**Course description form**

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| 1. **Course Name**
 |
| Electromagnetics I |
| 1. **Course Code**
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| EP208 |
| 1. **Semester/Year**
 |
| 1st Semester/Second Year |
| 1. **The date this description was prepared**
 |
| 1/9/2023  |
| 1. **Available forms of attendance**
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| Face-to-Face theoretical lectures |
| 1. **Number of study hours (total) / number of units (total)**
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| 30/6 |
| 1. **Name of the course administrator**
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| Name: Ass. Lect. Yasir Ghazi RashidEmail:yasserghazee\_enge@uodiyala.edu.iq |
| 1. **Course objectives**
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| The main goal of studying the electromagnetic theory course is to identify the basic principles of this theory, as follows• Study vectors in general in systems of perpendicular, cylindrical and spherical axes. And also a study of field dispersion, Chaos's theorem, field rotation, Stock's theorem, and finally Crane's theorem.• Studying the stable electric field in vacuum and treating the Laplace and Poisin equations and their solutions in Cartesian, cylindrical and spherical coordinate systems. Also, a study of the electric dipole and electric quadrupole, the single solution theorem, and the method of electrical images.• Study the stable electric field in insulating materials and understand the phenomenon of polarization in these materials. In addition to calculating electrical displacement, electrical influence, and dielectric constant, as well as studying the Laplace and Poise equations in insulating materials. | **Objectives of the study subject** |
| 1. **Teaching and learning strategies**
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| * Weekly lectures included providing students with the basics and topics related to the pre-skills education outcomes to solve practical problems through presentation, lecture, or conducting experiments.
* Solve a group of practical and applied examples by faculty members.
* Through discussion, students participate in solving some practical problems.
* Practical laboratories in the department are monitored by faculty members in the department.
* Asking the student to visit the library and the international information network (the Internet) to obtain additional knowledge of the academic subjects.
* Presenting a seminar to the student in front of his fellow students to enhance his self-confidence.
 | **The Strategy**  |
| 1. **Course structure**
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| Interpolation and solving differential equations. | **Learning method** | **Required learning outcomes** | **Name of the unit or topic**  | **Hours** | **Week** |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | An introductory introduction to electromagnetic fields and their importance in electrical engineering | **Electromagnetics Overview***What is electromagnetics? Why study electromagnetics? Course topics* | 2 | 1 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Vector review | **Vector Algebra:***Scalars and Vectors; Unit Vector; Vector Addition and Subtraction; Position and Distance Vectors; Vector Multiplication; Components of a Vector* | 2 | 2 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Learn about coordinate systems, transformation, and vector calculations | **Coordinate Systems and Transformation:***Cartesian Coordinates (x, y, z); Circular Cylindrical Coordinates (ρ,* $φ$*, z); Spherical Coordinates (r,* $∅$*,* $φ$*); Constant-Coordinate Surfaces, the transformation between coordinate system.***Vector Calculus:***Differential Length, Area, and Volume; Line, Surface, and Volume Integrals Del Operator; Gradient of a Scalar; Divergence of a Vector and Divergence Theorem.* | 4 | 3&4 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Study of Coulomb's law and electric field intensity | **Coulomb's Law and Electric Field Intensity:***The experimental law of Coulomb, Electric field intensity; Field of n point charges; Electric fields due to continuous charge distributions (line charge, surface charge and volume charge distributions), Steam line and sketches of fields; Electric flux density.* | 6 | 5&6&7 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Study of Chaos' law and its applications | **Gauss's Law-Electric Flux Density:***Gauss's law; Some symmetrical charge distribution, Application of gauss's law; Maxwell's first equation (for electrostatics); The vector operator and the divergence theorem.* | 6 | 8&9&10 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Identify the electric field intensity | **Electrostatic Fields***Coulomb’s Law and Field Intensity; Electric Flux Density, and Gauss’s Law; Applications of Gauss’s Law; Energy and Potential.* | 4 | 11&12 |
| Daily, oral, monthly, written examinations and reports | Whiteboard and Data show | Learn how to calculate energy and electrical magnitude Difference | **Energy and Potential:***Energy and potential-energy expended in moving a point charge in an electric field; The line integrals; Potential difference and potential, The potential field of a point charge; The potential field of a system of charges; Conservative property; Potential gradient; The dipole energy density in the electrostatic field.* | 6 | 13&14&15 |
| 1. **Course Evaluation**
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| Distribution of the grade out of 100 according to the tasks assigned to the student, such as daily preparation, daily, oral, monthly, written exams, reports, etc.

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| 10% (10) | **Quizzes** |
| 10% (10) | **Assignments** |
| 10% (10) | **Projects**  |
| 10% (10) | **Report** |
| 40% (40) | **Annual quest** |
| 60% (60) | **Final Exam** |
| 100% (100 Marks) | **Total assessment** |

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| 1. **Learning and teaching resources**
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| Matthew, N. O. "Sadiku Elements of Electromagnetics." (2018). | Required textbooks (methodology, if any) |
| Electromagnetics By Joseph Edminister (Schaum’s Outline Series) : Joseph Edminister, Vishnu Priye Mc Graw Hill Education | Main references (sources) |
| All scientific magazines and periodicals related to electromagnetic fields | Recommended supporting books and references (scientific journals, reports....) |
| https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering | Electronic references, Internet sites |