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|  | **Mutah University**  **Detailed Syllabus**  **Electromagnetic Theory II** | Description: C:\Users\lamasat.lamasat-PC\Pictures\Picture1.png |

**First:** Course Information**:**

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| --- | --- |
| * Course Number: 335 | * Course Title: Electromagnetic Theory II |
| * Credit Hours: 3 credit hours | * College: Science |
| * Pre-requisite: 334 | * Department: Physics |
| * Instructor: Dr. Moaz Altarawneh | * Semester & Academic Year:   Fall 2016/2017 |
| * The time of the lecture: 10-11 Sunday, Tuesday and Thursday | * Office Hours: 8:00-12:30 Monday+ Wednesday 2:00-4:00 Sunday, Tuesday and Thursday |

**Second:** General Course Description

The course discusses the Magnetization, the Field of Magnetized Objects, the **H** Field, The Electromotive Force, Electromagnetic Induction, Conservation of Energy and Momentum, the Wave Equation, Electromagnetic Waves in Vacuum and Matter.

**Third:** Course Objectives

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| 1. To Study the Magnetic Dipole Moment and Magnetization of Objects. |
| 1. To study the relation of Magnetic field, Magnetization, and the **H** Field of Linear and nonlinear Magnetic Materials. |
| 1. To study the Electromotive Force and the different way of creating it. |
| 1. Electro Magnetic Induction and the importance of this Induction. |
| 1. Maxwell’s Equations and their applications. |
| 1. Solving the Wave Equation in the case of Electric and magnetic Fields. |
| 1. Studying the behavior of Electro-Magnetic waves in Vacuum and Matters. |

**Fourth:** Expected Learning Outcomes

* To use Biot-Savar Law to find the magnetic field for different sources shapes.
* To employ Amperes law to calculate the magnetic field for systems with symmetry.
* To find the vector potential and H field for different configurations.
* To calculate the magnetic field due to magnetized objects.
* To know Maxwell's equations and understand the physics behind each equation.

**Fifth:** Course Plan Distribution & Learning Resources

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| --- | --- | --- |
| **Learning Resources** | **Topics to be Covered** | **Week**  **No.** |

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| --- | --- | --- | --- |
| 1,2,3,4,5,6 | | Magnetostatics   * Magnetic Force * Magnetic Field * Ampere’s Law * Vector Potential | Chapter 5 |
| 7,8,9 | | Magnetostatic Fields in Matter.   * Magnetization * The Field of Magnetized Objects * **H** Field | Chapter 6 |
| 10,11 | | Electrodynamics   * Electromotive Force * Electromagnetic Induction * Maxwell’s Equations | Chapter 7 |
| 12,13 | | Conservation Laws   * Energy * Momentum | Chapter 8 |
| 14, 15 | | Electromagnetic Waves   * The Wave Equation * Electromagnetic Waves in Vacuum * Electromagnetic Waves in Matter * Absorption Dispersion * Guided Waves | Chapter 9 |
| 16 | Potentials and Fields   * Scalar and Vector Potential * Retarded Potentials * Liěnard-Wiechert Potential | | Chapter 10 |

**Sixth:** Teaching Strategies and Methods

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| --- | --- |
| **Teaching Strategies and Methods** | No |
| Direct Instruction | **1** |
| Demonstration | **2** |
| Problem solving | **3** |
| Interactive instruction | **4** |

**Seventh:** Methods of Assessment

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| --- | --- | --- | --- |
| **Proportion of Final Evaluation** | **Evaluation Methods of** | **Week & Date** | **No.** |
| **20%** | First exam ( 4 problems) |  | **1.** |
| **20%** | Second exam ( 4 problems) |  | **2.** |
| **10%** | Homework : selected problems from each chapter. |  | **3.** |
| **50%** | Final exam.  ( comprehensive exam) |  | **4.** |
| **(100%)** |  | **Total** | |

**Eighth:** Required Textbooks

* **Primary Textbook:**

Title: Introduction to Electrodynamics

Author(s): David J. Griffiths

Publisher: Prentice-Hall International, Inc.

Year 1999

Edition: 3rd Edition or 2nd edition.

* **Secondary References**

1. Foundation of Electromagnetic Theory, by Reitz and Milford
2. Electromagnetic Fields, Roald K. Wangsness

**Ninth :** General Instructions

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| **Additional Notes, Office hours, Incomplete Exams, Reports, Papers, …etc** | **No** |
| Missing more than six class, the student will be dropped from the class. | **1** |
| Cheating is prohibited and university regulations will be followed firmly. | **2** |