



Ministry of Higher Education and
Scientific Research - Iraq
Al-Mustaqbal University
College for engineering and technology
Department of Biomedical Engineering



MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information			
Module Title	MEDICAL LASERS		Module Delivery
Module Type	SUPPLEMENT		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Tutorial <input checked="" type="checkbox"/> Practical <input checked="" type="checkbox"/> Seminar
Module Code	UOMU0101065		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	UGx UGIII	Semester of Delivery	
Administering Department	Department of Biomedical Engineering. UGV	College	Engineering College
Module Leader		e-mail	
Module Leader's Acad. Title		Module Leader's Qualification	
Module Tutor		e-mail	
Peer Reviewer Name		e-mail	
Review Committee Approval		Version Number	1.0

Relation With Other Modules

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	<p>To promote acquisition of knowledge of the main use of lasers in medicine and to provide a basic understanding of tissue optics. And To provide theoretical knowledge of lasers and intense pulsed light therapy applications in medicine. as well To teach students to evaluate the impact of lasers on the human body, tissues and to predict the changes in laser power; know security tools, basic rules and standards for working with lasers; use and follow safety rules at work with lasers. Lasers for Medical Applications summarizes the wealth of recent research on the principles, technologies and application of lasers in diagnostics, therapy and surgery. This Module first gives an overview of the use of lasers in medicine, key principles of lasers and radiation interactions with tissue. To understand the wide diversity and therefore the large possible choice of these devices for a specific diagnosis or treatment, the respective types of the laser (solid state, gas, dye, and semiconductor).</p>
Module Learning Outcomes	<p>On successful completion of this module the student will be able to:</p> <ol style="list-style-type: none"> 1. Upon completion of the study course students will be able to evaluate the activity of the laser, its physical structure and its effect on the human body, and to justify the use of lasers in medicine. By the end of the study course the students will be able to apply the principles of the effective use of medical lasers and knowledge of risks. 2. Correctly use terms of laser physics. 3. Discuss the differences between continuous and pulsed laser systems, and the uses of both. 4. Describe the basics of laser safety.

	<p>5. Understand how the design of a laser affects its output characteristics.</p> <p>6. Assess the properties of laser systems based on a knowledge of their design.</p> <p>7. Describe the role of lasers in medicine, their applications in diagnostic and therapeutic processes.</p>
Indicative Contents	<p>Indicative content includes the following.</p> <ol style="list-style-type: none"> 1. Introduction to medical Laser. [5 hrs]. 2. Light and optics. [10 hrs] 3. Interaction of radiation with atoms and ions. [10 hrs] 4. Amplification by stimulated, Emission of Radiation. [10 hrs] 5. Properties of laser beams, Population inversion, pumping processes, Continuous wave lasers Optical resonators. [10 hrs] 6. Types of laser which used in Medical. [10 hrs] 7. Medical Applications of Lasers. [15 hrs] 8. Risks/Benefits of using laser in medical. [5 hrs]
Learning and Teaching Strategies	
Strategies	<p>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 type of simple experiments involving some sampling activities that are interesting to the students.</p>

Student Workload (SWL)			
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
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Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	2, 4	LO #1, 2,3
	Assignments	2	10% (10)	2, 5	LO # 3, 4, and 5
	Projects	1	10% (10)	Continuous	
	Report	1	10% (10)	6	LO # 4, 6
Summative assessment	Midterm Exam	2 hr	10% (10)	6	LO # 1-5
	Final Exam	2hr	50% (50)	14	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to medical Laser.
Week 2	Light and Optics.
Week 3	Interaction of radiation with atoms and ions.
Week 4	Interaction of radiation with atoms and ions.
Week 5	Amplification by stimulated, Emission of Radiation.
Week 6	Amplification by stimulated, Emission of Radiation.
Week 7	Properties of laser beams.
Week 8	Population inversion, pumping processes, Continuous wave lasers Optical resonators.
Week 9	Population inversion, pumping processes, Continuous wave lasers Optical resonators.
Week 10	Types of laser which used in Medical
Week 11	Basis of laser radiotherapy, surgery and imaging technology.
Week 12	Medical Applications of Lasers.
Week 13	Medical Applications of Lasers.
Week 14	Risks/Benefits of using laser in medical.
Week 15	Preparatory Week
Week 16	Final Exam

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Vij, D. R., & Mahesh, K. (Eds.). (2002). Medical applications of lasers. Springer Science & Business Media.	No
Recommended Texts	1- Sliney, D. H., & Trokel, S. L. (2012). Medical lasers and their safe use. Springer Science & Business Media. 2- Sona, A. (1976). Lasers and their applications.	No
Websites	1- https://www.rsu.lv/en/rsu-courses/medical-laser-physics-fk041	

APPENDIX

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

