Module Title	Optics in Bio Medical Engineering	**Module Delivery**	
Module Type	Basic		Theory
Module Code	UOMU0101052		Lecture
ECTS Credits	3		Tutorial
SWL (hr/sem)	100		Practical
			Seminar

Module Level	UGIII	**Semester of Delivery**	5
Administering Department	Department of Biomedical Engineering. UGV	**College**	Engineering College
Module Leader	Hiba diaa abdulameer	**e-mail**	hiba.diaa.abdulameer@uomus.edu.iq
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**	Msc
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	1/09/2025	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	MEDICAL PHYSICS - BME204	**Semester**	3
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- Providing the student with theoretical information for medical optics. 2- Introduced to the basic laws of optical engineering and their use in medical applications. 3- Concept of basics of optics and photonics 4- Knowing how to design medical systems that are compatible with the body.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Introduction the optical properties of tissue. 2. Describe the Nonlinear Optics. 3. Introduction the light–tissue interactions. 4. Describe the basic instrumentation in photonics. 5. Optical Fibers and Waveguides for Medical Applications. 6. Describe of basics concepts Biological Imaging Spectroscopy. 7. Describe the Photonic Detection and Imaging Techniques. 8. Describe the Image Formation in Biological and Biomedical Applications. 9. Describe the principles of Fluorescence Spectroscopy for Biomedical Diagnostics.

	10. Introduction the Biosensors for Medical Applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction the optical properties of tissue. [5 hrs]. Nonlinear Optics. [10 hrs] Optical Fibers and Waveguides. [10 hrs] Applications of optical fibers in medicine. [10 hrs] Biological Imaging Spectroscopy. [10 hrs] Detection and Imaging Techniques. [10 hrs] Principles of Fluorescence Spectroscopy for Biomedical Diagnostics [10 hrs] Evaluation of image performance, Design of optical system. [10 hrs] Optics in Medical Applications. [10 hrs]
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 giving scientific and practical lectures on basic topics related in medical applications.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	80	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.3
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	10% (10)	5, 10	LO #1, 2, 8 and 9
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-6
	Final Exam	2hr	50% (50)	14	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction the optical Medical
Week 2	Optics And Properties Of Tissue
Week 3	Nonlinear Optics
Week 4	Optical Fibers and Waveguides
Week 5	Applications of optical fibers in medicine
Week 6	Biological Imaging Spectroscopy
Week 7	Detection and Imaging Techniques
Week 8	Spectroscopy for Biomedical Diagnostics
Week 9	Spectroscopy for Biomedical Diagnostics
Week 10	Design of optical system
Week 11	Design of optical system
Week 12	Applications of optics Medical
Week 13	Optics Medical Devices
Week 14	Problems and solutions Tutorials
Week 15	**Preparatory Week**
Week 16	**Final Exam**

<table>
<tr><th colspan="3">Learning and Teaching Resources
مصادر التعلم والتدريس</th></tr>
<tr><td></td><td>Text</td><td>Available in the Library?</td></tr>
<tr><td>Required Texts</td><td>1- Optics, 4th edition, by Eugene Hecht, (Addison Wesley Longman, 2002);
2- Modern Optical Engineering, 3th ed., Warren J. Smith, Mc Graw Hill, 2000);
3- Ralf Menzel, "Photonics Linear and Nonlinear Interactions of Laser Light and Matter", (2007).</td><td>Yes</td></tr>
<tr><td>Recommended Texts</td><td>1. Tuan Vo Dirh, "Biomedical Photonics" ||, CRC Press, Bocaraton, 2014.
2. Raymond A. Serway, Jonhn w " Physics for Scientists and Engineers" Brooks cole(2015)</td><td>No</td></tr>
<tr><td>Websites</td><td colspan="2">موقع التعليم الالكتروني لجامعة ذي قار والجامعات العراقية والعالمية</td></tr>
</table>

APPENDIX:

<table>
<tr><th colspan="5">GRADING SCHEME
مخطط الدرجات</th></tr>
<tr><td>Group</td><td>Grade</td><td>التقدير</td><td>Marks (%)</td><td>Definition</td></tr>
<tr><td rowspan="4">Success Group
(50 - 100)</td><td>A - Excellent</td><td>امتياز</td><td>90 - 100</td><td>Outstanding Performance</td></tr>
<tr><td>B - Very Good</td><td>جيد جدا</td><td>80 - 89</td><td>Above average with some errors</td></tr>
<tr><td>C - Good</td><td>جيد</td><td>70 - 79</td><td>Sound work with notable errors</td></tr>
<tr><td>D - Satisfactory</td><td>متوسط</td><td>60 - 69</td><td>Fair but with major shortcomings</td></tr>
</table>

	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
(0 – 49)	**F** – Fail	راسب	(0-44)	Considerable amount of work required

Note:	

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