مركز الاعتماد وضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER

Course Syllabus

1	**Course title**	Optics-2	
2	**Course number**	0302321	
3	**Credit hours**	3	
	Contact hours (theory, practical)	3 (theory)	
4	**Prerequisites/corequisites**	Optics I	
5	**Program title**	Bsc in Physics	
6	**Program code**		
7	**Awarding institution**		
8	**School**	Science	
9	**Department**	Physics	
10	**Course level**	3rd year	
11	**Year of study and semester(s)**	Second semesrer-2023	
12	**Other department(s) involved in teaching the course**		
13	**Main teaching language**	English	
14	**Delivery method**	☒Face to face learning ☐Blended ☐Fully online	
15	**Online platforms(s)**	☐Moodle ☐Microsoft Teams ☐Skype ☐Zoom ☒Others: Microsoft Teams	
16	**Issuing/Revision Date**		

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17 Course Coordinator:

Name: Dr.Yahia Al Ramdien	Contact hours:3 hours weekly
Office number:	Phone number:
Email:Y.ramadeen@ju/edu/jo	

18 Other instructors:

Name:

Office number:

Phone number:

Email:

Contact hours:

Name:

Office number:

Phone number:

Email:

Contact hours:

19 Course Description:

As stated in the approved study plan.

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20 Course aims and outcomes:

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A- Aims:

B- Students Learning Outcomes (SLOs):

For purposes of mapping the course SLOs to the physics program SLOs, at the successful completion of the physics program, graduates are expected to be able to:

1. An ability to identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline.
2. An ability to formulate or design a system, process, procedure or program to meet desired needs.
3. An ability to develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgment to draw conclusions.
4. An ability to communicate effectively with a range of audiences.
5. An ability to understand ethical and professional responsibilities and the impact of technical and/or scientific solutions in global, economic, environmental, and societal contexts.
6. An ability to function effectively in teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

Upon successful completion of this course, students will be able to:

Program SLOs / Course SLOs	SLO (1)	SLO (2)	SLO (3)	SLO (4)	SLO (5)	SLO (6)	SLO (7)	SLO (8)	SLO (9)
1. Provide students with the necessary vector algebra and vector calculus needed to tackle the elements of classical electromagnetic theory.	✓	✓	✓						
2. Students will be able to define the basic concepts related to classical electromagnetic theory and represent electromagnetic waves, which include light waves. Results from electromagnetism describing the physics of electromagnetic waves are borrowed to enable a	✓	✓	✓						

determination of the energy delivered by such waves.									
3. Students will be able to discuss and identify The polarization of an electromagnetic wave.	✓	✓	✓						
4. Students will be we develop two-element column matrices or vectors to represent light in various modes of polarization. Then they examine the physical elements that produce polarized light and discover corresponding matrices that function as mathematical operators on the Jones vectors..	✓	✓	✓						
5. Students will be able to introduced the use of multilayer stacks of films, and develop a transfer matrix to represent the film and characterize its performance	✓	✓	✓						
6. Students will be able to describe Fersnel Equations.	✓	✓	✓						
7. Students will define more precisely the area of nonlinear optics, describe and categorize some nonlinear phenomena, and discuss some of their practical applications.	✓	✓	✓						
8. Student will use Maxwell's equations and the mathematical techniques of vector calculus to understand in particular how the refractive index and the absorption coefficient for isotropic conducting (metals) and nonconducting (insulators or dielectrics) materials can be driven	✓	✓	✓						

9. Student will be given a quantitative treatment of laser operation.	✓	✓	✓						

21. Topic Outline and Schedule:

Week	Lecture	Topic	Intended Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	4.8	Electromagnetic Waves	1,2	Face to face			Quiz	
	4.9	Light polarization	3	Face to face			Mid Exam	
	15.1	Dichroism	3	Face to face			Mid Exam	
2	15.2	Polarization by Reflection from Dielectric Surfaces	3	Face to face			Mid Exam	
	15.3	Polarization by Scattering	3	Face to face			Mid Exam	
	15.4	Polarization with Two Refractive Indices	3	Face to face			Quiz	
3	15.5	Double Refraction	3	Face to face			Mid Exam	
	15.6	Optical Activity	3	Face to face			Mid Exam	
	15.7	Photoelasticiy	3	Face to face			Mid Exam	
4	14.1	Jones Vectors	4	Face to face			Mid Exam	

	14.2	Jones Matrices	4	Face to face			Mid Exam	
	14.2	Jones Matrices	4	Face to face			Mid Exam	
5	22.1	Transfer Matrix	5	Face to face			Mid Exam	
	22.2	Reflectance at Normal Incidence	5	Face to face			Mid Exam	
	22.3	Two-Layer Antireflecting Films	5	Face to face			Mid Exam	
6	22.4	Three-Layer Antireflecting Films	5	Face to face			Quiz, mid Exam	
	22.4	Three-Layer Antireflecting Films	5	Face to face			Mid Exam	
	22.5	High-Reflective Layers	5	Face to face			Final Exam	
7	23.1	The Fresnel Equations	6	Face to face			Final Exam	
	23.2	External and Internal Reflections	6	Face to face			Final Exam	
	23.3	Phase Changes on Reflection	6	Face to face			Final Exam	
8	23.4	Conservation of Energy	6	Face to face			Final Exam	
	23.5	Evanescent Waves	6	Face to face			Final Exam	

	23.6	Complex Refractive Index	6	Face to face			Final Exam	
9	23.7	Reflection from Metals	6	Face to face			Final Exam	
	24.1	The Nonlinear Medium	7	Face to face			Final Exam	
	24.2	Second Harmonic Generation and Frequency Mixing	7	Face to face			Final Exam	
10	24.3	Electro-Optic Effects	7	Face to face			Final Exam	
	24.5	The Faraday Effect	7	Face to face			Final Exam	
	24.6	The Acousto-Optic Effect	7	Face to face			Final Exam	
11	24.7	Optical Phase Conjugation	7	Face to face			Final Exam	
	25.1	Polarization of a Dielectric Medium	8	Face to face			Final Exam	
	25.2	Propagation of Light Waves	8	Face to face			Final Exam	
12	25.3	Conduction Current in a Metal	8	Face to face			Final Exam	
	25.4	Propagation of Light Waves in a Metal	8	Face to face			Final Exam	
	25.5	Skin Depth	8	Face to face			Final Exam	

13	25.6	Plasma Frequency	8	Face to face				
	26.1	Rate Equations	9	Face to face				
	26.2	Absorption	9	Face to face				
14	26.3	Gain Media	9	Face to face				
	26.4	Steady-State Laser Output	9	Face to face				
	26.5	Homogeneos Broadening	9	Face to face				
15	26.6	Inhomogenes Broadening	9	Face to face				
	26.7	Time-Dependent Phenomena	9	Face to face				
	26.8,10	Pulsed Operation Diode Lasers	9	Face to face				

22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
Quiz	20	Chapter 4,15,22	1,2,3	1-7	Face to face
Mid Exam	30	Chapters 4,15,14,22,23	1,2,3	Week 8	Face to face
Final Exam	50	All chapters	1,2,3	Week16	Face to face

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23 Course Requirements

(e.g: students should have a computer, internet connection, webcam, account on a specific software/platform…etc):

24 Course Policies:

A- Attendance policies: B- Absences from exams and submitting assignments on time: C- Health and safety procedures: D- Honesty policy regarding cheating, plagiarism, misbehavior: E- Grading policy: F- Available university services that support achievement in the course:

25 References:

A- Required book(s), assigned reading and audio-visuals: Introduction to Optics , 3rd edition by Frank L.pedrotti, S., J, LENO M. PEDROTTI, LENO S. PEDROTTI B- Recommended books, materials, and media:

26 Additional information:

Name of Course Coordinator: ----------Signature: ---------- Date: ----------
Head of Curriculum Committee/Department: ---------- Signature: ----------
Head of Department: ---------- Signature: ----------
Head of Curriculum Committee/Faculty: ---------- Signature: ----------
Dean: ---------- Signature: ----------