



The Hashemite University
Faculty of Science
Department of Physics

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| Course Title: | Electromagnetism (1) | Course Number: | 110102331 |
| Semester: | Fall | Year: | 2022/2023 |
| Designation: | Compulsory | Prerequisite(s): | 110102282 and 1 |
| Instructor: | Dr. Gassem Alzoubi | Instructor's e-mail: | gassem@hu.edu.jo |
| | | Webpage: | http://staff.hu.edu.jo/gassem |
| Office Hours: | Sunday, Tuesday, and Thursday, 10:00 – 11:00 Pm, Physics Building, Room # 107 | | |

Course Description (catalog): Physics 331 is the first course of our two-semester sequence of classical electromagnetism. It introduces students to a variety of topics in electricity and magnetism, with vector calculus being used to study the static and dynamic properties of electromagnetic fields. Topics covered in this course include special cases of static charge distributions (electrostatics), time-independent current distributions (magnetostatics), and the electric and magnetic properties of matter.

Textbook(s) and/or Other Supplementary Materials:

Textbook: Introduction to Electrodynamics, Fourth Edition by David J. Griffiths (Cambridge University Press, 2017)

References:

- (1) Electromagnetism, First edition by Pollack and Stump (Addison-Wesley, 2001),
- (2) Electricity and Magnetism, Illustrated edition, by Nayfeh & Brussel (Dover Publications, 2015)

Major Topics Covered:

| Topics | No. of Weeks | Contact hours* | Chapter in Text | Sections | Suggested Problems (from textbook 9 th edition) |
|--------------------------------|--------------|----------------|-----------------|----------|--|
| Electrostatics | 4 | 12 | 2 | 2.1-2.5 | HW#1: 2.5, 2.6, 2.7, 2.13, 2.14, 2.16 HW#2: 2.20, 2.22, 2.23, 2.25, 2.34, 2.39, 2.42, 2.43, |
| Potentials | 4 | 12 | 3 | 3.1-3.4 | HW#3: 3.7, 3.9, 3.10, HW#4: 3.15, 3.18, 3.19, 3.24, 3.26 HW#5: 3.27, 3.29, 3.30, 3.32, 3.34 |
| First Exam | | | | | |
| Electrostatic Fields in Matter | 4 | 12 | 4 | 4.1-4.4 | HW#6: 4.4, 4.5, 4.8, 4.12, 4.14 HW#7: 4.6, 4.18, 4.21, 4.26, 4.28 |
| Second Exam | | | | | |
| Magnetostatics | 3 | 9 | 5 | 5.1-5.4 | HW#8: 5.4, 5.5, 5.6, 5.8, 5.9, 5.12, 5.14, 5.16 HW#9: 5.23, 5.25, 5.27, 5.34, 5.35, 5.37 |
| Final Exam | | | | | |
| Total | 15 | 45 | | | |

*Contact hours include lectures and exams

Specific Outcomes of Instruction (Course Learning Outcomes):

After completing the course, the student will be able to:

| | Course Learning Outcomes (CLO) | (SO*) |
|--------------|---|---------------|
| CLO1. | Develop a clear understanding of basic physical concepts in electrodynamics as an integral part of the student's overall education | (a), (k), (i) |
| CLO2. | Use vector calculus in solving problems in electrodynamics | (a), (k) |
| CLO3. | Provide detailed and accurate descriptions of of coulomb's law, Laplace's Equation and its applications, solution of Laplace's Equation using method of images, separation of variables, and multipole expansion, polarization and linear dielectrics, the Lorentz force law, the Biot-Savart law, magnetic, Ampère's Law, and vector potential | (a), (e) (k) |

(SO*) = Student Outcomes Addressed by the Course.

Student Outcomes (SO) Addressed by the Course:

| # | Outcomes Description | Contribution |
|-------------------------------|--|--------------|
| | Applied and Natural Sciences Student Outcomes | |
| (a) | an ability to apply knowledge of mathematics, science, and applied sciences | H |
| (b) | an ability to design and conduct experiments, as well as to analyze and interpret data | |
| (c) | an ability to formulate or design a system, process or program to meet desired needs | |
| (d) | an ability to function on multidisciplinary teams | |
| (e) | an ability to identify and solve applied sciences problems | L |
| (f) | an understanding of professional and ethical responsibility | |
| (g) | an ability to communicate effectively | |
| (h) | the broad education necessary to understand the impact of solutions in a global and societal context | |
| (i) | a recognition of the need for, and an ability to engage in life-long learning | |
| (j) | a knowledge of contemporary issues | |
| (k) | an ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice. | M |
| H = High, M = Medium, L = Low | | |

Grading Plan:

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|----------------------|-----------|-----|
| 1 st Exam | 30 Points | TBA |
| 2nd Exam | 30 Points | TBA |
| Final exam | 40 Points | TBA |

General Notes: **Attendance Policy:** students are expected to attend every class and arrive on time in compliance with HU regulations. In case you find yourself in a situation that prevents you from attending class or exam, you have to inform your instructor. If you miss more than 6 classes for the (Sunday, Tuesday, and Thursday model) or 4 classes for the (Monday and Wednesday Model), you cannot pass the course. Makeup excuses will be accepted only for very limited justified cases, such as illness and emergencies.

Prepared by: Dr. Gassem Alzoubi **Date:** Oct, 9, 2022