ECE 7010: Electromagnetic Field Theory II

Course Description

Green's functions with appplications; spectral representation of sources; sources in layered media and Sommerfeld integrals; time-domain fields, retarded potentials, and transients; periodic structures; integral equations.

Transcript Abbreviation: EM Field Theory 2
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Graduate
Student Ranks: Doctoral
Course Offerings: Spring
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lec
Expected out-of-class hours per week: 6.0
Graded Component: Lecture
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prereq: 6010 (719).
Exclusions: Not open to students with credit for 810 or 811.
Cross-Listings:

Course Rationale: Existing course.

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001
Subsidy Level: Doctoral Course

Course Goals

Learn spectral representation of sources, and solve for fields due to sources in layered media using Sommerfeld integrals
Learn applications of dyadic Green's functions.
Learn about time-domain fields, retarded potentials, and transients
Learn about periodic structures, Floquet modes, and band diagrams

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Sturm-Liouville problem and construction of one-dimensional Green's functions.	5.0							
Review of complex analysis	3.0							

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Construction of two- and three-dimensional Green's functions with examples and applications	5.0							
Spectral representation of sources and Sommerfeld integrals	7.0							
Fields in layered media	4.0							
Dyadic Green's functions	4.0							
Time-domain fields, retarded potentials, and transients	5.0							
Periodic structures, Floquet modes, and band diagrams	4.0							
Selected topics in current research	5.0							

Representative Assignments

Homework
Midterm exam
Final exam
Term project with written and oral components

Grades

Aspect	Percent
Homework	25%
Midterm exam	20%
Final exam	35%
Term project	20%

Representative Textbooks and Other Course Materials

Title	Author
Waves and Fields in Inhomoegeous Media (recommended)	W. C. Chew
Field Theory of Guided Waves (recommended)	R. E. Collin
Electromagnetic Wave Theory (recommended)	J. A. Kong

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
*	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
*	g	An ability to communicate effectively.
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
**	i	A recognition of the need for, and an ability to engage in life-long learning.
	j	A knowledge of contemporary issues.

Course Contribution		College Outcome
*	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

updated prereqs, exclusion, goals, and topic to match university format.
updated texts to be "recommended" 12/02/14, ced.

Prepared by: Carol Duhigg