



Ministry of Higher Education and
Scientific Research - Iraq

University of Warith Al_Anbiyaa
Engineering College
Biomedical Engineering Department



MODULE DESCRIPTION FORM

Module Information				
Module Title	Laser and Fiber Optics		Module Delivery	
Module Type	Core		<input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar	
Module Code	WBM-31-07			
ECTS Credits	4			
SWL (hr/sem)	150			
Module Level	3	Semester of Delivery		1
Administering Department	BME	College	ENG	
Module Leader	Saad Mahmood Sarhan		e-mail	saad.mah@uowa.edu.iq
Module Leader's Acad. Title	Assistant Doctor	Module Leader's Qualification	Ph.D.	
Module Tutor		e-mail		
Peer Reviewer Name		e-mail		
Scientific Committee Approval Date		Version Number	1.0	

Relation with other Modules				
Prerequisite module	None		Semester	
Co-requisites module	Electromagnetic field		Semester	5

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	<p>Building the student scientifically and qualifying him to understand:</p> <ol style="list-style-type: none"> 1. Study the electromagnetic nature of light which includes the idealization of waves as light rays and the polarization of light 2. Study Fiber optics communication system, types of fiber also the medical applications with emphasis on those used in biomedical engineering. 3. OPTIWAVE Simulation System used in optical Lab
Module Learning Outcomes	<p>A- Cognitive goals .</p> <ol style="list-style-type: none"> 1. A1- The course provides the students the essential knowledge related to Study Fiber optics communication system 2. A2- The student learns types of fiber also the medical applications with emphasis on those used in biomedical engineering 3. A3- Study the electromagnetic nature of light which includes the idealization of waves as light rays and the polarization of light 4. A4- Performs laboratory experiments A5- Acquire skill in simulation and programming programs to illustrate different waveforms <p>B. The skills goals special to the course.</p> <ol style="list-style-type: none"> 5. B1 - Training the student to explore problems and find solutions 6. B2 - Training the student in scientific research in a specialized manner 7. B3 - Training the student on the practical application of the theoretical lecture and comparison between practical and theoretical results B 4- Training the student to form a scientific seminar and to participate in discussing and analyzing the results

Indicative Contents	<p>Indicative content includes the following.</p> <p>Part A : optical communication Systems</p> <ul style="list-style-type: none"> • Introduction: [4hrs] • Historical development; The general system; Advantages of optical fiber communication. [6hrs] • Optical Fiber Waveguides: [8 hrs] . • Fiber types; [8hrs] <p>Ray theory transmission; Total internal reflection; Acceptance angle; Numerical aperture; Electromagnetic mode theory for optical propagation; Electromagnetic waves; Modes in a planer guide. [12 hrs]</p> <ul style="list-style-type: none"> • Transmission Characteristics of Optical Fibers: [4 hrs] <p>3</p> <ul style="list-style-type: none"> • Attenuation; Material absorption losses; Intrinsic and extrinsic absorption; Linear scattering; Rayleigh and Mie scattering; • Nonlinear scattering losses; Stimulated Brillouin and Raman scattering; Fiber bend losses; Dispersion; Intra-modal dispersion; Inter-modal dispersion; modal noise. [4 hrs] <p>Part B: Medical application</p> <ul style="list-style-type: none"> • Endoscopes • Laser applications in dentistry • Optical fibers in Textiles • Laser Brain Surgery [12hrs] <p>Part C- Revision problem classes [5 hrs]</p>
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Learning and Teaching Strategies	
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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem)	108	Structured SWL (h/w)	7
Unstructured SWL (h/sem)	42	Unstructured SWL (h/w)	3
Total SWL (h/sem)	100		

Module Evaluation					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2
	Assignments	2	10% (10)	2, 12	LO #1, 2
	Projects / Lab.	1	10% (10)	Continuous	LO #1, 2
	Report	1	10% (10)	13	LO #1, 2
Summative assessment	Midterm Exam	3 hrs.	10% (10)	7	LO #1, 2
	Final Exam	3 hrs.	50% (50)	16	LO #1, 2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to optical communication system
Week 2	Benefits of Fiber Optics
Week 3	Nature of light
Week 4	Properties of light
Week 5	Fiber modes
Week 6	Types of optical fibers
Week 7	Light sources
Week 8	Light Emitting Diode
Week 9	Semiconductor laser.
Week 10	Transmission Characteristics of Optical Fibers
Week 11	Attenuation
Week 12	Dispersion
Week 13	MEDICAL APPLICATIONS OF OPTICAL FIBERS
Week 14	Endoscopes
Week 15	Laser applications in dentistry
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	GOVIND E P. AGRAWAL, "Fiber optics communication systems."	Yes
Recommended Texts	JOHN M. SENIOR, "Optical Fiber Communications"	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/ optical Communication	

Grading Scheme			
Group	Grade	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	(45-49)	More work required but credit awarded
	F – Fail	(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.			