ESOGÜ Electrical-Electronics Engineering Department

COURSE CODE: 15122XXXX   **COURSE TITLE:** Electromagnetic Fields

Semester	Weekly Hours		COURSE			
	Theoretical	**Practical**	**Credits**	**ECTS**	**Type**	**Language**
3	3	0	3	5	Compulsory (X) Elective ( )	Turkish ( ) English (X)

Write the credit (for non-credit courses weekly hours) below (If necessary distribute the credits.).			
Math and Basic Science	**Electrical Engineering** [mark (Ö) if there is high design content]	**General Education**	**Humanities**
0	3 ( )	0	0

Assessment	THEORETICAL-PRACTICAL COURSES			LABORATORY COURSES		
	Type	**Number**	**%**	**Activity Type**	**Number**	**%**
Midterm	Midterm	1	35	Quiz		
	Quiz	4	20	Lab performance		
	Homework			Report		
	Project			Oral exam		
	Other (Laboratory)			Other (………)		
Final			45			
Makeup exam (Oral/Written)						

Prerequisites	-
Brief content of the course	Coulomb's law and static electric fields, electrostatic potential, Gauss' law, Laplace and Poisson equations, electrostatic phenomena in non-empty space, image principle, electrostatic energy, Lorentz force and static magnetic fields, Biot-Savart's law, vector potential, Ampere's law, magnetostatic phenomena in non-empty space, magnetostatic energy, magnetic circuits, Ohm's law, Maxwell's equations, Faraday's law of induction.
Objectives of the course	Teaching fundamental concepts of electrostatics and magnetostatics, magnetic circuits, Maxwell equations and their basic consequences.
Contribution of the course towards professional education	The purpose of the course is to provide an understanding on electromagnetic field theory which is one of the fundamentals of electrical engineering, ability to solve related engineering problems and thus, knowledge and ability to deal with electromagnetic field applications which could be encountered in professional life.
Outcomes of the course	1. Defining electric and magnetic fields, electrostatic and vector potentials and related laws. 2. Solving fundamental electrostatic and magnetostatic problems. 3. Defining Maxwell's equations.
Textbook of the course	- David K. Cheng, Field and Wave Electromagnetics, 2nd edition, Addison-Wesley Publishing Co., 1989.
Other reference books	- Mithat İdemen, Elektromagnetik Alan Teorisinin Temelleri, İTÜ Vakfı Yayınları, 4. Baskı, 2015. - Gökhan Uzgören, Alinur Büyükaksoy ve Ali Alkumru, Elektromagnetik Alan Teorisi Çözümlü Problemler Cilt I ve Cilt II, İTÜ Vakfı Yayınları, 2009. - John David Jackson, Classical Electrodynamics, 3rd edition, John Wiley and Sons Inc., 1999. - David J. Griffiths, Introduction to Electrodynamics, 4th edition, Addison-Wesley Publishing Co., 2012.
Required material for the course	

	WEEKLY PLAN OF THE COURSE	
Week	**Topics**
1	Vector analysis. Fundamental concepts.
2	Coulomb's law and static electric fields. Field lines.
3	Coulomb's law and static electric fields. Field lines.
4	Gauss' law.
5	Electrostatic potential. Laplace and Poisson equations.
6	Electrostatic phenomena in non-empty space. Image principle.
7	Electrostatic energy. Concept of capacitance.
8	Midterm
9	Midterm
10	Lorentz force and static magnetic fields. Biot-Savart's law.
11	Vector potential. Ampere's law.
12	Magnetostatic phenomena in non-empty space. Magnetostatic energy. Ohm's law.
13	Magnetic circuits.
14	Maxwell's equations. Faraday's law of induction.
15,16	Final

NO	OUTCOMES OF THE PROGRAMME	4	3	2	1
1	Adequate knowledge of mathematics, science and Electrical and Electronics Engineering; ability to practice theoretical and practical knowledge of these areas into modeling and solving complex problems of Electrical and Electronics Engineering.	X			
2	Ability to identify complex engineering problems in Electrical and Electronics Engineering and related fields, for this purpose having skills to formulate, select and apply appropriate methods.	X			
3	Having skills to apply modern design methods to design a complex system, process, equipment or product that should work under realistic conditions and constraints and satisfy specific requirements concerning the Electrical and Electronics Engineering.				X
4	Having skills to develop, select and apply modern techniques and tools needed to analyze and solve complex applications in Electrical and Electronics Engineering, skills to use information technology effectively.				X
5	Skills to design and conduct tests, collect data, analyze results, and interpret data for the experimental investigation of complex problems in Electrical and Electronics Engineering.				X
6	Ability to function effectively as an individual and as a member of teams within the discipline and in multidiscipline areas.				X
7	Communicating effectively in oral and written form both in Turkish and English. Effective eport writing and understanding written reports, preparing design and manufacturing reports, making effective presentations, skills to give and receive clear and concise instructions.				X
8	Awareness of the necessity of lifelong learning, access to information, monitoring developments in science and technology and the ability to self-renewing.				X
9	Understanding of professional and ethical responsibility.				X
10	Information on project management, change management and risk management practices, awareness on entrepreneurship and innovation, knowledge on sustainable development.				X
11	Information about universal and societal effects of engineering applications on health, safety and environment; awareness of the legal consequences of engineering solutions.				X

Scale for assessing the contribution of the course to the program outcomes:

4: High   **3: Medium**   **2: Low**   **1:None**

Name of Instructor(s):   Prof. Dr. Gökhan ÇINAR

Signature(s):   **Date:**