**BSc. program, Electrical and Electronic Engineering Department**

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| |  | | --- | | **Course Unit Title** | | | | | | | Electromagnetic Theory | | | | | |
| |  | | --- | | **Course Unit Code** | | | | | | | EE 216 | | | | | |
| |  | | --- | | **Type of Course Unit** | | | | | | | Compulsory | | | | | |
| |  | | --- | | **Level of Course Unit** | | | | | | | 2nd year BSc program | | | | | |
| |  | | --- | | **National Credits** | | | | | | | 3 | | | | | |
| |  | | --- | | **Number of ECTS Credits Allocated** | | | | | | | 5 | | | | | |
| |  | | --- | | **Theoretical (hour/week)** | | | | | | | 4 | | | | | |
| |  | | --- | | **Practice (hour/week)** | | | | | | | - | | | | | |
| |  | | --- | | **Laboratory (hour/week)** | | | | | | | - | | | | | |
| |  | | --- | | **Year of Study** | | | | | | | 2 | | | | | |
| |  | | --- | | **Semester when the course unit is delivered** | | | | | | | 4 | | | | | |
| |  | | --- | | **Course Coordinator** | | | | | | | Assist.Prof. Dr. Refet Ramiz | | | | | |
| |  | | --- | | **Name of Lecturer (s)** | | | | | | | Assist.Prof. Dr. Refet Ramiz | | | | | |
| |  | | --- | | **Name of Assistant (s)** | | | | | | | - | | | | | |
| |  | | --- | | **Mode of Delivery** | | | | | | | Face to Face, | | | | | |
| |  | | --- | | **Language of Instruction** | | | | | | | English | | | | | |
| |  | | --- | | **Prerequisites** | | | | | | | PHY 102, MAT 102 | | | | | |
| |  | | --- | | **Recommended Optional Programme Components** | | | | | | | Mathematic skills | | | | | |
| **Course description:**  Electromagnetic Spectrum, Vector Analysis, Coordinate Systems, Force Between the Point Sources, Coulomb Law , Electric Field Strength (E), Electric Field of Several Point Charges, Charge Distribution, Charge Density, Continuous Charge Distribution, Electric Scalar Potential (V), Electric Field Lines, Equpotential Countours, Field Lines, Electric Potential of Charge Distribution, The Electric Feild as the Gradient of the Electric Potential, Electric Flux, Electric Flux Through Closed Surface, Charged One Shell, Capasitors and Capasitance, Moving Particles in the Electric Field, Dielectrics, Permittivite, Electric Dipol, Electric Dipol Moment, Polarization, Boundary Conditions, Boundary of Two Dielectrics Capacitors with Dielectrics, Energy of the Capacitor, Diverjans Theorem, Laplacien Operator, Poisson Equation, Laplace Equation, Static Magnetic Fields of Stable Electric Currents, Force on the Wire that is Carrying Currents Inside the Magnetic Fields, Magnetik Field of Current Carrying Element (Biot Savart Law), Force Between the Two Linear Parallel Conductors , Magnetic Flux, Magnetic Flux Density,Magnetic Flux Through Closed Surface (Gauss Law), Torq on the Ring, Magnetic Moment, SolenoidInductance, Inductances of Simple Geometries, Ampere Law and H, Amper Law Applied to Conductive Medium and Maxwell Equation, Conductors and Charged Particles Moving Inside the Static Magnetic Fields, Rotary Motor, Magnetic Leviation (Maglev), Hall-Effect Generator, Moving Conductor Inside the Static Magnetic Field, Electric and Magnetic Fields Changing with Time, Conductors Moving Inside the Magnetic Field, General Situation of the Induction | | | | | | | | | | | |
| **Objectives of the Course:**   * To provide a student with the necessary tools for the critical evaluation of existing and future electromagnetic phenomena * To teach the concepts and principles of constructions of electromagnetics * To enable a student to evaluate and choose a electromagnetic tools to match the problem | | | | | | | | | | | |
| **Learning Outcomes** | | | | | | | | | | | |
| At the end of the course the student should be able to | | | | | | | | | | Assessment | |
| 1 | Use of evaluation criteria for an assessment of electromagnetics | | | | | | | | | 1, 2 | |
| 2 | Demonstrate and reconstruct a specific electromagnetic problems | | | | | | | | | 1, 2 | |
| 3 | Apply electromagnetic principles for verification of the problems | | | | | | | | | 1, 2 | |
| 4 | Analyze variables of electromagnetic problems | | | | | | | | | 1, 2 | |
| 5 | Examine different concepts implemented in electromagnetic problems | | | | | | | | | 1, 2 | |
| 6 | Compare electrical, electronic and biomedical problems | | | | | | | | | 2 | |
| 7 |  | | | | | | | | |  | |
| Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work | | | | | | | | | | | |
| **Course’s Contribution to Program** | | | | | | | | | | | |
|  |  | | | | | | | | | | CL |
| 1 | Ability to understand and apply knowledge of mathematics, science, and engineering | | | | | | | | | | 4 |
| 2 | An ability to analyze a problem, identify and define the computing requirements appropriate to its solution | | | | | | | | | | 3 |
| 3 | Ability to design a product within realistic constraints | | | | | | | | | | 3 |
| 4 | Ability to work with multi-disciplinary teams | | | | | | | | | | 4 |
| 5 | Planning and carrying out experiments, as well as to analyze and interpret data | | | | | | | | | | 3 |
| 6 | Be able to understand professional, ethical responsibilities and standards of engineering practice. | | | | | | | | | | 2 |
| 7 | Be able to understand the effect of engineering in a global, economic, environmental, and societal setting. | | | | | | | | | | 3 |
| 8 | Ability to use the techniques, skills and modern engineering tools necessary for engineering practice | | | | | | | | | | 3 |
| CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High) | | | | | | | | | | | |
| **Course Contents** | | | | | | | | | | | |
| Week | | Chapter | Topics | | | | | | | | Exam |
| 1 | | 1,2 | Electromagnetic Spectrum  Vector Analysis | | | | | | | |  |
| 2 | | 3,4 | Coordinate Systems  Force Between the Point Sources, Coulomb Law | | | | | | | |  |
| 3 | | 4 | Electric Field Strength (E)  Electric Field of Several Point Charges  Charge Distribution, Charge Density  Continuous Charge Distribution  Electric Scalar Potential (V)  Electric Field Lines, Equpotential Countours  Field Lines | | | | | | | |  |
| 4 | | 4,5 | Electric Potential of Charge Distribution  The Electric Feild as the Gradient of the Electric Potential  Electric Flux  Electric Flux Through Closed Surface | | | | | | | |  |
| 5 | | 5,6 | Charged One Shell  Capasitors and Capasitance  Moving Particles in the Electric Field  Dielectrics, Permittivite | | | | | | | |  |
| 6 | | 6,7 | Electric Dipol, Electric Dipol Moment  Polarization  Boundary Conditions  Boundary of Two Dielectrics | | | | | | | |  |
| 7 | |  |  | | | | | | | | Midterm |
| 8 | | 7,8 | Capacitors with Dielectrics  Energy of the Capacitor  Diverjans Theorem  Laplacien Operator, Poisson Equation, Laplace Equation | | | | | | | |  |
| 9 | | 8 | Static Magnetic Fields of Stable Electric Currents  Force on the Wire that is Carrying Currents Inside the Magnetic Fields  Magnetik Field of Current Carrying Element (Biot Savart Law)  Force Between the Two Linear Parallel Conductors | | | | | | | |  |
| 10 | | 8,9 | Magnetic Flux, Magnetic Flux Density  Magnetic Flux Through Closed Surface (Gauss Law)  Torq on the Ring, Magnetic Moment  Solenoid | | | | | | | |  |
| 11 | | 9 | Inductance  Inductances of Simple Geometries  Ampere Law and H | | | | | | | |  |
| 12 | | 10 | Amper Law Applied to Conductive Medium and Maxwell Equation Conductors and Charged Particles Moving Inside the Static Magnetic Fields  Rotary Motor | | | | | | | |  |
| 13 | | 10 | Magnetic Leviation (Maglev)  Hall-Effect Generator  Moving Conductor Inside the Static Magnetic Field | | | | | | | |  |
| 14 | | 10,11 | Electric and Magnetic Fields Changing with Time  Conductors Moving Inside the Magnetic Field  General Situation of the Induction | | | | | | | |  |
| 15 | |  |  | | | | | | | | Final |
| **Recommended Sources**  **Textbook:**  **Supplementary Course Material**   * John D.KRAUS, Electromagnetics, McGRAW-HILL, Fourth Edition   . | | | | | | | | | | | |
| **Assessment** | | | | | | | | | | | |
| Attendance | | | | 10 % |  | | | | | | |
| Assignment | | | | % |  | | | | | | |
| Midterm Exam | | | | 40 % | Written Exam | | | | | | |
| Final Exam | | | | 50 % | Written Exam | | | | | | |
| Total | | | | 100 % |  | | | | | | |
| **Assessment Criteria**  Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies | | | | | | | | | | | |
| **Course Policies**   * Attendance to the course is mandatory. * Late assignments will not be accepted unless an agreement is reached with the lecturer. * Students may use calculators during the exam. * Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations | | | | | | | | | | | |
| **ECTS allocated based on Student Workload** | | | | | | | | | | | |
| Activities | | | | | | | Number | Duration (hour) | Total Workload(hour) | | |
| Course duration in class (including Exam weeks) | | | | | | | 15 | 3 | 45 | | |
| Labs and Tutorials | | | | | | | - | - | - | | |
| Assignment | | | | | | | 5 | 2 | 10 | | |
| Project/Presentation/Report | | | | | | | 1 | 8 | 8 | | |
| E-learning activities | | | | | | | - | - | - | | |
| Quizzes | | | | | | | - | - | - | | |
| Midterm Examination | | | | | | | 1 | 15 | 15 | | |
| Final Examination | | | | | | | 1 | 20 | 20 | | |
| Self Study | | | | | | | 14 | 4 | 56 | | |
| Total Workload | | | | | | | | | 154 | | |
| Total Workload/30(h) | | | | | | | | | 5.13 | | |
| ECTS Credit of the Course | | | | | | | | | 5 | | |