MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fiber Optics Communication**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**CET4201**				
ECTS Credits	**5**				
SWL (hr/sem)	**150**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	CET		**College**	EETC	
Module Leader	Omar Nameer M. Salim		**e-mail**	omarnmsalim@mtu.edu.iq	
Module Leader's Acad. Title	Assoc. Professor.		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Asst. Prof. Alhamzah taher		**e-mail**	alhamza_tm@yahoo.com	
Peer Reviewer Name	Dr. Osama Abbas Hussein		**e-mail**	osama.abbas@mtu.edu.iq	
Scientific Committee Approval Date	13/06/2023		**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 Aims أهداف المادة الدراسية	1. In this course, the students can acquire the basic knowledge of Optical Communication Systems 2. Optical Communication Media 3. Fiber optics communication principles and their application. 4. Students will be learned about high-speed single-mode and low-speed multimode fiber, 5. Students can acquire knowledge of step and graded refractive index profiles, different dispersion mechanisms and their effect on high-speed links, 6. The advantage of coherent (LASER) light sources over incoherent (LED) sources for the long haul, high-speed links, and photodetectors.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Discuss Laser Principles , operation , structures , applications 2. Describe Photodiodes 3. Explain the Optical Communication Media 4. Identify optical fiber waveguides 5. Explain the of optical fiber communication 6. Describe Transmission characteristics of optical fibers 7. Discuss Optical Transmitters - transmitter types , design 8. Explain Optical Amplifiers
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Basic Concepts of Optical Communication Systems (6 hr) Light Emitting Diodes (6 hr) Photodiodes (6 hr) Optical Communication Media (12 hr) Transmission characteristics of optical fibers (12 hr) Optical Fiber waveguides, couplers and connectors (12hr) Optical Transmitters (8 hr) Optical receivers (8 hr) Optical Amplifiers (4 hr)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Skills competency is important as theory knowledge, especially in vocational and technical education. Thus, the aim of this module is to develop the students conceptual knowledge and skills in optical fiber communication to equip the students with the necessary skills to become competent and skillful Technologists. lecture and seminars will be used to explain the theory and principles of the module. Also, laboratory reports and mini-projects will be used. Quantitative instruments such as pre-test and post-test will be used to check students' conceptual knowledge of electrical measurement after the theory lecture or laboratories work. Video will be used to explain the electrical measurement instruments. Observation form and laboratory rubric will be used to analyze the skills of the students. The observer comments from the laboratory staff on student skills will be classified according to thematic analysis to evaluate students learned skills.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	74	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	76	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	6% (6)	3, 9,12	LO #1, 2,3,4,5,6,
	Assignments	2	4% (4)	5, 13	LO # 1- 7
	Project / Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 1-7
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Basic Concepts of Optical Communication Systems
Week 2	Light Behavior
Week 3	Laser Principles
Week 4	Light Emitting Diodes (LEDs) - principle of operation , structures , applications
Week 5	Laser Diodes LDs- principle of operation , structures , applications
Week 6	Photodiodes - (pin Photodiode , Avalanche Photodiode , comparisons of photodetectors
Week 7	**Mid-term Exam**
Week 8	Optical Communication Media- Overview of optical communication media, free space optical communication, optical fiber waveguides.
Week 9	Overview of optical fiber communication- general system, advantages, disadvantages, and applications of optical fiber communication
Week 10	optical fiber waveguides, Ray theory, cylindrical fiber, single mode fiber, multi-mode fiber, cutoff wavelength, mode filed diameter
Week 11	Transmission characteristics of optical fibers- Attenuation, absorption, scattering losses, bending loss, dispersion
Week 12	Fiber couplers and connectors
Week 13	Optical Transmitters - transmitter types , design
Week 14	Optical Receivers - receivers types , design
Week 15	Optical Amplifiers
Week 16	**A preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Fiber Optics
Week 2	Lab 2: Fiber Cleaving
Week 3	Lab 3: Numerical Aperture of a Fiber
Week 4	Lab 4: Coupling into Fiber
Week 5	Lab 5: Profile of Fundamental Mode
Week 6	Lab 6: High-Order Modes in Fiber
Week 7	Lab 7: **Mid-term Exam**

Week 8	Lab 8: Coupling and Propagation Loss - i
Week 9	Lab 9: Coupling and Propagation Loss - ii
Week 10	Lab 10: Analog Communication Link - i
Week 11	Lab 11: Analog Communication Link – ii
Week 12	Lab 12: Digital Communication Link - i
Week 13	Lab 13: Digital Communication Link - ii
Week 14	Lab 14: A preparatory week before the Final Exam
Week 15	Lab 15: **Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**Optical Communications Essentials, Gerd Keiser, The McGraw-Hill Companies.** **Optical Fiber Communication – Gerd Keiser, 4th Ed., MGH, 2008.**	Yes
Recommended Texts	**Handbook of Laser Technology and Applications , Colin E. Webb, Julian D. C. Jones** **CRC Press**	No
Websites		

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.