# Course Profile

| Semester:Summer |
| :--- |
| Year: 2020 |
| Level/Term: 2/3 |

| I. Course Code: | EEE 225 | | |
| :--- | :--- | :--- | :--- |
| II. Course Title: | Electromagnetic Fields & Waves | | |
| III. Credit: | 3 | IV. Pre-Requisite: | N/A |
| V. Contact Hours: | Lecture- 3 hours/week | | |

**VI. Course Objectives:**

The objectives of this course are

    a) To develop the basic ideas about vectors, vector calculus& co-ordinate system.
    b) To understand the ideas of electromagnetics including Static and dynamic electromagnetic (EM) fields, energy, and power.
    c) To study and interpret Divergence theorem, Stoke's theorem, Gauss's law, Biot-Savart law, Curl, Ampere's law, Farayay's law, Boundary conditions and Maxwell's equations.
    d) To relate the knowledge of EM to important applications.

**VII. Course Outcome (COs):**

| Sl. No. | COs (Upon successful completion of this course, students should be able to) | Corresponding POs | Bloom's taxonomy domain/level* | | | Delivery Methods & activities | Assessment tools |
| :--- | :--- | :--- | :---: | :---: | :---: | :--- | :--- |
| | | | C | A | P | | |
| CO 225-1 | **Describe** the physical interpretation of vector calculus operations. | PO1 | 2 | - | - | Lectures, Tutorials | CT, Exam, Assignments |
| CO 225-2 | **Analyze** and **visualize** different types of co-ordinates system. | PO1 | 2 | 1 | - | Lectures, Tutorials | CT, Exam |
| CO 225-3 | **Interpret** visualizations of electric fields, electric scalarpotentials, magnetic fields and different theorems/laws (Divergence theorem, Stoke'stheorem, Biot-Savart law, Curl, Ampere's law, Farayay's law etc)along with boundary conditions and Maxwell's equations. | PO1 | 2 | 1 | - | Lectures, Tutorials | CT, Exam, Assignments |

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| CO 225-4 | **Apply** the knowledge and understanding to explain how electromagnetic phenomena are utilized and also the principles to perform required calculations. | PO2 | 3 | 2 | - | Lectures, Tutorials | CT, Exam |

\*C: Cognitive, A: Affective, P: Psychomotor;

## VIII. Course Plan with Detail Description:

| Session | Contents | COs |
|---------|----------|-----|
| **Week 1** | ❖ Introduction to the course.<br>❖ Discussion on vectors algebra & vector calculus<br>❖ Practice mathematical problem | 1 |
| **Week 2** | ❖ Discussion on Rectangular, cylindrical and spherical co-ordinate system<br>❖ Practice mathematical problem | 1,2 |
| **Week 3** | ❖ Coulomb's law & it's application<br>❖ Electric field intensity, electric flux density<br>❖ Field of a line charge and a sheet of charge | 3 |
| **Week 4** | ❖ Electric flux density<br>❖ Gauss law with application<br>❖ Electric field due to point charge, infinite line charge, surface charge | 1,3,4 |
| **Week 5** | ❖ Divergence theorem and related maths<br>❖ Maxwell's first equation<br>❖ Energy expanded in moving point charge in an electric field<br>❖ Line integral | 1,3,4 |
| **Week 6** | ❖ Potential field of a point charge<br>❖ Potential gradient<br>❖ Electric dipole<br>❖ Energy of an electrostatic system | 3 |
| **Week 7** | ❖ Current and current density<br>❖ Boundary condition in Electrostatics for various time varying system | 3,4 |
| **Week 8** | ❖ Resistors & capacitors and their dependence on various factors<br>❖ Capacitance of a two wire line | 3 |
| **Week 9** | ❖ Poisson's and Laplace's equations<br>❖ Examples of the solutions of Laplace's equation and Poisson's equation | 2 |
| **Week 10** | ❖ Biot-Savart law<br>❖ Curl<br>❖ Ampere's law, Stoke's theorem<br>❖ Magnetic flux and flux density | 3 |
| **Week 11** | ❖ Magnetic boundary conditions<br>❖ Magnetic Forces<br>❖ Inductance and Mutual Inductance | 3 |
| **Week 12** | ❖ Faraday's law<br>❖ Maxwell's equations in point and integral form<br>❖ The retarded potentials | 3 |

## IX. Evaluation Policy:

| Marks  Distribution: | | Attendance | 10% | |
|---|---|---|---|---|
| | | Quiz | 20% | |
| | | Assignment | 10% | |
| | | Presentation | 10% | |
| | | Final Exam | 50% | |
| | | **Total** | **100%** | |
| Grading System: | As per DIU rule | | | |

## X. Resources:

Textbook(s):
[1] Engineering Electromagnetics, W.H. Hayt
[2] Elements of Electromagnetics, Matthew N. O. Sadiku

Reference(s):
 [1] Fundamentals of Engineering Electromagnetics, David K, Cheng

## XI. Course Link in Moodle/Google Class Room:

Moodle Link: https://elearn.daffodilvarsity.edu.bd/course/view.php?id=5644

Google Classroom Code: xrcor5i

## XII. Course Instructor(s):

- Name: Dr. M. ShamsulAlam
  Designation: Professor & Dean
  Department of EEE
  Faculty of Engineering
  Email: eeesa@daffodilvarsity.edu.bd
  Cell: 01713109917