Form: Course Syllabus	Form Number	EXC-01-02-02A
	Issue Number and Date	2/3/24/2022/2963 05/12/2022
	Number and Date of Revision or Modification	
	Deans Council Approval Decision Number	2/3/24/2023
	The Date of the Deans Council Approval Decision	23/01/2023
	Number of Pages	06

1.	**Course Title**	Advanced Practical Physics
2.	**Course Number**	0352712
3.	**Credit Hours (Theory, Practical)**	3
	Contact Hours (Theory, Practical)	(2, 3)
4.	**Prerequisites/ Corequisites**	None
5.	**Program Title**	Physics
6.	**Program Code**	2
7.	**School/ Center**	Science
8.	**Department**	Physics
9.	**Course Level**	Graduate
10.	**Year of Study and Semester (s)**	2nd Semester 2023/2024
11.	**Other Department(s) Involved in Teaching the Course**	None
12.	**Main Learning Language**	English
13.	**Learning Types**	[X] Face to face learning ☐ Blended ☐ Fully online
14.	**Online Platforms(s)**	☐ Moodle [X] Microsoft Teams
15.	**Issuing Date**	March 2024
16.	**Revision Date**	November 2024

17. Course Coordinator:

Name: Sami H. Mahmood

Contact hours: 1:30 – 4:30 pm, Thursday

Office number:17

Phone number: 22023

Email: s.mahmood@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. This course starts with an introduction on experimental methods and measurements. Then, a set of experiments based on the research facilities in the department should be carried out by the students after they become familiar with the relevant research methodology. A paper should be submitted including the data analysis, results and discussions, and the conclusions of each experiment. The course schedule consists of one theoretical hour a week for lecturing, and five practical hours a week for experimental work.

20. Program Intended Learning Outcomes: (To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

1. **ILO1:** to be able 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. **ILO2:** to be able to formulate or design a scientific system, process, procedure or program to contribute achieving scientific desired needs.
3. **ILO3:** to be able to develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgment to draw conclusions.
4. **ILO4:** to be able to communicate his/her scientific contributions effectively with a range of audiences.

5. **ILO5:** to be able to recognize and demonstrate social, ethical and professional responsibilities and the impact of technical and/or scientific solutions in global economic, environmental, and societal contexts.
6. **ILO6:** to be able to function effectively independently and on teams for establishing goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

21. Course Intended Learning Outcomes: (Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

1. Analyze XRD data and infer various structural information.

2. Analyze DSC curves to identify phase transitions in materials.

3. Analyze SEM images and determine the particle size distribution in a powder sample.

4. Inspect AFM images of surfaces and describe the surface morphology.

5. Communicate and collaborate with teammates and classmates.

6. Discuss, interpret, and report the experimental results with proper referencing.

Course ILOs	The learning levels to be achieved					
	Remembering	**Understanding**	**Applying**	**Analysing**	**evaluating**	**Creating**
1				✓		
2				✓		
3				✓		
4		✓	✓			
5		✓	✓		✓	
6		✓	✓		✓	✓

٢٢. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

Program ILOs / Course ILOs	ILO (1)	ILO (2)	ILO (3)	ILO (4)	ILO (5)	ILO (6)
1	✓		✓			
2	✓		✓			
3	✓		✓			
4	✓		✓			
5				✓	✓	✓
6	✓		✓	✓	✓	✓

٢٣. Topic Outline and Schedule:

Week	Topic	ILO/s Linked to the Topic	Learning Types (Face to Face/ Blended/ Fully Online)	Platform Used	Synchronous / Asynchronous Lecturing	Evaluation Methods	Learning Resources
1	Introduction	To acquire background knowledge concerning the scope of the course and properties of solids	Face to face			Oral discussion	
2	Structural analysis	To acquire general knowledge concerning the structural properties of materials and	Face to face			Oral discussion	PPT and main solid state physics books

Learning Resources

		the use of X-ray diffraction					
Week	**Topic**	**Intended Learning Outcome**	**Learning Methods (Face to Face/Blended/ Fully Online)**	**Platform**	**Synchronous / Asynchronous Lecturing**	**Evaluation Methods**	**Resources**
3	Theory of X-ray diffraction analysis and interpretation	To acquire knowledge on theoretical background relevant to XRD data analysis	Face to face			Oral discussion	PPT and main solid state physics books
4	Students' presentations on the structural defects in crystalline solids	To be able to deliver a presentation, and respond to questions and suggestions	Face to face			PPT presentations and discussion with the audience	
5	Practical session on the XRD Data collection and analysis	To be familiar with the XRD instrumentation and data collection techniques	Face to face				
6	XRD data analysis	To be able to use practical skills for the XRD analysis	Face to face			Oral discussion	
7	Official holiday (Eid)						
8-9	Structural analysis of	To be able to perform sound analysis of experimental	Face to face			Discussing the results of structural data analysis	

	iron metal powder	data, determine experimental uncertainties, and construct a proper scientific report with appropriate discussion and interpretation of the structural results				with each student	
10	Structural analysis of sodium chloride	To be able to construct a proper scientific report with appropriate discussion and interpretation of the structural results	Face to face			Discussing the results of structural data analysis with each student	
11	Practical session on the DSC data collection and analysis	To be familiar with the DSC instrumentation and data collection techniques	Face to face				
12	Practical session on SEM data collection and analysis	To be familiar with the SEM imaging, instrumentation and data collection techniques	Face to face				
13	Practical session on AFM data collection and analysis	To be familiar with the AFM instrumentation and imaging	Face to face				
15-16	Final exams						

٢٤. Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	ILO/s Linked to the Evaluati	Period (Week)	Platfor
Report and presentation	20 %	Report on the structural defects in solids	ILO5	2 – 4	
Experimental reports on the structural analysis	40 %	Structural characteristics of iron (bcc) powder and NaCl (fcc) powder	ILO1, ILO6	8 – 10	
Final Exam	40 %	All material of the course	ILO1, ILO2, ILO3, ILO4	End of semester	

٢٥. Course Requirements:

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

Students should have a personal computer equipped with Origin software (or equivalent) for data analysis

٢٦. Course Policies:

A- Attendance policies: Student's should attend every session; they cannot miss more than two sessions even with a proper excuse.

B- Absences from exams and submitting assignments on time: No late assignments are accepted. No absence from the final exam is accepted unless it is justifiable, in which case an alternative evaluation and a makeup exam will be offered.

C- Health and safety procedures: Safety measures should be followed during all lab sessions.

D- Honesty policy regarding cheating, plagiarism, misbehavior: all students are expected to have the highest levels of honesty and no plagiarism is tolerated in any of the students' reports.

E- Grading policy: Every student will be able to see his/her evaluation grade and graded reports are returned as soon as possible.

F- Available university services that support achievement in the course: A fully furnished lab with computer facility for data analysis is available for the students.in the course:

٢٧. References:

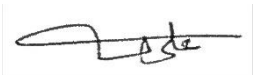
A- Required book(s), assigned reading and audio-visuals:

[1] PPT presentations

B- Recommended books, materials, and media:

[2] Main books of Solid State Physics
[3] Warren, X-ray Diffraction, (Addison-Wesley, London, 1969)
[4] Philip R. Bevington and D. Keith Robinson, Data Reduction and Error Analysis for the Physical Sciences, 3rd ed., (McGraw-Hill, Boston, 2003)

2٨. Additional information:

Name of the Instructor or the Course Coordinator:	Signature:	Date:
Sami Mahmood		24/11/2024
Name of the Head of Quality Assurance Committee/ Department	Signature:	Date:
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Name of the Head of Department	Signature:	Date:
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Name of the Head of Quality Assurance Committee/ School or Center	Signature:	Date:
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Name of the Dean or the Director	Signature:	Date:
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