COURSE INFORMATION

Course Code	BMUH 530	Course Name	Computational Electromagnetics I					
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	: The student is expected to understand the introductory concepts of the method-of-moments approach, integral equations and Green's function techniques used in computational electromagnetics. It is aimed to develop ability to formulate electromagnetic problems and to suggest solution methods based on computer software usable for electromagnetics problems. The student is also expected to gain mathematical and physical foundation to work on further aspects of the computational electromagnetics. Applications may vary with the research orientation of the instructor.
Course contents	: Classification of EM problems, Method of Moments – Theory and Applications, Integral Equations – Theory and Applications, Green's functions – Theory and Applications
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	Understand the mathematical foundations of method of moments, integral equations and Green's functions	Lecture, Lecture with Discussion	Midterm and Final Exams
2	Apply the method of moments and Green's functions techniques in various problems of electromagnetics	Lecture, Lecture with Discussion	Midterm and Final Exams
3	Implement the skills that she/he gained on computer software	Computer applications	Project and presentation

Weekly Detailed Course Content

Week	**Content**	**Recommended Resource(s)**	**Time (Hours)**
1	Introduction	Textbook/ Lecture Notes	3
2	Classification of EM problems	Textbook/ Lecture Notes	3
3	Introduction to integral equations	Textbook/ Lecture Notes	3
4	Integral equations: Applications in electromagnetics	Textbook/ Lecture Notes	3

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5	Method of moments: Theory	Textbook/ Lecture Notes	3
6	Method of moments: Applications	Textbook/ Lecture Notes	3
7	Method of moments: Applications	Textbook/ Lecture Notes	3
8	**Midterm**		3
9	Green's functions: Theory	Textbook/ Lecture Notes	3
10	Green's functions: Applications	Textbook/ Lecture Notes	3
11	Green's functions: Applications	Textbook/ Lecture Notes	3
12	Developing student projects	Textbook/ Lecture Notes	3
13	Developing student projects	Textbook/ Lecture Notes	3
14	Student project presentations	Textbook/ Lecture Notes	3
15	Final exam		3
16			

Sources

Course notes/textbooks	: The method of moments in electromagnetics, W. C. Gibson, Chapman & Hall / CRC Numerical Techniques in Electromagnetics, M.N.O. Sadiku,CRC Press Mathematical methods for physicist, 7th Ed., G. B. Arfken, H. J. Weber, F. E. Harris, Academic Press
Readings	: Field and wave electromagnetics, D. Cheng, Addison Wesley Classical electrodynamics, J. D. Jackson, Wiley Antenna theory: Analysis and design, C. Balanis, Wiley
Supplemental readings	: Computational Methods for Electromagnetics, A.F. Peterson, S.L. Scott, R. Mittra, IEEE Press. R.F. Harrington, Field Computation by Moment Methods, MacMillan. S.M. Rao, Time Domain Electromagnetics, Academic Press. P.Zhou, Numerical Analysis of Electromagnetic Fields, Fall/ Springer-Verlag
References	:

Evaluation System

Work Placement	**Number**	**Percentage of Grade**
Attendance		
Quizzes		
Homework		
Presentation	1	5
Laboratory/Practice		
Report(s)		
Graduate Thesis/Project		
Seminar		
Projects	1	25
Midterm exam(s)	1	30
Others		
Final exam	1	40
	Total	100

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Percentage of semester work	60
Percentage of final exam	40
Total	100

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 project	1	10	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