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

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

|  |  |
| --- | --- |
| * Course Number: 0302334 | * Course Title: Electromagnetic Theory I |
| * Credit Hours: 3 | * College: Science |
| * Pre-requisite: Calculus3 (0301201) | * Department: Physics |
| * Instructor: Dr. Amer Al-Oqali | * Semester & Academic Year:   First Semester 2016/2017 |
| * the time of the lecture: Sun, Tues, Thurs 10-11. | * Office Hours: Sun, Tues, Thurs 12-1 |

**Second :** General Course Description

The course discusses Vector Analysis, Coulomb’s law, Electric Field, Gauss’s Law, electric Potential, Electric Potential energy, Laplace's Equation, The Method of Images, Separation of Variables, Multipole Expansion, Electric Fields in matter, Electric Polarization, and the Electric displacement Vector.

**Third :** Course Objectives

* To apply the vector Calculus in physics**.**
* To calculate the Electric Force, Field, and Potential of a general electric charge distribution.
* Use Different techniques to calculate the Electric Potential.
* To study of the monopole, Dipole, Quadrupole Fields and higher order.
* To study the behavior of the Electric Field in Matter.

**Fourth:** Expected Learning Outcomes

* Applying the Vector Calculus on Physics
* Students should be able to solve Physical problems to Determine the magnitude and direction of the Electric Force, Electric Field, Electric Potential, Vector Field using Vector Calculus.
* Use separation of variables to solve Laplace equation in different coordinate systems.

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

|  |  |  |
| --- | --- | --- |
| **Learning Resources** | **Topics to be Covered** | **Week**  **No.** |
| **Chapter 1** | Vector Analysis.   * Vector Algebra. * Vector Differential Operators. * Integral Theorems. * Curvilinear Coordinates. * Dirac Delta Function. |  |
| **Chapter 2** | Electrostatics.   * Coulomb’s Law * The Electric Field * Gauss’s Law * Potential and Poisson Equation * Work and Energy * Conductors |  |
| **Chapter 3** | Special Techniques   * Method of Images * Separation of Variables * Multipole Expansion |  |
| **Chapter 4** | Electric Fields in matter   * Polarization and Bound Charges * The Electric Displacement * Boundary Value Problems with Dielectric |  |
|  |  |  |

**Sixth :** Teaching Strategies and Methods

|  |  |
| --- | --- |
| **Teaching Strategies and Methods** | No |
|  | **1** |
|  | **2** |
|  | **3** |
|  | **4** |
|  | **5** |

**Seventh :** Methods of Assessment

|  |  |  |  |
| --- | --- | --- | --- |
| **Proportion of Final Evaluation** | **Evaluation Methods of** | **Week & Date** | **No.** |
| 25% | First Exam | 6th Week 30/10/2016 | **1.** |
| 25% | Second Exam | 12th Week 11/12/2016 | **2.** |
| 50% | Final Exam | To be announced later | **3.** |
|  |  |  | **4.** |
|  |  |  | **5** |
|  |  |  | **6** |
| **(100%)** |  | **Total** | |

**Eighth :** Required Textbooks

**- Primary Textbook:**

* *Introduction to Electrodynamics,* David J. Griffiths, 3rd Edition , 2008.

**- Secondary References**

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

**Ninth :** General Instructions

|  |  |
| --- | --- |
| **Additional Notes, Office hours, Incomplete Exams, Reports, Papers, …etc** | **No** |
|  | **1** |
|  | **2** |
|  | **3** |
|  | **4** |
|  | **5** |