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|  | | | | | | | **ECTS Course Description Form** | | | | | | | | | | | | | | | | | | | | | | | | |
| **PART I ( Senate Approval)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Offering School** | **Engineering** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Offering Department** | **Electrical and Electronics Engineering** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Program(s) Offered to** | **Electrical and Electronics Engineering** | | | | | | | | | | | | | | | | **Compulsory** | | | | | | | | | | | | | | |
| **Computer Engineering** | | | | | | | | | | | | | | | | **Elective** | | | | | | | | | | | | | | |
| **Industrial Engineering** | | | | | | | | | | | | | | | | **Elective** | | | | | | | | | | | | | | |
| **Course Code** | EE 211 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Course Name** | Electromagnetic Field Theory | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Language of Instruction** | English | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Type of Course** | Lecture | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Level of Course** | Undergrad | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Hours per Week** | **Lecture: 3** | | | | | | | **Laboratory:** | | | | **Recitation:** 1 | | **Practical:** | | | | | | | **Studio:** | | | | | **Other:** | | | | | |
| **ECTS Credit** | **6** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Grading Mode** | Letter grade | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Pre-requisites** | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Co-requisites** | *-* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Registration Restriction** | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Educational Objective** | 1. Understand fundamentals of Electromagnetic fields.  2. Understand Waves and Phasors.  3. Understand the Transmission Line Modelling.  4. Review of vectors.  5. Understand and study electrostatics theory.  6. Understand and study magnetostatics theory. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Course description** | Electrical engineers of the 21st century need to understand the fundamental principles and laws of electromagnetics to develop and implement better analog or digital electronic systems that consider electromagnetic propagation and radiation effects. This course will be one of the more challenging courses in the EE degree plan. However, it gives you a solid background for advanced courses in such as antenna, microwave, photonics/lasers, and semiconductor engineering. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Learning Outcomes** | **LO1** | | | | | To explore meaning and usage of electromagnetics theory | | | | | | | | | | | | | | | | | | | | | | | | | |
| **LO2** | | | | | To find the parameters of transmission lines. | | | | | | | | | | | | | | | | | | | | | | | | | |
| **LO3** | | | | | To derive electrostatics and magnetostatics functions in free space and in different materials. | | | | | | | | | | | | | | | | | | | | | | | | | |
| **PART II ( Faculty Board Approval)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Basic Outcomes (University-wide)** | | **No.** | | **Program Outcomes** | | | | | | | | | | | **LO1** | | | **LO2** | | | | **LO3** | |  | | | |  | |  | |
| **PO1** | | **Ability** to communicate effectively and write and present a report in Turkish and English. | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO2** | | **Ability** to work individually, and in intra-disciplinary and multi-disciplinary teams. | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO3** | | **Recognition** of the need for life-long learning and **ability** to access information , follow developments in science and technology, and continually reinvent oneself. | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO4** | | **Knowledge** of project management, risk management, innovation and change management, entrepreneurship, and sustainable development. | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO5** | | **Awareness** of sectors and **ability** to prepare a business plan. | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO6** | | **Understanding** of professional and ethical responsibility and **demonstrating** ethical behavior. | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **Faculty Specific Outcomes** | | **PO7** | | **Ability to develop, select and use modern techniques and tools necessary for engineering applications and ability to use information technologies effectively.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO8** | | **Recognition of the effects of engineering applications on health, environment and safety in the universal and societal dimensions and the problems of the time and awareness of the legal consequences of engineering solutions.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO9** | | **Ability to identify, define, formulate and solve complex engineering problems; and electing and applying appropriate analysis and modelling methods for this purpose.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **Discipline Specific Outcomes (program)** | | **PO10** | | **Gains comprehensive knowledge in mathematics, natural sciences, related engineering fields and general engineering subjects.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO11** | | **Able to identify complex engineering problems and solve them with appropriate methods of analysis.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO12** | | **Able to design a complex electronic system that meets the desired performance by using modern design techniques and taking real life conditions into account.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO13** | | **Able to develop new techniques and tools for solution of current engineering problems.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO14** | | **Able to use computer software and hardware technologies together with information technologies in an effective way.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO15** | | **Able to produce innovative solutions for solution of current engineering problems by gathering data through experiment design and interpretation of results.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO16** | | **Able to actively work individually or in teams where engineers from the same or different disciplines are involved.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO17** | | **Gains competency in effective written and verbal communication, presentation and preparation of technical reports in Turkish and English.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO18** | | **Constantly increases knowledge with the awareness of lifelong learning by closely following the developments in science and technology .** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO19** | | **Acts in accordance with scientific and ethical principles and the standards used in engineering practice at every stage of career** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO20** | | **Able to describe concepts related to business life such as project management, risk management, change management, entrepreneurship and sustainability.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO21** | | **Gains awareness of the legal consequences of engineering solutions developed together with the effect of engineering applications on health, environment and safety on a universal and social scale.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO22** | | **Able to solve problems involving probability and statistics, derivative and integral calculations, multivariable mathematics, linear algebra, differential equations, and complex variables, and their electrical and electronics applications.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO23** | | **Able to organize projects and events for the social environment they live in with the awareness of social responsibility and implement them.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
| **PO24** | | **Able to plan and direct activities for employees under their responsibility to develop within the framework of a project.** | | | | | | | | | | | 🗸 | | | 🗸 | | | | 🗸 | |  | | | |  | |  | |
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| **PART III ( Department Board Approval)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Course Subjects, Contribution of Course Subjects to Learning Outcomes, and Methods for Assessing Learning of Course Subjects** | | | **Subjects** | | **Week** | | | |  | | | | | | | **LO1** | | | **LO2** | | | | **LO3** | |  | | | |  | |  | |
| **S1** | | 1 | | | | Review of vector calculus | | | | | | | A1-A3 | | | A1-A3 | | | | A1-A3 | |  | | | |  | |  | |
| **S2** | | 2-3 | | | | Static electric fields: Coulomb’s Law, Gauss’s Law | | | | | | | A1-A3 | | | A1-A3 | | | | A1-A3 | |  | | | |  | |  | |
| **S3** | | 3 | | | | Electric potential, dielectrics, capacitance | | | | | | | A1-A3 | | | A1-A3 | | | | A1-A3 | |  | | | |  | |  | |
| **S4** | | 4-5 | | | | Electrostatic energy, Poisson’s and Laplace’s equations | | | | | | | A1-A3 | | | A1-A3 | | | | A1-A3 | |  | | | |  | |  | |
| **S5** | | 6-7 | | | | Steady electric currents: Ohm’s law, Kirchoff’s law, Joule’s law | | | | | | | A1-A3 | | | A1-A3 | | | | A1-A3 | |  | | | |  | |  | |
| **S6** | | 8 | | | | Static magnetic fields: Vector potential, Biot-Savart law | | | | | | | A1-A3 | | | A1-A3 | | | | A1-A3 | |  | | | |  | |  | |
| **S7** | | 9-10 | | | | Steady electric currents: Ohm’s law, Kirchoff’s law | | | | | | | A1-A3 | | | A1-A3 | | | | A1-A3 | |  | | | |  | |  | |
| **S8** | | 11 | | | | Magnetization, Magnetic energy, force and torque | | | | | | | A1-A3 | | | A1-A3 | | | | A1-A3 | |  | | | |  | |  | |
| **S9** | | 12-14 | | | | Maxwell’s equations and plane wave propagation | | | | | | | A1-A3 | | | A1-A3 | | | | A1-A3 | |  | | | |  | |  | |
| **Assessment Methods, Weight in Course Grade, Implementation and Make-Up Rules** | | | **No.** | | **Type** | | | | | | **Weight** | | **Implementation Rule** | | | | | | | **Make-Up Rule** | | | | | | | | | | | | |
| **A1** | | **Exam** | | | | | | 70% | | Midterm is 30% and final is 40% of the final grade. | | | | | | | A make-up exam is provided in case of a legitimate reason with a proof. | | | | | | | | | | | | |
| **A2** | | **Quiz** | | | | | |  | |  | | | | | | |  | | | | | | | | | | | | |
| **A3** | | **Homework** | | | | | | 30% | | At least three homework are given | | | | | | | No make-up | | | | | | | | | | | | |
| **A4** | | **Project** | | | | | |  | |  | | | | | | | - | | | | | | | | | | | | |
| **A5** | | **Report** | | | | | |  | | - | | | | | | | - | | | | | | | | | | | | |
| **A6** | | **Presentation** | | | | | |  | | - | | | | | | | - | | | | | | | | | | | | |
| **A7** | | **Attendance/ Interaction** | | | | | |  | | - | | | | | | | - | | | | | | | | | | | | |
| **A8** | | **Class/Lab./**  **Field Work** | | | | | |  | |  | | | | | | |  | | | | | | | | | | | | |
| **A9** | | **Other** | | | | | |  | |  | | | | | | |  | | | | | | | | | | | | |
| **TOTAL** | | | | | | | | **100%** | | | | | | | | | | | | | | | | | | | | | |
| **Evidence of Achievement of Learning Outcomes** | | | Students will demonstrate learning outcomes through midterm exams, homework assignments, and the final exam. Every topic is tested with at least one exam or homework question. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Method for Determining Letter Grade** | | | The overall grade is converted to a letter grade using the table below.   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Total points** | 100-95 | 94-90 | 89-85 | 84-80 | 79-75 | 74-70 | 69-65 | 64-60 | 59-55 | 54-50 | | **Letter Grade** | A | A- | B+ | B | B- | C+ | C | C- | D+ | D | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Teaching Methods, Student Work Load** | | | **No** | | **Method** | | | | | **Explanation** | | | | | | | | | | | | | | | | | **Hours** | | | | | |
| ***Time applied by instructor*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **1** | | **Lecture** | | | | | Class content is explained by writing on the board and with computer presentations | | | | | | | | | | | | | | | | | 3x14 | | | | | |
| **2** | | **Interactive Lecture** | | | | |  | | | | | | | | | | | | | | | | |  | | | | | |
| **3** | | **Recitation** | | | | | Problem solutions in practice sessions | | | | | | | | | | | | | | | | | 1x14 | | | | | |
| **4** | | **Laboratory** | | | | |  | | | | | | | | | | | | | | | | |  | | | | | |
| **5** | | **Practical** | | | | |  | | | | | | | | | | | | | | | | |  | | | | | |
| **6** | | **Field Work** | | | | |  | | | | | | | | | | | | | | | | |  | | | | | |
| ***Time expected to be allocated by student*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **7** | | **Project** | | | | |  | | | | | | | | | | | | | | | | |  | | | | | |
| **8** | | **Homework** | | | | | Homework is completed | | | | | | | | | | | | | | | | | 3x8 | | | | | |
| **9** | | **Pre-class Learning of Course Material** | | | | | Next class’ material is read before the class | | | | | | | | | | | | | | | | | 2x14 | | | | | |
| **10** | | **Review of Course Material** | | | | | Previous class material is reviewed each week | | | | | | | | | | | | | | | | | 3x14 | | | | | |
| **11** | | **Studio** | | | | |  | | | | | | | | | | | | | | | | |  | | | | | |
| **12** | | **Office Hour** | | | | | One-to-one meetings for discussions | | | | | | | | | | | | | | | | | 2x14 | | | | | |
| **TOTAL** | | | | | | | *178* | | | | | | | | | | | | | | | | | | | | | | |
| **IV. PART** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Instructor** | | | **Name** | | | | | | | Yusuf Öztürk | | | | | | | | | | | | | | | | | | | | | | |
| **E-mail** | | | | | | | yusuf.ozturk@antalya.edu.tr | | | | | | | | | | | | | | | | | | | | | | |
| **Phone Number** | | | | | | | *0242 245 0312* | | | | | | | | | | | | | | | | | | | | | | |
| **Office Number** | | | | | | | *A1-27* | | | | | | | | | | | | | | | | | | | | | | |
| **Office Hours** | | | | | | | As posted on the office door, or by appointment. | | | | | | | | | | | | | | | | | | | | | | |
| **Course Materials** | | | **Mandatory** | | | | | | | *Fawwaz T. Ulaby, Umberto Ravaioli “Fundamentals of Applied Electromagnetics”, 7ed, 2015 (the Reference Book).*  *http://em7e.eecs.umich.edu/* | | | | | | | | | | | | | | | | | | | | | | |
| **Recommended** | | | | | | | *William H. Hayt, “Engineering Electromagnetics”, 8ed, 2012.* | | | | | | | | | | | | | | | | | | | | | | |
| **Other** | | | **Scholastic Honesty** | | | | | | | Violations of scholastic honesty include, but are not limited to cheating, plagiarizing, fabricating information or citations, facilitating acts of dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. Any for of scholastic dishonesty is a serious academic violation and will result in a disciplinary action. | | | | | | | | | | | | | | | | | | | | | | |
| **Students with disabilities** | | | | | | | Reasonable accommodations will be made for students with verifiable disabilities. | | | | | | | | | | | | | | | | | | | | | | |
| **Safety Issues** | | | | | | | The course does not require any special safety precautions. | | | | | | | | | | | | | | | | | | | | | | |
| **Flexibility** | | | | | | | The level of detail can be made more in-depth or can be reduced depending on the students interests and time availability. | | | | | | | | | | | | | | | | | | | | | | |