Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Advanced Electromagnetic Theory I	FZ5002		3 + 0	3.0	7.5

Prerequisites	None
Language of Instruction	Turkish
Course Level	Second Cycle
Course Type	Elective
Mode of delivery	Face to face
Course Coordinator	Assoc. Prof. Dr. Hilal GÖKTAŞ
Instructors	Prof. Dr. İsmail TARHAN Assist. Prof. Dr. Melis ULU DOĞRU
Assistants	
Course Objectives	Obtain the physical principles of electrostatics, boundary value problems and variable separation, understand and solve the Green's functions, able to perform multipole expansion, understand the physics of Maxwell equations.
Course Content	Introduction to Electromagnetic Theory and Vector Analysis, Electrostatic Field, Gauss Law, Poisson and Laplace Equations, Electrostatic boundary-value problems I: Method of images, Green's function for a sphere, general solution for potential, Orthogonal functions and expansions, separation of variables, Electrostatic boundary-value problems II: Laplace's equation in spherical coordinates, Legendre polynomials, Boundary-value problems, Spherical harmonics, Laplace's equation in cylindrical coordinates, Bessel functions, Green's functions in spherical coordinates and cylindrical coordinates, Multipole expansion, molecular polarizability and electric susceptibility, Dielectrics and boundary conditions, Magnetostatic, Biot-Savart law and Ampere's law, Vector potential and Magnetic induction, Faraday Law, Maxwell Equations, Conservation Laws.
Course Learning Outcomes	1) Understand the basic of electrodynamics 2) Learn to use boundary conditions for model systems and generalize the solutions 3) Use Maxwell equations to solve problems in proper way

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Introduction to Electromagnetic Theory and Vector Analysis	Oral lectures with interactive discussions	
2. Week	Electrostatic Field, Gauss Law, Poisson and Laplace Equations	Oral lectures with interactive	

Quick Access

Physics (Master)
- Qualification Awarded
- Level of Qualification
- Qualification Requirements and Regulations
- Specific Admission Requirements
- Recognition of Prior Learning
- Profile of the Program
- Program Key Learning Outcomes
- Occupational Profile of Graduates
- Access to Further Studies
- Course Structure & Credits
- Exam Regulations & Assessment & Grading
- Graduation Requirements
- Mode of Study
- Programme Director(or Equivalent)
- Evaluation Questionnaire
- TYYÇ

Course Information
- Course Information
- Weekly Course Content
- Resources
- Assessment
- Course Category
- CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES
- ECTS credits and course workload

		discussions	
3. Week	Electrostatic boundary-value problems I: Method of images, Green's function for a sphere, general solution for potential	Oral lectures with interactive discussions	
4. Week	Orthogonal functions and expansions, separation of variables.	Oral lectures with interactive discussions	
5. Week	Electrostatic boundary-value problems II: Laplace's equation in spherical coordinates, Legendre polynomials, Boundary-value problems, Spherical harmonics	Oral lectures with interactive discussions	
6. Week	Laplace's equation in cylindrical coordinates, Bessel functions, Green's functions in spherical coordinates and cylindrical coordinates	Oral lectures with interactive discussions	
7. Week	Multipole expansion, molecular polarizability and electric susceptibility	Oral lectures with interactive discussions	
8. Week	Dielectrics and boundary conditions	Oral lectures with interactive discussions	
9. Week	Magnetostatic	Oral lectures with interactive discussions	
10. Week	Biot-Savart law and Ampere's law	Oral lectures with interactive discussions	
11. Week	Vector potential and Magnetic induction	Oral lectures with interactive discussions	
12. Week	Faraday Law	Oral lectures with interactive discussions	
13. Week	Maxwell Equations	Oral lectures with interactive discussions	
14. Week	Conservation Laws	Oral lectures with interactive discussions	
15. Week	Review of the semester	Oral lectures with interactive discussions	
16. Week	Final exam	Exam	

RESOURCES

Recommended Sources
Jackson, J. D., "Classical Electrodynamics ", Wiley, 3rd Edition, 1999.L.D.
Griffiths D. J., Introduction to Electrodynamics, Prentice Hall, 3rd Edition, 1999
Griffiths D. J., Introduction to Electrodynamics, Prentice Hall, 3rd Edition, 1999

ASSESSMENT

Measurement and Evaluation Methods and Techniques		
Homework, midterm exam, final		
In-Term Studies	**Quantity**	**Percentage**
Mid Term Exam 1	1	40
Total	1	40

End-Term Studies	Quantity	Percentage
Final Exam	1	60
Total	1	60
Contribution Of In-Term Studies To Overall Grade		40
End-Term Studies		60
Total		100

COURSE CATEGORY

Course Category	Percentage
Core Courses	% 100

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

Programme Outcomes	Contribution Level	DK1	DK2	DK3
PY1	5	5	5	4
PY2	4	4	5	4
PY3	5	5	5	0
PY4	4	4	4	4
PY5	4	5	4	4
PY6	4	5	4	5
PY7	0	5	5	5
PY8	4	4	4	4
PY9	0	4	4	4
PY10	0	2	2	2
PY11	0	4	4	4
PY12	0	4	4	4
PY13	4	4	4	4
PY14	0	4	4	4
PY15	0	4	4	4

*DK = Course's Contrubution.

	0	1	2	3	4	5
Level of contribution	None	Very Low	Low	Fair	High	Very High

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ECTS CREDITS AND COURSE WORKLOAD

Event	Quantity	Duration (Hour)	Total Workload (Hour)
Class Hours (14 weeks)	14	3	42
Presentation/Seminar	1	10	10
Further Study	14	2	28
Assignment 1	7	4	28
Application/Practice	14	2	28
Final Exam Preparation	1	26	26
Mid Term Exam Preparation	1	20	20

Final Exam	1	2	2
		Total Workload	184
		Total Workload / 25.5 (s)	7.22
		ECTS Credit of the Course	7