مركز الاعتماد وضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER

Course Syllabus

1	**Course title**	Optics II
2	**Course number**	(PHY 0302321)
3	**Credit hours**	3
	Contact hours (theory, practical)	(3,0)
4	**Prerequisites/corequisites**	(PHY 0302321)
5	**Program title**	B.Sc.
6	**Program code**	
7	**Awarding institution**	The University of Jordan
8	**School**	School of Science
9	**Department**	Department of Physics
10	**Course level**	Bachelor
11	**Year of study and semester(s)**	2022, Fall
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……
16	**Issuing/Revision Date**	20/11/2022

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17 Course Coordinator:

Name: Yahya Al-ramadin	Contact hours: S, T, Th : 8.30 – 9.30
Office number: 304	Phone number: 0777659911
Email: Y.ramadin@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:

This course Optics (part II) (Phy 0302321) is intended for the senior undergraduate students who have already studied part I; namely Optics I (PHY 3620. . Accordingly, the focus is on the applications and little emphasis is left on formalism).

20 Course aims and outcomes:

A- Aims:

Introductory lecture. .
Elecromagnetic Waves.
Production of Polarized Light.
Matrix Treament of Polarization.
Theory of Multilayer Films.
Fresnel Equations.
Non- Linear Optics.
Optical Properties of Materials.
Laser Operation
.
.
.

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:

SLO (1) Master professionally a broad set of knowledge concerning the fundamentals in the basic areas of physics: Quantum Mechanics, Classical Mechanics, Electrostatics and Magnetism, Thermal Physics, Optics, Theory of Special Relativity, Mathematical Physics, Electronics.

SLO (2) Apply knowledge of mathematics and fundamental concepts in the basic areas of physics to identify and solve physics related problems.

SLO (3) Utilize computers and available software in both data collections and data analysis.

SLO (4) Utilize standard laboratory equipment, modern instrumentation, and classical techniques to design and conduct experiments as well as to analyze and interpret data.

SLO (5) Develop a recognition of the need and ability to engage in life-long learning.

SLO (6) Demonstrate ability to use techniques, skills, and modern scientific tools necessary for professional practice.

SLO (7) Communicate clearly and effectively in both written and oral forms.

SLO (8) Apply proficiently team-work skills and employ team-based learning strategies.

SLO (9) Apply professional and ethical responsibility to society.

21. Topic Outline and Schedule:

Attached is the syllabus which describes the topics to be covered in chronological order.

Week	Lecture	Topic	Intended Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous/ Asynchronous Lecturing	Evaluation Methods	Resources
1	1-1							
	1-2							
	1-3							
2	2-1							
	2--2							
	2-3							
Week	**Lecture**	**Topic**	**Intended Learning Outcome**	**Learning Methods (Face to Face/Blended/ Fully Online)**	**Platform**	**Synchronous/ Asynchronous Lecturing**	**Evaluation Methods**	**Resources**
3	3.1							
	3.2							
	3.3							
4	4.1							
	4.2							
	4.3							
5	5.1							
	5.2							
	5.3							
6	6.1							
	6.2							
	6.3							
7	7.1							

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	7.2							
	7.3							
8	8.1							
	8.2							
	8.3							
9	9.1							
	9.2							
	9.3							
10	10.1							
	10.2							
	10.3							
11	11.1							
	11.2							
	11.3							
12	12.1							
	12.2							
	12.3							
13	13.1							
	13.2							
	13.3							
14	14.1							
	14.2							
	14.3							
15	15.1							
	15.2							
	15.3							

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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
First Exam	20	Chapters 4-8, & 4-9 15.1And 14	1	8th Week	On campus
Second Exam	30	Chapters22,23	2	13th Week	On campus
Final Exam	50	Chapters 4,15,14,22,23, 24	1,2,3	16th Week	On campus

23 Course Requirements

Students are directed and encouraged to use all possible resources:
a) use the internet as a learning source.
b) a series of short movies is promoted
c) students are encouraged to learn a suitable software package as a learning tool.

24 Course Policies:

A- Attendance policies:

No more than 15% of classes can be missed under any circumstances. The students are supposed to be on time for each session and will not be admitted after 10 minutes from the starting time.

B- Absences from exams and submitting assignments on time:

Assignments are only taken if submitted on time and no make ups for short quizzes.

C- Health and safety procedures:

The lectures are located in proper locations for best lecturing conditions.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

Any act of cheating or plagiarism is not tolerated and the students are clearly required to submit their own work.

E- Grading policy:

The grading for this course is divided into: 50 % midterm exams, and 50% final exam.

F- Available university services that support achievement in the course:

A proper library and well-furnished lab.

25 References: ,

A- Required Text book, assigned reading and audio-visuals:

Introduction to Optics. Third Edition by :

F. L. Pedrootti ,

Leno M. Pedrotti

And L. S, Pedrotti

B- Recommended books, materials, and media:

- References: any introductory book on a level comparable to our textbook.
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- Introduction to Classical & Modern Optics by:
- R. Meyer
-
- Optics by E. Hecht
-
-

26 Additional information:

Name of Course Coordinator: Y, Ramadin ---Signature: Yahya --Date: Noveember 20/ -2022----------
Head of Curriculum Committee/Department: ---------- Signature: ----------
Head of Department: ---------- Signature: ----------
Head of Curriculum Committee/Faculty: ---------- Signature: ----------
Dean: ---------- Signature: ----------

Optics) II (PHY 321) – Fall semester, 2022

- Instructor: Yahya Ramadin.
- This course (part II) is intended for the senior undergraduate students who have already studied part I Optics I (PHY 320). Accordingly, the focus is on the applications and little emphasis is left on formalism .
- Required textbook: Introduction to Optics, 3rd edition Pearson
- References: any introductory book on a level comparable to our textbook. Recommended titles (among others): Introductory Optics II.
- Self-reading titles: Polaization of Eletromagnetic Theory , Matrix Representation ,
- Multilayer Films & Applications
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- Grading: Two mid-term exams (both will count 50% of the cumulative grade) and final comprehensive exam (counts 50% of the cumulative grade).
- The content of the lectures below describes what is planned for the lectures a.

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- Topics to be covered in chronological order:

Lecture	Section	Theme	Digression	Problem-solving application
10/10/2022	Section 4-8-	Elecromagnetic Waves , Plane wave, $E = E_o \cos (k r - w t)$ $B = B \cos (k .r - w t)$ $E = v B$	Example 4 -2	P 4 - 3
12/10/2022	4-8	. The energy density $U = 2U_e = 2U_m = {}^{e} E^{2}$ Power = u c A The power per unit area (A) S = u c	.	P4-6 ,& P. 4- 24
17/10/2022	8-9	Polrization of Light.		P4 -7
19/10/2022	15	Production of Polarized light.	.	P..
24/10/2022	15-1	Dichrroism.	.	P 1 5 – 5, P15-7
26/10/2022	15- 2	By Reflection	-Example 15 - 1	P15 – 10 & P15 –12
31/10/2022	15 - 3	B y Scattering.		P15 - 12 .
2/11/2022	15-4	By Birefringeence.		P15- 12 & P. 15 – 16
7/11/2022	14	.Matrix Treatment of Polarization		.
9/11/2022	14-1	Jones Vector	Into Dimesions	P 14 – 1 & 14- 2
14/11/2022	14- 2	Maqthmatical Representation of Polarizer : Jones Matrices	Example 14 - 1.	PP 3 3 & P 14 – 4
16/11/2022	14 -2	.Retarder & Rotater	Example 14 - 2.	P14 – 6 14 – 8

21/11/2022	14-2	Jones Matrices.	Example 14 - 2)	P14 – 10 & 14 – 13
23/11/2022	14	Jones Vector for 1- Linear polarized Light 2- Circular. Polarized light 3- Elliptically Pol. Light	-	P 14 - 20.
6/11/2022	**First Exam: This is a closed-book exam covers all the materials of chapters 4 – 8 .4 – 9 , 15, & 14 . The answer key will be provided right after the end of the exam.**			
30/11/2022	8.1	The Variational principle. Compare footnote 19 on page 36 with footnote 18 on page 103!	Gaussian integrals: P.2.21.	-
5/12/2022	8.1	The Variational principle (cont.)	Step function & Delta function: P.2.23 & P.2.24.	-Ex.8.3 vs P.8.3 & P.8.2 vs P.8.18. -P.8.19 & P.8.21.
7/12/2022	8.2	-The ground state of Helium. -The screening effect.	Sec.5.2.1: brush up & P.4.19.	-
12/12/2022	8.2	The ground state of Helium (cont.).	Anti-screening in QCD.	P.8.7 & P.5.15.
14/12/2022	10.1	The scattering amplitude.	-	-
19/12/2022	10.1	The scattering amplitude (cont.).		P.10.2 & P.2.53.
21/11/2022	10.2	Partial wave technique.	-Table 4.4. -Consult **[B]** Sec. 12.17.	-
26/12/2022	10.2	Partial wave technique (cont.).	-	P.10.4.
28/12/2022	10.3	Phase shifts.	-	-
2/1/2023	**Second Exam: This is a closed-book exam covers all the materials of chapter 8. The answer key will be provided right after the end of the exam.**			
4/1/2023	10.3	Phase shifts (cont.).	-	P.10.5 & P.10.6.
9/1/2023	10.4	The Born approximation technique.	Consult **[B]** Sec.14.3.	-
11/1/2023	10.4	The Born approximation technique (cont.).	-	P.10.10 & P.10.13.
16/1/2023	10.4	-The Born approximation technique (cont.). -Epilogue.	-	Yukawa potential: [Ex.10.5, P10.11 & P.10.12] vs Gaussian potential [P.10.20].

22/1/2023	**Final Exam: This is a closed-book comprehensive exam covers all the materials of the course.**