ESOGU ELECTRICAL-ELECTRONICS ENGINEERING DEPARTMENT
COURSE INFORMATION FORM

Course Title	Course Code
ELECTROMAGNETIC FIELDS	**151223563**

Semester in Program	Number of Course Hours per Week		ECTS Credit
	Theory	Practice	
3	3	0	5

Course ECTS Credit Distribution				
Basic Sciences	**Engineering Sciences**	**Design**	**General Education**	**Social**
0	5	0	0	0

Language of Instruction	Course Level	Course Type
English	Undergraduate	Required

Prerequisite	-
Objectives of the Course	Teaching fundamental concepts of electrostatics and magnetostatics, magnetic circuits, Maxwell equations and their basic consequences.
Brief Course Content	Coulomb's law and static electric fields, electrostatic potential, Gauss's 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.

	Learning Outcomes of the Course	Contributed POs	Teaching Methods *	Assessment Methods **
1	calculate divergence and curl, line, surface and volume integrals.	1a	1, 2	A, B
2	define electric and magnetic fields according to their force effect	1b, 1c	1, 2	A, B
3	explain the physical meanings of the differential equations for electrostatic and magnetostatic fields	1b, 1c	1, 2	A, B
4	calculate the electric field from charge distributions and magnetic fields from current distributions	1b, 1d, 2	1, 2, 10	A, B
5	solve simple electrostatic boundary value problems	1b, 1d, 2	1, 2, 10	A, B
6	describe and use simple models of electric and magnetic field interactions with materials	1b, 1c	1, 2	A, B
7	write down Maxwell's equations and explain their physical meanings	1b, 1c	1, 2	A, B
8	explain the concept of electromotive force, magnetic circuits, Ohm's law and Joule phenomenon	1b, 1c, 1d	1, 2, 10	A, B

***Teaching Methods** **1:**Lecture, **2:**Discussion, **3:**Experiment, **4:**Simulation, **5:**Question-Answer, **6:**Tutorial, **7**:Observation, **8**:Case Study, **9:**Technical Visit, **10:**Problem Solving, **11:**Induvidual Work, **12**:Team/Group Work, **13**:Brain Storm, **14:**Project Design / Management, **15:**Report Preparation and/or Presentation

****Assessment Methods** **A:**Exam, **B:**Quiz, **C:**Oral Exam, **D:**Homework, **E:**Report, **F:**Article Examination, **G:**Presentation, **I:**Experimental Skill, **J:**Project Observation, **K**:Class Attendance; **L**:Jury Exam

Main Textbook	David K. Cheng, Field and Wave Electromagnetics, Addison-Wesley; 2nd ed., 1989.
Supplementary Resources	- Branislav Notaros, Electromagnetics, Pearson Higher Ed., 1st ed., 2010. - Matthew N.O. Sadiku, Principles of Electromagnetics, Oxford University Press, 6th ed., 2015. - U.S. Inan, A. Inan and R. Said, Engineering Electromagnetics and Waves, Pearson Higher Ed., 2nd ed., 2015.
Necessary Course Material	-

Course Weekly Schedule	
1	Vector analysis.
2	Coulomb’s law and static electric fields, field lines.
3	Gauss’s law.
4	Electrostatic potential and Laplace equation.
5	Electrostatic phenomena in nonempty spaces, electrostatic energy.
6	Concept of capacitance.
7	Advanced problems in electrostatics.
8	Mid-Term Exams
9	Lorentz force and static magnetic fields. Biot-Savart’s law.
10	Vector potential. Ampere’s law.
11	Nonempty spaces, mutual effects of circuits, inductance.
12	Energy, Ohm’s law, Joule phenomenon.
13	Magnetic circuits.
14	Advanced problems in magnetostatics.
15	Maxwell’s equations. Faraday’s law of induction.
16,17	Final Exams

Calculation of Course Workload			
Activities	**Count**	**Time (Hour)**	**Total Workload (Hour)**
Weekly classroom time	14	3	42
Weekly study time (review, reinforcing, preparation)	14	3	42
Homework	0	0	0
Taking a quiz	6	1	6
Studying for a quiz	6	4	24
Oral exam	0	0	0
Studying for an oral exam	0	0	0
Report writing (Preparation and presentation time included)	0	0	0
Project (Preparation and presentation time included)	0	0	0
Presentation (Preparation time included)	0	0	0
Mid-Term Exam	1	2	2
Studying for Mid-Term Exam	1	20	20
Final Exam	1	2	2
Studying for Final Exam	1	20	20
		Total workload	**158**
		Total workload / 30	**5.27**
		Course ECTS Credit	**5**

Assessment	
Activity Type	**%**
Mid-term	30
Quiz	30
Final Exam	40
Total	100

COURSE CONTRIBUTION TO THE PROGRAM OUTCOMES (5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)		
NO	**PROGRAM OUTCOMES**	**Contribution**
1	a. Sufficient knowledge of mathematics	3
	b. Sufficient knowledge of basic sciences	4
	c. Sufficient basic engineering and Electrical-Electronics engineering knowledge	5
	d. Skill of applying all these knowledge and experience to complicated Electrical-Electronics engineering problems	5
2	Skill of defining, identifying, formulating and solving the complicated problems in Electrical-Electronics engineering and related areas by applying appropriate analysis and modelling methods.	5
3	Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions.	1
4	To analyze and solve the complicated engineering problems: a. skill of developing, selecting and applying the required techniques and devices	1
	b. skill of using information technologies effectively	1
5	To study the complicated on the complicated Electrical-Electronics engineering problems and research subjects: a. skill of experimental design	1
	b. skill of performing the experiments, collecting the data and analyzing and interpreting the results	1
6	a. Skill of performing individual studies	1
	b. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies	1
7	a. Skill of effective oral and writing communication in Turkish and English	1
	b. Skill of improving and using foreign language knowledge	1
	c. Skill of effective reporting, understanding the reports and preparing the design and production reports	1
	d. Skill of effective presentation and giving and getting clear and understandable instructions.	1
8	Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology	1
9	a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities	1
	b. Knowledge about legal regulations and standards of engineering	1
10	a. Knowledge about project management, risk management and change management	1
	b. Awareness of the significance of entrepreneurship and innovation	1
	c. Knowledge about sustainable development	1
11	Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of Electrical-Electronics engineering; and awareness of the legal issues resulting from engineering solutions	1
12	Knowledge about modern problems in local and universal scale	1

INSTRUCTORS				
Prepared by	Gökhan ÇINAR			

Date: 06.07.2024