

DERS BILGISI						
Course Title	Code	Semester	C +P + L	Hour	Credits	ECTS
Elektromagnetik teorinin analitik esasları	EE529	Kis/Bahar	3 + 0 + 0		3	10

Prerequisites	EE226
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Language of Instruction	English
Course Level	Master, Doktora
Course Type	secimlik
Course Coordinator	Doc. Dr. Cahit Canbay
Instructors	Doc. Dr. Cahit Canbay
Assistants	
Goals	Ogrenciler ekstra edinecekleri matematik altyapilarini kullanarak tam iletken veya kayipli dielektrik duzlemsel, silindirik ve kuresel yapılardan optik bolge dahil elektromagnetik sacilma problemlerini cozebilecek ve sacilma problemlerin bilgisayar simülasyonları yardımıyla elde edilen çözümleri doğrulama yeteneğine sahip olacak. Ayrıca, moment yöntemi ve benzeri sayisal yontemleri kullanarak ileri sacilma problemlerini cozebileceklerdir. Öğrenciler kolaylıkla bilgilerini teknolojide ilgili alanda kullanabileceklerdir.
Content	Matematik altyapi: Hilbert uzayi; moment yontemi; onemli teorem ve kavramlar: kaynak kavrami; dualite; teklik; goruntu teorisi; esdegerlik prensibi; induksiyon teoremi, karsiliklilik prensibi, Green fonksiyonu; tensorel Green fonksiyonu; integral denklemleri; isimaalani. duzlem dalga fonksiyonu: genis duzlemlerde aciklik. silindirik dalga fonksiyonu: silindirik dalgaların kaynagi; iki boyutlu isim; silindirik dalga transformasyonu; silindirde sacilma; Kenardan sacilma; uc boyutlu isima; silindirde aciklik; kuresel dalga fonksiyonu; kuresel dalga transformasyonu; kurelerden sacilma; dipol ve iletken kure; varyasyonel teknikler .

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
Dersin Öğrenme Çıktıları	Program Öğrenme Çıktıları	Öğretim Yöntemleri	Ölçme Yöntemleri
1) Verilen matematik altyapi sayesinde elektromagnetik problemler kolaylıkla cozulebilecek	1,2,3,4,5,6,11	1,2,3,6	A,D
2) Duzgun, silindirik ve kuresel sekildeki tam iletken, kayipli dielektrik yapılardan elektromagnetik sacilma hem teorik hem de bilgisayarla simulasyon yoluyla sayisal olarak gerceklestirilecektir.	1,2,3,4,5,6,11	1,2,3,6	A,D

3) Düzlem dalgaları, karşılıklı olarak silindirik ve küresel dalga cinsinden ifade edilebilecek.	1,2,3,4,5,6,11	1,2,3,6	A,D
4) Elektromagnetik sacilma problemleri bilgisayarla cozulebilecek.	1,2,3,4,5,6,9	1,2,3,6	A,D
5) Her bir ogrenci kendilerine verilmiş problemleri sunabilecek ve elestirileri yanitlayabileceklerdir	7,9	3,6	D
6) sinav ve odevler ogrencilere yetkinlik kazadiracaktır.	7,9	1	A
7 Her bir ogrenci kendilerine verilmiş problemleri hem sunup hem de kendileri objektif olarak degerlendirmeleri onlara, kendilerine guven ve objektiflik ozellikleri kazadiracaktır.	7,9	6	D
Teaching Methods:	1: Lecture, 2: Problem Solving, 3: Simulation, 4: Seminar, 5: Laboratory, 6: Term Research Paper		
Assessment Methods:	A: Exam, B: Quiz, C: Experiment, D: Homework, E: Project		

COURSE CONTENT		
Week	Topics	Study Materials
1	Mathematical foundations: Hilbert space	Course Book
2	method of moments. Fundamental theorems and concepts: the source concept.	Course Book
3	duality; uniqueness; image theory; equivalence principle; induction theorem, reciprocity	Course Book
4	Green's functions; tensor Green's functions	Course Book
5	integral equations; radiation field	Course Book
6	Plane Wave Functions: apertures in ground planes.	Course Book
7	Cylindrical Wave Functions: sources of cylindrical wave functions; two dimensional radiation	Course Book
8	cylindrical wave transformation; scattering by cylinders;	Course Book
9	Midterm	Course Book
10	scattering by wedges; three dimensional radiation; apertures in cylinders	Course Book
11	spherical wave functions; sources of spherical waves	Course Book
12	wave transformations; scattering by spheres; dipole and conducting sphere	Course Book
13	Variational Techniques.	Course Book
14	Homework Presentations	Course Book

RECOMMENDED SOURCES	
Textbook	R. F. Harrington, Time-Harmonic Electromagnetic Fields, 2nd ed., D. G. Dudley, Ed. Wiley-IEEE Press, 2001.

Additional Resources	*Constantine A. Balanis, Antenna Theory: Analysis and Design, 3rd ed., Wiley-Interscience, 2005.
	*Stratton Julius Adams, Electromagnetic Theory, Adams Press, 2007.
	*Cahit Canbay, Anten ve Propagasyon I, Yeditepe University Press, 1997.
	*IEEE Trans. on ...

MATERIAL SHARING	
Documents	Cahit Canbay, Anten ve Propagasyon I, Yeditepe University Press, 1997, http://ee.yeditepe.edu.tr/staff/canbay/ee421coursebook.htm ,
Assignments	Each student has unique homework. Since students are supposed to accomplish their oral presentations, separately, other students will be able to learn and see the solutions of other homeworks, too.
Exams	Questions and Answers of Mid-terms

ASSESSMENT		
IN-TERM STUDIES	NUMBER	PERCENTAGE
Midterm I	1	50
Midterm II	-	-
Homework Assignment	1	50
Total		100
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		100

COURSE CATEGORY	Field Course
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COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Can reach information in breadth and depth, and can evaluate, interpret and apply this information to scientific research in the area of Electrical and Electronics Engineering.					x
2	Can complete and apply information with scientific methods using limited or missing data; can integrate information from different disciplines.					x
3	Sets up Electrical and Electronics Engineering problems, develops and implements innovative methods for their solutions.					x

4	Develops new and/or original ideas and methods; finds innovative solutions to the system, component, or process design.	x
5	Has comprehensive knowledge about the state-of-the-art techniques and methods in Electrical and Electronics Engineering and their limitations.	x
6	Can design and conduct research of analytical, modeling or experimental orientation; can solve and interpret complex cases that come up during this process.	x
7	Can communicate verbally and in writing in one foreign language (English) at the General Level B2 of the European Language Portfolio.	x
8	Can assume leadership in multi-disciplinary teams; can develop solutions in complex situations, and take responsibility.	
9	Can systematically and openly communicate in national and international venues the proceedings and conclusions of the work he/she performs in Electrical and Electronics Engineering.	x
10	Respects social, scientific and ethical values in all professional activities performed during the collection, interpretation and announcement phases of data.	
11	Is aware of new and emerging applications in Electrical and Electronics Engineering; investigates and learns them, whenever necessary.	x
12	Can identify the social and environmental aspects of Electrical and Electronics Engineering applications.	

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (including 2 midterms: 14xtotal lecture hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	7	98
Midterm I	-	-	-
Midterm II	1	2	2
Homework assignment	14	3	42
Final examination	1	2	2
Total Work Load			186
Total Work Load / 25 (h)			7.44
ECTS Credit of the Course			7