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	09

1.	**Course title**	Electricity and Magnetism-1
2.	**Course number**	0302331
3.	**Credit hours**	3
	Contact hours (theory, practical)	3 hours weekly (theory)
4.	**Prerequisites**	Mathematical Physics-2
5.	**Program title**	B.Sc. in Physics
6.	**Program code**	
7.	**Awarding institution**	The University of Jordan
8.	**School**	Science
9.	**Department**	Physics
10.	**Course level**	3rd year
11.	**Year of study and semester(s)**	
12.	**Other department(s) involved in teaching the course**	none
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**	4/10/2025

17. Course Coordinator:

Name: Usama al Khawaja	Contact hours: Sunday, Tuesday 10:30-12:30
Office number:	Phone number:
Email: u.alkhawaja@ju.edu.jo	

18. Other Instructors:

Name:
Office number:
Phone number:
Email:
Contact hours:

19. Course Description:

As stated in the approved study plan. Electrostatics: electrostatic field, electrostatic potential, work and energy in electrostatics, conductors. Calculation of electrostatic potentials: Laplace's equation, the method of images, separation of variables, multipole expansion. Electrostatic fields in matter. Magnetostatics. Magnetostatic fields in matter.

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. 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.

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

1. Apply advanced mathematical techniques and methods in solving electromagnetic problems and understand and explain the physical meanings of final solutions.

2. Use symmetries to simplify solutions of electromagnetic problems.

3. Apply Coulomb's Law and superposition principle to calculate electric fields due to point or continuous charge distributions.

4. Apply Gauss's Law in integral form to compute electric fields due to symmetric charge distributions and in differential form to compute the charge density ρ from a known electric field **E**.

5. Compute the electric potential of a localized charge distribution and calculate the electric field from the electric potential and vice versa.

6. Calculate the energy stored in a charge distribution.

7. Use method of images to determine the electric potential in a region and solve Laplace's equation to determine the electric potential in a region for specified potentials or charge distributions at the boundary.

8. Calculate the field of a polarized object and determine bound charges in a dielectric material. Identify the relations between the electric field **E**, the polarization **P**, and the electric displacement **D** and the appropriate boundary conditions on **D** for the special case of linear dielectrics.

9. Apply Biot-Savart Law and Ampère's Law to compute magnetic fields due to various current distributions.

10. Compute the vector potential for various current distributions and calculate the magnetic field from the vector potential.

11. Calculate the magnetic field of a magnetized object and compute the bound surface and volume currents. Identify the relations between the magnetic field **B,** the magnetization **M** and the auxiliary field **H** and the appropriate. boundary conditions on **H** for the special case of linear media.

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

3			✓			
4			✓			
5			✓			
6			✓			
7			✓	✓	✓	
8			✓			
9			✓			
10			✓			
11			✓			

22. 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	✓					
7	✓					
8	✓					
9	✓					
10	✓					
11	✓					

23. Topic Outline and Schedule:

Week	Lecture	Topic	ILO/s Linked to the Topic	Learning Types (Face to Face/ Blended/	Platform Used	Synchronous / Asynchronous Lecturing	Evaluation Methods	Learning Resources
1	1.1	Electrostatics	1-6	Face to Face	Microsoft Teams	Synchronous	Quiz, Midterm Exam, Final Exam	"Introduction to Electrodynamics," David J. Griffiths, 4th Edition, Pearson 2012.
	1.2							
	1.3							
2	2.1							
	2.2							
	2.3							
3	3.1							
	3.2							
	3.3							
4	4.1	Special Techniques (Potentials)	1,2,5,7					
	4.2							
	4.3							
5	5.1							
	5.2							
	5.3							
6	6.1							
	6.2							
	6.3							
7	7.1	Electric Fields in Matter	1,2,8					
	7.2							
	7.3							
8	8.1							
	8.2							
	8.3							
9	9.1							
	9.2							

	9.3							
10	10.1	Magnetostatics	1,2,9,10					
	10.2							
	10.3							
11	11.1							
	11.2							
	11.3							
12	12.1							
	12.2							
	12.3							
13	13.1	Magnetic Fields in Matter	1,2,11					
	13.2							
	13.3							
14	14.1							
	14.2							
	14.3							
15	15.1							
	15.2							
	15.3							

24. Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
First Exam	25%	Electrostatics	1-6	5	Paper Quiz
Midterm Exam	25%	Special Techniques (Potentials), Electric Fields in Matter	1,2,7,8	9	Paper Exam
Final Exam	50%	All topics	1-11	16	Paper Exam

25. Course Requirements:

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

Textbook, computer, and internet access.

26. Course Policies:

A- Attendance policies:

Students are expected to attend all classes. Absence should not exceed 15%.

B- Absences from exams and submitting assignments on time:

Exam makeups will be arranged for students with valid absence excuses.

C- Health and safety procedures:

Students are required to abide by all mandated health and safety procedures.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

Cheating, plagiarism, and misbehavior will be dealt with according to University regulations.

E- Grading policy:

First Exam: 25%, Midterm Exam: 25%, Final Exam: 50%.

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

Microsoft Teams, E-Learning platform, Moodle.

27. References:

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

1. "Introduction to Electrodynamics," David J. Griffiths, 4th Edition, Pearson 2012.

2. "Introduction to Electrodynamics," David J. Griffiths, 3rd Edition, Prentice Hall, New Jersey, 1999 (will be fine, but numbers of examples and problems may be different than Ref.1).

B- Recommended books, materials and media:

1. "Classical Electrodynamics" 3rd Edition, by John David Jackson, Wiley.
2. "Electromagnetic fields and waves: including electric circuits," Paul Lorrain, Dale R. Corson, and Francois Lorrain, 3rd Edition, Freeman, New York,1988.

28. Additional information:

Name of the Instructor or the Course Coordinator: Usama Al Khawaja	Signature:	Date: 5/10/2025
Name of the Head of Quality Assurance Committee/ Department	Signature:	Date:
……	……..……	……..……
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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