
	100% (100 Marks)				
Total assessment		100% (100 Marks)			

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	General introduction to human rights.
Week 2	Human rights in ancient civilizations.
Week 3	Human rights in divine laws and religions.
Week 4	Concept and characteristics of human rights.





Week 5	Constitution of the Republic of Iraq of 2005.
Week 6	The concept of freedom and liberties.
Week 7	Mid-term Exam.
Week 8	Types of rights and liberties / Right to life and work.
Week 9	Universal Declaration of Human Rights 1948.
Week 10	Historical overview of the emergence of democratic thought.
Week 11	Definition and forms of democracy. Basic pillars of democracy.
Week 12	Islam and democracy.
Week 13	Dictatorial system and good governance.
Week 14	Preparatory week before the final exam.
Week 15	Preparatory week before the final Exam.
Week 16	Final Exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Human Rights and Democracy" (2018), prepared by Asst. Prof. Dr. Ghassan Karim Mejhad and Asst. Prof. Dr. Amjad Zain Al-Abideen Tuamah.	Yes
Recommended Texts		
Websites	https://uomustansiriyah.edu.iq/media/lectures/6/6_2_018_12_17!03_44_26_PM.pdf	

GRADING SCHEME مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors





Success Group (50 – 100)	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	Works 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 with 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.

MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	Analytical Chemistry		Module Delivery
Module Type	Basic		☒ Theory
Module Code	MPH1106		☐ Lecture
ECTS Credit	6		☒ Lab
SWL (hr/sem.)	150		☒ Tutorial
			☐ Practical
			☐ Seminar
Module Level	1	Semester of Delivery	1
Administering Department	Medical Physics	College	Science
Module Leader	Dr. Hamza Yassin	e-mail	
Module Leader's Acad. Title	Ass. P.	Module Leader's Qualification	Ph.D in chemistry
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2





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 Objectives أهداف المادة الدراسية	1- The aim of this course is to define the Analytical Chemistry and the application of it in the life in general. 2- In addition the aim of this course is to present the Introduction of Analytical Chemistry and Qualitative Analysis in Analytical Chemistry 3-Description of the Classification of Analytical Chemistry and the role of it 4- Description of the relationship between of Analytical Chemistry and other branches of chemistry 5- Definition of Electrolytes in Analytical Chemistry 6- Calculation of Equivalent weight Analytical Chemistry 7- To present the Classification of Solutions in Analytical Chemistry 8- To educate the students the Stoichiometric Calculations in Analytical Chemistry 9- To introduce the Mole Concept in Analytical Chemistry 10- To educate the students the Concentrations in Analytical Chemistry (Molarity)and (Formality) 11- To introduce and to apply the Concentrations in Analytical Chemistry (Normality)
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	12- To apply another kind of Concentrations in Analytical Chemistry (Molality) 13- To apply another kind of Concentrations in Analytical Chemistry (Percentage and its kinds). 13- To introduce and to apply another kind of Concentrations in Analytical Chemistry (ppt, ppm, ppb). 14. Concentrations in Analytical Chemistry (Mole Fraction of solvent and solute) 15. The definition of pH and the Calculation of pH of solutions in Analytical Chemistry
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of the module, the following learning outcomes are expected to be acquired by the students: 1. Understand the concepts and be familiar with the steps and techniques employed volumetric method of analysis. 2. Acquire skills in laboratory technique required to perform and plan chemical analysis and systematically collect and interpret data obtained in quantitative analytical process. 3-Understanding the fundamental of Analytical Chemistry. 4-Understanding the Definition of Analytical Chemistry and the application of it in the human life. 5- Describing the operating principles of the Analytical Chemistry 6- Describing the instrumentation required for the Analytical Chemistry and their associated operating principles 7- Understanding the significance quality and limitation of the results produced by the Analytical chemistry and the role of this branch with other branches , chemistry , Biology, Medicine, Agriculture, Engineering, physics, Drugs. 8- Explaining the Calculation of Equivalent weight Analytical Chemistry





	9-Describing the Mole Concept in Analytical Chemistry 10-Evaluation the methods of the Concentrations in Analytical Chemistry and the application of these methods in the problems calculations. 11-Evaluation the definition of pH and the Calculation of pH of solutions in Analytical Chemistry and the application of these Calculations in the problems solutions.
Indicative Contents المحتويات الإرشادية	Indicative contents included the following topics: 1. Nature and role of analytical chemistry 2. Main division of analytical chemistry 3. Quantitative chemical method and analysis 4. Tools of analytical chemistry 4.1 Chemicals, apparatus and unit operations used in analytical chemistry 4.2 Using spreadsheet in analytical chemistry 4.3 Errors in chemical analyses
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Adapting different Teaching strategies and methods which applied to support student learning. Selecting the teaching strategy most suited to the current level of knowledge of the students. A learning strategy by a student which is the way to organize and use a specific range of skills to learn curriculum content or complete other tasks more efficiently and effectively by learning new scientific subjects relates with Analytical Chemistry and the calculations related with the subject.





	. Applying the most innovative and creative teaching methods to teach <u>academic and analytical chemistry concepts and meet the individual needs of students</u> by using different types of encouraging aspects like donating free marks and effective words for encouraging the good student.
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Student Workload (SWL)			
الحمل الدراسي للطلاب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	75	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	150		

Module Evaluation					
تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	2	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects/Lab.	1	14%(14)	Continuous	all
	Report	1	2%(2)	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	Introduction of Analytical Chemistry and Qualitative Analysis in Analytical Chemistry.
Week 2	Classification of Analytical Chemistry and the role of it.
Week 3	The relationship between of Analytical Chemistry and other branches of chemistry.
Week 4	Electrolytes in Analytical Chemistry.
Week 5	Calculation of Equivalent weight Analytical Chemistry.
Week 6	Classification of Solutions in Analytical Chemistry.
Week 7	Stoichiometric Calculations in Analytical Chemistry.
Week 8	Mole Concept in Analytical Chemistry.
Week 9	Concentrations in Analytical Chemistry (Molarity) and (Formality).
Week 10	Concentrations in Analytical Chemistry (Normality).
Week 11	Concentrations in Analytical Chemistry (Molality).
Week 12	Concentrations in Analytical Chemistry (Percentage and its kinds).
Week 13	Concentrations in Analytical Chemistry (ppt, ppm, ppb).
Week 14	Concentrations in Analytical Chemistry (Mole Fraction of solvent and solute).
Week 15	The definition of pH and the Calculation of pH of solutions in Analytical Chemistry.
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Measurements and Density.
Week 2	Lab 2: The Stoichiometry of a Reaction.
Week 3	Lab 3: Titration of Acids and Bases.
Week 4	Lab 4: Oxidation – Reduction Titration.





Week 5	Lab 5: Quantitative Analysis Based on Gas Properties.
Week 6	Lab 6: Thermochemistry: The Heat of Reaction.
Week 7	Lab 7 Determination of the melting point of an organic compound.
Week 8	Lab 8: Purification of solutions by simple distillation..

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Fundamental of Analytical Chemistry" by Doglas A. Skooge, Donald M. West and James Holler, 8 th Edition, 2004.	Yes
Recommended Texts	"Analytical Chemistry" by Gray D. Christian, 6 th Edition, 2004, John Wiley and Sons, Inc.	No
Websites	https://www.amazon.com/Fundamentals-Analytical-Chemistry-Douglas-Skoog/dp/0495558281	

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	Works meets minimum criteria
	FX - Fail	راسب (قيد المعالجة)	(45 – 49)	More work required but credit awarded





Fail Group (0 - 49)	F - Fail	راسب	(0 – 44)	Considerable amount of work required
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Note:

Marks with 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.

Semester Two

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية		
Module Title	Mechanics 2	Module Delivery
Module Type	Core	☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	MPH1217	
ECTS Credit	7	
SWL (hr/sem.)	175	





Module Level	1	Semester of Delivery	2
Administering Department	Medical Physics	College	Science
Module Leader	Dr. Waleed Nassar Raja	e-mail	
Module Leader's Acad. Title	Ass. P.	Module Leader's Qualification	Ph.D in Physics
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MPH1101	Semester	1
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents اهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• Analyze Dynamic Systems: To provide students with foundational and advanced skills to analyze dynamics problems associated with particles, rigid bodies, and simple mechanisms from first principles. • Energy and Momentum Principles: To develop a comprehensive understanding of work, energy transfer, conservation laws, impulse, and momentum principles applied to engineering systems. • Problem-Formulation: To cultivate analytical reasoning and critical thinking through the application of mathematical modeling to real-world mechanical and physical systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the module, students are expected to be able to: 1- LO1: Understand the core principles of dynamical analysis and apply them to evaluate motion and forces in simple mechanical systems. 2- LO2: Formulate and solve problems involving work, kinetic energy, potential energy, and mechanical energy conservation.





	3- LO3: Apply linear momentum, impulse theorems, and conservation laws to analyze one-dimensional and two-dimensional collisions. 4- LO4: Utilize circular motion principles, centripetal forces, and varying force integrations to solve complex mechanical scenarios.
Indicative Contents المحتويات الارشادية	• Circular Motion & Gravitation: Uniform circular motion, centripetal acceleration, radial net forces, banking angles, vertical loops, and satellite/orbital motion. • Work and Energy: Work done by constant and varying forces (graphical and direct integration), Hooke's law, spring work, kinetic energy, and the work-kinetic energy theorem. • Power & Conservative Systems: Instantaneous and average power, potential energy (U_g and U_s), conservative vs. non-conservative forces, and the principle of conservation of mechanical energy. • Impulse, Momentum & Collisions: Linear momentum, impulse-momentum theorem, conservation of momentum, perfectly elastic/inelastic collisions, and two-dimensional glancing collisions.

Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	Teaching and learning strategies for this course will include: A minimum of 50 contact hours, typically to include interactive group teaching, cocurriculars, individual meetings, in-class presentations, lab-based experiments and exams. Course 3 information and supplementary materials are available on the University's Virtual Learning Environment (VLE). Students will receive individualised developmental feedback on their work for this course. Students are required to attend and participate in all the formal and timetabled sessions for this course. Students are also expected to manage their directed learning and independent study in support of the course..

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	5
Unstructured SWL (USSWL)(h/sem.)	100	Unstructured SWL (h/w)	6.7





الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب إسبوعيا	
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	175		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects/Lab.	1	14%(14)	Continuous	all
	Report	1	2%(2)	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	Uniform Circular Motion
Week 2	Applications of Circular Motion (Pendulums & Vehicles)
Week 3	Advanced Circular Motion & Gravitation
Week 4	Work Done by Constant Forces
Week 5	Work Done by Varying Forces
Week 6	Work Done by Varying Forces
Week 7	Mid term
Week 8	Kinetic Energy and the Work-Kinetic Energy Theorem
Week 9	Power and Energy Transfer Rates
Week 10	Potential Energy and Conservative Forces
Week 11	Conservation of Mechanical Energy
Week 12	Work by Nonconservative Forces & Energy Loss
Week 13	Linear Momentum and Impulse
Week 14	One-Dimensional Collisions (Elastic & Inelastic)
Week 15	Two-Dimensional Collisions & Systems of Particles
Week 16	Final Exam.





Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1 Determining the viscosity coefficient of a liquid using Stokes' method
Week 2	Lab 2: Lever law.
Week 3	Lab 3: Finding the resultant force of two forces acting at the same point.
Week 4	Lab 4: Verifying Boyle's law.
Week 5	Lab 5: Verifying Charles' law and calculating absolute zero.
Week 6	Lab 6: Determining the specific heat of a solid using the mixing method.
Week 7	Lab 7: Determining the latent heat of fusion of ice.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Fundamentals of Physics by Halliday, Resnick & Walker 2001. John Wiley & Sons. Supplementary references	Yes
Recommended Texts	1- Physics for scientist and engineers with modern physics by Serway (1997), Saunders college publisher. 2- University Physics by Sears, Zemansky, and Young (1995).	Yes
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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	Works 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 with 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.

MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	Biophysics		Module Delivery
Module Type	Core		☒ Theory
Module Code	MPH1208		☒ Lecture
ECTS Credit	7		☒ Lab
SWL (hr/sem.)	175		☒ Tutorial
			☐ Practical
			☐ Seminar
Module Level	1	Semester of Delivery	2
Administering Department	Medical Physics	College	Science
Module Leader	Dr. Waleed Nassar Raja	e-mail	
Module Leader's Acad. Title	Ass. P.	Module Leader's Qualification	Ph.D in Physics
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

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 Objectives أهداف المادة الدراسية	1. This course deals with the basic concept of physics to understand the relation of physics with biology. 2. To develop problem solving skills that dealing with the work of medical devices. 3. To understand how the principles of physics are applied within the human body. 4. Develop a physical explanation of biological processes. 5. Clarifying the relationship between what happens outside and inside the human body.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Explain the meaning of biophysics and biophysicists. 2. Explain the atomic structure of human body. 3. Summarize what is meant by diffusion. 4. Discuss the four major biomolecules of nature. 5. Describe energy absorbance by molecules. 6. Define electromagnetic radiation and its types. 7. Discuss the effect of radiation on molecules inside body. 8. Discuss the relation between radiation and the work of some medical devices. 9. Discuss the examples of Energy interactions with human body. 10. Define Molecular motion. 11. Show mechanisms of passive and active transport through the membranes. 12. Discuss the electrical properties of biomembranes. 13. Explain the Waves and Sound.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Introduction of Biophysics</u>



	What is BIOPHYSICS?- IMPORTANCE OF BIOPHYSICS.- What Do Biophysicists Do?- CONCEPT OF UNIT - Fundamental and derived units - SYSTEMS OF UNITS – Physical Quantities- Atomic Structure - Bonding between atoms - The hierarchy of living things [15 hrs] Proteins– Carbohydrates – Carbohydrates - Nucleic acids- Energy absorbance by molecules- Molecular transduction of energy. [15 hrs] Electromagnetic Radiation – Effect of EMR on human body- definition of ionizing and nonionizing radiation - free radicals - Examples of Energy interactions with human body. [10 hrs] Examples of Energy interactions with human body - ACTIVE TRANSPORT- Antiport, symport - Comparing Facilitated Diffusion and Active Transport – OSMOSIS - Basic principle of an osmometer - Electro-chemical potential - Extracellular Fluid – Waves and Sound . [15 hrs]
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	5
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	100	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	6.7
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	175		





Module Evaluation					
تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects/Lab.	1	14%(14)	Continuous	all
	Report	1	2%(2)	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	Introduction of Biophysics.
Week 2	Atomic Structure
Week 3	Energy Interactions with human body
Week 4	MECHANISMS OF PASIVE AND ACTIVE TRANSPORT THROUGH THE MEMBRANES
Week 5	ELECTRICAL PROPERTIES OF BIOMEMBRANES
Week 6	Waves and Sound – Part 1
Week 7	Waves and Sound – Part 2
Week 8	Equilibrium and Stability
Week 9	Friction
Week 10	Translational Motion
Week 11	Elasticity and Strength of Materials
Week 12	Fluids
Week 13	The Motion of Fluids
Week 14	Heat and Kinetic Theory
Week 15	Thermodynamics
Week 16	Final Exam.





Delivery Plan (Weekly Lab. Syllabus)		
المنهاج الاسبوعي للمختبر		
	Material Covered	
Week 1	Lab 1: Measurements of Body Mass Index (BMI)	
Week 2	Lab 2: Measure a blood pressure using mercury sphygmomanometer	
Week 3	Lab 3: Measure of blood mass in the body	
Week 4	Lab 4: Determination of the energy content of food by combustion	
Week 5	Lab 5: Stress level and HRV stress	
Week 6	Lab 6: investigation of Archimedes principle	
Week 7	Lab 7: Measurement of liquid density	
Week 8	Lab 8: Speed of sound.	
Week 9	Lab 9: Determination of frequency of tuning fork.	
Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Biological Physics: Energy, Information, Life • <i>Author:</i> Philip Nelson	Yes
Recommended Texts	Physical Biology of the Cell • <i>Authors:</i> Rob Phillips, Jane Kondev, Julie C. Theriot, and Hernan G. Garcia	Yes
Websites	The Biophysical Society (biophysics.org)	

GRADING SCHEME				
مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 – 100)	A - Excellent	امتياز	90 – 100	Outstanding Performance
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	FX - Fail	راسب (قيد المعالجة)	(45 – 49)	More work required but credit awarded





Fail Group (0 - 49)	F - Fail	راسب	(0 – 44)	Considerable amount of work required
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Note:

Marks with 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.

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية			
Module Title	General Biology		Module Delivery
Module Type	Basic		☒ Theory
Module Code	MPH1209		☒ Lecture
ECTS Credit	6		☒ Lab
SWL (hr/sem.)	150		☒ Tutorial
			☐ Practical
			☐ Seminar
Module Level	1	Semester of Delivery	2
Administering Department	Medical Physics	College	Science
Module Leader	Abrar Kareem Dhari	e-mail	
Module Leader's Acad. Title	Ass. Lec.	Module Leader's Qualification	Msc. in Biology
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	





Scientific Committee Approval Date	1/9/2025	Version Number	2
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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	• Establish Foundational Knowledge: To provide a comprehensive introduction to the core principles of modern biology, spanning from the molecular and cellular levels to complex organisms and ecosystems. • Develop Scientific Inquiry: To cultivate critical thinking and analytical skills through the application of the scientific method, experimental design, and biological data interpretation. • Connect Structure and Function: To explore how the structural organization of biological systems—from macromolecules and cells to entire organ systems—dictates their physiological functions. • Appreciate Evolutionary Dynamics: To examine the mechanisms of evolution and genetics that explain the immense diversity of life and the interconnectedness of organisms within their environments.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, successful students will be able to: 1- Explain the fundamental chemical and molecular processes that sustain cellular life, including metabolism, energy transfer, and macromolecular synthesis. 2- Describe the structure and function of prokaryotic and eukaryotic cells, detailing the mechanisms of cellular transport, division (mitosis and meiosis), and gene expression. 3- Apply the principles of Mendelian and molecular genetics to solve inheritance problems and interpret patterns of genetic variation. 4- Analyze the evolutionary processes, mechanisms of natural selection, and phylogenetic relationships that drive biodiversity.



	5- Evaluate ecological interactions, energy flow, and nutrient cycling within ecosystems, alongside basic homeostatic mechanisms in multicellular organisms. 6- Demonstrate competency in biological terminology, scientific reasoning, and the safe, ethical execution of biological inquiry.
Indicative Contents المحتويات الإرشادية	<i>The Chemistry of Life & Cell Structure</i> • Characteristics of living organisms and the scientific method. • Chemical foundation: atomic structure, chemical bonds, and the unique properties of water and buffers. • Structure and function of biological macromolecules (carbohydrates, lipids, proteins, and nucleic acids). • Cellular architecture: prokaryotic vs. eukaryotic cells, organelle specialization, and the endomembrane system. <i>2. Cellular Energetics & Transport</i> • Plasma membrane structure (fluid mosaic model) and mechanisms of membrane transport (passive, active, and bulk transport). • Cell signaling pathways and signal transduction. • Bioenergetics: Adenosine Triphosphate (ATP) and enzyme function. • Catabolic and anabolic pathways: Cellular respiration (glycolysis, Krebs cycle, oxidative phosphorylation) and photosynthesis (light-dependent reactions and the Calvin cycle). <i>3. Genetics & Molecular Biology</i> • The cell cycle, checkpoints, and regulation of cell division via mitosis. • Meiosis, gametogenesis, and mechanisms generating genetic diversity. • Mendelian genetics, Punnett squares, pedigree analysis, and complex patterns of inheritance (codominance, incomplete dominance, polygenes). • Molecular genetics: DNA structure, semi-conservative replication, transcription, translation, and the central dogma of molecular biology. <i>4. Evolution & Biodiversity</i> • History of evolutionary thought, evidence for evolution, and Charles Darwin's theory of natural selection. • Population genetics and the Hardy-Weinberg equilibrium.



	• Mechanisms of speciation, macroevolution, and the principles of taxonomy, systematics, and cladistics. • Overview of the three domains of life (Bacteria, Archaea, Eukarya) and major evolutionary milestones in plants, fungi, and animals. <i>5. Ecology & Animal Physiology</i> • Introduction to ecology: biotic and abiotic factors, population growth models, and community interactions (competition, symbiosis, predation). • Ecosystem dynamics: energy flow, trophic pyramids, and biogeochemical cycles. • Homeostasis and physiological regulation: negative and positive feedback mechanisms. • Overview of select vertebrate physiological systems (e.g., nervous, cardiovascular, and immune systems).
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Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	To effectively deliver a General Biology module and ensure students achieve the learning outcomes, a blended approach of theoretical instruction, practical application, and active engagement is recommended. Here are the core learning and teaching strategies for this course: <i>1. Direct Instruction & Theoretical Delivery</i> • Interactive Lectures: Traditional lectures enhanced with active participation elements (e.g., polling, Q&A sessions) to deliver foundational concepts like cellular energetics, genetics, and ecology. • Multimedia Presentations: Utilizing 3D models, animations, and videos to visualize complex microscopic processes (e.g., DNA replication, electron transport chain, mitosis/meiosis) that are difficult to grasp through text alone.



- **Guest Seminars:** Inviting specialists (e.g., from medical physics, forensics, or advanced life sciences) to briefly present real-world applications of general biology concepts.

2. Practical & Laboratory-Based Learning

- **Hands-On Wet Labs:** Weekly laboratory sessions where students apply the scientific method, practice microscopy, perform chemical tests for biological molecules, and observe biological phenomena firsthand.
- **Data Collection & Analysis:** Teaching students how to record experimental data systematically and use spreadsheet software to organize results, create graphs, and draw scientific conclusions.
- **Demonstrations:** Instructor-led demonstrations for complex or resource-intensive procedures prior to student execution.

3. Active & Collaborative Learning

- **Problem-Based Learning (PBL):** Presenting students with real-world biological scenarios or case studies (e.g., a genetic disorder pedigree or an ecological imbalance) and requiring them to apply course knowledge to find solutions.
- **Flipped Classroom:** Assigning reading materials or pre-recorded lecture videos before class, allowing in-class time to be used entirely for discussions, problem-solving, and clarifying misconceptions.
- **Group Projects & Peer Review:** Small group assignments focused on researching a specific biological topic and presenting findings, fostering teamwork and scientific communication skills.

4. Technology-Enhanced & Self-Directed Learning

- **Learning Management Systems (LMS):** Utilizing platforms (e.g., Moodle, Canvas, or Google Classroom) to distribute lecture notes, syllabus materials, and supplemental reading.
- **Virtual Laboratories:** Using digital lab simulations to supplement physical labs, allowing students to repeat experiments, practice safety protocols digitally, or simulate long-term evolutionary/ecological models.
- **Independent Study:** Guided reading of textbook chapters and introductory scientific literature to build self-reliance and research skills.

5. Formative & Summative Assessment Strategies

- **Multi-Format Quizzes (Formative):** Regular, low-stakes weekly quizzes utilizing multiple-choice, true/false, and fill-in-the-blank questions to continuously gauge student understanding and reinforce memory retention.
- **Practical Examinations (Summative):** Objective Structured Practical Examinations (OSPE) to assess laboratory skills, specimen identification, and experimental execution.
- **Major Examinations (Summative):** Midterm and final written exams designed to test comprehensive knowledge, conceptual application, and critical thinking across the module's core units.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعياً	2.4
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	90	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعياً	3.6
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	150		

Module Evaluation

تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects/Lab. Report	1	14%(14)	Continuous	all
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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	Unit 1: The Chemistry of Life & Cell Structure (Weeks 1–4): Introduction to Biology & The Scientific Method
Week 2	The Chemical Basis of Life
Week 3	Biological Molecules
Week 4	Cell Structure and Function
Week 5	Unit 2: Cellular Energetics (Weeks 5–6): Membrane Transport & Cell Signaling
Week 6	Cellular Respiration & Photosynthesis
Week 7	Mid term
Week 8	Unit 3: Genetics & Molecular Biology (Weeks 8–11): The Cell Cycle & Cellular Reproduction
Week 9	Meiosis & Sexual Reproduction
Week 10	Mendelian Genetics & Inheritance Patterns
Week 11	Molecular Genetics: DNA and Protein Synthesis
Week 12	Unit 4: Evolution & Diversity of Life (Weeks 12–13): Mechanisms of Evolution
Week 13	Phylogeny & The Diversity of Life
Week 14	Unit 5: Ecology & Animal Physiology (Weeks 14–15): Unit 5: Ecology & Animal Physiology (Weeks 13–14)
Week 15	Animal Form, Function, & Systems
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Microscopy of Plant and Animal Cells
Week 2	Osmosis and Diffusion Across a Model Cell Membrane
Week 3	Enzyme Catalysis: Factors Affecting Catalase Activity
Week 4	Photosynthesis: Measuring Oxygen Production and Pigment Separation
Week 5	Cellular Respiration in Germinating Seeds
Week 6	Mendelian Genetics and Chi-Square Analysis with Corn Kernels
Week 7	Terrestrial Microcosms and Population Ecology

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?





Required Texts	Campbell Biology (12th Edition) by Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, and Rebecca B. Orr (Pearson).	Yes
Recommended Texts	Biology: The Core (3rd Edition) by Eric J. Simon (Pearson).	Yes
Websites	Khan Academy - AP/College Biology (khanacademy.org/science/biology).	

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
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	F - Fail	راسب	(0 – 44)	Considerable amount of work required

Note:

Marks with 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.

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية		
Module Title	Computer science-I	Module Delivery
Module Type	SUPPORT	☒ Theory ☐ Lecture ☒ Lab
Module Code	MUC 12010	





ECTS Credits	3		☐ Tutorial ☒ Practical ☐ Seminar	
SWL (hr/sem)	75			
Module Level	1	Semester of Delivery	2	
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Ruaa mohameed		e-mail	
Module Leader's Acad. Title	Asst. Lect	Module Leader's Qualification	M.Sc in Coumuter	
Module Tutor	Name (if available)	e-mail	E-mail	
Name (if available)	Name	e-mail	E-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2	

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 Objectives	
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أهداف المادة الدراسية	1. To develop problem solving skills and understanding of circuit theory through the application of techniques. 2. To understand voltage, current and power from a given circuit. 3. This course deals with the basic concept of electrical circuits. 4. This is the basic subject for all electrical and electronic circuits. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the reaction and involvement of atoms in electric circuits. 5. Describe electrical power, charge, and current. 6. Define Ohm's law. 7. Identify the basic circuit elements and their applications. 8. Discuss the operations of sinusoid and phasors in an electric circuit. 9. Discuss the various properties of resistors, capacitors, and inductors. 10. Explain the two Kirchhoff's laws used in circuit analysis. 11. Identify the capacitor and inductor phasor relationship with respect to voltage and current.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Circuit Theory</u> DC circuits – Current and voltage definitions, Passive sign convention and circuit elements, Combining resistive elements in series and parallel. Kirchhoff's laws and Ohm's law. Anatomy of a circuit, Network reduction, Introduction to mesh and nodal analysis. [15 hrs]



	AC circuits I – Time dependent signals, average and RMS values. Capacitance and inductance, energy storage elements, simple AC steady-state sinusoidal analysis. [15 hrs] AC Circuits II - Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers. [10 hrs] RL, RC and RLC circuits - Frequency response of RLC circuits, simple filter and band-pass circuits, resonance and Q-factor, use of Bode plots, use of differential equations and their solutions. Time response (natural and step responses). Introduction to second order circuits. [15 hrs] Revision problem classes [6 hrs] <u>Part B - Analogue Electronics</u> Fundamentals Resistive networks, voltage and current sources, Thevenin and Norton equivalent circuits, current and voltage division, input resistance, output resistance, coupling and decoupling capacitors, maximum power transfer, RMS and power dissipation, current limiting and over voltage protection. [15 hrs] Components and active devices – Components vs elements and circuit modeling, real and ideal elements. Introduction to sensors and actuators, self-generating vs modulating type sensors, simple circuit interfacing. [7 hrs] Diodes and Diode circuits – Diode characteristics and equations, ideal vs real. Signal conditioning, clamping and clipping, rectification and peak detection, photodiodes, LEDs, Zener diodes, voltage stabilization, voltage reference, power supplies. [15 hrs]
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining
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	and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	50	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.33
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	25	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.67
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7





	Projects/Lab.	1	14%(14)	Continuou s	all
	Report	1	2%(2)	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	What is a computer? Then find out the types of icons on the desktop.
Week 2	Execute by applying the right mouse command related to system icons, programs, and folders.
Week 3	Execute right mouse commands (copy, paste, cut, delete, and change folder name).
Week 4	Execute the right mouse button (the properties of the system icon, program icon, and folder icon)
Week 5	Create a new folder, then save it, change its name, shape, hide it, and show it)
Week 6	Show and hide the system icon (Control panel)
Week 7	Learn the Word program, then ways to open the program
Week 8	Home tab and execute its commands
Week 9	Insert and Execute tab Insert a table, clip art, picture, shapes, text box, and symbols
Week 10	Page layout tabs such as paper margins, orientation, and size





Week 11	The Page Layout tab performs watermark, page borders, and color commands
Week 12	Executing and opening a file command such as saving the document and options for choosing the language of numbers and printing
Week 13	Completing a file command for the rest of it, such as opening a new one, sending it, and previewing it before printing
Week 14	review
Week 15	Monthly test

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: An application to create a folder, change its name, format and save it.
Week 2	Lab 2: Change wallpaper. Learn about system icons, hide them, and show them.
Week 3	Lab 3: Application of commands difference between delete and removal and the location of the use of each of them.
Week 4	Lab 4: Application right-click (system icon, program icon, folder icon properties)
Week 5	Lab 5: Use the (Control Panel) application to open and modify some programs such as time, date, deletion, and others
Week 6	Lab 6: The application opens the Home tab and performs its commands
Week 7	Lab 7: Insert and Execute tab application Insert a table, clip art, picture, shapes, text box, and symbols





Week 8	Lab 8: Apply page layout tabs such as paper margins, orientation, and size
Week 9	Lab 9: The Page Layout tab applies watermark, page border, and color commands
Week 10	Lab 10 : Executing and opening a file command such as saving the document and options for choosing the language of numbers and printing
Week 11	Lab: A file command completion application for the rest of the command, such as opening a new command, submitting it, and previewing it before printing
Week 12	Lab: The application of inserting a table and adding data inside it.
Week 13	Lab: Complete the insert table application and add new rows and columns
Week 14	Lab: Complete the insert table application and the method for deleting rows and columns from within the table

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Computer basics represented by the difference between a computer and a human being, number, programs, memory size, and everything related to computer basics.	Yes
Recommended Texts	Apply to create the folder, change its name, show it, hide it, copy it, paste it, cut it, change the screen scroll, apply the right mouse commands, and everything related to basic computer basics in practice.	Yes
Websites	Microsoft office	





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.

MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title		English 1	Module Delivery
Module Type		Support	☒ Theory ☐ Lecture
Module Code		MUC 12011	





ECTS Credits		2	☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
SWL (hr/sem)		50		
Module Level	2		Semester of Delivery	2
Administering Department			College	
Module Leader	Fatema Aziz		e-mail	
Module Leader's Acad. Title	Asst. Instructor		Module Leader's Qualification	M.Sc in English language
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name			e-mail	E-mail
Scientific Committee Approval Date	1/9 /2025		Version Number	2

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 Objectives	
أهداف المادة الدراسية	1. To learn the four English skills (reading, writing, listening and speaking).





	2. To understand and distinguish between vocabulary that are similar in use. 3. To help students know the phonic symbols of English letters. 4. To help students read, understand and comprehend certain English texts. 5. To enable students to write in English language as well as to learn the basic rules of building up English sentences. 6. To have the ability to practice the language in real situations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Engage the students in real communication to practice speaking skill. 2. Divide the students into groups to practice writing skill. 3. Ask the students to learn and grasp the words that describe family members. 4. Distinguish among the different rules used in texts. 5. Analyze the sentences depending on their grammatical structures. 6. Differentiate between the word-system in students' mother tongue and the target language. 7. Draw certain conclusions after understanding the given texts.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. In this course, students are directed to practice what they are taught throughout the semester. They are encouraged to work on collecting important notes during the session to be able to utilize the learned materials later on. It's important to use certain aids to help understand the lesson. Moreover, students should be directed to write certain meaningful and grammatical paragraphs. They should understand the texts to be able to answer questions given in the quizzes, mid-term and final examination.

Learning and Teaching Strategies





استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their global thinking skills. This will be achieved through classes interactive communication, by performing and involving the four English skills, the receptive and productive ones, reading, listening, writing and speaking. some practical activities will be beneficial and interested to the students like engaging them in a communicative situation, asking them to practice a role-changing activity and so on.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	5	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.33
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية





		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20%(20)	5 and 10	LO # 1, # 2 and #10, #11
	On line Assignments	4	8%(8)	2,5,8,11	LO # 3, # 4 and #6, #7
	Onside Assignments	4	8%(8)	3,6,9,12	LO # 3, # 4 and #6, #7
	Report	1	4%(4)	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	Hello! How are you? What's this in English? Good morning!
Week 2	Your world, What's his name? Contractions, Countries, Where are they from? Numbers
Week 3	All about you! What's his address? Personal information, Social expressions
Week 4	Family and friends! Possessive adjectives, Describing a friend, The alphabet
Week 5	The way I live! Present simple I/they/we/you, Sports/Food/Drinks, Language and nationalities, How much is it? Numbers





Week 6	Every day! Present simple he/she, Saying the time, Words go together, Days of the week, Prepositions of time on/at/in
Week 7	Mid-term exam for the materials given above
Week 8	My favorites! Make questions who, where, how, why... ect. Opposite adjectives, A holiday postcard
Week 9	Where I live? There's/re, Directions, Go straight on, Turn right... ect.
Week 10	Time past! Was/were born, Saying years, When's your birthday?
Week 11	We had a great time! Regular v.s Irregular verbs, Time expressions, Making conversation
Week 12	I can do that! Show ability can/can't, Verb+noun, Adjective+noun
Week 13	Please and thank you! I'd like, Some v.s any, Making offers
Week 14	Here and now! Present continuous v.s Present simple, Colours and clothes, What's the matter?
Week 15	It's time to go! Future plans, Means of transport, Social expressions
Week 16	Preparation for the final examination

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Soars, L. (2009). New headway Plus: Beginner Student's Book.	Yes





Recommended Texts	Oxford Picture Dictionary by Jayme Adelson-Goldstein and Norma Shapiro (Oxford University Press)	No
Websites	British Council: LearnEnglish managed by the British Council (learnenglish.britishcouncil.org)	

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.





MODULE DESCRIPTION FORM

Module Information				
معلومات المادة الدراسية				
Module Title	Organic chemistry		Module Delivery	
Module Type	Basic		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	MPH 12012			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	1	Semester of Delivery		2
Administering Department	Type Dept. Code	College	Type College Code	
Module Leader	Noor Jabar		e-mail	Dr.rasim92hmts@uoanbar.edu.iq
Module Leader's Acad. Title	Assistant Lecture		Module Leader's Qualification	Msc. In Chemistry
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail
Scientific Committee Approval Date	1/ 9/2025		Version Number	

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 Objectives أهداف المادة الدراسية	1. The chemistry of organic compounds course is determined according to the study plan prepared in the Medical Physics Department. 2. The course aims to introduce the student to the general concepts of the organic compounds and their importance and uses in various fields. 3. It also aims at a detailed study of the different structural compositions and naming principles for the compounds of organic chemistry, by focusing on the compounds. And help the student to know the composition of these substances, including drugs, and to know how interactions occur and the mechanism of interaction.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- The student should know the general concepts of the compounds of the organic chemistry curriculum. - That the student is acquainted with the basics and rules of naming, different structural structures and physical properties, and focuses on the same different rings for their vital activity, and recognizes their physical and chemical properties, and that the student distinguishes between the different structural structures. - That the student knows the basic principles of preparation methods - To familiarize the student with the different bases of their interactions. - That the student is aware of the importance of these compounds and their applications.
Indicative Contents المحتويات الإرشادية	a- Methods of teaching and learning 1- Giving lectures. 2- Using the method of recitation, discussion and solving questions. 3- Giving assignments to students to strengthen them and prepare them for the final and final exams.





	b- Evaluation methods 1- Daily and monthly exams 2- Duties 3- In-class exercises
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.33
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		





Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects/Lab.	1	14%(14)	Continuous	all
	Report	1	2%(2)	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	Introduction and principles in organic techniques
Week 2	Chemistry of carbon and hydrogen compounds
Week 3	Concept of energy





Week 4	Organic formulations
Week 5	Reaction relationship and physical properties of organic compounds
Week 6	Alkanes
Week 7	Alkenes
Week 8	First month exam
Week 9	Alkynes
Week 10	Alcohols and phenols
Week 11	Ethers
Week 12	Carbonyl compounds
Week 13	Second month exam
Week 14	Amine derivatives
Week 15	Basic principles in the techniques of organic preparations
Week 16	Comprehensive review, applications and problem solving

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Melting point
Week 2	Boiling point
Week 3	Distillation





Week 4	Extraction
Week 5	Detection of organic compounds
Week 6	Detection of alcoholic compounds
Week 7	Chromatography methods

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<i>Organic Chemistry</i> , 6th Edition. Robert T. <i>Morrison</i> . 4.3 out of 5 stars 70 ; <i>Organic Chemistry</i> , 7th Edition ; <i>Organic Chemistry</i> Fundamentals (Quick Study Academic).	Yes
Recommended Texts	<i>Introductory Organic Chemistry and Hydrocarbons A Physical Chemistry Approach</i> . 1st Edition. By Caio Lima Firme . Copyright 2020.	No
Websites	https://www.amazon.com/Organic-Chemistry-Morrison-Boyd/dp/8131704815	

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	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	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.





المرحلة الثانية

UGII





Semester Three

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information			
معلومات المادة الدراسية			
Module Title	Heat and Thermodynamic		Module Delivery
Module Type	Core		☒ Theory
Module Code	MPH21013		☐ Lecture
ECTS Credit	6		☒ Lab
SWL (hr/sem.)	150		☒ Tutorial
			☐ Practical
			☐ Seminar
Module Level	2	Semester of Delivery	3
Administering Department	Medical Physics	College	Science
Module Leader	Ali K. Sayed	e-mail	ali.kadhom@mauc.edu.iq
Module Leader's Acad. Title	Ass. Lec.	Module Leader's Qualification	Msc. in Medical Physics
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

Relation with other Modules			
العلاقة مع المواد الدراسية الاخرى			
Prerequisite module	None	Semester	





Co-requisites module	None	Semester	
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Module Aims, Learning Outcomes and Indicative Contents اهداف المادة الدراسية ونتائج التعلم والمحتويات الارشادية	
Module Aims أهداف المادة الدراسية	This course covers principles of classical thermodynamics. Develops understanding of mass, energy, heat, work, efficiency, ideal and real thermodynamic cycles and processes. Covers first and second laws of thermodynamics, ideal and real gas law, properties of real gases, and the general energy equation for closed and open systems.6. Discuss the gravitation and central forces.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Use thermodynamic terminology correctly. • Explain fundamental thermodynamic properties. • Derive and discuss the first and second laws of thermodynamics. • Solve problems using the properties and relationships of thermodynamic fluids. • Analyze basic thermodynamic cycles.
Indicative Contents المحتويات الارشادية	First and second laws of thermodynamics. Ideal and real gas law. Closed and open systems.

Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	Teaching and learning strategies for this course will include: A minimum of 50 contact hours, typically to include interactive group teaching, cocurriculars, individual meetings, in-class presentations, lab-based experiments and exams. Course 3 information and supplementary materials are available on the University's Virtual Learning Environment (VLE). Students will receive individualised developmental feedback on their work for this course. Students are required to attend and participate in all the formal and timetabled sessions for this course. Students are also expected to manage their directed learning and independent study in support of the course..

Student Workload (SWL)

الحمل الدراسي للطالب





Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	5
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	75	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	5
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	150		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	16%(16)	4,7,10,13	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	3, 6, 9, 12	LO # 3,# 4 and #6,#7
	Projects/Lab.	7	14%(14)	Continuous	all
	Report	1	2%(2)	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	Introduction to Thermodynamics and Thermodynamic Concepts
Week 2	Behavior of Gases, Ideal and real gas
Week 3	Zeroth Law of Thermodynamics, Temperature and Temperature scales
Week 4	First Law of Thermodynamics
Week 5	Heat capacities of Ideal gas,
Week 6	Heat Engines and second law of thermodynamic, Heat Pumps
Week 7	The Carnot Engine, Internal Combustion engine
Week 8	Entropy and Second Law of Thermodynamics
Week 9	Entropy and Performance of Heat Engines
Week 10	Third Law of Thermodynamics
Week 11	Maxwell's Relations, Cyclic rule, Applications of Maxwell's Relations
Week 12	Systems, Phases and Components





Week 13	Phase Transitions
Week 14	First order phase changes
Week 15	Second order phase changes
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Seebeck coefficient experiment.
Week 2	Lab 2: Finding Relative Humidity and Dew Point Using Dry Bulb and Wet Bulb Hygrometers.
Week 3	Lab 3: Newton's law of cooling.
Week 4	Lab 4: The Latent Heat of Fusion of Ice.
Week 5	Lab 5: The apparent Expansion Coefficient of Water.
Week 6	Lab 6: Determining the Specific Heat Capacity of Solids.
Week 7	Lab 7: Mixing water at different temperatures.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Thermodynamics, Fundamental, Principles, and Applications By Antonio Saggion, Rossella Faraldo, Matteo Pierno	Yes
Recommended Texts	Thermodynamics: Principles and Applications, by Frank C. Andrews	Yes
Websites	https://www.classcentral.com/subject/thermodynamics .	

GRADING SCHEME مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
	A - Excellent	امتياز	90 – 100	Outstanding Performance
	B - Very Good	جيد جدا	80 – 89	Above average with some errors





Success Group (50 – 100)	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	Works 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 with 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.

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية			
Module Title	Optics		Module Delivery
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	MPH21014		
ECTS Credit	6		
SWL (hr/sem.)	150		
Module Level	2	Semester of Delivery	3
Administering Department	Medical Physics	College	Science
Module Leader	Dr. Ansam Gh. Kassim	e-mail	ansam.qasim@mauc.edu.iq
Module Leader's Acad. Title	Ass. Prof.	Module Leader's Qualification	Ph.D in Physics
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2





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 اهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The optics is important subject that is related of the medical physics application. The optics course includes two parts: Geometrical optics and wave optics. Geometrical optics explains the process of formation images in lenses, mirrors and spherical surfaces, as well as the formation of images in the human eye and studies the vision defects. Wave optics illustrates the most important wave phenomena of interference, diffraction and polarization of light.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion, successful students will be able to: 1- Knowledge of the ray optics, Fermat principle, wave optics. 2- Identification the refractive index, optical path, critical angle, total internal reflection and medical application of light, also definition of interference, diffraction and polarization. 3- Determining the importance of light in the medical field. 4 – Identification of thin and thick lenses and study the image formation. 5- Study the instruments that related with these phenomena and identification the fringes formation. 6- Study the optical devices and focus on the human eye and Pay attention to vision defects. 7- Learn about the young's experiment, Newton's rings, Lioyd's Mirror, Fraunhofer diffraction, Fresnel diffraction, and grating diffraction.
Indicative Contents المحتويات الإرشادية	Nature of light, ray optics, electromagnetic spectrum, reflection and deflection, interference.

Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	At the beginning of the course, the instructor will detail the methods used to evaluate student progress and the criteria for assigning a course grade. The me methods may include one or more of the following tools: examinations, quizzes, homework assignments, laboratory reports, research papers, small group problem solving of questions arising from application of course concepts and concerns to actual experience, oral presentations, or maintenance of a personal lab manual. Specific evaluation procedures will be given in class. In general, grading will be





based on accumulated points from homework assignments, tests, final exam, and labs.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	5
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	75	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	5
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	16%(16)	4,7,10,13	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	3, 6, 9, 12	LO # 3,# 4 and #6,#7
	Projects/Lab.	7	14%(14)	Continuous	all
	Report	1	2%(2)	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	Nature and propagation of light.
Week 2	Electromagnetic spectrum.
Week 3	Refractive Index.
Week 4	Fermat's Principle.
Week 5	Critical Angle and Total Internal Reflection.
Week 6	Refraction by prism, Dispersion.
Week 7	Mid Exam.
Week 8	Reflection and refraction at spherical surfaces.
Week 9	GRAPHICAL CONSTRUCTIONS. THE PARALLEL-RAY METHOD.





Week 10	The magnification
Week 11	Lenses
Week 12	Image Formation.
Week 13	Diffraction Phenomena and types of diffractions.
Week 14	Fraunhofer diffraction and Single Slit Diffraction (Fraunhofer Diffraction)
Week 15	Double-Slit Diffraction Pattern and Diffraction Grating and Dispersion power of grating and Resolving Power.
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Measuring the refractive index of a liquid using a concave mirror.
Week 2	Lab 2: Use a photoelectric cell to achieve Lambert's law of absorption and determine the absorption coefficient of a transparent material for light waves..
Week 3	Lab 3: Polarization of light waves and measurement of rotation angle using a polarimeter.
Week 4	Lab 4: Measuring the focal length of a diverging glass.
Week 5	Lab 5: Measuring the radius of concave lens and mirror using Spherometer.
Week 6	Lab 6: Finding the refractive index of liquid using a concave lens and mirror.
Week 7	Lab 7: Determine the refractive index of a prism using a spectrometer.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Fundamental of Optics, by Jenkins and White.	Yes
Recommended Texts	Optics, by Miles and Thomas	Yes
Websites	https://www.cambridge.org/core/books/principles-of-optics/D12868B8AE26B83D6D3C2193E94FFC32	

GRADING SCHEME مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
	A - Excellent	امتياز	90 - 100	Outstanding Performance





Success Group (50 – 100)	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	Works 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 with 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.

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية				
Module Title	English (2)		Module Delivery	
Module Type	Support		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	MUC21115			
ECTS Credit	2			
SWL (hr/sem.)	50			
Module Level	2	Semester of Delivery	3	
Administering Department	Medical Physics	College	SCience	
Module Leader	Aumar Ali	e-mail		
Module Leader's Acad. Title	Ass. lec.	Module Leader's Qualification		
Module Tutor		e-mail		
Peer Reviewer Name		e-mail		
Scientific Committee Approval Date	1/9/2025	Version Number	2	





Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MUC12011	Semester	2
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Here is a comprehensive module descriptor outlining the Module Aims, Learning Outcomes, Indicative Contents, and Learning and Teaching Strategies for the English Language-2 (Primary Level) course. 1. Module Aims This module aims to: • Consolidate and Expand: Build upon foundational English skills, helping learners transition from basic word-level recognition to functional sentence-level communication, basic paragraphs, and short narratives. • Develop Core Competencies: Strengthen the four primary language skills—Listening, Speaking, Reading, and Writing—through engaging, age-appropriate, and theme-based contexts. • Enhance Grammatical Accuracy & Vocabulary: Introduce functional grammar structures (such as past/future tenses, adjectives, and prepositions) and thematic vocabulary relevant to everyday life, nature, and community. • Foster Confidence: Create a supportive, interactive environment that encourages learners to express ideas, ask questions, and overcome hesitation when communicating in English.
	By the end of this module, successful students will be able to:



Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Listening: Comprehend and respond appropriately to simple spoken instructions, routine classroom dialogues, short stories, and descriptions of familiar events. • Speaking: Engage in simple conversations, describe daily routines, compare objects/animals, and talk about past experiences or future plans using correct pronunciation and intonation. • Reading: Read and understand short texts, simple graded readers, informational fact sheets, and daily schedules, extracting key details and answering basic comprehension questions. • Writing: Write coherent sentences and short, structured paragraphs (e.g., personal diary entries, postcards, or descriptions) utilizing correct spelling, basic punctuation, and appropriate tense markers. • Grammatical Application: Accurately apply core grammar concepts (e.g., simple past regular/irregular verbs, comparatives/superlatives, and future <i>going to</i>) in both controlled and free-practice tasks
Indicative Contents المحتويات الارشادية	The syllabus content is structured around 14 thematic and linguistic units: • Everyday Life & Routines: Review of simple present, time expressions, daily schedules, and personal habits. • Surroundings & Community: Prepositions of place, maps, town locations, and community helpers/professions. • The Natural World & Animals: Food groups, healthy eating, countable/uncountable nouns, animal habitats, and comparative/superlative adjectives. • Narrating the Past: Simple past tense (regular and common irregular verbs), past time markers, and storytelling. • Looking Forward: Future plans using <i>going to</i>, hobbies, sports, and weather descriptions with modal advice (<i>should/shouldn't</i>). • Capstone Project: Collaborative tasks involving portfolio creation, role-playing, and presentations (e.g., a travel brochure or community map project).

Learning and Teaching Strategies

استراتيجيات التعلم و التعليم

Strategies	To accommodate young learners and developmental stages at the primary level, a blend of communicative and task-based strategies is employed: • Communicative Language Teaching (CLT): Prioritizing active student interaction through pair work, small group discussions, and role-play simulations (e.g., dialogues at a restaurant or shop). • Task-Based Learning (TBL): Engaging students in meaningful, goal-oriented tasks—such as designing a poster, mapping a neighborhood, or compiling a holiday postcard—to apply language naturally. • Multisensory & Interactive Techniques: Utilizing visual aids (flashcards, realia, maps), audio resources (songs, rhymes, short listening clips), and physical movement (Total Physical Response where applicable) to reinforce vocabulary. • Scaffolded Instruction: Breaking down complex grammatical structures or writing assignments into manageable, step-by-step components with modeling and guided practice before independent output. • Formative Assessment & Feedback: Incorporating continuous checks for understanding through low-stakes quizzes, games, peer evaluation, and encouraging positive reinforcement to build confidence.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	30	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	2.0
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	1.33
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	50		

Module Evaluation

تقييم المادة الدراسية



		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20%(20)	5 and 10	LO # 1, # 2 and #10, #11
	On line Assignments	4	8%(8)	2,5,8,11	LO # 3,# 4 and #6,#7
	Onside Assignments	4	8%(8)	3,6,9,12	LO # 3,# 4 and #6,#7
	Report	1	4%(4)	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	Welcome Back & Review
Week 2	Daily Routines
Week 3	Places Around Town
Week 4	Food and Nutrition
Week 5	Animal Kingdom
Week 6	Superlatives & The Natural World
Week 7	Mid-Term Review and Assessment
Week 8	Past Adventures
Week 9	Irregular Past Actions
Week 10	Future Plans
Week 11	The World of Work
Week 12	Weather and Seasons
Week 13	Project-Based Learning & Portfolio
Week 14	Final Review & Celebration
Week 15	Review and Assessment
Week 16	Final Exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<i>Thompson & Thompson Genetics and Genomics in Medicine</i> (by Ronald Cohn et al.)	Yes





Recommended Texts	<i>Emery's Elements of Medical Genetics and Genomics</i> (by Peter D. Turnpenny and Sian Ellard)	Yes
Websites	OMIM (Online Mendelian Inheritance in Man) — omim.org	

GRADING SCHEME

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 – 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جداً	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	Works 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 with 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.

MODULE DESCRIPTION FORM

Module Information

معلومات المادة الدراسية

Module Title	Atomic Physics			Module Delivery		
Module Type	Core			☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	MPH21016					
ECTS Credit	5					
SWL (hr/sem.)	125					
Module Level		2	Semester of Delivery		3	
Administering Department		Medical Physics	College	Science		
Module Leader	Nada Mohameed		e-mail			





Module Leader's Acad. Title	Ass. Lec.	Module Leader's Qualification	Msc in Physics
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

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	1. Quantum Mechanics: Applying quantum mechanical principles to describe and analyze atomic phenomena. Exploring concepts such as wave-particle duality, the uncertainty principle, and quantum superposition in the context of atomic systems. 2. Atomic Structure: Understanding the structure of atoms, including the arrangement of electrons in different energy levels, the roles of protons and neutrons in the nucleus, and the overall size and shape of atoms. 3. Energy Levels and Spectroscopy: Exploring the energy levels of atoms and the transitions between these levels. Studying the emission and absorption of electromagnetic radiation by atoms, leading to the field of spectroscopy. 4. Atomic Interactions: Investigating the interactions between atoms, including collisions, scattering, and the formation of chemical bonds. Understanding the forces and potentials that govern these interactions. 5. Atomic Spectra and Laser Physics: Studying the properties of atomic spectra, including the emission and absorption of light by atoms. Understanding the principles and applications of lasers, which rely on atomic transitions and stimulated emission. 6. Atomic and Nuclear Physics: Exploring the connections between atomic and nuclear physics, including the study of radioactivity, nuclear decay,





	and nuclear reactions. Investigating atomic systems involving radioactive isotopes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Knowledge and Understanding: Acquire a comprehensive understanding of the fundamental principles and concepts of atomic physics, including atomic structure, energy levels, quantum mechanics, and atomic interactions. • Mathematical and Analytical Skills: Apply mathematical and analytical methods to solve problems and describe atomic systems. Develop proficiency in using mathematical tools such as quantum mechanics, differential equations, and statistical mechanics to model and analyze atomic phenomena. • Critical Thinking: Develop critical thinking skills to analyze and evaluate complex atomic physics problems. Apply logical reasoning and scientific principles to interpret experimental results and theoretical models. • Problem Solving: Develop problem-solving skills by applying atomic physics concepts to a variety of scenarios. Apply theoretical knowledge to explain and predict atomic phenomena and solve numerical problems related to atomic structure, energy levels, spectroscopy, and atomic interactions. • Communication Skills: Communicate scientific ideas effectively through written reports, presentations, and discussions. Clearly articulate concepts, experimental procedures, and results related to atomic physics to both technical and non-technical audiences. Research Skills: Develop research skills by engaging with current literature and scientific publications in atomic physics. Gain the ability to critically evaluate research papers, understand ongoing developments in the field, and potentially contribute to research projects in atomic physics.
Indicative Contents المحتويات الارشادية	Indicative content includes the following. <u>Part A</u> - Atomic Structure: Rutherford model of the atom, Bohr model and energy levels, Quantum mechanical model of the atom, Electron configurations and orbital notation and Periodic table and periodic trends. [15 hrs]





	– Quantum Mechanics: Wave-particle duality, Schrödinger equation and its solutions, Operators and observables in quantum mechanics, Heisenberg uncertainty principle and Quantum numbers and their significance. [15 hrs] -Energy Levels and Spectroscopy: Atomic energy levels and transitions, Absorption and emission of electromagnetic radiation, Spectral lines and line spectra and Selection rules for atomic transitions. [10 hrs] Atomic Interactions: Coulomb's law and electric fields, Forces between charged particles Ionization and excitation of atoms, Elastic and inelastic scattering of particles and Chemical bonding and molecular structure. [15 hrs] Revision problem classes [6 hrs] <u>Part B -</u> Atomic Spectra and Laser Physics: Atomic emission and absorption spectra, Zeeman effect and Stark effect, Laser principles and operation, Population inversion and stimulated emission and Laser cooling and trapping techniques. [15 hrs] Atomic and Nuclear Physics: Radioactive decay and nuclear reactions, Nuclear structure and nuclear models, Nuclear fission and fusion, Isotopes and atomic mass spectroscopy and Applications of atomic physics in nuclear technology. [7 hrs] Applications of Atomic Physics: Atomic magnetometers and magnetic field sensing Atomic imaging techniques (electron microscopy, scanning probe microscopy), Atomic spectroscopy in astrophysics and Atomic physics in quantum computing and quantum information science. [15 hrs]
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Learning and Teaching Strategies





استراتيجيات التعلم و التعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	4
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	4.33
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	125		

Module Evaluation

تقييم المادة الدراسية

		Quizzes	2	16%(16)	4, 11
Formative assessment	Quizzes	4	16%(16)	4,7,10,13	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	3, 6, 9, 12	LO # 3,# 4 and #6,#7
	Projects/Lab.	7	14%(14)	Continuous	all
	Report	1	2%(2)	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	Introduction - Historical overview of atomic models and models of the atom
Week 2	Bohr model of the atom, Energy levels, quantum numbers and Atomic spectra and line emission
Week 3	Quantum mechanics fundamentals





Week 4	Schrödinger equation and wave functions
Week 5	Operators and observables in quantum mechanics
Week 6	Angular momentum and spin and Hydrogen atom and wave functions
Week 7	Mid exam.
Week 8	Atomic interactions and forces and Ionization and excitation processes
Week 9	Absorption and emission of electromagnetic radiation
Week 10	Spectral lines and line spectra and Selection rules for atomic transitions
Week 11	Zeeman effect and Stark effect, Laser principles
Week 12	operation Population inversion and stimulated emission
Week 13	Nuclear physics and radioactive decay
Week 14	Nuclear reactions and fission/fusion processes
Week 15	Applications of atomic physics in technology
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Finding the diffraction grating constant.
Week 2	Calculating the Rydberg constant.
Week 3	Calculating the grating constant and finding the wavelengths of the spectra of two elements using a spectrometer.
Week 4	The photoelectric effect.
Week 5	Frank-Hertz "Finding the first excitation potential of xenon gas".
Week 6	The magnetic field generated by two coupled Helmholtz coils
Week 7	Experiment for the determination of charge to mass ratio of the electron.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<i>Atomic Physics</i> by C.J. Foot (Oxford Master Series in Physics)	Yes
Recommended Texts	<i>Physics of Atoms and Molecules</i> by B.H. Bransden and C.J. Joachain	Yes





Websites	HyperPhysics (Department of Physics and Astronomy, Georgia State University)	
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GRADING SCHEME**مخطط الدرجات**

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 – 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جداً	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	Works 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 with 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.

MODULE DESCRIPTION FORM

Module Information				
معلومات المادة الدراسية				
Module Title		Physiology		Module Delivery
Module Type		Basic		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code		MPH21017		
ECTS Credit		4		
SWL (hr/sem.)		100		
Module Level		2	Semester of Delivery	





Administering Department	Medical Physics	College	Science
Module Leader	Dr. Raf'aa Abdulmajeed	e-mail	
Module Leader's Acad. Title	Ass. Prof.	Module Leader's Qualification	Ph.D in Medicine
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

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	1. Basic concept and knowledge of structure and functioning of different systems in body. 2. To understand integrated aspect of functioning of the individual and all the systems in totality in body. 3. To understand the integration of the combined knowledge of Physiology and Anatomy. 4. To know all the common clinical conditions of deranged normal physiology in body - clinical usefulness for knowing Physiology. 5. To be able to solve simple clinical problems with the help of their knowledge in Physiology. 6. To promote and inculcate curiosity and skill for elective learning in the field of research. 7. Basic exposure to some necessary clinical departments and Clinical tests laboratories for horizontal and vertical integration for early clinical exposure and to witness theoretical knowledge. These objectives provide a broad overview of the topics typically covered in a Basic physiology 1 module, but the specific content and emphasis may vary from course to course.



Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of the module, learners will be expected to: A1. Define the organisation of the body A2. Outline the main anatomical systems within the body, their structures, physiology and function to include, the muscular, skeletal, cardiovascular, lymphatic, nervous, urinary, digestive, reproductive, endocrine, respiratory and Integumentary system A3. Analyse the effects of postural deviations on human function A4. Describe pathology for each system of the human body. A5. Explain the physiological and psychological effects of complementary therapies
Indicative Contents المحتويات الارشادية	Indicative content includes the following. The indicative contents of physiology may vary depending on the specific course or educational institution. However, here are some common topics and areas of study that are typically covered in physiology course: 1. Describe the anatomical regions and planes of the body. 2. Describe the chemical organization of the body. 3. Describe the structure, function and types of cell. 4. Explain the structure, function, growth and repair of the integumentary system. 5. Explain the structure, function and growth of the skeletal system and associated parts. 6. Explain the structure, function, growth and repair of the muscular system. 7. Explain the location and action of muscle groups within the muscular system. 8. Describe the structure and function of each component of the nervous system. 9. Explain the structure and function of the endocrine system to include each endocrine gland. 10. Explain the structure, function and processes of the respiratory system. 11. Explain the structure and function of the cardiovascular system and its associated parts. 12. Define blood pressure and Explain the factors that affect blood pressure.



	13. Explain the structure and function of the lymphatic system and its associated parts. 14. Explain the principles of immunity. 15. Explain the structure, function and processes of the digestive system. 16. Explain the structure, function and processes of the urinary system.
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Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	Learning and teaching strategies in physiology aim to engage students in active learning, facilitate understanding of complex concepts, and develop critical thinking skills. Here are some common learning and teaching strategies employed in physiology courses: 1. Lectures: Lectures are often used to deliver foundational knowledge and concepts in physiology. They provide an overview of the topics, explain key principles, and highlight important details. Lectures may be supplemented with visual aids, such as slides or multimedia presentations, to enhance understanding. 2. Laboratory Work: Laboratory sessions allow students to apply theoretical knowledge to practical situations. They provide hands-on experience with lab. techniques, data collection, analysis, and interpretation. Lab work may involve experiments related to pathological analysis. 3. Problem-solving Exercises: Problem-solving exercises and case studies help students apply their knowledge to real-life scenarios. They encourage critical thinking and problem-solving skills by presenting physiological problems or experimental data for analysis and interpretation. Students may work individually or in groups to find solutions and explain their reasoning. 4. Interactive Discussions: Interactive discussions, such as small group discussions or classroom debates, promote active learning and peer-to-peer interaction. They allow students to ask questions, clarify doubts, and engage in meaningful discussions about physiological concepts, experiments, or applications. 5. Multimedia Resources: Incorporating multimedia resources, such as videos, animations, and interactive simulations, can enhance students' engagement and understanding of complex physiological processes. These resources can visually illustrate molecular structures, enzyme kinetics, or cellular processes, making them more accessible and memorable.





	6. Collaborative Learning: Collaborative learning activities, such as group projects or problem-solving tasks, encourage students to work together to solve physiological problems or complete assignments. This fosters teamwork, communication, and the exchange of ideas, allowing students to learn from each other's perspectives and experiences.
	7. Assessments: Assessments, such as quizzes, exams, and assignments, evaluate students' understanding and knowledge retention. They provide feedback on individual progress and help identify areas that require further review or clarification. Assessments may include multiple-choice questions, problem-solving tasks, or short essay questions.
	8. Online Resources: Utilizing online resources, such as virtual labs, interactive tutorials, or online discussion forums, can provide additional learning opportunities outside of the classroom. These resources offer flexibility and accessibility, allowing students to review content at their own pace and seek additional support when needed.
	9. Real-world Applications: Relating physiology concepts to real-world applications, such as medical advancements, biotechnology, or environmental issues, can enhance students' motivation and understanding. Exploring the practical relevance of physiology concepts helps students appreciate the significance of their learning and its impact in various fields.
	These strategies aim to create an active and engaging learning environment that promotes understanding, critical thinking, and application of physiology principles. The specific strategies employed may vary based on the teaching style, course format, and resources available to the instructor.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	4.0
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	40	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	2.67
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	100		





Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	16%(16)	4,7,10,13	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	3, 6, 9, 12	LO # 3,# 4 and #6,#7
	Projects/Lab.	7	14%(14)	Continuous	all
	Report	1	2%(2)	13	LO # 5,# 8 and #10
Summative assessment	Midterm Exam	2hr	10%(10)	7	LO # 1,# 7
	Final Exam	2hr	50%(50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Anatomical regions and planes of the body.
Week 2	Chemical organization of the body.
Week 3	Structure, function and types of cell.
Week 4	The integumentary system.
Week 5	Skeletal system and associated parts.
Week 6	Muscular system. The location and action of muscle.
Week 7	Mid exam.
Week 8	Nervous system.
Week 9	Endocrine gland.
Week 10	Respiratory system.
Week 11	Cardiovascular system.
Week 12	Blood pressure.
Week 13	Lymphatic system.
Week 14	Principles of immunity.
Week 15	Digestive system.
Week 16	Final Exam.





Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to the physiology lab (Rules for laboratory experiments, laboratory Safety Signs/Labels and laboratory reports).
Week 2	Sample collection and preservation.
Week 3	Anthropometric measurements.
Week 4	Osmosis Across Plasma Membrane.
Week 5	Bleeding time and clotting time.
Week 6	Blood Pressure.
Week 7	Midterm Exam.
Week 8	Cardiovascular effects of exercise.
Week 9	Electrocardiogram and heart sounds.
Week 10	Clinical examination of vision.
Week 11	Pancreas function and insulin shock.
Week 12	Body fluids.
Week 13	Urinalysis (Physical characteristics).
Week 14	Urinalysis (chemical characteristics).
Week 15	Revision

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Guyton and Hall Textbook of Medical Physiology Principles of Anatomy and Physiology 15th edition	Available Online
Recommended Texts	Color atlas of physiology	No
Websites	Any website	





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	Works 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 with 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.

MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	Electromagnetic Waves		Module Delivery
Module Type	Core		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	MPH21018		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	2	Semester of Delivery	





Administering Department	MPH	College	Sciences
Module Leader	Dr. Wissam Abdulla Lateef	e-mail	
Module Leader's Acad. Title	Lect.	Module Leader's Qualification	Ph.D.in Physics
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name		e-mail	E-mail
Scientific Committee Approval Date	1/9/2025	Version Number	2

Relation with other Modules

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	Fundamental Concepts Understand the nature and properties of electromagnetic waves, including their origin, types, and behavior in different media. Explain the relationship between electric and magnetic fields and how they combine to form electromagnetic waves. Describe the key parameters of electromagnetic waves, such as wavelength, frequency, amplitude, and velocity. Mathematical Foundations Apply Maxwell's equations to derive the wave equation for electromagnetic waves in free space and in various media.
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	Solve problems involving the propagation of electromagnetic waves using appropriate mathematical tools, including vector calculus and differential equations. Wave Propagation Analyze how electromagnetic waves propagate through different media, including vacuum, dielectric materials, and conducting materials. Understand the concepts of reflection, refraction, diffraction, and absorption of electromagnetic waves at interfaces between different media. Wave Polarization Define and explain the concept of polarization of electromagnetic waves. Differentiate between linear, circular, and elliptical polarization and describe the practical implications of each. Energy and Power in Electromagnetic Waves Calculate the energy, power, and intensity of electromagnetic waves. Understand the Poynting vector and its significance in describing the flow of energy in an electromagnetic field. Electromagnetic Spectrum Describe the electromagnetic spectrum and identify the various regions, including radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays. Discuss the applications of different regions of the electromagnetic spectrum in technology and everyday life. Applications of Electromagnetic Waves Explore practical applications of electromagnetic waves in communication, medical imaging, radar, and other technologies. Analyze case studies that demonstrate the use of electromagnetic waves in modern engineering and scientific advancements.
Module Learning Outcomes	• Knowledge and Understanding



مخرجات التعلم للمادة الدراسية

- Demonstrate a comprehensive understanding of the fundamental principles of electromagnetic waves, including wave properties, Maxwell's equations, and the electromagnetic spectrum.
- Describe the behavior of electromagnetic waves in various media and explain how different materials affect wave propagation.

Application of Theoretical Concepts

- Apply Maxwell's equations to derive wave equations for different scenarios and predict the behavior of electromagnetic waves in different contexts.
- Solve complex problems involving electromagnetic wave propagation, reflection, refraction, and diffraction using appropriate mathematical methods.

Wave Polarization and Analysis

- Analyze the polarization of electromagnetic waves and distinguish between different types of polarization (linear, circular, elliptical) in practical scenarios.
- Utilize mathematical models to predict and describe the polarization state of electromagnetic waves after interaction with materials or boundaries.

Energy, Power, and Radiation

- Calculate the energy, power, and intensity associated with electromagnetic waves and utilize the Poynting vector to determine energy flow in different electromagnetic fields.
- Assess the radiation patterns and power distribution of electromagnetic waves generated by antennas and other sources.

Practical Applications and Technologies

- Evaluate the role of electromagnetic waves in modern technologies, including wireless communication, radar systems, medical imaging, and remote sensing.
- Analyze real-world case studies to demonstrate the application of electromagnetic wave theory in technological innovations and scientific



	research. Safety and Environmental Impact • Critically assess the safety implications of electromagnetic wave exposure, particularly at high frequencies, and propose safety measures to mitigate potential risks. • Evaluate the environmental impact of electromagnetic wave-based technologies, considering both positive and negative effects on ecosystems and human health. Research and Critical Thinking • Conduct independent research on advanced topics related to electromagnetic waves, such as metamaterials, photonic crystals, or novel communication technologies. • Develop and present coherent arguments, supported by evidence, on contemporary issues related to electromagnetic wave applications, safety, and regulation.
Indicative Contents المحتويات الإرشادية	Introduction to Electromagnetic Waves part (A) 10 marks • Nature and characteristics of electromagnetic waves. • Historical development of electromagnetic theory. • Overview of the electromagnetic spectrum. • Overview and physical interpretation of Maxwell's equations. • Derivation of the wave equation from Maxwell's equations. • Boundary conditions and the significance of Maxwell's equations in different media (vacuum, conductors, dielectrics). • Wave equation solutions in free space. • Propagation of electromagnetic waves in different types of media (e.g., vacuum, conductors, insulators, plasmas). • Attenuation, dispersion, and phase velocity in different materials. • Skin effect and electromagnetic wave penetration in conductors. • Definition and types of polarization (linear, circular, elliptical). • Mathematical description of polarization states.





- Polarization in reflection and transmission (Brewster's angle, total internal reflection).

Reflection, Refraction, and Transmission **part (B) 15 marks**

- Snell's law and Fresnel equations for reflection and transmission coefficients.
- Total internal reflection and critical angle.
- Reflection and transmission at normal and oblique incidences.
- Antennas and their role in the transmission and reception of electromagnetic waves.
- Poynting vector and energy flow in electromagnetic fields.
- Energy density and intensity of electromagnetic waves.
- Radiation pressure and momentum transfer from electromagnetic waves.
- Detailed exploration of different regions of the electromagnetic spectrum (radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, gamma rays).
- Applications and technologies associated with each region of the spectrum (e.g., communication systems, imaging technologies, astronomy).
- Waveguides and Transmission Lines **part (C) 15 marks**

- Theory and operation of waveguides for the transmission of electromagnetic waves.
- Modes of wave propagation in waveguides.
- Transmission line theory and the use of Smith charts in impedance matching.
- Radiation of Electromagnetic Waves
- Fundamental principles of electromagnetic radiation.
- Dipole antennas and radiation patterns.
- Concepts of near-field and far-field radiation.
- Antenna arrays and beamforming.
- Introduction to metamaterials and their impact on electromagnetic wave propagation.
- Photonic crystals and their applications in controlling light.
- Surface plasmon resonance and its applications in sensing.
- Terahertz waves and their emerging applications.



	- Electromagnetic waves in wireless communication systems (e.g., 5G, satellite communications). - Medical applications of electromagnetic waves (e.g., MRI, X-ray imaging). - Radar systems and remote sensing technologies. - Electromagnetic compatibility (EMC) and interference (EMI) issues in electronic systems.
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	80	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		



Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20%(20)	4,7,10,13	LO # 1, # 2 and #10, #11
	On line Assignments	4	8%(8)	2,5,8,11	LO # 3,# 4 and #6,#7
	Onside Assignments	4	8%(8)	3,6,9,12	LO # 3,# 4 and #6,#7
	Report	1	2%(4)	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	Introduction to Electromagnetic Waves Overview of the nature of electromagnetic waves.





	Historical background: From Maxwell's equations to modern applications. Introduction to the electromagnetic spectrum.
Week 2	Review of vector calculus and its role in electromagnetism. Introduction to Maxwell's equations: Gauss's law for electricity and magnetism. Physical interpretation and relevance in various media.
Week 3	Faraday's law of induction and Ampère's law with Maxwell's correction. Deriving the wave equation from Maxwell's equations. Importance of boundary conditions in different media.
Week 4	Solving the wave equation for free-space propagation. Characteristics of electromagnetic waves in a vacuum. Energy and momentum of free-space waves.
Week 5	Wave Propagation in Media Propagation of electromagnetic waves in dielectrics, conductors, and plasmas. Phase and group velocity, attenuation, and dispersion. Skin effect and electromagnetic wave penetration depth in conductors.
Week 6	polarization of Electromagnetic Waves Introduction to wave polarization: Linear, circular, and elliptical. Mathematical description and analysis of polarization states. Polarization in reflection and transmission.
Week 7	Mid Examn.
Week 8	Reflection, Refraction, and Transmission (Part 1) Snell's law and the basics of wave interaction with boundaries. Fresnel equations for reflection and transmission at normal incidence. Total internal reflection and Brewster's angle.
Week 9	Reflection, Refraction, and Transmission (Part 2) Reflection and transmission at oblique incidence. Applications: Antennas, waveguides, and optical fibers.





	Overview of thin-film interference and anti-reflective coatings.
Week 10	Energy and Power in Electromagnetic Waves The Pointing vector and energy flow in electromagnetic fields. Energy density and intensity of electromagnetic waves. Radiation pressure and applications in solar sails.
Week 11	The Electromagnetic Spectrum (Part 1) Detailed exploration of the lower-frequency regions: Radio waves and microwaves. Applications: Communication systems, radar, and microwave technology. Health and safety considerations in lower-frequency exposure.
Week 12	The Electromagnetic Spectrum (Part 2) Detailed exploration of higher-frequency regions: Infrared, visible light, UV, X-rays, and gamma rays. Applications: Medical imaging, fiber optics, and astronomy. Safety concerns with UV, X-ray, and gamma ray exposure.
Week 13	Radiation of Electromagnetic Waves (Part 1) Fundamentals of electromagnetic radiation. Dipole antennas: Radiation patterns and design principles. Near-field and far-field radiation concepts.
Week 14	Radiation of Electromagnetic Waves (Part 2) Antenna arrays and beamforming techniques. Modern applications: Phased arrays and satellite communication. Overview of radio telescopes and radar systems.
Week 15	Advanced Topics in Electromagnetic Waves Metamaterials and their applications in controlling electromagnetic waves.
Week 16	Preparatory week before the final Exam





Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	JIN AU KONG, ELECTROMAGNETIC WAVE THEORY, EMW Publishing Cambridge, Massachusetts, USA	Yes
Recommended Texts	<i>Introduction to Electrodynamics</i> by David J. Griffiths	Yes
Websites	https://clerkmaxwellfoundation.org/html/electromagnetic_theory.html	

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.

MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	The Crimes of Baath regime in Iraq		Module Delivery
Module Type	Support		☒ Theory
Module Code	MUC21019		☐ Lecture
ECTS Credit	2		☐ Lab
SWL (hr/sem.)	50		☐ Tutorial
			☐ Practical
			☐ Seminar
Module Level	2	Semester of Delivery	3
Administering Department	Medical Physics	College	Science
Module Leader		e-mail	
Module Leader's Acad. Title	Ass. lec.	Module Leader's Qualification	
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

Relation with other Modules			
العلاقة مع المواد الدراسية الاخرى			
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	The primary objectives of the module are designed to give students a comprehensive understanding of historical and legal contexts: • Define Crimes and Legal Frameworks: Enable students to understand what constitutes a crime, its various types, and familiarize them with local and international laws that criminalize human rights violations. • Examine Historical Atrocities: Provide a clear, documented breakdown of the major crimes, violations, and policies committed by the former Ba'ath regime in Iraq. • Contextualize Impact: Explore the profound psychological, social, and environmental consequences left by the regime on individual citizens and the wider Iraqi landscape. • Identify Documentation and Sites: Educate students on specific locations of oppression—such as prisons, detention facilities, and mass graves—along with a chronological understanding of acts of genocide and persecution.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the module, students are expected to achieve the following outcomes: • Conceptual Clarity: Ability to define crimes under humanitarian and international law and recognize how state actions breached domestic and global legal statutes. • Analytical Awareness: Capability to articulate the scope and severity of specific historical events, campaigns, and systemic violations executed between 1963 and 2003. • Impact Evaluation: Understanding of how societal militarization, environmental destruction (e.g., marshlands), and psychological trauma impacted the social fabric of Iraq. • Historical Retention: Competence in identifying the locations, timelines, and classifications of major atrocities, including mass graves and specific civilian massacres.

Indicative Contents المحتويات الارشادية	The theoretical syllabus covers a systematic breakdown of historical, legal, and environmental topics, typically including: • Introduction to Humanitarian and International Laws: The legal concept of crimes, types of international crimes, and violations of Iraqi laws. • State Control and Social Impact: The militarization of society, political/military violations, state positioning on religion, and the psychological and social effects of crimes on individuals. • Prisons and Detention Infrastructure: Mapping and studying the regime's detention facilities. • Environmental Crimes: Scorch-earth policies, destruction of villages, war and radioactive pollution, mine explosions, the dredging/destruction of orchards and palm groves, and the draining of the southern marshes. • Mass Graves and Genocide: Comprehensive chronological classification of mass graves and extermination events spanning from 1963 to 2003. This includes examining specific historical tragedies such as: ○ The events of 1963 and 1979–1988. ○ Campaigns against the Kurds (including the 1983 purges and the 1987–1988 Anfal campaigns). ○ The suppression and graves associated with the 1991 Sha'ban (Intifada) Uprising.
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Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	To deliver this sensitive and heavily analytical content effectively, instructors employ a mix of active learning and assessment methods: • Interactive Lectures and Brainstorming: Encouraging structured dialogue regarding historical documentation and legal definitions. • Dialogue and Discussion: Fostering open, critical analysis of historical texts and primary material. • Independent and Group Assignments: Assigning research reports, presentations, and group projects to develop analytical and leadership skills.



- **Formative and Summative Assessments:** Regular classroom quizzes, monthly/mid-term exams, structured report evaluations, and comprehensive written final examinations.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	30	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	2
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	1.33
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20%(20)	5 and 10	LO # 1, # 2 and #10, #11
	On line Assignments	4	8%(8)	2,5,8,11	LO # 3,# 4 and #6,#7
	Onside Assignments	4	8%(8)	3,6,9,12	LO # 3,# 4 and #6,#7
	Report	1	4%(4)	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	Introduction & Legal Framework
Week 2	Concepts and Classifications of Crime
Week 3	International Crimes Framework
Week 4	Tribunal Decisions and Legal Rulings
Week 5	Psychological and Social Crimes
Week 6	Militarization of Society
Week 7	Mid-term Exam.





Week 8	Human Rights Violations and State Authority.
Week 9	Environmental Crimes: Contamination
Week 10	Environmental Crimes: Scorched Earth Policy
Week 11	Environmental Crimes: Marshes and Agriculture
Week 12	Mass Graves: Historical Timeline (1963–1988)
Week 13	Mass Graves: The 1991 Uprising & Later Eras
Week 14	Documentation and Memory
Week 15	Course Review
Week 16	Final Exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	جرائم نظام البعث في العراق (The official standardized textbook approved and adopted by the committee commissioned by the Iraqi Ministry of Higher Education and Scientific Research for undergraduate academic instruction across universities.	Yes
Recommended Texts	جرائم حزب البعث جرائم ضد الإنسانية: قراءة في المفاهيم الأساسية by Dr. Muayad Al-Saadi (Published by the General Secretariat for the Council of Ministers, Martyrs Foundation, 2020).	Yes
Websites	The International Center for Transitional Justice (ICTJ) Iraq Reports Portal	

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	Works 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 with 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.

Semester Four

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية		
Module Title	Medical Imaging	Module Delivery





Module Type	C			☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	MPH 22020				
ECTS Credit	5				
SWL (hr/sem.)	125				
Module Level		2	Semester of Delivery		4
Administering Department		Medical Physics	College	Science	
Module Leader	Dr. Mustafa Kamel Jassim		e-mail		
Module Leader's Acad. Title		Ass. P.	Module Leader's Qualification		PhD. in Physics
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date		1/9/2025	Version Number	2	

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

اهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	• Provide a rigorous foundation in the physical principles, hardware instrumentation, and mathematical algorithms underlying modern medical imaging modalities. • Develop a comprehensive understanding of image formation, quality metrics, and optimization techniques across X-ray, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Ultrasound, and Nuclear Medicine (SPECT/PET). • Equip students with the knowledge to evaluate radiation safety, dosimetry principles, and bioeffects associated with ionizing and non-ionizing imaging techniques.
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	Familiarize students with modern digital image processing, Picture Archiving and Communication Systems (PACS), and the application of artificial intelligence in diagnostic radiology.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, successful students will be able to: Demonstrate Knowledge: Explain the physical principles, radiation-matter interactions, and hardware components governing projection radiography, CT, MRI, ultrasound, and nuclear medicine systems. Analyze Image Quality: Evaluate image quality metrics—including spatial resolution, contrast resolution, signal-to-noise ratio (SNR), and modulation transfer function (MTF)—and understand how reconstruction algorithms impact diagnostic efficacy. Assess Safety & Dosimetry: Calculate and interpret radiation dose metrics, apply radiation protection principles (justification, optimization, and limitation), and identify safety protocols for magnetic and acoustic environments. Synthesize Clinical Applications: Compare the diagnostic advantages, limitations, and clinical utility of different imaging modalities for specific organ systems and pathologies. Understand Digital Infrastructure: Describe the principles of DICOM standards, PACS architecture, and the role of machine learning in computer-aided diagnosis.
Indicative Contents المحتويات الإرشادية	Physical Principles & Quality: Electromagnetic spectrum, image quality parameters (MTF, SNR, CNR), and spatial/contrast resolution. Projection X-Ray & CT: X-ray production, tubes, filters, scatter control, CT hardware generation, helical scanning, filtered backprojection, and iterative reconstruction. Magnetic Resonance Imaging (MRI): Nuclear magnetism, relaxation times (T_1, T_2), pulse sequences (Spin Echo, Gradient Echo), spatial localization (k-space), advanced diffusion/functional techniques, and safety bioeffects (SAR, gradient switching). Ultrasound: Acoustic impedance, wave propagation, piezoelectric transducers, A/B/M modes, and Doppler hemodynamics.



	• Nuclear Medicine: Radioactive decay, radiopharmaceuticals, gamma cameras, SPECT, positron physics, coincidence detection, and hybrid PET/CT systems. • Radiation Protection & Advanced Systems: Dosimetry units, biological effects of radiation, PACS/DICOM, and emerging AI applications in medical imaging.
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Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	• Interactive Lectures: Deliver core theoretical concepts, physical mathematics, and clinical context using multimedia presentations and structured whiteboard derivations. • Problem-Solving Seminars: Engage students in quantitative exercises involving radiation dosimetry calculations, k-space filling mechanics, and image quality metric evaluations. • Case Studies & Clinical Correlation: Analyze real-world clinical images to bridge the gap between theoretical physics and diagnostic interpretation, highlighting artifact recognition and optimization strategies. • Independent Study & Research: Encourage self-directed learning through assigned readings, academic literature reviews on emerging imaging technologies, and curriculum-aligned quizzes.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	65	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	4.33
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	4
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	125		

Module Evaluation تقييم المادة الدراسية
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		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	16%(16)	4,7,10,13	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	3, 6, 9, 12	LO # 3,# 4 and #6,#7
	Projects/Lab. Report	7 1	14%(14) 2%(2)	Continuous 13	all 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	Introduction to Medical Imaging & Image Quality
Week 2	X-Ray Production & Projection Radiography
Week 3	Computed Tomography (CT) – Principles & Instrumentation
Week 4	Computed Tomography (CT) – Image Reconstruction & Protocols
Week 5	Magnetic Resonance Imaging (MRI) – Physics & Nuclear Magnetism
Week 6	Magnetic Resonance Imaging (MRI) – Pulse Sequences & Spatial Encoding
Week 7	Mid term.
Week 8	Magnetic Resonance Imaging (MRI) – Advanced Techniques & Safety
Week 9	Ultrasound (Ultrasound/Sonography) – Physics & Wave Propagation
Week 10	Ultrasound (Ultrasound/Sonography) – Modes & Doppler Imaging
Week 11	Nuclear Medicine Imaging – SPECT
Week 12	Nuclear Medicine Imaging – PET & Hybrid Imaging
Week 13	Radiation Dosimetry & Protection in Medical Imaging
Week 14	Image Processing, PACS & Artificial Intelligence in Radiology
Week 15	Emerging Modalities & Course Review
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر
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	Material Covered	
Week 1	Lab 1. X-Ray Attenuation and Half-Value Layer (HVL) Measurement	
Week 2	Lab 2:. Evaluation of Computed Tomography (CT) Image Quality & Hounsfield Units	
Week 3	Lab 3:. MRI Signal-to-Noise Ratio (SNR) and Image Artifact Identification	
Week 4	Lab 4:. Ultrasound Transducer Characterization & Field Mapping	
Week 5	Lab 5:. Gamma Camera Spatial Resolution and Uniformity (SPECT Quality Control)	
Week 6	Lab 6:. Radiation Dosimetry in Projection Radiography	
Week 7	Lab 7:. Digital Image Processing and DICOM Analysis in Radiology	
Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<i>The Essential Physics of Medical Imaging</i> (4th Edition) by Jerrold T. Bushberg et al.	Yes
Recommended Texts	<i>Magnetic Resonance Imaging: Physical Principles and Sequence Design</i> by E. Mark Haacke et al.	Yes
Websites	Radiopaedia (radiopaedia.org)	

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	Works 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 with 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.





MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	Molecular Biology		Module Delivery
Module Type	Basic		☒ Theory
Module Code	MPH 22021		☐ Lecture
ECTS Credit	4		☒ Lab
SWL (hr/sem.)	100		☒ Tutorial
			☐ Practical
			☐ Seminar
Module Level	2	Semester of Delivery	4
Administering Department	Medical Physics	College	Science
Module Leader	Dr. Labeeb Ahmad Kadum	e-mail	
Module Leader's Acad. Title	Lec.	Module Leader's Qualification	PhD in Biology
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

Relation with other Modules			
العلاقة مع المواد الدراسية الاخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents	
اهداف المادة الدراسية ونتائج التعلم والمحتويات الارشادية	
Module Aims أهداف المادة الدراسية	The primary objectives of the module are designed to equip students with a robust foundational and advanced understanding of molecular systems: • Fundamental Concepts: To provide an in-depth understanding of the fundamental concepts in molecular biology and genetics.



	• Genome Dynamics: To develop a core understanding of genome structure, organization, packaging, replication, and repair mechanisms in both prokaryotic and eukaryotic systems. • Gene Expression: To explore the complete pipeline of gene expression—covering transcription, RNA processing, translation, protein targeting, and the regulation of gene expression. • Mutations & Disease: To impart knowledge on the types and causes of genetic mutations, cellular repair mechanisms, and the molecular origins of conditions like cancer. • Inquiry & Practical Skills: To build analytical and laboratory-based competencies necessary for scientific inquiry, experimental design, and data interpretation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of a Molecular Biology module, students are typically expected to achieve the following outcomes: • Knowledge & Understanding: ○ Describe the basic structure, biochemistry, and functional differences of nucleic acids (DNA/RNA) and proteins. ○ Explain the core principles of DNA replication, transcription, translation, and how they interrelate. ○ Understand chromosomal organization, telomere maintenance, and genome repair mechanisms. • Subject-Specific Skills: ○ Comprehend and analyze standard molecular laboratory techniques (e.g., DNA extraction, PCR, gel electrophoresis, hybridization, restriction analysis, and sequencing). ○ Evaluate the applications of genetic engineering, gene cloning, and recombinant DNA technology. • Cognitive & Analytical Competencies: ○ Interpret molecular data, solve genetic problems, and utilize bioinformatics tools/genomics databases. ○ Critically appraise primary scientific literature and integrate theoretical knowledge into experimental frameworks.
Indicative Contents المحتويات الارشادية	The curriculum content is generally structured across core thematic blocks: • Structure and Biochemistry of Nucleic Acids: Chemical nature of DNA and RNA, nucleosides/nucleotides, double helix stability, and higher-order chromosomal packaging/organization.



	• DNA Replication, Repair, and Recombination: Enzymology of replication in prokaryotes and eukaryotes, replication forks, telomeres, mutation sources, and DNA repair pathways (e.g., mismatch repair, excision repair). • Transcription and RNA Processing: RNA polymerases, promoters, enhancers, transcription factors, mRNA splicing, capping, polyadenylation, and non-coding RNAs. • Translation and Post-Translational Modifications: The genetic code, tRNA adaptation, ribosomes, initiation/elongation/termination, protein folding, targeting, and modifications. • Gene Regulation: Operon models (prokaryotic control) and complex transcriptional/epigenetic regulation in eukaryotes. • Molecular Techniques & Biotechnology: Polymerase Chain Reaction (PCR), cloning vectors, restriction mapping, DNA sequencing technologies, gel electrophoresis, gene libraries, and bioinformatics applications.
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Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	To bridge theory and practical application, a blended or multi-faceted delivery approach is typically utilized: • Lectures & Interactive Sessions: Core concepts are delivered via traditional or blended lectures, supplemented by active-class discussions, conceptual problem-solving, and video breakdowns. • Tutorials & Seminars: Small-group student cohorts engage in collaborative problem-solving, data analysis exercises, peer discussions, and presentations of primary research articles. • Laboratory Practical Classes: Hands-on wet-lab sessions allowing students to apply theoretical protocols (such as pipetting, DNA isolation, amplification, and visualization). • Directed Independent Study & Digital Platforms: Utilization of Learning Management Systems (LMS) for reading assignments, asynchronous modules, self-assessment quizzes, and bioinformatics simulation toolkits.

Student Workload (SWL)





الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	5
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	25	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	1.67
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	100		

Module Evaluation					
تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	16%(16)	4,7,10,13	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	3, 6, 9, 12	LO # 3,# 4 and #6,#7
	Projects/Lab.	7	14%(14)	Continuous	all
	Report	1	2%(2)	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	Part I: Foundations of Molecular Biology & Macromolecular Structure: Introduction to Molecular Biology & Chemical Foundations
Week 2	Structure and Chemistry of Nucleic Acids (DNA and RNA)
Week 3	Genome Organization and Chromatin Structure
Week 4	Part II: Maintenance of the Genome (Replication, Repair, and Recombination): DNA Replication: Prokaryotic and Eukaryotic Mechanisms
Week 5	DNA Damage and Repair Mechanisms
Week 6	Genetic Recombination and Transposable Elements
Week 7	Mid term.
Week 8	Genetic Recombination and Transposable Elements: Transcription in Prokaryotes
Week 9	Transcription in Eukaryotes.
Week 10	RNA Processing and Post-Transcriptional Modifications
Week 11	Protein Synthesis: Translation Mechanics
Week 12	Post-Translational Modifications and Protein Folding





Week 13	Regulation of Gene Expression & Advanced Topics: Regulation of Gene Expression (Prokaryotic vs. Eukaryotic)
Week 14	Molecular Biology Techniques and Biotechnology
Week 15	Applications and Emerging Frontiers in Molecular Biology
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1. The Griffith Experiment (1928): Objective: Discover the phenomenon of bacterial transformation.
Week 2	Lab 2: The Avery-MacLeod-McCarty Experiment
Week 3	Lab 3: The Hershey-Chase Experiment
Week 4	Lab 4: The Meselson-Stahl Experiment
Week 5	Lab 5: The Nirenberg and Matthaei Experiment
Week 6	Lab 6: The Sanger Sequencing Method.
Week 7	Lab 7: The Polymerase Chain Reaction (PCR).

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<i>Molecular Biology of the Cell</i> by Bruce Alberts et al. (W. W. Norton & Company)	Yes
Recommended Texts	<i>Molecular Biology: Principles of Genome Function</i> by Nancy Craig et al. (Oxford University Press)	Yes
Websites	National Center for Biotechnology Information (NCBI) Bookshelf (ncbi.nlm.nih.gov/books)	

GRADING SCHEME

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
	A - Excellent	امتياز	90 – 100	Outstanding Performance





Success Group (50 – 100)	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	Works 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 with 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.

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية					
Module Title	Bioelectronics			Module Delivery	
Module Type	C			☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	MPH 22022				
ECTS Credit	5				
SWL (hr/sem.)	125				
Module Level	2	Semester of Delivery	4		
Administering Department	Medical Physics	College	Science		
Module Leader	GHufran Waleed Mohamad		e-mail		
Module Leader's Acad. Title	Ass. Lec.	Module Leader's Qualification	Msc. in Physics		
Module Tutor		e-mail			
Peer Reviewer Name		e-mail			
Scientific Committee Approval Date	1/9/2025	Version Number	2		



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 اهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The primary goals of a Bioelectronics module are typically to: • Bridge Disciplines: Introduce students to the application of electronic engineering principles, semiconductor technologies, and circuit design to biology, medicine, and health sciences. • Understand Biopotentials: Impart a thorough scientific understanding of the physiological processes and cellular mechanisms that generate bioelectric signals (e.g., ECG, EEG, EMG). • Develop Instrumentation Skills: Equip students with the knowledge to design, analyze, and test electronic hardware—such as biopotential electrodes, operational amplifiers, and electrical filters—used for capturing and conditioning low-level biological signals. • Ensure Safety and Compliance: Familiarize students with electrical safety standards, patient protection regulations (preventing macroshock and microshock), and the operational principles of key therapeutic/diagnostic devices like pacemakers and defibrillators.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of a Bioelectronics module, students are typically expected to be able to: • Knowledge and Understanding: ○ Explain the origin of bioelectric potentials and the behavior of ionic transport across cell membranes. ○ Describe the mathematical foundations, models, and characteristics of biopotential electrodes and instrumentation amplifiers. • Intellectual & Analytical Skills: ○ Analyze and solve complex bioelectrical circuit problems involving linear circuits, noise reduction, and signal conditioning. ○ Evaluate the performance, limitations, and design criteria of biomedical measurement and diagnostic systems.



	• Professional & Practical Skills: ○ Design, simulate, implement, and test bioelectronic circuits (such as filters and differential amplifiers) using laboratory tools and software. ○ Apply safety protocols and regulatory standards regarding medical device deployment and electrical isolation.
Indicative Contents المحتويات الارشادية	The syllabus content generally covers a progression from fundamental cellular biology to advanced medical hardware and organic devices: • Introduction to Biopotentials: Cell membrane physics, resting potentials, action potentials, and the electrical activity of excitable tissues (heart, brain, skeletal muscles yielding ECG, EEG, and EMG). • Biopotential Electrodes: Half-cell potentials, electrode-electrolyte interfaces, skin-electrode equivalent circuits, polarization, and types of recording vs. stimulating electrodes. • Bioelectronic Circuitry & Amplifiers: Operational amplifiers (Op-Amps), differential amplifiers, Instrumentation Amplifiers, Common Mode Rejection Ratio (CMRR), noise sources, and signal isolation techniques. • Filtering and Signal Conditioning: Low-pass, high-pass, band-pass, and notch filters designed to remove motion artifacts and power-line interference. • Therapeutic and Diagnostic Equipment: Principles of operation for electrocardiographs, blood pressure monitors, pacemakers, and defibrillators. • Advanced Topics & Emerging Technologies: Introduction to organic bioelectronics, Ion-Sensitive Field-Effect Transistors (ISFETs), organic electrochemical transistors (OECTs), biosensors, and brain-machine interfaces. • Electrical Safety: Effects of electric current on human tissue, leakage currents, macroshock, microshock hazards, and isolation barriers.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	o achieve the module aims and learning outcomes, a blend of instructional methods is typically deployed:



	• Interactive Lectures: Delivering theoretical frameworks, mathematical modeling, and core concepts of bioelectricity and circuit design. • Laboratory Sessions / Practical Work: Hands-on hardware prototyping, breadboarding or PCB testing of bio-amplifiers, usage of oscilloscopes/function generators, and software simulation (e.g., SPICE, MATLAB). • Problem-Solving Classes & Tutorials: Working through quantitative design calculations concerning signal-to-noise ratios, filter cut-off frequencies, and electrode equivalent circuits. • Independent Self-Directed Learning: Encouraging students to review relevant research literature, technical application notes, and modern developments in medical device technology. • Assessments: Ranging from formative lab reports and homework assignments to summative written mid-term/final examinations and project presentations evaluating circuit design and diagnostic analysis.
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Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	90	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	6
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	35	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	2.33
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	125		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	16%(16)	4,7,10,13	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	3, 6, 9, 12	LO # 3,# 4 and #6,#7
	Projects/Lab.	7	14%(14)	Continuous	all
	Report	1	2%(2)	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	Phase 1: Foundations of Molecular Bioelectronics: Introduction to Molecular Bioelectronics
Week 2	Biomolecular Building Blocks & Chemistry
Week 3	Fundamental Mechanisms of Charge Transport in Molecules
Week 4	Phase 2: Biomolecules as Electronic Components: DNA and Peptide Electronics
Week 5	Redox Proteins and Enzymes in Electronic Systems
Week 6	Biomolecular Recognition and Electrochemical Biosensors
Week 7	Mid term.
Week 8	Phase 3: Organic Bioelectronics & Nanomaterials: Mid-Term Review & Organic Semiconductors in Biology
Week 9	Organic Electrochemical Transistors (OECTs) & Bio-Interfaces
Week 10	Nanomaterials for Bioelectronics
Week 11	Nanomaterials for Bioelectronics: Enzymatic and Microbial Biofuel Cells
Week 12	Neuro-Electronic Interfaces and Nanoscale Probes
Week 13	Bio-Inspired and Molecular Computing
Week 14	Phase 5: Frontiers, Ethics, and Conclusion: Emerging Frontiers and Theranostics
Week 15	Course Synthesis & Final Project Presentations.
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)	
المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1. Characterization of Biopotential Electrodes and Skin-Electrode Impedance
Week 2	Lab 2:. Design and Testing of an ECG Bio-Amplifier Circuit
Week 3	Lab 3:. Surface Electromyography (EMG) Signal Acquisition and Processing
Week 4	Lab 4:. Fabrication and Characterization of an Amperometric Glucose Biosensor
Week 5	Lab 5:. Bioimpedance Spectroscopy (EIS) for Cellular or Tissue Analysis
Week 6	Lab 6: Characterization of an Organic Electrochemical Transistor (OECT) for Bio-Sensing
Week 7	Lab 7: Active Noise Reduction: Design of Notch and Bandpass Filters for Biomedical Signals.





Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	"Introduction to Bioelectronics: For Engineers and Physical Scientists" by Ronald Pethig and Stewart Smith (Cambridge University Press)	Yes
Recommended Texts	"Handbook of Bioelectronics: Directly Interfacing Electronics and Biological Systems" edited by Sandro Carrara and Krzysztof Iniewski (Cambridge University Press)	Yes
Websites	IEEE Engineering in Medicine and Biology Society (EMBS) (embs.ieee.org)	

GRADING SCHEME مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 – 100)	A - Excellent	امتياز	90 – 100	Outstanding Performance
	B - Very Good	جيد جداً	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	Works 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 with 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.				





MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	Healthy Culture		Module Delivery
Module Type	Basic		☒ Theory
Module Code	MPH 22023		☐ Lecture
ECTS Credit	3		☒ Lab
SWL (hr/sem.)	75		☒ Tutorial
			☐ Practical
			☐ Seminar
Module Level	2	Semester of Delivery	4
Administering Department	Medical Physics	College	Science
Module Leader	Dr. Mustafa Kamel Jassim	e-mail	
Module Leader's Acad. Title	Ass. P.	Module Leader's Qualification	Msc. in Physics
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

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	
اهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The overarching purpose of a "Healthy Culture" module is generally designed to: • Examine Intersections: Explore how cultural values, beliefs, social structures, and practices shape human health, illness experiences, and healthcare delivery.



	• Critique Medical Systems: Provide conceptual tools to analyze biomedicine, alternative healing systems, and global health frameworks through a critical cultural lens. • Promote Cultural Competence: Foster awareness, sensitivity, and humility regarding diverse cultural perspectives on the body, suffering, mental health, and wellbeing. • Develop Analytical Skills: Equip students with qualitative or social science frameworks to evaluate health inequalities and social determinants of health.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the module, students are typically expected to be able to: • Knowledge and Understanding: ○ Define and critique key concepts such as culture, medicalization, structural violence, health beliefs, and cultural safety. ○ Explain how socioeconomic, historical, and environmental factors influence health behaviors and outcomes across different populations. • Cognitive/Intellectual Skills: ○ Critically analyze the social construction of illness, disease etiology, and medical knowledge production. ○ Evaluate real-world health programs, policies, or patient-provider dynamics from cross-cultural perspectives. • Practical/Transferable Skills: ○ Demonstrate improved cross-cultural communication strategies relevant to health promotion, public health, or clinical practice. ○ Conduct independent inquiry, synthesize multidisciplinary literature, and articulate complex arguments through written or oral formats.
Indicative Contents المحتويات الارشادية	The syllabus typically covers core themes divided across topics such as: • Foundational Concepts: Introduction to medical anthropology, sociology of health, and defining the relationship between culture, body, and mind. • Social Construction of Illness: How different cultures perceive, experience, name, and frame symptoms, suffering, and stigma.



	• Pluralistic Healing Systems: Biomedicine as a cultural system alongside ethnomedicine, folk healing, and complementary/alternative medicine (CAM). • Power, Inequality, and Health: The impact of structural violence, racism, marginalization, poverty, and globalization on health disparities. • The Medicalization of Everyday Life: Cultural definitions of "normality" vs. "pathology," and the influence of the pharmaceutical industry ("Big Pharma"). • Global Health and Ethics: Cross-cultural health interventions, medical tourism, humanitarianism, and the ethics of international health delivery.
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Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	To deliver these concepts effectively, modules usually employ a blended and active learning approach: • Interactive Lectures: Providing core theoretical frameworks, historical contexts, and foundational concepts. • Seminars and Group Workshops: Facilitating critical peer discussions on assigned readings, ethnographic case studies, and real-world medical dilemmas. • Case-Based Learning: Analyzing qualitative patient narratives, cross-cultural health campaigns, or media representations of health and disease. • Independent and Directed Study: Engaging with curated multimedia resources, academic journals, and self-directed research to prepare formative and summative assessments (e.g., essays, reflective journals, or group presentations). <i>If you are looking for the exact handbook specification for a specific university or course code, please share the name of the institution or module code so I can tailor this precisely to your syllabus.</i>

Student Workload (SWL)

الحمل الدراسي للطالب





Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	2.2
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	2.8
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	75		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20%(20)	4,7,10,13	LO # 1, # 2 and #10, #11
	On line Assignments	4	8%(8)	2,5,8,11	LO # 3,# 4 and #6,#7
	Onside Assignments	4	8%(8)	3,6,9,12	LO # 3,# 4 and #6,#7
	Report	1	2%(4)	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	Introduction to Health and the Healthy Culture Concept
Week 2	Nutritional Epigenetics and Cultural Diets
Week 3	Chronobiology, Sleep, and Modern Cultural Rhythms
Week 4	Stress, the HPA Axis, and Psychosocial Culture
Week 5	Microbiome Dynamics, Diet, and Cultural Lifestyles
Week 6	Physical Activity, Cellular Homeostasis, and Myokines
Week 7	Mid term.
Week 8	Environmental Toxins, Xenobiotic Metabolism, and Culture
Week 9	Midterm Assessment and Review
Week 10	Pharmacogenomics, Ethnomedicine, and Traditional Remedies
Week 11	Molecular Epidemiology of Lifestyle Diseases





Week 12	Addiction, Neuroplasticity, and Cultural Behaviors
Week 13	Immunology of Social Connection and Longevity
Week 14	Synthetic Biology, Bioethics, and Cultural Horizons
Week 15	Capstone Presentations and Future Directions
Week 16	Final Exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<i>Culture, Health and Illness</i> by Cecil G. Helman	Yes
Recommended Texts	<i>Essentials of Health, Culture, and Diversity</i> by Mark Edberg	Yes
Websites	Think Cultural Health (U.S. Department of Health and Human Services)	

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	Works 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 with 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.				





MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	Computer Science II	Module Delivery	
Module Type	Support	☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	MUC 22024		
ECTS Credit	3		
SWL (hr/sem.)	75		
Module Level	2	Semester of Delivery	4
Administering Department	Medical Physics	College	Science
Module Leader	Ali Chalooop	e-mail	
Module Leader's Acad. Title	Ass. Lec.	Module Leader's Qualification	Bsc. in Computer
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

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	
اهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• Introduce Core Productivity Tools: Provide students with a comprehensive understanding of the core applications within the Microsoft Office suite (primarily Word, Excel, and PowerPoint).



	• Enhance Digital Literacy & Efficiency: Develop practical, everyday computing skills required to produce professional documents, structured data sheets, and impactful multimedia presentations. • Bridge Theory and Practice: Enable learners to navigate operating system environments and apply office productivity software to solve academic, administrative, and real-world business problems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the successful completion of the module, learners will be able to: • Navigate the Office Interface: Utilize the Microsoft Office ribbon, user interface, and backstage view efficiently across various programs. • Document Creation (Microsoft Word): Create, format, edit, and style professional documents, reports, and templates using advanced layout options, tables, and reference tools. • Data Management and Analysis (Microsoft Excel): Build worksheets, manage rows/columns, input data, and apply formulas, functions, and charts to visualize and evaluate datasets. • Presentation Design (Microsoft PowerPoint): Design and deliver engaging, visually appealing presentations utilizing slide layouts, themes, multimedia elements, and basic animations. • Cross-Application Integration: Manage file systems and integrate data or elements smoothly across different office components to streamline administrative workflows.
Indicative Contents المحتويات الارشادية	• Introduction to the Office Environment: Starting and exiting applications, window navigation, and customizing the Quick Access Toolbar. • Microsoft Word Essentials: • Text entry, formatting, paragraph alignment, bullets, and numbering. • Page layout, margins, themes, backgrounds, and headers/footers. • Inserting tables, illustrations, and symbols; managing references and styles. • Microsoft Excel Essentials: • Workbook and worksheet navigation, grid structures, data entry, AutoCorrect, and AutoComplete features. • Introduction to mathematical formulas, basic functions, cell referencing, and sorting/filtering data.



	• Data visualization through charts and graphs. • Microsoft PowerPoint Essentials: • Overview of presentation structures, creating and organizing slides. • Formatting text, working with drawing tools, adding graphical objects, and applying transitions or multimedia elements.
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Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	• Interactive Lectures: Instructor-led conceptual overviews introducing the core features, logic, and interface elements of each application. • Hands-on Lab Practice: Active engagement through computer-based exercises, step-by-step software tutorials, and guided lab sessions. • Demonstration and Visualization: Real-time software walkthroughs by instructors to illustrate formatting tricks, shortcuts, and document-building techniques. • Problem-Based & Task-Oriented Learning: Assigning practical, scenario-based projects (e.g., drafting a formal report, budgeting via spreadsheet, or compiling a slide deck) that mirror real-world administrative demands. • Collaborative & Blended Learning: Utilizing peer feedback, shared digital documentation, and online resources to troubleshoot issues and foster independent technical confidence.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	50	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	3.33
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	25	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	1.67
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	75		





Module Evaluation					
تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	16%(16)	4,7,10,13	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	3, 6, 9, 12	LO # 3,# 4 and #6,#7
	Projects/Lab.	7	14%(14)	Continuous	all
	Report	1	2%(2)	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	Introduction to Computing Fundamentals & Office Interface
Week 2	Microsoft Word – Document Basics & Formatting
Week 3	Microsoft Word – Advanced Page Design & Layout
Week 4	Microsoft Word – Tables, Visual Elements & Objects
Week 5	Microsoft Word – Styles, References & Collaboration
Week 6	Microsoft Excel – Introduction & Worksheet Fundamentals
Week 7	Mid term.
Week 8	Microsoft Excel – Formulas, Basic Functions & Cell Referencing
Week 9	Microsoft Excel – Data Management, Sorting & Filtering
Week 10	Microsoft Excel – Data Visualization with Charts
Week 11	Microsoft PowerPoint – Presentation Principles & Interface
Week 12	Microsoft PowerPoint – Text Formatting & Visual Content
Week 13	Microsoft PowerPoint – Multimedia, Transitions & Animations
Week 14	Cross-Application Integration & Productivity Tips
Week 15	Comprehensive Project & Review
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر





	Material Covered
Week 1	Lab 1. Professional Research Paper & Formatting
Week 2	Lab 2:. Mail Merge for Mass Communication
Week 3	Lab 3:. Collaborative Forms & Interactive Layouts
Week 4	Lab 4:. Advanced Data Organization & Cleaning
Week 5	Lab 5:. Core Financial & Logical Modeling
Week 6	Lab 6:. Data Aggregation with Pivot Tables & Charts
Week 7	Mid term
Week 8	Lab 7:. Statistical & Mathematical Analysis
Week 9	Lab 8: Master Slide Design & Corporate Branding
Week 10	Lab 9: Multimedia Integration & Dynamic Transitions
Week 11	Lab 10 Database Schema & Table Design
Week 12	Lab 11Advanced Queries (Select, Parameter & Action)
Week 13	Lab 12Professional Forms & Subform Integration
Week 14	Lab 13: Comprehensive Reports & Grouping
Week 15	Lab 14: Cross-Application Office Integration
Week 16	Final Exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	"Microsoft Office Step by Step (Office 2021 and Microsoft 365)" by Curtis Frye (Published by Microsoft Press)	Yes
Recommended Texts	"Microsoft Office 365 All-in-One For Dummies" by Peter Weverka (Published by For Dummies).	Yes
Websites	Microsoft 365 Training Center (support.microsoft.com/training)	

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	Works 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 with 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.

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية					
Module Title	Electronics			Module Delivery	
Module Type	Basic			☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	MPH 22025				
ECTS Credit	4				
SWL (hr/sem.)	100				
Module Level	2	Semester of Delivery	4		
Administering Department	Medical Physics	College	Science		
Module Leader	Maryam Ali Raheem	e-mail			
Module Leader's Acad. Title	Ass. Lec.	Module Leader's Qualification	Msc. in Physics		
Module Tutor		e-mail			
Peer Reviewer Name		e-mail			
Scientific Committee Approval Date	1/9/2025	Version Number	2		





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	The overarching goals of an Electronics module typically include: • Providing a foundational understanding of core electronic components, semiconductor physics, and circuit theory. • Developing analytical skills required to evaluate, model, and solve problems involving analog and digital electronic circuits. • Fostering practical competencies through hands-on laboratory experiments, circuit building, and component testing. • Equipping students with the design principles needed to construct basic electronic systems, such as amplifiers, power supplies, and logic networks.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the module, students are generally expected to demonstrate: • Knowledge and Understanding: Explain the operational principles, characteristics, and limitations of primary electronic devices (e.g., diodes, bipolar junction transistors [BJTs], field-effect transistors [FETs], and operational amplifiers). • Intellectual / Analytical Skills: Apply systematic circuit analysis methods (such as Kirchhoff's laws, nodal analysis, and mesh analysis) to determine voltages, currents, and frequency responses in electronic networks. • Design & Evaluation Skills: Design basic electronic building blocks to meet specific performance criteria (e.g., gain, bandwidth, stability, and power efficiency). • Practical & Professional Skills: Safely use laboratory test and measurement equipment (e.g., oscilloscopes, function generators, multimeters, DC power supplies) to build, test, and troubleshoot circuits.



Indicative Contents المحتويات الارشادية	The syllabus content is typically structured across several key thematic areas: • Introduction to Semiconductor Theory: Atomic structure, p-n junctions, and semiconductor physics. • Discrete Semiconductor Devices: ◦ Diodes and diode applications (rectifiers, zener regulators, clipping/clamping circuits). ◦ Transistors (BJTs and MOSFETs): biasing, small-signal models, and switching operations. • Analog Circuits & Amplifiers: Common-emitter/source configurations, frequency response, feedback mechanisms, and operational amplifier (Op-Amp) applications (inverting/non-inverting amplifiers, filters, comparators). • Power Supplies: Transformers, rectification, filtering, and linear voltage regulation. • Introduction to Digital Electronics (Optional/Interdisciplinary): Binary arithmetic, Boolean algebra, logic gates, and combinational/sequential logic blocks.
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Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	To bridge abstract theories with practical engineering abilities, modern electronics modules use a blended delivery model: • Lectures: Used to introduce theoretical principles, mathematical derivations, core concepts, and contextual industry applications. • Laboratory Sessions: Hands-on practical blocks where students construct breadboard circuits, take measurements, compare real-world outcomes with theoretical calculations, and debug faulty designs. • Problem-Solving & Tutorial Classes: Interactive sessions focused on guided analytical exercises, calculation practice, and working through circuit design challenges. • Computer-Aided Simulation (CAE): Use of simulation software (such as SPICE, Multisim, or MATLAB) to model circuit behavior before physical implementation. • Independent Study: Self-directed reading, assignment completion, and pre-lab preparation to reinforce concepts delivered during contact hours.



Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	5
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	25	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	1.67
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	100		

Module Evaluation

تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	16%(16)	4,7,10,13	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	3, 6, 9, 12	LO # 3,# 4 and #6,#7
	Projects/Lab.	7	14%(14)	Continuous	all
	Report	1	2%(2)	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	Introduction to Semiconductor Physics & Diodes
Week 2	Diode Applications & Special Diodes
Week 3	Bipolar Junction Transistors (BJTs) – Construction & Biasing
Week 4	BJT Small-Signal Amplifiers
Week 5	Field-Effect Transistors (FETs) – JFETs and MOSFETs
Week 6	Frequency Response of Amplifiers
Week 7	Mid term.
Week 8	Operational Amplifiers (Op-Amps) – Fundamentals & Ideal Op-Amps
Week 9	Midterm Examination & Review
Week 10	Operational Amplifier Applications
Week 11	Active Filters and Oscillators
Week 12	DC Power Supplies & Voltage Regulation
Week 13	Introduction to Digital Electronics & Boolean Algebra





Week 14	Combinational and Sequential Logic Circuits
Week 15	Final Project Presentations & Course Review
Week 16	Final Exam.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1. Diode Characteristics and Rectifier Circuits
Week 2	Lab 2:. Bipolar Junction Transistor (BJT) DC Biasing and Load Line Analysis
Week 3	Lab 3:. Common-Emitter (CE) Transistor Amplifier
Week 4	Lab 4:. Operational Amplifier (Op-Amp) Basic Configurations
Week 5	Lab 5:. Active RC Filters (Low-Pass and High-Pass)
Week 6	Lab 6: Combinational Logic Gates and Boolean Algebra Verification
Week 7	Lab 7: Timer A-stable and Mono-stable Multi-vibrators.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<i>Microelectronic Circuits</i> by Adel S. Sedra and Kenneth C. Smith	Yes
Recommended Texts	<i>Electronic Devices and Circuit Theory</i> by Robert L. Boylestad and Louis Nashelsky	Yes
Websites	All About Circuits (allaboutcircuits.com)	

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	Works 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 with 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.

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية			
Module Title	Arabic Language II	Module Delivery	
Module Type	Support	☒	Theory
Module Code	MUC 22026	☐	Lecture
ECTS Credit	2	☐	Lab
SWL (hr/sem.)	50	☒	Tutorial
		☐	Practical
		☐	Seminar
Module Level	2	Semester of Delivery	4
Administering Department	Medical Physics	College	Science
Module Leader	Nooralhoda Turki Kamel	e-mail	
Module Leader's Acad. Title	Ass. Lec.	Module Leader's Qualification	Msc. in Arabic Language
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date	1/9/2025	Version Number	2

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى





Prerequisite module	MUC1104	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents اهداف المادة الدراسية ونتائج التعلم والمحتويات الارشادية	
Module Aims أهداف المادة الدراسية	• To equip students with essential linguistic tools, structural frameworks, and academic vocabulary necessary to comprehend and engage with formal texts. • To bridge the gap between general language proficiency and the precise communicative demands of higher education, enabling students to process academic literature, reports, and technical presentations. • To foster critical thinking and analytical reading skills through exposure to diverse textual genres, ranging from expository essays to structured technical or media-based discourse.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, successful students will be able to: • Demonstrate comprehension of grammatically complex texts and structurally formal syntax. • Apply fundamental rules of morphology and syntax accurately in written and oral communication. • Analyze and synthesize information from varied sources to draft clear, coherent summaries or short reports. • Communicate technical or general academic concepts with improved clarity, appropriate phrasing, and correct terminology.
Indicative Contents المحتويات الارشادية	• Grammatical & Syntactic Foundations: Review of core structural patterns, sentence architecture, nominal and verbal clauses, and concord rules. • Morphology & Vocabulary Building: Derivational patterns, root-and-pattern systems, and the acquisition of a targeted academic/formal vocabulary base. • Reading Comprehension Strategies: Analyzing structured paragraphs, identifying main ideas versus supporting details in expository texts, and contextual inferencing.





	• Composition & Technical Writing: Principles of paragraph construction, punctuation, editing guidelines, and drafting concise professional summaries or abstracts. • Aural & Oral Practice: Listening to structured presentations or lectures, tracking logical arguments, and participating in guided academic discussions.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Interactive Lectures: Core linguistic concepts, syntax rules, and morphological patterns are introduced systematically by the instructor with immediate practical examples. • Guided Tutorials & Practical Exercises: Hands-on drills focusing on sentence diagramming, error-correction, translation exercises, and active text dissection. • Collaborative Peer Work: Small group tasks involving reading comprehension challenges, joint editing of written paragraphs, and short structured presentations to build confidence. • Independent Study & Formative Assessment: Regular assignments, text analysis worksheets, and vocabulary logs designed to encourage autonomous learning and reinforce concepts introduced in class.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	30	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	2
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	1
Total SWL (h/sem.)	50		





الحمل الدراسي الكلي للطلاب

Module Evaluation					
تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20%(20)	4,7,10,13	LO # 1, # 2 and #10, #11
	On line Assignments	4	8%(8)	2,5,8,11	LO # 3,# 4 and #6,#7
	Onside Assignments	4	8%(8)	3,6,9,12	LO # 3,# 4 and #6,#7
	Report	1	2%(4)	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	Part 1: Foundations of Academic Grammar & Syntax: Introduction to Academic & Formal Arabic
Week 2	The Nominal Sentence (الجملة الاسمية) in Technical Contexts
Week 3	The Verbal Sentence (الجملة الفعلية) & Action-Oriented Phrasing
Week 4	Morphology, Roots, and Academic Vocabulary (الاشتقاق)
Week 5	Numbers, Quantifiers, and Measurements
Week 6	Reading Comprehension I: Analyzing Expository Text
Week 7	Mid term.
Week 8	Part 2: Review & Formative Evaluation
Week 9	Advanced Syntax & Modifiers
Week 10	Structure of Technical Reports and Research Abstracts
Week 11	Paragraph Cohesion & Logical Connectors
Week 12	Part 3: Advanced Application, Communication & Synthesis: Summarization & Paraphrasing Techniques
Week 13	Oral Presentation & Academic Discourse
Week 14	Advanced Editing, Proofreading & Error Correction





Week 15	Final Presentations & Course Synthesis
Week 16	Final Exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<i>Modern Standard Arabic Grammar: A Learner's Guide</i> by Mohammad T. Alhawary.	Yes
Recommended Texts	Title & Author: <i>Arabic: An Essential Grammar</i> by Faruk Abu-Chakra.	Yes
Websites	Name & URL Reference: <i>Al-Baheth Al-Arabi</i> (Arabic Dictionary and Root Analysis Portal)	

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	Works 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 with 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.				

MODULE DESCRIPTION FORM





Module Information					
معلومات المادة الدراسية					
Module Title	Phonetics Science			Module Delivery	
Module Type	C			☒	Theory
Module Code	MPH 22027			☒	Lecture
ECTS Credit	4			☐	Lab
SWL (hr/sem.)	100			☒	Tutorial
				☐	Practical
				☐	Seminar
Module Level		2	Semester of Delivery		4
Administering Department		Medical Physics	College	Science	
Module Leader	Omer Ayad Abduljabar		e-mail		
Module Leader's Acad. Title		Ass. Lec.	Module Leader's Qualification		Msc. English Language
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date	1/9/2025		Version Number	2	

Relation with other Modules العلاقة مع المواد الدراسية الاخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents اهداف المادة الدراسية ونتائج التعلم والمحتويات الارشادية	
Module Aims أهداف المادة الدراسية	The primary aims of a Phonetics Science module are to: • Understand Speech Mechanisms: Provide a comprehensive understanding of the physiological, aerodynamic, and articulatory mechanisms underlying human speech production. • Classify and Label Sounds: Train students to recognize, describe, label, and classify speech sounds systematically. • Master Transcription Systems: Equip students with the skills to accurately transcribe speech using the International Phonetic Alphabet (IPA).



	• Explore Acoustic Properties: Introduce the physical (acoustic) characteristics of speech waves and how sounds are transmitted and perceived (auditory phonetics). • Build Practical Foundations: Establish critical listening and analytical skills required for advanced linguistic studies, speech-language pathology, or clinical linguistics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the module, successful students are typically expected to: • Knowledge & Understanding: ○ Define core phonetic and acoustic terminology. ○ Explain the role of the human speech organs (vocal tract, articulators, lungs, larynx) in sound production. ○ Understand the relationship between articulatory gestures and acoustic waveforms. • Subject-Specific Skills: ○ Describe and classify consonants and vowels according to universal parameters (e.g., place and manner of articulation, tongue height, and lip rounding). ○ Read, write, and interpret broad (phonemic) and narrow (allophonic/impressionistic) IPA transcriptions. ○ Analyze supra-segmental features such as stress, length, pitch, and intonation patterns. • Cognitive/Analytical Skills: ○ Critically evaluate speech data and recognize individual, social, or contextual variations in spoken language.
Indicative Contents المحتويات الارشادية	he module content is typically structured into core thematic units: • Unit 1: Articulatory Anatomy & Aerodynamics ○ The vocal mechanism and speech chain. ○ Active and passive articulators (tongue, lips, alveolar ridge, palate, etc.). ○ Airstream mechanisms (pulmonic egressive, etc.). • Unit 2: Description and Classification of Speech Sounds ○ Consonants: Voicing, place of articulation, and manner of articulation (plosives, fricatives, affricates, nasals, approximants, trills). ○ Vowels: Cardinal vowels, tongue shape/height, and lip posture (monophthongs and diphthongs). • Unit 3: The International Phonetic Alphabet (IPA)

	- Principles of IPA transcription. - Diacritics and secondary articulations. - Practical transcription exercises for words, connected speech, and nonsense words. Unit 4: Supra-segmental Phonetics - Syllable structure and syllabification. - Word stress, sentence stress, rhythm, and timing. - Intonation, tone, and the pragmatic functions of pitch. Unit 5: Acoustic and Auditory Phonetics - Physical properties of sound waves (frequency, amplitude, duration). - Waveforms and spectrogram interpretation (formants, harmonics). - The mechanism of hearing and speech perception.
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Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	To bridge theoretical concepts with practical physical performance, the module employs a blend of delivery methods: Lectures: Used to introduce core theoretical concepts, phonetic principles, acoustic physics, and anatomical frameworks. Practical Laboratory/Tutorial Sessions: Hands-on sessions focusing on ear-training, transcription drills, live sound production practice, and analyzing spectrograms using acoustic analysis software (e.g., Praat). Interactive Guided Practice: Regular transcription problem-solving, listening discrimination tasks, and immediate feedback loops. Independent Study & Digital Resources: Utilizing online audio-visual corpora, self-paced pronunciation modules, e-learning quizzes, and specialized phonetic web tools.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	4
Unstructured SWL (USSWL)(h/sem.)	40	Unstructured SWL (h/w)	2.67



الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب إسبوعيا	
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	100		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	20%(20)	4,7,10,13	LO # 1, # 2 and #10, #11
	On line Assignments	4	8%(8)	2,5,8,11	LO # 3,# 4 and #6,#7
	Onside Assignments	4	8%(8)	3,6,9,12	LO # 3,# 4 and #6,#7
	Report	1	2%(4)	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	Introduction to Phonetics and the Speech Chain
Week 2	Anatomy of the Vocal Tract
Week 3	Aerodynamics and Airstream Mechanisms
Week 4	Classification of Consonants (Place and Manner)
Week 5	Classification of Consonants (Phonation and Liquids)
Week 6	Vowel Systems and Cardinal Vowels
Week 7	Mid term.
Week 8	Monophthongs, Diphthongs, and Triphthongs
Week 9	Review and Practical Assessment
Week 10	Introduction to the International Phonetic Alphabet (IPA)
Week 11	Diacritics and Secondary Articulations
Week 12	Supra-segmental Features (Syllables and Stress)
Week 13	Supra-segmental Features (Pitch, Intonation, and Rhythm)
Week 14	Acoustic and Auditory Phonetics Fundamentals





Week 15	Clinical and Applied Phonetics
Week 16	Final Exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	<i>A Course in Phonetics</i> by Peter Ladefad and Keith Johnson.	Yes
Recommended Texts	<i>Practical Phonetics and Phonology: A Resource Book for Students</i> by Beverley Collins and Inger M. Mees.	Yes
Websites	Interactive Sagittal Section (University of Iowa).	

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	Works 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 with 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.				





المرحلة الثالثة

UGIII





Semester Five

MODULE DESCRIPTION FORM

Module Information				
معلومات المادة الدراسية				
Module Title	Medical Physics -1		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	MPH 31028			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	3	Semester of Delivery		5
Administering Department	MPH	College	Sciences	
Module Leader	Dr. Wissam Abdulla Lateef		e-mail	
Module Leader's Acad. Title	Lecturer		Module Leader's Qualification	Ph.D. physics
Module Tutor	N/A		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail
Scientific Committee Approval Date	1 / 9 /2025		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

Module Objectives أهداف المادة الدراسية	1. Develop basic understanding of medical physics concepts, 2. Develop problem-solving and critical-thinking skills, 3. Learn to integrate and apply various physics concepts to a single problem, 4. Develop scientific communication skills
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the course, students will be expected to be able to... 1– Describe an imaging system and break it down into its components and physical principles for each of the imaging modalities covered (x-ray, CT, NM, US, MRI). 2– Identify the key factors that affect image quality and address these factors for the different imaging modalities. 3– Learn to communicate the physical principles behind medical technology, radiation safety, and relevant applications
Indicative Contents	





المحتويات الإرشادية

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	45	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	3
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	80	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	5.33
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	125		

Module Evaluation

تقييم المادة الدراسية





		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects / Lab.	1	14%(14)	Continuous	all
	Report	1	2%(2)	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)	Total assessment	100% (100 Marks)

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Medical Physics – scope, history, and applications in healthcare
Week 2	Basic physical quantities, units (SI), and measurement systems
Week 3	Vectors & Scalars; Motion in 1D and 2D
Week 4	Project 1 discussion
Week 5	Newton's Laws of Motion and Applications in Medicine
Week 6	Work, Energy, and Power – energy transformations in the body





Week 7	Midterm Exam
Week 8	Momentum & Collisions – relevance to trauma and imaging
Week 9	Rotational Motion & Torque – biomechanics of joints
Week 10	Elasticity, Stress, and Strain – biomechanics of tissues & bones
Week 11	Fluids in the Body – pressure, buoyancy, Bernoulli's principle
Week 12	Thermodynamics – temperature, heat transfer in the human body
Week 13	Waves & Sound – ultrasound physics
Week 14	Light & Optics – lenses, eye defects, medical imaging optics
Week 15	Introduction to Radiation Physics – types, sources, basic safety
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: X-Ray Tube Output and Kilo-voltage Peak (kVp) Calibration
Week 2	Lab 2: Computed Tomography (CT) Image Quality and Phantom Evaluation
Week 3	Lab 3 Gamma Camera Intrinsic Uniformity and Spatial Resolution
Week 4	Lab 4: Determination of Radioactive Decay Constant and Half-Life
Week 5	Lab 5: Percentage Depth Dose (PDD) and Beam Profile Measurement in Teletherapy
Week 6	Lab 6: Magnetic Resonance Imaging (MRI) Signal-to-Noise Ratio and Uniformity
Week 7	Lab 7: Biological Dosimetry and Radiation-Induced DNA Damage Assessment

Learning and Teaching Resources





مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Medical Imaging Physics, by W.R. Hendee and E.R. Ritenour, Fourth Edition, Wiley-Liss, Inc., New York, 2002.	Yes
Recommended Texts	- Medical Physics and Biomedical Engineering, B H Brown, R H Smallwood, D C Barber and D R Hose, IOP Publishing Ltd, 1999. M. Maqbool (ed.), An Introduction to Medical Physics, Biological and Medical Physics, Biomedical Engineering, DOI 10.1007/978-3-319-61540-0 11	Yes
Websites	https://onlinelibrary.wiley.com/doi/book/10.1002/0471221155	

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.

MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	Anatomy I		Module Delivery
Module Type	Basic		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar
Module Code	MPH 31029		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	3	Semester of Delivery	5
Administering Department	MPH	College	Science
Module Leader	Dr. Rafa abdulmajeed		e-mail
Module Leader's Acad. Title		Module Leader's Qualification	Ph.D. Medicine
Module Tutor	Name (if available)		e-mail E-mail
Peer Reviewer Name	Name		e-mail E-mail
Scientific Committee Approval Date	1 / 9 /2025		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

Module Objectives أهداف المادة الدراسية	• Understanding Basic Anatomical Concepts: This includes learning fundamental anatomical terminology, body planes, directional terms, and anatomical positions. • Knowledge of Human Body Systems: Understanding the structure and function of the major organ systems of the human body, such as the skeletal, muscular, cardiovascular, respiratory, digestive, nervous, endocrine, and reproductive systems. • Identification of Anatomical Structures: Being able to identify and locate key anatomical structures within the human body, including bones, muscles, organs, nerves, blood vessels, and other tissues. • Relationships between Structures: Understanding the spatial relationships between anatomical structures and how they relate to each other within the body. • Clinical Relevance: Recognizing the clinical significance of anatomical structures and how anatomical knowledge applies to medical practices, surgical procedures, and diagnostic imaging.
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	• Integration with Other Disciplines: Integrating anatomical knowledge with other disciplines such as physiology, pathology, radiology, and clinical medicine. • Communication Skills: Effectively communicating anatomical information through written, oral, and visual means, including the use of anatomical terminology and anatomical illustrations. • Ethical and Professional Considerations: Understanding the ethical principles and professional responsibilities related to the study and practice of anatomy, including respect for human cadavers and patients' rights to privacy and informed consent.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate Proficiency in Anatomical Terminology: Students will be able to accurately describe and identify anatomical structures using appropriate terminology. 2. Identify Major Organs and Systems: Students will be able to identify and describe the structure and function of major organs and systems within the human body. 3. Locate Anatomical Structures: Students will be able to locate and identify key anatomical structures within the body using various reference points. 4. Describe Relationships between Anatomical Structures: Students will understand the spatial relationships between anatomical structures and their functional significance. 5. Analyze Anatomical Variations: Students will be able to recognize and analyze normal anatomical variations among individuals and their clinical implications. 6. Interpret Anatomical Images: Students will develop the skills to interpret anatomical images, including radiographs, CT scans, MRIs, and histological slides. 7. Apply Anatomical Knowledge in Clinical Scenarios: Students will be able to apply their anatomical knowledge to analyze clinical



	cases and propose appropriate diagnostic or therapeutic interventions. 8. Understand Embryological Development: Students will understand the basic principles of embryological development and the formation of major organ systems. 9. Demonstrate Histological Understanding: Students will be able to describe the microscopic structure of tissues and organs and understand how it relates to their function. 10. Integrate Anatomy with Physiology: Students will understand the relationship between anatomy and physiology and how anatomical structures contribute to physiological processes. 11. Communicate Anatomical Concepts: Students will effectively communicate anatomical information through written, oral, and visual presentations. 12. Apply Ethical Principles: Students will understand the ethical considerations involved in the study and practice of anatomy, including respect for human cadavers and patient confidentiality. 13. Demonstrate Critical Thinking Skills: Students will develop critical thinking skills to analyze complex anatomical problems and propose reasoned solutions. 14. Prepare for Further Study or Professional Practice: Students will be prepared to apply their anatomical knowledge in further study or professional practice in fields such as medicine, allied health, research, or education.
Indicative Contents المحتويات الإرشادية	Introduction to Anatomy • Definition and scope of anatomy • Historical perspectives • Importance and relevance of studying anatomy



	Anatomical Terminology
	• Basic anatomical terms and concepts • Anatomical planes and directions • Body cavities and regions
	Histology
	• Study of basic tissues (epithelial, connective, muscular, nervous) • Microscopic anatomy of organs and tissues
	Skeletal System
	• Bones of the human body • Axial skeleton (skull, vertebral column, rib cage) • Appendicular skeleton (limbs, girdles)
	Muscular System
	• Types of muscles (skeletal, smooth, cardiac) • Muscles of the human body • Muscle tissue structure and function
	Cardiovascular System
	• Heart anatomy and physiology • Blood vessels (arteries, veins, capillaries) • Circulatory pathways
	Respiratory System
	• Anatomy of the respiratory tract • Mechanics of breathing





	• Gas exchange in the lungs
	Digestive System
	• Anatomy of the digestive tract • Digestive glands and their functions • Processes of digestion and absorption
	Nervous System
	• Central nervous system (brain, spinal cord) • Peripheral nervous system (nerves, ganglia) • Structure and function of neurons
	Endocrine System
	• Endocrine glands and their hormones • Regulation of hormone secretion • Functions of major hormones
	Urinary System
	• Anatomy of the urinary tract • Kidney structure and function • Urine formation and excretion
	Reproductive System
	• Male reproductive anatomy and physiology • Female reproductive anatomy and physiology • Reproductive processes and gametogenesis
	Special Senses





- Anatomy of the eye, ear, and other sensory organs
- Physiology of vision, hearing, and balance

Embryology

- Basic embryological concepts
- Development of major organ systems
- Common developmental anomalies

Clinical Anatomy

- Anatomical basis of common medical procedures
- Clinical imaging techniques (X-ray, CT, MRI)
- Surgical anatomy and approaches

Anatomical Variations and Anomalies

- Normal anatomical variations among individuals
- Congenital anomalies and their implications

Integration with Other Disciplines

- Relationship between anatomy and physiology
- Connections to pathology, radiology, and clinical medicine

Ethical Considerations

- Respect for human cadavers and anatomical specimens
- Patient confidentiality and privacy





Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

- Utilize active learning methods like group discussions and hands-on activities to engage students in understanding anatomical concepts.
- Incorporate visualization tools such as anatomical models and multimedia resources to aid in comprehension.
- Implement peer teaching and clinical case studies to reinforce learning and demonstrate real-world applications.
- Provide structured lectures, laboratory sessions, and feedback mechanisms to support student learning and mastery of anatomy.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	40	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.67
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية





		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects / Lab.	1	14%(14)	Continuou s	all
	Report	1	2%(2)	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	Introduction to Human Anatomy – terminology, planes, positions, and body cavities
Week 2	Levels of structural organization; overview of organ systems
Week 3	Skeletal System I – bone structure, classification, and functions
Week 4	Skeletal System II – axial skeleton
Week 5	Skeletal System III – appendicular skeleton





Week 6	Joints and Articulations – classification and movement
Week 7	Muscular System I – muscle tissue types and properties
Week 8	Mid term
Week 9	Muscular System II – major muscles of the body
Week 10	Nervous System I – organization, neurons, and neuroglia
Week 11	Nervous System II – central nervous system
Week 12	Nervous System III – peripheral nervous system
Week 13	Cardiovascular System – heart anatomy and great vessels
Week 14	Respiratory System – structure and organization
Week 15	Final Examination Preparation Review sessions Practice exams Final examination

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to Muscular System Overview of muscle types and functions Introduction to muscle tissue structure
Week 2	Upper Limb Muscles Identification and dissection of muscles of the shoulder and arm Understanding muscle attachments and actions in upper limb movements





Week 3	Lower Limb Muscles Identification and dissection of muscles of the hip and thigh Understanding muscle attachments and actions in lower limb movements
Week 4	Trunk Muscles Identification and dissection of muscles of the abdomen and back Understanding muscle attachments and actions in trunk movements and posture
Week 5	Head and Neck Muscles Identification and dissection of muscles of the head and neck Understanding muscle attachments and actions in facial expressions and head movements
Week 6	Muscle Function and Clinical Correlation Review of muscle functions and movements Clinical case studies related to muscular system disorders and injuries
Week 7	Laboratory Exam and Review Practical examination covering muscle identification and functions Review session to reinforce key concepts and prepare for assessments

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Gray's Anatomy for Students" by Richard Drake, A. Wayne Vogl, and Adam W.M. Mitchell.	Yes
Recommended Texts	Atlas of Human Anatomy" by Frank H. Netter.	-





Websites	Kenhub offers a comprehensive online platform featuring interactive anatomy tutorials, quizzes, and videos.
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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.				

MODULE DESCRIPTION FORM





Module Information				
معلومات المادة الدراسية				
Module Title	Quantum mechanics in medicine		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	MPH31030			
ECTS Credits	5			
SWL (hr/sem)	125			
Module Level	3	Semester of Delivery	5	
Administering Department	Medical Physics	College	Sciences	
Module Leader	Dr. Mustafa kamel Jassim		e-mail	
Module Leader's Acad. Title	P. Ass.	Module Leader's Qualification	Ph.D. Physics	
Module Tutor			e-mail	
Peer Reviewer Name			e-mail	E-mail
Scientific Committee Approval Date	1/9 /2025	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

Module Objectives

أهداف المادة الدراسية

- Introduction to Quantum Mechanics:
- Understand the basic principles of quantum mechanics, including wave-particle duality, uncertainty principle, and quantum states.
- Explain the concept of quantum superposition and entanglement and how they differ from classical physics.
- Quantum Effects in Biological Systems:
- Analyze how quantum mechanical effects influence biological systems at the molecular and cellular levels (e.g., photosynthesis, enzyme activity).
- Explore the role of quantum tunneling in biological processes such as DNA mutations and repair.
- Quantum Imaging Techniques:
- Describe how quantum mechanics is applied in advanced imaging techniques, such as MRI (Magnetic Resonance Imaging) and PET (Positron Emission Tomography).
- Understand the principles of quantum coherence and its role in improving medical imaging resolution and accuracy.
- Quantum Computing in Drug Discovery and Medical Research:
- Discuss the potential of quantum computing in solving complex biological problems, such as protein folding and drug discovery.
- Explore how quantum algorithms may accelerate the analysis of large medical datasets and optimize personalized medicine approaches.
- Quantum Mechanics in Radiation Therapy:
- Understand the role of quantum mechanics in the interaction of radiation with matter, particularly in cancer treatments such as proton therapy and radiotherapy.
- Evaluate how quantum principles optimize radiation dose delivery and minimize damage to healthy tissues.



	- Quantum Sensors and Diagnostic Devices: - Investigate how quantum sensors (e.g., SQUIDs - Superconducting Quantum Interference Devices) are used in medical diagnostics and monitoring of brain activity (e.g., in MEG – Magnetoencephalography). - Examine the development and potential of quantum-enhanced sensors for early disease detection and monitoring. - Ethical and Practical Considerations: - Analyze the ethical implications and potential risks of quantum technologies in medicine, especially regarding patient privacy, data security, and accessibility. - Discuss the challenges in integrating quantum technologies into clinical practice and the healthcare industry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Fundamentals of Quantum Mechanics: Demonstrate an understanding of the key principles of quantum mechanics, such as wave-particle duality, quantum superposition, and the uncertainty principle. Apply quantum mechanical concepts to explain phenomena in biological and medical contexts. Quantum Effects in Biological Systems: Analyze how quantum mechanical processes influence molecular and cellular functions, such as photosynthesis, enzyme activity, and DNA mutation. Evaluate the role of quantum tunneling and entanglement in biological systems and their potential implications for health and disease. Application of Quantum Mechanics in Medical Imaging: Explain the quantum mechanical principles underlying advanced medical imaging techniques, such as MRI and PET scans. Assess how quantum coherence and other quantum effects improve the





	resolution and accuracy of medical imaging technologies. Quantum Computing in Healthcare: Demonstrate an understanding of how quantum computing can be applied to solve complex problems in drug discovery, protein folding, and medical research. Critically evaluate the potential of quantum computing to revolutionize personalized medicine, medical data analysis, and large-scale biological simulations. Quantum Radiation Therapy: Describe how quantum mechanics principles are applied in radiation therapy, particularly in cancer treatment. Analyze the interaction of quantum radiation with biological tissues and evaluate its effectiveness and safety in clinical settings. Quantum Sensors and Diagnostics: Explain the working principles of quantum-enhanced diagnostic devices, such as SQUIDS, and their applications in brain monitoring (e.g., MEG). Critically assess emerging quantum-based sensors and diagnostic technologies for their potential to improve early disease detection and patient monitoring. Ethical, Social, and Practical Considerations: Discuss the ethical, legal, and societal implications of quantum technologies in medicine, including data security, patient privacy, and accessibility. Identify the challenges and barriers to the clinical adoption of quantum technologies in healthcare settings.
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	Future Directions of Quantum Mechanics in Medicine: Evaluate the current research landscape in quantum medicine and critically appraise potential future applications, including quantum-enhanced drug development, diagnostics, and therapies. Synthesize recent advances in quantum medical technologies and propose innovative solutions for integrating quantum technologies into mainstream healthcare.
Indicative Contents المحتويات الإرشادية	Introduction to Quantum Mechanics Historical overview: Classical vs. Quantum mechanics Key quantum principles: Wave-particle duality, uncertainty principle, quantum states Quantum superposition and entanglement: Definitions and basic theory Quantum tunneling: Explanation and relevance to biological processes 2. Quantum Mechanics in Biological Systems Quantum biology: Overview and key concepts Quantum effects in photosynthesis: Energy transfer at the quantum level Enzyme catalysis and quantum tunneling: Role in metabolic processes DNA mutation and repair: Quantum mechanical contributions Sensory systems (e.g., magnetoreception in birds): Quantum influence on biological functions 3. Quantum Mechanics in Medical Imaging Quantum principles in MRI (Magnetic Resonance Imaging): Nuclear spin and resonance Positron Emission Tomography (PET): Quantum processes in positron decay Quantum coherence and entanglement in improving imaging resolution Future quantum imaging techniques: Potential breakthroughs in medical diagnostics 4. Quantum Computing in Medicine



	Introduction to quantum computing: Quantum bits (qubits), superposition, and entanglement Applications in drug discovery: Protein folding and molecular simulations Quantum machine learning in medical data analysis: Personalized medicine and big data Potential breakthroughs in genomics and precision medicine using quantum algorithms 5. Quantum Mechanics in Radiation Therapy Quantum mechanics and radiation-matter interactions: Basic principles Proton therapy and radiotherapy: Quantum explanations for enhanced targeting of tumors Quantum effects in radiation dose optimization: Minimizing side effects and improving accuracy Future innovations in quantum-based cancer treatments 6. Quantum Sensors and Diagnostics Introduction to quantum sensors: Superconducting Quantum Interference Devices (SQUIDs) Magnetoencephalography (MEG): Quantum sensing applications in brain activity monitoring Quantum-enhanced biosensors: Early disease detection and real-time monitoring Future developments: Quantum devices for non-invasive diagnostics 7. Quantum Entanglement and Biological Systems Discussion of quantum entanglement in biological systems Theoretical and experimental exploration of entanglement in medical research Entanglement and coherence in neural processes: Brain function and consciousness 8. Quantum Mechanics and Nanomedicine
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	Quantum dots in medicine: Applications in drug delivery and diagnostics Nanoparticles for quantum sensing and imaging Quantum effects in nanoparticle-tissue interactions Quantum technologies in targeted therapies and precision medicine 9. Quantum Mechanics in Pharmacology Role of quantum mechanics in understanding drug-receptor interactions Quantum tunneling in biochemical reactions relevant to drug action Quantum simulations of drug binding and pharmacodynamics Quantum pharmacology and its implications for personalized medicine 10. Ethical, Legal, and Social Implications (ELSI) Ethical issues in quantum medical research: Patient privacy and data security Social impacts of quantum-enhanced medical technologies: Access, equity, and costs Legal frameworks for quantum technologies in healthcare Regulatory challenges in integrating quantum medical innovations into clinical practice 11. Future Directions in Quantum Mechanics for Medicine Ongoing research in quantum biology and quantum medicine Emerging technologies: Quantum computers, sensors, and diagnostic tools in medicine Potential revolutionary applications: Quantum AI in personalized medicine, quantum cryptography in healthcare Interdisciplinary collaborations: Bridging physics, biology, and medicine for quantum innovations
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم





Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	50	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.33
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	75	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20%(20)	5 and 10	LO # 1, # 2 and #10, #11





	Assignments	4	8%(8)	2,5,8,11	LO # 3,# 4 and #6,#7
	Projects	4	8%(8)	3,6,9,12	LO # 3,# 4 and #6,#7
	Report	1	4%(4)	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	Introduction to Quantum Mechanics in Medicine
Week 2	Quantum Superposition and Entanglement
Week 3	Quantum Tunneling in Biological Systems
Week 4	Quantum Coherence in Biological Systems
Week 5	Quantum Mechanics in Medical Imaging – MRI
Week 6	Quantum Mechanics in Medical Imaging – PET and Future Technologies
Week 7	Quantum Computing in Drug Discovery and Medical Research
Week 8	Quantum Machine Learning in Healthcare
Week 9	Mid-Term





Week 10	Quantum Radiation Therapy
Week 11	Quantum Radiation Therapy – Applications
Week 12	Quantum Sensors in Medicine
Week 13	Quantum Biosensors and Diagnostics
Week 14	Quantum Nanomedicine
Week 15	Ethical, Legal, and Social Implications (ELSI) of Quantum Medicine
Week 16	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Physics in Biology and Medicine (6th Edition) by Paul Davidovits	Yes
Recommended Texts	Quantum Biology: A Glimpse Into the Future of Medicine by Geoffrey W. Guy	Yes
Websites	The Guy Foundation (theguyfoundation.co.uk)	

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.

MODULE DESCRIPTION FORM

Module Information				
معلومات المادة الدراسية				
Module Title	Medical terminology		Module Delivery	
Module Type	Basic		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	MPH 31031			
ECTS Credits	3			
SWL (hr/sem)	75			
Module Level	3	Semester of Delivery	5	
Administering Department	MPH	College	Sciences	





Module Leader	Faez H. Alberekda	e-mail	faeza.hussein@mauc.edu.iq
Module Leader's Acad. Title		Module Leader's Qualification	Ph.D. Physics
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	1/ 9 /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	The primary class objective is to read and understand the language of medicine. Upon the completion of this course the student will be able to: • Form medical terms by combining prefixes, suffixes and root words. • Associate medical terms with specific body systems. • Identify and interpret diagnostic and symptomatic terms related to the pathophysiology specific to each body system. • Describe designated diagnostic testing procedures (laboratory, x-ray, surgical, pharmacy, etc.). • Distinguish common medical abbreviations and acronyms.
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	• Choose and define medical terms from appropriate sources. • Summarize and correctly interpret medical/clinical related materials. • Evaluate the quality of medical literature available in print and internet format. • Develop an active vocabulary of selected medical terms.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	At the end of the course students will be able to: 1. Identify the basic structure of medical words, including prefixes, suffixes, roots, combining forms, and plurals. 2. Identify medical terminology as it relates to the anatomy and physiology of the human body. 3. Identify the rules of building medical terms and a connection between the term and its relationship to anatomy and physiology.
Indicative Contents مضمون المحتويات	The study of medical terminology introduces students to the language of medicine. Students will gain an understanding of basic elements, rules of building and analyzing medical words, and medical terms associated with the body as a whole. Utilizing a systems-approach, the student will define, interpret, and pronounce medical terms relating to structure and function, pathology, diagnosis, clinical procedures, oncology, and pharmacology. In addition to medical terms, common abbreviations applicable to each system will be interpreted.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Learning and teaching strategies in medical terminology aim to engage students in active learning, facilitate understanding of complex concepts, and develop critical
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thinking skills. Here are some common learning and teaching strategies employed in medical terminology courses:

1. Lectures: Lectures are often used to deliver foundational knowledge and concepts in physiology. They provide an overview of the topics, explain key principles, and highlight important details. Lectures may be supplemented with visual aids, such as slides or multimedia presentations, to enhance understanding.

4. Interactive Discussions: Interactive discussions, such as small group discussions or classroom debates, promote active learning and peer-to-peer interaction. They allow students to ask questions, clarify doubts, and engage in meaningful discussions about medical concepts.

6. Multimedia Resources: Incorporating multimedia resources, such as videos, animations, and interactive simulations, can enhance students' engagement and understanding medical terms.

7. Collaborative Learning: Collaborative learning activities, such as group projects or problem-solving tasks, encourage students to work together to solve terms problems or complete assignments. This fosters teamwork, communication, and the exchange of ideas, allowing students to learn from each other's perspectives and experiences.

8. Assessments: Assessments, such as quizzes, exams, and assignments, evaluate students' understanding and knowledge retention. They provide feedback on individual progress and help identify areas that require further review or clarification. Assessments may include multiple-choice questions, problem-solving tasks, or short essay questions.

9. Online Resources: Utilizing online resources, such as interactive tutorials, or online discussion forums, can provide additional learning opportunities outside of the classroom. These resources offer flexibility and accessibility, allowing students to review content at their own pace and seek additional support when needed.

10. Real-world Applications: Relating medical concepts to real-world applications, such as medical advancements, biotechnology, or environmental issues, can enhance students' motivation and understanding. Exploring the practical relevance of medical concepts helps students appreciate the significance of their learning and its impact in various fields.

These strategies aim to create an active and engaging learning environment that promotes understanding, critical thinking, and medical principles. The specific



strategies employed may vary based on the teaching style, course format, and resources available to the instructor.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	50	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3.33
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	25	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.67
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20%(20)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2,5,8,11	LO # 3, # 4 and #6, #7
	Projects	4	8%(8)	3,6,9,12	LO # 3, # 4 and #6, #7





	Report	1	4%(4)	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	1. Introduction – Basic Elements of a Medical Word
Week 2	2. Suffixes: Surgical, Diagnostic, Pathological, Grammatical and Plural
Week 3	3. Prefixes
Week 4	4. Body Structure
Week 5	5. Integumentary System
Week 6	6. Gastrointestinal (Digestive) System
Week 7	7. Respiratory System
Week 8	8. Cardiovascular System
Week 9	9. Blood and Lymphatic System
Week 10	10. Musculoskeletal System
Week 11	11. Urinary System





Week 12	12. Female Reproductive System
Week 13	13. Male Reproductive System
Week 14	14. Endocrine System
Week 15	15. Nervous System
Week 16	16. Special Senses

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Medical Terminology: A Short Course by Davi-Ellen Chabner (Elsevier)	Yes
Recommended Texts	Exploring Medical Language: A Student-Directed Approach by Myrna LaFleur Brooks and Danielle LaFleur Brooks (Elsevier)	Yes
Websites	MedlinePlus (Medical Words Section) managed by the U.S. National Library of Medicine	

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	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	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.

MODULE DESCRIPTION FORM

Module Information		
معلومات المادة الدراسية		
Module Title	Physics of Diagnostic Radiology	Module Delivery
Module Type	C	☒ Theory
Module Code	MPH31032	☐ Lecture
ECTS Credits	5	☒ Lab
SWL (hr/sem)	125	☒ Tutorial
		☐ Practical
		☒ Seminar





Module Level	3	Semester of Delivery	5
Administering Department	MPH	College	Science
Module Leader	Dr. Wissam Abdulla Lateef	e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	Ph.D. Physics
Module Tutor	Name (if available)	e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	1 / 9 /2025	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

Module Objectives أهداف المادة الدراسية	he objectives of a module on the Physics of Diagnostic Radiology generally aim to provide students with a solid understanding of the principles underlying the physical mechanisms and technologies used in diagnostic imaging. Here's a typical breakdown of module objectives: 1. Fundamental Concepts
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	Understand the basic principles of radiation physics, including the nature and properties of X-rays and other forms of ionizing radiation. Learn about the interaction of radiation with matter and its relevance to diagnostic imaging. Grasp the concept of radiation units (e.g., exposure, dose) and their measurement. 2. X-Ray Imaging Technology Explain the construction and functioning of X-ray tubes and generators. Understand the principles of image formation in conventional radiography and fluoroscopy. Discuss the factors affecting image quality, such as contrast, resolution, and noise. 3. Image Acquisition and Processing Learn about the different types of image receptors used in radiology, including film, digital detectors, and computed radiography. Understand the principles of digital image acquisition, processing, and storage. Explore the techniques used for image enhancement and post-processing. 4. Advanced Imaging Modalities Understand the physical principles behind advanced imaging modalities, such as computed tomography (CT), magnetic resonance imaging (MRI), and ultrasound. Learn how these modalities are used in clinical practice and their advantages and limitations. 5. Radiation Safety and Protection Learn the principles of radiation protection and safety for both patients and healthcare workers. Understand the concepts of dose reduction techniques and the ALARA (As Low As Reasonably Achievable) principle. Discuss regulations and guidelines governing radiation use in diagnostic radiology. 6. Quality Control and Assurance
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	Understand the importance of quality control in diagnostic imaging equipment and procedures. Learn about the methods used for routine quality assurance checks and performance evaluations. Explore strategies for maintaining image quality while minimizing radiation exposure. 7. Clinical Applications Discuss the application of diagnostic radiology in various medical fields, including oncology, cardiology, and emergency medicine. Understand the role of diagnostic radiology in disease diagnosis, treatment planning, and follow-up. 8. Emerging Technologies and Trends Learn about current trends and emerging technologies in diagnostic radiology, such as artificial intelligence and machine learning applications in imaging. Explore the future directions of diagnostic imaging technologies and their potential impact on healthcare.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Knowledge and Understanding Understanding Radiation Physics: Demonstrate a clear understanding of the fundamental principles of radiation physics, including the production and interaction of X-rays and other ionizing radiation. Comprehension of Imaging Technologies: Explain the construction, function, and operating principles of diagnostic radiology equipment, including X-ray tubes, detectors, and image processing systems. Advanced Imaging Modalities:





Critically evaluate the physical principles underlying advanced imaging techniques such as CT, MRI, and ultrasound, and their clinical applications.

Intellectual Skills

Image Quality and Analysis:

Assess the factors that influence image quality, including contrast, resolution, and noise, and apply this knowledge to optimize diagnostic imaging procedures.

Critical Thinking:

Analyze and compare different diagnostic imaging modalities, recognizing their strengths, limitations, and appropriate clinical applications.

Radiation Protection and Safety:

Apply the principles of radiation safety and protection, including dose reduction techniques, to minimize radiation exposure to patients and healthcare workers.

Practical Skills

Operation of Imaging Equipment:

Demonstrate the ability to operate diagnostic imaging equipment and implement quality control measures to ensure optimal image quality and safety.

Quality Control Procedures:

Conduct routine quality assurance tests on radiology equipment and interpret the results to maintain high standards of diagnostic imaging.

Transferable Skills

Problem-Solving in Diagnostic Imaging:





	Apply knowledge of diagnostic radiology physics to troubleshoot issues related to imaging quality and safety in clinical practice. Effective Communication: Communicate effectively with healthcare professionals about imaging results, radiation safety practices, and equipment performance in a clear and concise manner. Lifelong Learning: Demonstrate the ability to stay informed about new developments in diagnostic imaging technologies and incorporate evidence-based practices into clinical work.
Indicative Contents المحتويات الإرشادية	1. Introduction to Diagnostic Radiology Overview of diagnostic radiology and its role in modern medicine. Historical development of radiology and key milestones in imaging technology. 2. Basic Radiation Physics Nature and properties of ionizing radiation. Production of X-rays and the principles of X-ray generation. Interaction of radiation with matter (e.g., photoelectric effect, Compton scattering, pair production). 3. X-Ray Tube and Generator Technology Components of an X-ray tube (e.g., cathode, anode, filament). Operation of X-ray generators (single-phase, high-frequency). Heat production and dissipation in X-ray tubes. Factors affecting X-ray beam quality (kVp, mAs) and filtration. 4. Image Formation and Receptors Principles of image formation in radiography and fluoroscopy. Characteristics of image receptors: film, computed radiography (CR), digital radiography (DR).





	Detector types: scintillators, photostimulable phosphors, flat-panel detectors. Concepts of exposure, contrast, resolution, and noise. 5. Advanced Imaging Modalities Computed Tomography (CT) Spiral and helical CT, multi-slice technology. CT detectors and image reconstruction techniques. Magnetic Resonance Imaging (MRI) Basic physics of MRI: magnetic fields, radiofrequency pulses, and relaxation times. T1, T2, and proton density-weighted imaging. Ultrasound Principles of ultrasound wave generation and propagation. Image formation and Doppler imaging. Nuclear Medicine and PET Basic principles of radioisotope imaging. Physics of positron emission tomography (PET). 6. Image Processing and Digital Imaging Digital imaging basics: pixel, voxel, and matrix concepts. Image processing techniques: windowing, filtering, edge enhancement, and noise reduction. PACS (Picture Archiving and Communication System) and DICOM standards for image storage and communication. 7. Radiation Dosimetry and Units Measurement of radiation dose: exposure, absorbed dose, equivalent dose, and effective dose. Dose units: Gray (Gy), Sievert (Sv), and Becquerel (Bq). Dosimeters and methods of dose measurement.
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	8. Radiation Protection and Safety
	Biological effects of ionizing radiation: deterministic and stochastic effects.
	Principles of radiation protection: time, distance, and shielding.
	Regulatory guidelines and legislation (e.g., ICRP, NCRP recommendations).
	ALARA principle and dose limits for patients and radiology personnel.
	9. Quality Control in Diagnostic Radiology
	Importance of quality assurance in imaging departments.
	Routine tests and checks for radiology equipment (e.g., calibration, beam alignment, image receptor tests).
	Standards and protocols for ensuring consistent image quality and safety.
	10. Emerging Technologies in Diagnostic Radiology
	Current trends in radiology, including AI and machine learning applications in diagnostic imaging.
	Hybrid imaging techniques (e.g., PET-CT, SPECT-CT).
	Innovations in low-dose imaging and dose reduction technologies.
	11. Clinical Applications and Case Studies
	Application of diagnostic radiology in various clinical specialties: oncology, orthopedics, cardiology, and emergency medicine.
	Case studies illustrating the use of different imaging modalities in diagnosis and treatment planning.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials
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and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.33
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	16%(16)	4,7,10,13	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	3, 6, 9, 12	LO # 3,# 4 and #6,#7
	Projects / Lab.	7	14%(14)	Continuous	All
	Report	1	2%(2)	13	LO # 5,# 8 and #10
	Midterm Exam	2hr	10%(10)	7	LO # 1,# 7





Summative assessment	Final Exam	3hr	50%(50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Diagnostic Radiology Overview of the course, learning objectives, and assessment methods. History and evolution of diagnostic radiology. Basic overview of diagnostic imaging modalities.
Week 2	Fundamentals of Radiation Physics Nature and properties of ionizing radiation. Production of X-rays and the operation of X-ray tubes. Interaction of radiation with matter (photoelectric effect, Compton scattering).
Week 3	X-Ray Generation and Imaging Technology Detailed study of X-ray tubes and generators. Factors affecting X-ray beam quality (kVp, mAs, filtration). Image formation in radiography and fluoroscopy.
Week 4	Image Receptors and Digital Radiography Types of image receptors: film, computed radiography (CR), digital radiography (DR). Digital detectors: flat-panel detectors, photostimulable phosphors.





	Concepts of exposure, contrast, and resolution in imaging.
Week 5	Computed Tomography (CT) Principles Physics of CT scanning: spiral, helical, and multi-slice CT. Image acquisition and reconstruction techniques. Dose considerations in CT imaging.
Week 6	Mid exam
Week 7	Magnetic Resonance Imaging (MRI) Principles Basic physics of MRI: magnetic fields, radiofrequency pulses, and relaxation times. Image formation in MRI: T1, T2, and proton density-weighted images. Safety considerations in MRI (e.g., magnetic field hazards).
Week 8	Ultrasound and Nuclear Medicine Imaging Principles of ultrasound: wave propagation, reflection, and Doppler imaging. Overview of nuclear medicine: radioisotope imaging and PET. Clinical applications of ultrasound and nuclear medicine.
Week 9	Radiation Dosimetry and Units Concepts of radiation dose: exposure, absorbed dose, equivalent dose, and effective dose. Units of radiation measurement: Gray (Gy), Sievert (Sv), and Becquerel (Bq).
Week 10	Radiation Protection and Safety Biological effects of ionizing radiation: deterministic and stochastic effects. Principles of radiation protection: time, distance, and shielding. Regulatory guidelines and the ALARA principle (As Low As Reasonably Achievable).
Week 11	Quality Control in Diagnostic Radiology Importance of quality control and assurance in radiology departments. Routine tests for radiology equipment: calibration, beam alignment, image receptor checks.





	Ensuring consistent image quality and safety.
Week 12	Clinical Applications and Case Studies Application of diagnostic radiology in various clinical specialties. Case studies demonstrating the use of different imaging modalities. Discussion on integrating theoretical knowledge with clinical practice.
Week 13	Review and Consolidation Recap of key concepts and topics covered throughout the course. Addressing any gaps in understanding or clarifying complex topics. Preparation for assessments and exams.
Week 14	Advanced Imaging Modalities and Hybrid Techniques Overview of hybrid imaging techniques: PET-CT, SPECT-CT. Current trends in radiology, including AI and machine learning applications.
Week 15	Assessment and Evaluation Final exam or project presentations. Feedback and reflection on the course. Discussion on future directions in the field of diagnostic radiology.
Week 16	Final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Determination of X-Ray Tube Half-Value Layer (HVL) and Beam Quality
Week 2	Evaluation of Focal Spot Size Using a Pinhole Camera or Star Test Pattern.





Week 3	Measurement of Kilovolt Peak (kVp) and Exposure Timer Accuracy
Week 4	Scatter Radiation and Grid Efficiency in Radiography
Week 5	Contrast-Detail Analysis and Image Quality Evaluation in Digital Radiography
Week 6	Computed Tomography (CT) Number Accuracy, Noise, and Uniformity
Week 7	Radiation Protection, Leakage Radiation, and Half-Value Layer of Protective Barriers

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<i>The Essential Physics of Medical Imaging</i> (4th Edition, by Jerrold T. Bushberg, J. Anthony Seibert, John M. Boone, and Edwin M. Leidholdt Jr. (Wolters Kluwer)	Yes
Recommended Texts	<i>Physics for Diagnostic Radiology</i> (3rd Edition), by Philip Palin Dendy and Brian Heaton (CRC Press)	Yes
Websites	AEA Human Health Campus (Medical Physics Education & Training) International Atomic Energy Agency (IAEA) Portal humanhealth.iaea.org	

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	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	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.

MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	Laser Basics		Module Delivery
Module Type	Core		☒ Theory ☐ Lecture ☒ lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	MPH31033		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	3	Semester of Delivery	5
Administering Department	MPH	College	sciences – Hee
Module Leader	Dr.Mustafa kamel Jassim		e-mail





Module Leader's Acad. Title		Ass. P..	Module Leader's Qualification		Ph.D. Physics
Module Tutor	Name (if available)		e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		1/ 9 /2025	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

Module Objectives أهداف المادة الدراسية	- This course deals with the basic concept of laser physics. - To develop problem solving skills that dealing with the work of laser. - To understand how the principles of physics are applied within the laser - Develop a physical explanation of laser.
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	10. Clarifying the relationship between the laser and its applications and different fields of medicine.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 14. Explain the meaning of laser. 15. Explain the atomic structure of human body. 16. Discuss the major principles of laser. 17. Describe the laser types. 18. Define the fundamentals of laser. 19. Discuss the effect of laser on molecules inside body. 20. Discuss the relation between laser and the work of some medical devices. 21. Discuss the examples of laser interactions with human body. 22. Define some of laser applications in medicine.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Introduction of LASER</u> Properties of Light - What is LASER?- IMPORTANCE OF LASER.- What Do LASER Do?- CONCEPT OF UNIT - Fundamental and derived units in laser - SYSTEMS OF UNITS – Physical Quantities- Atomic Structure - Bonding between atoms .[15 hrs] Laser tissues Interaction– Laser Properties - Population of the atoms –Boltzman Equation. [15 hrs]





	Laser Resonator (Cavity) – Laser Gain - Laser Operation (Part 1) - Laser Operation (Part 2)- Laser Types – Laser Modes . [10 hrs]
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	25	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.67
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		





Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	16%(16)	4,7,10,13	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	3, 6, 9, 12	LO # 3,# 4 and #6,#7
	Projects / Lab.	7	14%(14)	Continuous	all
	Report	1	2%(2)	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	Introduction to Optics and Electromagnetic Waves
Week 2	Quantum Mechanics and Energy Levels
Week 3	Interaction of Light with Matter
Week 4	Principles of Laser Amplification
Week 5	Optical Resonators and Cavity Stability
Week 6	Beam Propagation and Gaussian Beams





Week 7	Mid Ex..
Week 8	Continuous Wave (CW) Operation and Output Power
Week 9	Pulsed Laser Operation: Q-Switching
Week 10	Pulsed Laser Operation: Mode-Locking
Week 11	Solid-State and Semiconductor Lasers
Week 12	Gas, Liquid, and Metal Vapor Lasers
Week 13	Nonlinear Optics and Frequency Conversion
Week 14	Industrial, Medical, and Scientific Applications
Week 15	Laser Safety and Standards
Week 16	Final Ex.

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Geometrical Optics and Gaussian Beam Profiling
Week 2	Laser Cavity Alignment and Transverse Modes
Week 3	Polarization States of Laser Light
Week 4	Semiconductor Diode Laser Characteristics
Week 5	Fiber Optic Coupling and Numerical Aperture
Week 6	Optical Power, Energy, and Attenuation (Beer-Lambert Law)
Week 7	Laser Safety, Hazard Evaluation, and Beam Power Density

Learning and Teaching Resources





مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Laser Fundamentals" by William T. Silfvast (Cambridge University Press)	Yes
Recommended Texts	"Lasers: Fundamentals and Applications" by K. Thyagarajan and Ajoy Ghatak (Springer)	
Websites	RP Photonics Encyclopedia (www.rp-photonics.com/encyclopedia.html)	

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.





MODULE DESCRIPTION FORM

Module Information				
معلومات المادة الدراسية				
Module Title	Medical genetics		Module Delivery	
Module Type	E		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	MPH 31034			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	3	Semester of Delivery		5
Administering Department	MPH	College	Sciences	
Module Leader	Dr. Labeeb Ahmad Kadum		e-mail	
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.	
Module Tutor	N/A		e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail	
Scientific Committee Approval Date	1 / 9 /2025	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

Module Objectives أهداف المادة الدراسية	• Understand Fundamental Principles: To provide a comprehensive foundation in human genetics, focusing on the molecular and cellular mechanisms of inheritance. • Explore Genetic Disorders: To examine the etiology, pathophysiology, and clinical presentation of single-gene, chromosomal, and multifactorial genetic diseases. • Develop Diagnostic Literacy: To introduce contemporary diagnostic techniques, molecular testing methods, and cytogenetic analyses used in clinical and laboratory settings. • Appraise Ethical & Clinical Implications: To evaluate the ethical, legal, and social implications (ELSI) of genetic testing, personalized medicine, and emerging genomic technologies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, successful students will be able to: • Explain the structure and function of the human genome, including gene expression, regulation, and patterns of inheritance (mendelian and non-mendelian). • Analyze pedigrees to determine modes of inheritance for various genetic conditions. • Describe the molecular mechanisms underlying chromosomal aberrations, mutations, and repair deficiencies.





	• Evaluate various diagnostic modalities (e.g., PCR, sequencing, karyotyping, FISH) and determine their clinical applications. • Discuss the genetic basis of complex common disorders (such as cardiovascular diseases and cancers) and the principles of gene therapy and pharmacogenomics.
Indicative Contents المحتويات الإرشادية	• Introduction to Human Molecular Genetics: • Genome organization, DNA replication, transcription, and translation. • Mutations, types of DNA damage, and cellular repair mechanisms. • Patterns of Inheritance: • Mendelian inheritance (Autosomal dominant/recessive, X-linked). • Non-Mendelian inheritance (Mitochondrial inheritance, genomic imprinting, trinucleotide repeat disorders). • Cytogenetics and Chromosomal Disorders: • Normal human karyotype, chromosomal banding, and nomenclature. • Numerical and structural chromosomal abnormalities (e.g., Down syndrome, Turner syndrome, translocations). • Biochemical and Molecular Genetics: • Inborn errors of metabolism. • Molecular pathology of specific monogenic disorders (e.g., cystic fibrosis, sickle cell anemia, muscular dystrophies). • Genetics of Complex Diseases and Cancer: • Multifactorial inheritance and genome-wide association studies (GWAS). • Oncogenes, tumor suppressor genes, and the multi-step nature of carcinogenesis. • Clinical Diagnostics and Technologies: • Polymerase Chain Reaction (PCR), Sanger sequencing, and Next-Generation Sequencing (NGS).





	- Fluorescence In Situ Hybridization (FISH) and prenatal screening techniques. Genomics in Medicine: - Pharmacogenomics and personalized medicine. - Gene therapy and emerging genome-editing technologies (e.g., CRISPR-Cas9). - Ethical, legal, and social issues in medical genetics.
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	35	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	2.33
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	4.33





Total SWL (h/sem.)	100
الحمل الدراسي الكلي للطلاب	

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20%(20)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2,5,8,11	LO # 3, # 4 and #6, #7
	Projects	4	8%(8)	3,6,9,12	LO # 3, # 4 and #6, #7
	Report	1	4%(4)	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)	Total assessment	100% (100 Marks)

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Human Genetics & Genome Organization





Week 2	DNA Damage, Mutations, and Repair Mechanisms
Week 3	Mendelian Patterns of Inheritance
Week 4	Non-Mendelian and Complex Inheritance
Week 5	Cytogenetics: Chromosomal Structure and Normal Karyotyping
Week 6	Numerical and Structural Chromosomal Aberrations
Week 7	Midterm Exam
Week 8	Biochemical Genetics and Inborn Errors of Metabolism
Week 9	Midterm Examination and Review
Week 10	Molecular Pathology of Single-Gene Disorders
Week 11	Genetics of Common Multifactorial Diseases
Week 12	Cancer Genetics: Oncogenes and Tumor Suppressor Genes
Week 13	Clinical Diagnostics and Molecular Testing Technologies
Week 14	Next-Generation Sequencing (NGS) and Genomic Medicine
Week 15	Pharmacogenomics, Gene Therapy, and Bioethics
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
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Required Texts	Thompson & Thompson Genetics and Genomics in Medicine (9th Edition) by Ronald Cohn, Stephen Scherer, and Ada Hamosh.	Yes
Recommended Texts	Essential Medical Genetics (6th Edition) by Edward S. Tobias, Michael Connor, and Malcolm Ferguson-Smith.	No
Websites	Online Mendelian Inheritance in Man (OMIM) — omim.org : An authoritative and continuously updated catalog of human genes and genetic disorders.	

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.

Semester Six





MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	Medical Physics II		Module Delivery
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar
Module Code	MPH 32135		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	3	Semester of Delivery	6
Administering Department	MPH	College	Sciences
Module Leader	Dr. Wissam Abdul Lateef		e-mail
Module Leader's Acad. Title	Lect.	Module Leader's Qualification	Ph.D. Physics
Module Tutor	N/A		e-mail E-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	1 / 9 /2025	Version Number	1.0

Relation with other Modules





العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MPH 31028	Semester	5
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	5. Develop basic understanding of medical physics concepts, 6. Develop problem-solving and critical-thinking skills, 7. Learn to integrate and apply various physics concepts to a single problem, 8. Develop scientific communication skills
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the course, students will be expected to be able to... 1– Describe an imaging system and break it down into its components and physical principles for each of the imaging modalities covered (x-ray, CT, NM, US, MRI). 2– Identify the key factors that affect image quality and address these factors for the different imaging modalities. 3– Learn to communicate the physical principles behind medical technology, radiation safety, and relevant applications
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم



Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.
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Student Workload (SWL)			
الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل	80	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا	5.33
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	45	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا	3.0
Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل	125		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11



	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3,# 4 and #6,#7
	Projects / Lab.	1	14%(14)	Continuou s	All
	Report	1	2%(2)	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	Introduction to Medical Physics II – overview of imaging and radiation applications
Week 2	Electromagnetic Waves – spectrum, properties, and medical uses
Week 3	X-rays – production, properties, and interaction with matter
Week 4	X-ray Imaging Systems – radiography, fluoroscopy
Week 5	Computed Tomography (CT) – principles and image reconstruction
Week 6	Nuclear Medicine – radionuclides, gamma cameras
Week 7	Midterm Exam
Week 8	Magnetic Resonance Imaging (MRI) – physics and instrumentation
Week 9	Ultrasound Imaging – generation, detection, Doppler effect





Week 10	Radiation Physics I – interaction of radiation with matter
Week 11	Radiation Physics II – dosimetry, units, and measurements
Week 12	Radiation Protection – ALARA principle, shielding
Week 13	Radiotherapy Physics I – external beam therapy
Week 14	Radiotherapy Physics II – brachytherapy and planning
Week 15	Preparatory week before the final Exam
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Inverse Square Law and Radiation Attenuation
Week 2	Characteristics and Calibration of a Geiger-Müller (GM) Counter
Week 3	Acoustic Impedance and Ultrasound Velocity Measurement
Week 4	Half-Value Layer (HVL) Determination in Diagnostic X-Ray Beams
Week 5	Laser Beam Profile and Divergence Measurement
Week 6	Bioelectric Potentials: Electrocardiography (ECG) Lead Placement and Waveform Analysis
Week 7	Magnetic Resonance (NMR/MRI) Relaxation Time Constants (T_1 and T_2)

Learning and Teaching Resources





مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	<i>Medical Imaging Physics</i> , by W.R. Hendee and E.R. Ritenour, ISBN 0471382264; available in The Book Store at Western (www.bookstore.uwo.ca)	Yes
Recommended Texts	<i>Physics of Radiology</i>, A.B. Wolbarst, ISBN 0838557694, UWO Library.	Yes
Websites	https://link.springer.com/book/10.1007/978-3-319-61540-0 https://onlinelibrary.wiley.com/doi/book/10.1002/0471221155	

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.





MODULE DESCRIPTION FORM

Module Information			
معلومات المادة الدراسية			
Module Title	Anatomy II		Module Delivery
Module Type	Basic		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar
Module Code	MPH 32136		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	3	Semester of Delivery	6
Administering Department	MPH	College	
Module Leader	Dr. Sara habeeb Abdulhussain		e-mail
Module Leader's Acad. Title	Lect.	Module Leader's Qualification	Ph.D. Medicine
Module Tutor	Name (if available)		e-mail E-mail
Peer Reviewer Name	Name		e-mail E-mail
Scientific Committee Approval Date	1 / 9 /2025	Version Number	1.0

Relation with other Modules





العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MPH 31029	Semester	5
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	• Understanding Basic Anatomical Concepts: This includes learning fundamental anatomical terminology, body planes, directional terms, and anatomical positions. • Knowledge of Human Body Systems: Understanding the structure and function of the major organ systems of the human body, such as the skeletal, muscular, cardiovascular, respiratory, digestive, nervous, endocrine, and reproductive systems. • Identification of Anatomical Structures: Being able to identify and locate key anatomical structures within the human body, including bones, muscles, organs, nerves, blood vessels, and other tissues. • Relationships between Structures: Understanding the spatial relationships between anatomical structures and how they relate to each other within the body. • Clinical Relevance: Recognizing the clinical significance of anatomical structures and how anatomical knowledge applies to medical practices, surgical procedures, and diagnostic imaging. • Integration with Other Disciplines: Integrating anatomical knowledge with other disciplines such as physiology, pathology, radiology, and clinical medicine.
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	• Communication Skills: Effectively communicating anatomical information through written, oral, and visual means, including the use of anatomical terminology and anatomical illustrations. • Ethical and Professional Considerations: Understanding the ethical principles and professional responsibilities related to the study and practice of anatomy, including respect for human cadavers and patients' rights to privacy and informed consent.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	15. Demonstrate Proficiency in Anatomical Terminology: Students will be able to accurately describe and identify anatomical structures using appropriate terminology. 16. Identify Major Organs and Systems: Students will be able to identify and describe the structure and function of major organs and systems within the human body. 17. Locate Anatomical Structures: Students will be able to locate and identify key anatomical structures within the body using various reference points. 18. Describe Relationships between Anatomical Structures: Students will understand the spatial relationships between anatomical structures and their functional significance. 19. Analyze Anatomical Variations: Students will be able to recognize and analyze normal anatomical variations among individuals and their clinical implications. 20. Interpret Anatomical Images: Students will develop the skills to interpret anatomical images, including radiographs, CT scans, MRIs, and histological slides. 21. Apply Anatomical Knowledge in Clinical Scenarios: Students will be able to apply their anatomical knowledge to analyze clinical cases and propose appropriate diagnostic or therapeutic interventions.





	22. Understand Embryological Development: Students will understand the basic principles of embryological development and the formation of major organ systems. 23. Demonstrate Histological Understanding: Students will be able to describe the microscopic structure of tissues and organs and understand how it relates to their function. 24. Integrate Anatomy with Physiology: Students will understand the relationship between anatomy and physiology and how anatomical structures contribute to physiological processes. 25. Communicate Anatomical Concepts: Students will effectively communicate anatomical information through written, oral, and visual presentations. 26. Apply Ethical Principles: Students will understand the ethical considerations involved in the study and practice of anatomy, including respect for human cadavers and patient confidentiality. 27. Demonstrate Critical Thinking Skills: Students will develop critical thinking skills to analyze complex anatomical problems and propose reasoned solutions. 28. Prepare for Further Study or Professional Practice: Students will be prepared to apply their anatomical knowledge in further study or professional practice in fields such as medicine, allied health, research, or education.
Indicative Contents المحتويات الإرشادية	Introduction to Anatomy • Definition and scope of anatomy • Historical perspectives • Importance and relevance of studying anatomy Anatomical Terminology • Basic anatomical terms and concepts





- Anatomical planes and directions
- Body cavities and regions

Histology

- Study of basic tissues (epithelial, connective, muscular, nervous)
- Microscopic anatomy of organs and tissues

Skeletal System

- Bones of the human body
- Axial skeleton (skull, vertebral column, rib cage)
- Appendicular skeleton (limbs, girdles)

Muscular System

- Types of muscles (skeletal, smooth, cardiac)
- Muscles of the human body
- Muscle tissue structure and function

Cardiovascular System

- Heart anatomy and physiology
- Blood vessels (arteries, veins, capillaries)
- Circulatory pathways

Respiratory System

- Anatomy of the respiratory tract
- Mechanics of breathing
- Gas exchange in the lungs

Digestive System



- Anatomy of the digestive tract
- Digestive glands and their functions
- Processes of digestion and absorption

Nervous System

- Central nervous system (brain, spinal cord)
- Peripheral nervous system (nerves, ganglia)
- Structure and function of neurons

Endocrine System

- Endocrine glands and their hormones
- Regulation of hormone secretion
- Functions of major hormones

Urinary System

- Anatomy of the urinary tract
- Kidney structure and function
- Urine formation and excretion

Reproductive System

- Male reproductive anatomy and physiology
- Female reproductive anatomy and physiology
- Reproductive processes and gametogenesis

Special Senses

- Anatomy of the eye, ear, and other sensory organs
- Physiology of vision, hearing, and balance



	Embryology • Basic embryological concepts • Development of major organ systems • Common developmental anomalies Clinical Anatomy • Anatomical basis of common medical procedures • Clinical imaging techniques (X-ray, CT, MRI) • Surgical anatomy and approaches Anatomical Variations and Anomalies • Normal anatomical variations among individuals • Congenital anomalies and their implications Integration with Other Disciplines • Relationship between anatomy and physiology • Connections to pathology, radiology, and clinical medicine Ethical Considerations • Respect for human cadavers and anatomical specimens • Patient confidentiality and privacy
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	
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	- Utilize active learning methods like group discussions and hands-on activities to engage students in understanding anatomical concepts. - Incorporate visualization tools such as anatomical models and multimedia resources to aid in comprehension. - Implement peer teaching and clinical case studies to reinforce learning and demonstrate real-world applications. - Provide structured lectures, laboratory sessions, and feedback mechanisms to support student learning and mastery of anatomy.
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Student Workload (SWL)			
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	65	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.33
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	35	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.33
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation				
تقييم المادة الدراسية				
	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome



Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects / Lab.	1	14%(14)	Continuou s	all
	Report	1	2%(2)	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	Digestive System I – overview, mouth, pharynx, esophagus
Week 2	Digestive System II – stomach, small intestine, large intestine
Week 3	Digestive System III – accessory organs (liver, pancreas, gallbladder)
Week 4	Urinary System I – kidneys and nephron structure
Week 5	Urinary System II – ureters, bladder, urethra
Week 6	Endocrine System I – major glands and hormones
Week 7	Endocrine System II – hypothalamus-pituitary axis





Week 8	Mid term
Week 9	Reproductive System I – male anatomy
Week 10	Reproductive System II – female anatomy
Week 11	Lymphatic System – organs, vessels, and lymph nodes
Week 12	Special Senses I – eye anatomy
Week 13	Special Senses II – ear anatomy
Week 14	Integumentary System – skin, hair, nails
Week 15	Review & Integration of Systems Covered
Week 16	Final Examination Preparation Practice exams Final examination

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to Muscular System Overview of muscle types and functions Introduction to muscle tissue structure
Week 2	Upper Limb Muscles Identification and dissection of muscles of the shoulder and arm Understanding muscle attachments and actions in upper limb movements
Week 3	Lower Limb Muscles Identification and dissection of muscles of the hip and thigh





	Understanding muscle attachments and actions in lower limb movements
Week 4	Trunk Muscles Identification and dissection of muscles of the abdomen and back Understanding muscle attachments and actions in trunk movements and posture
Week 5	Head and Neck Muscles Identification and dissection of muscles of the head and neck Understanding muscle attachments and actions in facial expressions and head movements
Week 6	Muscle Function and Clinical Correlation Review of muscle functions and movements Clinical case studies related to muscular system disorders and injuries
Week 7	Laboratory Exam and Review Practical examination covering muscle identification and functions Review session to reinforce key concepts and prepare for assessments

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Gray's Anatomy for Students" by Richard Drake, A. Wayne Vogl, and Adam W.M. Mitchell.	Yes
Recommended Texts	Atlas of Human Anatomy" by Frank H. Netter.	-
Websites	Kenhub offers a comprehensive online platform featuring interactive anatomy tutorials, quizzes, and videos.	





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.

MODULE DESCRIPTION FORM





Module Information			
معلومات المادة الدراسية			
Module Title	Biochemistry		Module Delivery
Module Type	Basic		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar
Module Code	MPH32037		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	3	Semester of Delivery	
Administering Department	MPH	College	Sciences
Module Leader	Dr. Hamza Yassin Essa.		e-mail
Module Leader's Acad. Title	Lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	N/A		e-mail
Peer Reviewer Name	Name	e-mail	E-mail
Scientific Committee Approval Date	1 / 9 /2025	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

Module Objectives أهداف المادة الدراسية	The module objectives of Basic Biochemistry 1 may vary depending on the specific course or educational institution. However, here are some common objectives that are typically covered in a Basic Biochemistry 1 module: 1. Introduction to Biochemistry: Understand the scope, importance, and basic principles of biochemistry as a scientific discipline. 2. Structure and Function of Biomolecules: Explore the structure, properties, and functions of biomolecules, including proteins, carbohydrates, lipids, and nucleic acids. 3. Protein Structure and Function: Learn about the primary, secondary, tertiary, and quaternary structure of proteins and the relationship between structure and function. Understand protein folding, enzymes, and enzyme kinetics. 4. Enzymes. 5. Hormones. 6. Vitamins and Minerals. These objectives provide a broad overview of the topics typically covered in a Basic Biochemistry 1 module, but the specific content and emphasis may vary from course to course.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The outcomes of this modules are to have ability to understand the following subject: 1. Protein Structure and Function: Learn about the primary, secondary, tertiary, and quaternary structure of proteins and the relationship between structure and function. Understand protein folding, enzymes, and enzyme kinetics. 2. Carbohydrate Metabolism: Study the metabolism of carbohydrates, including glycolysis, gluconeogenesis, glycogen metabolism, and the regulation of blood sugar levels. 3. Lipid Metabolism: Explore the metabolism of lipids, including fatty acid



	oxidation, lipogenesis, cholesterol metabolism, and the role of lipids in cellular membranes. 4. Nucleic Acids and DNA Replication: Understand the structure and function of nucleic acids, including DNA and RNA. Learn about DNA replication, transcription, and translation. 5. Bioenergetics and Metabolism: Gain an understanding of the principles of bioenergetics and the metabolism of major biomolecules. Learn about ATP production, oxidative phosphorylation, and the regulation of metabolism. 6. Integration of Metabolic Pathways: Study the integration and coordination of different metabolic pathways in the cell. Understand how cells regulate metabolic processes to maintain homeostasis. 7. Techniques in Biochemistry: Familiarize yourself with common laboratory techniques used in biochemistry, such as chromatography, electrophoresis, spectrophotometry, and molecular biology techniques. 8. Biochemical Techniques and Applications: Learn about the applications of biochemistry in various fields, including medicine, biotechnology, pharmacology, and environmental science.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: The indicative contents of Basic Biochemistry may vary depending on the specific course or educational institution. However, here are some common topics and areas of study that are typically covered in a Basic Biochemistry course: 1. Introduction to Biochemistry: - Definition and scope of biochemistry - Historical overview of biochemistry - Importance and applications of biochemistry





	2. Biomolecules: - Structure, properties, and functions of proteins - Structure, properties, and functions of carbohydrates - Structure, properties, and functions of lipids - Structure, properties, and functions of nucleic acids 3. Protein Structure and Function: - Primary, secondary, tertiary, and quaternary structure of proteins - Protein folding and stability - Enzymes and enzyme kinetics - Regulation of enzyme activity 4. Carbohydrate classifications and reactions: 5. Enzymes 6. Hormones: 7. Vitamins and Minerals
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Learning and teaching strategies in Basic Biochemistry aim to engage students in active learning, facilitate understanding of complex concepts, and develop critical thinking
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skills. Here are some common learning and teaching strategies employed in Basic Biochemistry courses:

1. Lectures: Lectures are often used to deliver foundational knowledge and concepts in biochemistry. They provide an overview of the topics, explain key principles, and highlight important details. Lectures may be supplemented with visual aids, such as slides or multimedia presentations, to enhance understanding.
2. Laboratory Work: Laboratory sessions allow students to apply theoretical knowledge to practical situations. They provide hands-on experience with biochemical techniques, data collection, analysis, and interpretation. Lab work may involve experiments related to biomolecule analysis, enzyme kinetics, or metabolic pathways.
3. Problem-solving Exercises: Problem-solving exercises and case studies help students apply their knowledge to real-life scenarios. They encourage critical thinking and problem-solving skills by presenting biochemical problems or experimental data for analysis and interpretation. Students may work individually or in groups to find solutions and explain their reasoning.
4. Interactive Discussions: Interactive discussions, such as small group discussions or classroom debates, promote active learning and peer-to-peer interaction. They allow students to ask questions, clarify doubts, and engage in meaningful discussions about biochemical concepts, experiments, or applications.
5. Concept Mapping: Concept mapping is a visual learning tool that helps students organize and connect different biochemical concepts. It involves creating diagrams or mind maps that illustrate the relationships between different biomolecules, metabolic pathways, or cellular processes. Concept maps can aid in understanding the "big picture" and identifying the interconnections within biochemistry.



6. Multimedia Resources: Incorporating multimedia resources, such as videos, animations, and interactive simulations, can enhance students' engagement and understanding of complex biochemical processes. These resources can visually illustrate molecular structures, enzyme kinetics, or cellular processes, making them more accessible and memorable.

7. Collaborative Learning: Collaborative learning activities, such as group projects or problem-solving tasks, encourage students to work together to solve biochemical problems or complete assignments. This fosters teamwork, communication, and the exchange of ideas, allowing students to learn from each other's perspectives and experiences.

8. Assessments: Assessments, such as quizzes, exams, and assignments, evaluate students' understanding and knowledge retention. They provide feedback on individual progress and help identify areas that require further review or clarification. Assessments may include multiple-choice questions, problem-solving tasks, or short essay questions.

9. Online Resources: Utilizing online resources, such as virtual labs, interactive tutorials, or online discussion forums, can provide additional learning opportunities outside of the classroom. These resources offer flexibility and accessibility, allowing students to review content at their own pace and seek additional support when needed.

10. Real-world Applications: Relating biochemistry concepts to real-world applications, such as medical advancements, biotechnology, or environmental issues, can enhance students' motivation and understanding. Exploring the practical relevance of biochemistry concepts helps students appreciate the significance of their learning and its impact in various fields.





	These strategies aim to create an active and engaging learning environment that promotes understanding, critical thinking, and application of biochemistry principles. The specific strategies employed may vary based on the teaching style, course format, and resources available to the instructor.
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Student Workload (SWL)			
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	65	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	4.33
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	35	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	2.33
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	100		

Module Evaluation					
تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects / Lab.	1	14%(14)	Continuous	all





	Report	1	2%(2)	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)	Total assessment	100% (100 Marks)

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to biochemistry and living cells
Week 2	Carbohydrates classification and reactions
Week 3	Mono-Carbohydrates
Week 4	di- Carbohydrates
Week 5	Poly- Carbohydrates
Week 6	Amino acids
Week 7	Proteins and peptides
Week 8	Mid term
Week 9	Enzymes
Week 10	Lipids
Week 11	Fatty acids





Week 12	Nucleic acids DNA and RNA
Week 13	Hormones
Week 14	Vitamins
Week 15	Minerals and trace elements
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Buffer and solutions preparations
Week 2	Molish test, Fehling test
Week 3	Benedict test, Benedict test
Week 4	Iodine test and Unknown test, Ninhydrin test and Xanthoproteic test
Week 5	Sakaguchi test, Milon test, Protein test
Week 6	Solubility test of lipids, Saponification test.
Week 7	Acrolein test, Enzymes test

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Biochemistry books: Harper. Lippincott Color atlas of biochemistry	Available Online
Recommended Texts	Color atlas of biochemistry	No





Websites	Any website
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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.				

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية
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Module Title	Physics of Nuclear Medicine			Module Delivery	
Module Type	Core			☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	MPH32038				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		3	Semester of Delivery		6
Administering Department		MPH	College	Sciences	
Module Leader	Dr. Jamal K. Sadi		e-mail	jamal.kadhom@mauc.edu.iq	
Module Leader’s Acad. Title		Lecturer	Module Leader’s Qualification		Ph.D. Physics
Module Tutor	N/A		e-mail	E-mail	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		1 / 9 /2025	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





Module Objectives أهداف المادة الدراسية	This module aims to: • Provide an advanced, rigorous understanding of the physical principles, instrumentation, and mathematical foundations underlying modern diagnostic and therapeutic nuclear medicine. • Equip students with the theoretical knowledge required to evaluate, operate, and optimize complex imaging systems, including scintillation cameras, SPECT, PET, and hybrid modalities (SPECT/CT, PET/CT). • Develop core competencies in radiopharmaceutical physics, internal radiation dosimetry, tracer kinetics, and radiation protection standards necessary for safe clinical practice and research.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this module, successful students will be able to: • Demonstrate Knowledge and Understanding: ○ Explain the physical mechanisms of radioactive decay, radionuclide production (reactors and cyclotrons), and generator systems. ○ Describe the operational physics, design components, and electronics of radiation detectors and nuclear imaging instrumentation. • Apply Analytical and Technical Skills: ○ Perform calculations related to internal radiation dosimetry using the MIRD schema and radioactive equilibria. ○ Design and execute quality control (QC) protocols for gamma cameras, dose calibrators, and associated clinical equipment. ○ Analyze tomographic reconstruction algorithms (FBP and iterative methods) and apply quantitative corrections for attenuation and scatter. • Evaluate and Synthesize: ○ Critically assess the performance trade-offs between spatial resolution, sensitivity, and noise in planar, SPECT, and PET imaging. ○ Appraise the physical and radiobiological principles of targeted radionuclide therapy (TRT) and post-therapy dosimetry verification. ○ Formulate comprehensive radiation safety programs adhering to regulatory standards and the ALARA principle within a clinical department.





Indicative Contents المحتويات الإرشادية	• Radioactive Decay & Production: Chart of nuclides, decay modes (alpha, beta, isomeric transition, electron capture), radioactive equilibria, nuclear reactors, cyclotrons, and radionuclide generators (^{99}Mo / $^{99\text{m}}\text{Tc}$). • Radiopharmaceuticals & Interaction of Radiation: Chemistry of labeling, mechanisms of localization, interaction of charged particles and photons with matter, and internal radiation dosimetry (MIRD schema and SSS-factors). • Detection & Measurement Systems: Gas-filled detectors, scintillation detectors (NaI(Tl), PMTs), semiconductor detectors, dose calibrators, and spectrometric pulse-height analysis electronics. • Planar & Tomographic Imaging (SPECT): The Anger gamma camera, collimator design, system performance metrics, NEMA standards, SPECT acquisition protocols, Filtered Backprojection, and iterative reconstruction (OSEM). • Positron Emission Tomography (PET) & Hybrid Systems: Positron annihilation physics, block detectors, Time-of-Flight (TOF) PET, 2D/3D modes, corrections (attenuation, scatter, randoms), and integrated hybrid systems (SPECT/CT and PET/CT). • Quantitative Tracer Kinetics & Therapy: Compartmental modeling, Patlak/Logan graphical analyses, Standardized Uptake Value (SUV), targeted radionuclide therapy (TRT) physics, and Biologically Effective Dose (BED) modeling. • Radiation Protection & Safety: ALARA principles, facility shielding design for hot labs and scanning suites, radioactive waste management, and patient release criteria.
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Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved



through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students To achieve the rigorous academic objectives of a graduate-level nuclear medicine physics curriculum, a multi-faceted pedagogical approach is employed. This strategy bridges advanced theoretical mechanics with practical, clinical competency.

1. Lecture and Conceptual Frameworks

- **Advanced Interactive Lectures:** Delivery of core theoretical concepts using multimedia visualizations, animated decay schemes, and computational simulations of photon-matter interactions.
- **Flipped Classroom Model:** Students review assigned advanced reading materials (such as peer-reviewed literature or MIRD pamphlets) prior to class, reserving contact hours for complex problem-solving, mathematical derivations (e.g., tracer kinetics, reconstruction mathematics), and critical discussions.

2. Practical Laboratory Work and Hands-on Instrumentation

- **Clinical Facility Simulations:** Direct, hands-on experiments utilizing industry-standard equipment (e.g., dose calibrators, multi-channel analyzers, gamma cameras, and phantoms) to reinforce instrument physics.
- **Quality Assurance (QA) Practice:** Training students to execute standardized testing protocols (such as NEMA performance evaluations, uniformity corrections, and spatial resolution measurements) mirroring hospital physics departments.

3. Computational and Analytical Modeling

- **Data Reconstruction Labs:** Use of dedicated software environments to process raw projection data, apply Filtered Backprojection (FBP) versus Iterative Reconstruction (OSEM), and implement attenuation/scatter correction algorithms.
- **Dosimetry and Kinetic Modeling Exercises:** Numerical problem-solving sessions focusing on internal radiation dose calculations and compartment model simulations.

	4. Case-Based and Problem-Based Learning (PBL) • Clinical Scenario Analysis: Working through real-world challenges faced by medical physicists, such as troubleshooting image artifacts, investigating technologic anomalies, or designing shielding layouts for new cyclotron/hot lab suites. • Research and Literature Critiques: Evaluating contemporary advancements (such as total-body PET, digital SiPM detectors, or emerging targeted radionuclide therapies) through student-led seminar presentations and critical reviews. 5. Independent Study and Assessment-Driven Learning • Formative Assessments: Weekly problem sets, quizzes, and data analysis reports that provide continuous feedback on student mastery of complex physical principles. • Summative Research Project: An independent or group capstone assignment requiring the design of a quality management program, a comprehensive literature review on a novel hybrid imaging modality, or a complex clinical dosimetry evaluation.
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Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا			
Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطلاب خلال الفصل	80	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب إسبوعيا	5.33
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	45	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب إسبوعيا	3.0
Total SWL (h/sem.) الحمل الدراسي الكلي للطلاب	125		



Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects / Lab.	1	14%(14)	Continuous	All
	Report	1	2%(2)	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)	Total assessment	100% (100 Marks)

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Foundations of Nuclear Physics & Radioactive Decay
Week 2	Production of Radionuclides
Week 3	Radiopharmaceuticals & Chemistry of Radionuclide Labeling





Week 4	Interaction of Radiation with Matter & Radiation Dosimetry
Week 5	Radiation Detection & Measurement Systems
Week 6	The Anger Gamma Camera: Principles & Design
Week 7	Midterm Exam
Week 8	Gamma Camera Performance & Quality Control
Week 9	Single Photon Emission Computed Tomography (SPECT)
Week 10	Positron Emission Tomography (PET) Physics & Instrumentation
Week 11	Hybrid Imaging Systems (SPECT/CT and PET/CT)
Week 12	Quantitative Tracer Kinetics & Mathematical Modeling
Week 13	Emerging Modalities & Advanced Technologies
Week 14	Radiation Protection & Regulatory Standards
Week 15	Targeted Radionuclide Therapy (TRT) & Dosimetry
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)	
المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Gamma Camera Quality Control and Performance Evaluation
Week 2	Lab 2: $^{99\text{m}}\text{Mo}/^{99\text{m}}\text{Tc}$ Generator Elution and Radiochemical Quality Control
Week 3	Lab 3: Dose Calibrator Operation, Linearity, and Geometry Testing
Week 4	Lab 4: Collimator Performance and Spatial Resolution Trade-offs
Week 5	Lab 5: SPECT Tomographic Acquisition, Reconstruction, and Artifact Analysis
Week 6	Lab 6: PET/CT Phantom Imaging, Normalization, and Attenuation Correction
Week 7	Lab 7: Radiation Shielding Design and Half-Value Layer (HVL) Determination





Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Physics in Nuclear Medicine (4th Edition) by Simon R. Cherry, James A. Sorenson, and Michael E. Phelps.	Yes
Recommended Texts	Nuclear Medicine Physics: A Handbook for Teachers and Students by IAEA (International Atomic Energy Agency).	Yes
Websites	Society of Nuclear Medicine and Molecular Imaging (SNMMI) (www.snmmi.org)	

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.

MODULE DESCRIPTION FORM

Module Information				
معلومات المادة الدراسية				
Module Title	Medical laser applications		Module Delivery	
Module Type	Core		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	MPH32139			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	3	Semester of Delivery		6
Administering Department	MPH	College	Sciences	
Module Leader	Dr. Mustafa Kamel Jassim		e-mail	
Module Leader's Acad. Title	Ass. P.		Module Leader's Qualification	Ph.D. Physics
Module Tutor	N/A		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail





Scientific Committee Approval Date	1/ 9 /2025	Version Number	1.0
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Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MPH 31033	Semester	5
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1- This course deals with the basic concept of laser physics to understand the applications of laser in medicine. 2.To develop problem solving skills that dealing with the work of medical devices. 3. To understand how the principles of physics are applied within the human body. 4. Develop a physical explanation of laser. 5- Clarifying the relationship between the laser and its applications and different fields of medicine
Module Learning Outcomes	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Explain the meaning of laser.





مخرجات التعلم للمادة الدراسية	2. Explain the atomic structure of human body. 3. Summarize what is meant by laser. 4. Discuss the major principles of laser. 5 .Describe energy absorbance by molecules. 11. Define electromagnetic radiation and its types. 12. Discuss the effect of radiation on molecules inside body. 13. Discuss the relation between radiation and the work of some medical devices. 14. Discuss the examples of laser interactions with human body. 15. Define some of laser applications in medicine.
Indicative Contents المحتويات الإرشادية	• Properties of Laser Light: Monochromaticity, coherence, collimation, and high brightness/intensity. • Laser Principles: Stimulated emission, population inversion, optical resonators, and active media (solid-state, gas, liquid dye, and semiconductor diode lasers). • Operational Modes: Continuous wave (CW) versus pulsed operation (nanosecond, picosecond, and femtosecond lasers), Q-switching, and mode-locking. • Optical Properties of Tissues: Reflection, refraction (Snell's Law), scattering (Mie and Rayleigh scattering), and absorption coefficients. • Chromophores: Interaction with biological targets like water, hemoglobin, melanin, and proteins.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes,
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interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطلاب خلال الفصل	65	Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب إسبوعيا	4.33
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطلاب خلال الفصل	35	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب إسبوعيا	2.33
Total SWL (h/sem.) الحمل الدراسي الكلي للطلاب	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	16%(16)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2, 6, 9, 12	LO # 3, # 4 and #6, #7
	Projects / Lab.	1	14%(14)	Continuous	All
	Report	1	2%(2)	13	LO # 5, # 8 and #10
	Midterm Exam	2hr	10%(10)	7	LO # 1, # 7





Summative assessment	Final Exam	3hr	50%(50)	16	All
Total assessment			100% (100 Marks)	Total assessment	100% (100 Marks)

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Laser.
Week 2	Atomic Structure
Week 3	Laser Interactions with human body
Week 4	Laser tissues Interaction.
Week 5	Laser Eye surgery (Part 1)
Week 6	Laser Eye surgery (Part 2)
Week 7	Midterm Exam
Week 8	Laser Lithotripsy (Part 1)
Week 9	Laser Lithotripsy (Part 2)
Week 10	Laser in Cancer treatment part 1
Week 11	Laser in Cancer treatment part 2
Week 12	Laser in Dermatology (1)





Week 13	Laser in Dermatology (2)
Week 14	Laser in Dentistry (1).
Week 15	Laser in Dentistry(2).
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Laser Tissue Interaction: Thermal Effects and Coagulation
Week 2	Lab 2: Optical Fiber Transmission and Beam Delivery Systems.
Week 3	Lab 3: Photodynamic Therapy (PDT) Efficiency Assessment
Week 4	Lab 4: Laser Doppler Flowmetry for Blood Perfusion Measurement
Week 5	Lab 5: Spectroscopic Characterization of Tissue Auto-Fluorescence (Optical Biopsy)
Week 6	Lab 6: Laser Speckle Imaging for Surface Motion and Perfusion
Week 7	Lab 7: Photocoagulation and Retinal Laser Safety Modeling

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	• <i>Medical Applications of Lasers</i> Editors: D.R. Vij and K. Mahesh	Yes
Recommended Texts	• <i>Handbook of Laser Technology and Applications: Laser Applications: Medical, Metrology and Communication (Volume 4)</i> Editors: Chunlei Guo and Subhash Chandra Singh	Yes
Websites	• International Academy for Laser Medicine and Surgery (IALMS) • URL: ialms.international	





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.

MODULE DESCRIPTION FORM

Module Information

معلومات المادة الدراسية

Module Title	Biostatics	Module Delivery
Module Type	Basic	





Module Code	MPH 32040			☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	3	Semester of Delivery	6	
Administering Department	Medical Physics	College	Sciences	
Module Leader	Dr. Rabah Salim Shareef		e-mail	
Module Leader's Acad. Title	Asset. Professor	Module Leader's Qualification	Ph.D. Biology	
Module Tutor	None		e-mail	E-mail
Peer Reviewer Name		e-mail	E-mail	
Scientific Committee Approval Date	1/ 9 /2025	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

Module Objectives أهداف المادة الدراسية	Upon completion of the course the learner is expected to do the following: 1. design research questions; 2. distinguish qualitative and quantitative data; 3. Evaluate strength of different biological experimental designs; and 4. Evaluate different data analysis methods;
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of the course the learner will be able to: 1. Knowledge of the basics of biological tests 2. Know the importance of health and vital data 3. Know how to collect data and samples 4. analyze different experimental designs for generation of qualitative and quantitative data; 5. design research hypotheses and generate appropriate data; and 6. generated data to appropriate statistical analysis and give relevant interpretation to the output
Indicative Contents المحتويات الإرشادية	This course explores the meaning of statistics. It introduces students to some basic terms like variable, continuous variable, discrete or discontinuous variables population, sample, histogram, frequency, classes, class interval and frequency distribution; a distribution in statistical terms: mode, median, mean; measuring the spread of a distribution: range, semi interquartile range, mean deviation, variance, standard deviation; samples and populations: probability and the normal distribution curve, distribution of t, calculating the limits of a mean; and comparing the means of two samples: null hypothesis, alternate hypothesis, differences between standard deviations, limits for standard deviation and variance. The course also examines a comparison of three or more samples: simple analysis of variance; correlation of two variables: scatter diagram, correlation coefficient, regression lines, mean center; and chi-square test: the 2x2 contingency table. Learners are taken through planning experiments: layout of experiments, controls, precision of measurements, number of replicates, randomization, Latin squares, and interaction.



Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies

Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	35	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2.33
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.33
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية





		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20%(20)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2,5,8,11	LO # 3, # 4 and #6, #7
	Projects	4	8%(8)	3,6,9,12	LO # 3, # 4 and #6, #7
	Report	1	4%(4)	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	INTRODUCTON TO BIOSTATISTICS: Meaning of biostatistics - Types of variables - Population and samples (Populations, Samples from populations, Random sampling, Parameters and statistics)
Week 2	Data Collection: (Sources of statistical data, The sources of medical data , Methods of data collection , Sampling Method , Methods of ensuring sample representation of the original population)
Week 3	PRESENTATION OF BIOLOGICAL DATA: (Frequency distribution)
Week 4	Graphical presentation: (Bar Charts, Histogram, Frequency polygon, Cumulative Frequency Polygon, The Pie Chart)





Week 5	PROBABILITY AND STATISTICS: 1- Probability (Laws of probability: Counting possible outcomes, Probability of an event, adding probabilities, Multiplying probabilities) – 2- Permutation and combinations: (Permutations, Combinations)
Week 6	NORMAL DISTRIBUTION: (Symmetry and Kurtosis • Proportions of normal distribution • The distribution of means • Statistical hypothesis testing • Assessing departures from normality)
Week 7	BIONOMIAL AND POISSON DISTRIBUTION: (• Binomial distribution • Poisson distribution)
Week 8	STANDRAD ERROR AND CONFIDENCE INTERVAL: (• Standard error • Confidence interval)
Week 9	HYPOTHESIS TESTING: (• Null hypothesis and alternative hypotheses • The standard format for hypothesis testing)
Week 10	THE t- DISTRIBUTION: One group of observations (or one sample test) • Two independent group of observation (Variances not known; Variances known)
Week 11	THE CHI-SQUARE DISTRIBUTION: Ch-Square X^2
Week 12	Correlation Analysis: (Types of correlation , Measuring Correlation , Simple correlation coefficient , Multiple correlation coefficient , Partial Correlation)
Week 13	Regression Analysis: (The importance of regression analysis , The importance of , regression analysis , Simple linear Regression Analysis , Simple Regression Model , Multiple liner regression)
Week 14	ANALYSIS OF VARIANCE: One-way (Single factor) ANOVA
Week 15	ANALYSIS OF VARIANCE: Two-way (factor) ANOVA
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
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Required Texts	Biostatistics: A Foundation for Analysis in the Health Sciences by Wayne W. Daniel and Chad L. Cross (Wiley)	Yes
Recommended Texts	Basic & Clinical Biostatistics by Beth Dawson and Robert G. Trapp (McGraw Hill / AccessMedicine)	Yes
Websites	Statistics LibreTexts (Biostatistics Open Learning Textbook) managed by the LibreTexts	

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.





MODULE DESCRIPTION FORM

Module Information				
معلومات المادة الدراسية				
Module Title	Spectroscopy		Module Delivery	
Module Type	E		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☒ Seminar	
Module Code	MPH32041			
ECTS Credits	4			
SWL (hr/sem)	100			
Module Level	3	Semester of Delivery		6
Administering Department	MPH	College	Sciences	
Module Leader	Dr. Waleed Nassar Raja		e-mail	waleednassar@mauc.edu.iq
Module Leader's Acad. Title	Ass. P.	Module Leader's Qualification	Ph.D. Physics	
Module Tutor	N/A		e-mail	E-mail
Peer Reviewer Name	Name	e-mail	E-mail	
Scientific Committee Approval Date	1 / 9 /2025	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

Module Objectives أهداف المادة الدراسية	Here is a comprehensive academic structure for a Spectroscopy module, outlining its standard Module Aims, Learning Outcomes, and Indicative Contents suitable for undergraduate or advanced science programs. ## Module Aims • Provide a rigorous understanding of the interaction between electromagnetic radiation and matter across various regions of the electromagnetic spectrum. • Equip students with the theoretical principles underpinning key spectroscopic techniques used in chemical, physical, and medical analyses. • Develop analytical and problem-solving skills necessary for interpreting complex spectral data to determine molecular structures and physical properties. • Bridge fundamental quantum mechanical concepts with practical, modern laboratory and industrial applications of spectroscopy.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students will be able to: 1. Explain the fundamental principles of electromagnetic wave interactions, transitions between energy states, and the selection rules governing spectroscopic techniques. 2. Analyze and interpret UV-Visible, Infrared (IR), NMR, Mass Spectrometry, and atomic spectra to identify functional groups and determine molecular structures.





	3. Evaluate the strengths, limitations, and operational parameters of different spectroscopic instruments and methods. 4. Apply quantitative laws (such as the Beer-Lambert Law) to calculate concentrations and absorption characteristics from spectral data.
Indicative Contents المحتويات الإرشادية	<i>Introduction to Spectroscopy & Electromagnetic Radiation</i> • Nature of electromagnetic radiation: wave-particle duality, energy, wavelength, and frequency. • The electromagnetic spectrum and regions of absorption/emission. • Interaction of radiation with matter: energy levels, transitions, population of states, and the Boltzmann distribution. • Line widths, broadening mechanisms (natural, Doppler, and pressure broadening), and signal-to-noise ratios. <i>2. Atomic Spectroscopy</i> • Atomic energy levels and hydrogen-like systems. • Atomic absorption spectroscopy (AAS) and Atomic emission spectroscopy (AES). • Flame photometry and inductively coupled plasma (ICP) techniques. • Instrumentation: light sources, nebulizers, burners, and detectors. <i>3. Ultraviolet-Visible (UV-Vis) Spectroscopy</i> • Electronic transitions ($n \rightarrow \sigma^*$, $\pi \rightarrow \pi^*$, etc.) and chromophores. • Effects of solvent, conjugation, and pH on absorption spectra. • Instrumentation: single and double-beam spectrophotometers. • Quantitative analysis: The Beer-Lambert Law, deviations, and multi-component analysis. <i>4. Vibrational Spectroscopy (Infrared & Raman)</i> • Infrared (IR) Spectroscopy: Molecular vibrations, degrees of freedom, Hooke's Law model, and characteristic group frequencies. • Fourier Transform Infrared (FTIR) instrumentation and sampling techniques. • Raman Spectroscopy: Rayleigh and Raman scattering, Stokes and anti-Stokes lines, and the polarizability concept.





	- Complementary nature of IR and Raman spectroscopy. 5. <i>Magnetic Resonance Spectroscopy</i> - Nuclear Magnetic Resonance (NMR) Theory: Nuclear spin, magnetic moments, and behavior in an external magnetic field (^1H and ^{13}C NMR). - Chemical shift, spin-spin coupling (multiplets), and integration. - Introduction to Fourier Transform NMR (FT-NMR) and relaxation processes. 6. <i>Mass Spectrometry (Hyphenated Techniques)</i> - Principles of ionization (Electron Impact, Electrospray Ionization). - Mass analyzers (quadrupole, time-of-flight). - Interpretation of mass spectra: molecular ion peak, fragmentation patterns, and isotope effects. - Overview of hyphenated techniques (GC-MS and LC-MS).
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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	- strategic analysis (SWOT, PESTEL) and formulation for healthcare organizations. - Basics of healthcare accounting, budgeting, and cost-benefit analysis. - Resource allocation, supply chain management, and procurement in medical facilities.
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Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا





Structured SWL (SSWL)(h/sem.) الحمل الدراسي المنتظم للطالب خلال الفصل	35	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب إسبوعيا	2.33
Unstructured SWL (USSWL)(h/sem.) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب إسبوعيا	4.33
Total SWL (h/sem.) الحمل الدراسي الكلي للطالب	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20%(20)	5 and 10	LO # 1, # 2 and #10, #11
	Assignments	4	8%(8)	2,5,8,11	LO # 3,# 4 and #6,#7
	Projects	4	8%(8)	3,6,9,12	LO # 3,# 4 and #6,#7
	Report	1	4%(4)	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)	Total assessment	100% (100 Marks)





Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Part I: Foundations of Spectroscopy and Radiation-Matter Interactions: Introduction to Spectroscopy
Week 2	Atomic Energy Levels and Quantum States
Week 3	Interaction of Radiation with Matter
Week 4	Instrumentation and Measurement Principles
Week 5	Part II: Optical and UV-Visible Spectroscopy: Ultraviolet-Visible (UV-Vis) Spectroscopy – Atomic and Molecular
Week 6	Atomic Absorption and Emission Spectroscopy (AAS / AES)
Week 7	Midterm Exam
Week 8	Part III: Vibrational and Rotational Spectroscopy: Infrared (IR) Spectroscopy
Week 9	Raman Spectroscopy
Week 10	Part IV: Advanced Resonance and Magnetic Spectroscopy: Nuclear Magnetic Resonance (NMR) – Fundamentals
Week 11	High-Resolution NMR Spectroscopy
Week 12	Electron Spin Resonance (ESR / EPR) Spectroscopy
Week 13	Part V: Specialized Techniques and Modern Applications: Mass Spectrometry (MS) as a Spectroscopic Tool
Week 14	X-Ray Spectroscopy and Photoelectron Spectroscopy (XPS / UPS)
Week 15	Emerging Spectroscopic Frontiers and Applications





Week 16	Final Exam
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Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Introduction to Spectroscopy by Donald L. Pavia, Gary M. Lampman, George S. Kriz, and James A. Vyvyan (<i>Cengage Learning</i>)	Yes
Recommended Texts	Modern Spectroscopy by J. Michael Hollas (<i>John Wiley & Sons</i>)	No
Websites	RSC Education (Analytical Teaching Resources) — edu.rsc.org	

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	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded





(0 – 49)	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.

