COURSE INFORMATION

Course Code	BMUH 531	Course Name	Advanced Electromagnetism and Waves					
Type of Course	**Level of Course**	**Semester**	**Language**	**Theory**	**Application (Practice)**	**Laboratory**	**Local Credits**	**ECTS**
Elective	Graduate	Fall & Spring	English	3	0	0	3	6

Department	: Electrical and Computer Engineering
Prerequisites/Requirements for Admission	:
Mode of delivery	: Face to Face
Course coordinator	: Dr. Mehmet Ali Olpak
Course lecturer(s)	:
Course assistant(s)	:
Course description/aim	: Students are expected to understand electromagnetic phenomena in terms of boundary value problems, and to learn how to obtain time-harmonic solutions of Maxwell's equations for various systems
Course contents	: Boundary value problems in electromagnetic theory, Electromagnetic induction, Maxwell's equations, Wave equations and plane wave solutions, waves in lossless and lossy media, reflection and refraction, electromagnetic waves in transmission lines, waveguides and cavities, antennas and antenna arrays
Recommended optional program components	: None
Compulsory Attendance	: Yes

Course Learning Outcomes

	Learning outcome	**Teaching Methods/Techniques**	**Assessment method(s)**
	Students will be able to		
1	Understands electromagnetic boundary value problems and the content of Maxwell's equations.	Lecture, Lecture with Discussion	Midterm and Final Exams, Homeworks
2	Understands how wave equations arise in electromagnetic theory.	Lecture, Lecture with Discussion	Midterm and Final Exams, Homeworks
3	Understands the content of wave solutions of Maxwell's equations in the contexts of physical optics, transmission lines, waveguides and antennas	Lecture, Lecture with Discussion	Midterm and Final Exams, Homeworks

Weekly Detailed Course Content

Week	**Content**	**Recommended Resource(s)**	**Time (Hours)**
1	Introduction	Textbook/ Lecture Notes	3
2	Maxwell's equations, electromagnetic boundary conditions, boundary value problems	Textbook/ Lecture Notes	3
3	Potential functions, wave equations, time harmonic fields, electromagnetic spectrum	Textbook/ Lecture Notes	3
4	Plane waves in lossless and lossy media	Textbook/ Lecture Notes	3

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5	Energy and power of electromagnetic waves	Textbook/ Lecture Notes	3
6	Reflection and refraction of plane waves at plane boundaries	Textbook/ Lecture Notes	3
7	Waves in transmission lines	Textbook/ Lecture Notes	3
8	**Midterm**		3
9	Waves in uniform guiding structures	Textbook/ Lecture Notes	3
10	Rectangular waveguides, cavity resonators	Textbook/ Lecture Notes	3
11	Dipoles, antenna patterns, directivity	Textbook/ Lecture Notes	3
12	Thin linear antennas and fundamental concepts, antenna arrays, Friis transmission formula, radar equation	Textbook/ Lecture Notes	3
13	Special topics	Textbook/ Lecture Notes	3
14	Special topics	Textbook/ Lecture Notes	3
15	Final exam		3
16			

Sources

Course notes/textbooks	: Field and wave electromagnetics, D. Cheng, Addison Wesley Classical electrodynamics, J. D. Jackson, Wiley Antenna theory: Analysis and design, C. Balanis, Wiley
Readings	:
Supplemental readings	:
References	:

Evaluation System

Work Placement	**Number**	**Percentage of Grade**
Attendance		
Quizzes		
Homework	2	30
Presentation		
Laboratory/Practice		
Report(s)		
Graduate Thesis/Project		
Seminar		
Projects		
Midterm exam(s)	1	30
Others		
Final exam	1	40
	Total	100
	Percentage of semester work	60
	Percentage of final exam	40
	Total	100

COURSE INFORMATION

Workload Calculation

Activity	Number	Time (hours)	Total work load (hours)
Course hours	14	3	42
Individual study for course	14	8	112
Midterm exam(s)	1	3	3
Final exam	1	3	3
Individual study for homeworks	2	5	10
Individual study for final exam	1	20	20
		Total	190
		ECTS Credit(Total/30)	6

Contribution of Learning Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
LO1											
LO2											
LO3											

Contribution Level : 1 Very low, 2 Low, 3 Medium, 4 High, 5 Very High