

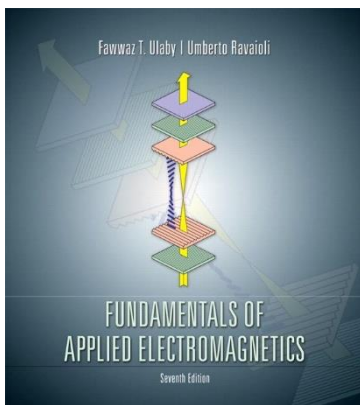
ME1200

Electromagnetic Theory Courseware

dream
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Teaching slides - Not Available



- We recommend to purchase “Fundamentals of Applied Electromagnetics, 7th Edition” By Fawwaz T. Ulaby, Umberto Ravaioli, Published by Pearson, and get the PowerPoint slide presentations at no cost

Training kit

- EM hardware kit
- Lab sheets and model answers
- Problem-based assignments
- Covers 18 hours of labs



Target university subject	Target year of study	Prerequisite(s)
Electromagnetic Theory Fields and Waves	2 nd or 3 rd year undergraduates	Field Theory Electricity and Magnetism

The ME1200 serves as a ready-to-teach package in the area of Electromagnetic Theory. This is a resource for lecturers consisting of teaching slides, training kits, lab sheets, and problem-based assignments.

Learning Outcomes

Students would be able to:

- Apply Maxwell's equations to solve applied electromagnetic problems
- Explain how a propagating electromagnetic wave is generated
- Explain the properties of guided time-harmonic electromagnetic wave in a terminated transmission line
- Characterize basic properties of wave propagation on transmission line using industrial grade test and measurement instruments
- Implement simple impedance matching schemes using stubs

Benefits of the ME1200 courseware

- Microstrip line transmission line excited by a synthesized microwave signal source from 2.4-2.6 GHz are employed to allow students to analyze the effect of the EM wave propagation through waveguide. Specifically, a near-field electric probe and power meter are used to detect the EM field intensity along the transmission line.
- The EM hardware kit is not a “black box”, students can actually see the transmission line and are able to appreciate the propagation effect of the EM wave along the structure.
- This hardware kit is bundled with free Smith Chart software, which allows interactive impedance matching network design.
- Students get to experience the usage of industry-grade software and tool through microwave power analysis.



Teaching Slides

The recommended textbook covers the following topics:

- Chapter 1 Introduction: Waves and Phasors 1
- Chapter 2 Transmission Lines 48
- Chapter 3 Vector Analysis 33
- Chapter 4 Electrostatics 178
- Chapter 5 Magnetostatics 235
- Chapter 6 Maxwell's Equations for Time-Varying Fields 281
- Chapter 7 Plane-Wave Propagation 313
- Chapter 8 Wave Reflection and Transmission 352
- Chapter 9 Radiation and Antennas 403
- Chapter 10 Satellite Communication Systems and Radar Sensors 457

Online instructor resources such as solution manual and **PowerPoint Slide Presentations** are available at no cost but requires registration with Pearson



Training Kit

EM Hardware Kit

The hardware kit consists of a synthesized microwave source, a microstrip line mounted on a robust support, and an adjustable near-field electric probe. The adjustable near-field electric field probe allows the student to measure the relative strength of the electric field at various points along the transmission line. This hardware kit is capable of demonstrating various characteristics of a transmission line and EM wave propagation such as standing wave, measurement of wavelength, impedance matching, and impedance transformation.



Termination board tuned at 2500MHz:

1. 50 ohm terminated transmission line
2. 220 ohm terminated transmission line
3. 220 ohm single-stub impedance transformer #1
4. 220 ohm single-stub impedance transformer #2

Accessories

The following accessories are provided with the training kit.

Item	Quantity
ME1200 Termination board	1
RF Coaxial cable	1
N(m)-SMA adaptor(f)	1
N(f)-SMA adaptor(f)	1
Male-to-Male SMA adapter	1
50 Ohm coaxial termination	1
Short-circuit coaxial termination	1
USB cable	1
Power adapter, 5 VDC, 1 A	1

Lab sheets

The training kit includes six lab sheets in editable Microsoft Word format. Each lab sheet requires 3 hours to complete. Model answers are provided with all lab sheets. The required instruments for the lab sheets are listed below.

Lab Sheet	Required Instrument	
	EM Hardware Kit	Power Meter or Spectrum Analyzer ^[1]
1. Introduction to EM Waves and Transmission Lines	√	
2. Wave Propagation on a Transmission Line and Standing Wave (SW) Pattern	√	√
3. Introduction to Smith Chart ^[1]		
4. Introduction to the Concept of Impedance Transformation - Design of Lumped Impedance Transformation Network ^{[1] [2]}		
5. Introduction to Impedance Transformation Using Single-Stub Transmission Line Networks ^{[1] [2]}	√	√
6. More advanced concepts of impedance transformation - Impedance matching and power transfer, double-stub transmission line networks ^{[1] [2]}	√	√

^[1] Free Smith Chart software will be provided for this lab, i.e. *fSmith*.

^[2] Advanced lab exercises suitable for students majoring in Telecommunications/Microwave/RF engineering.

Problem-Based Assignments

The problem-based assignment below allows students to enhance their problem-solving skills.

- Design an impedance matching network for antenna



Instruments

The recommended instruments and software from Keysight Technologies, to be purchased separately, are listed below.

Instrument / Software ^[1]	Model
Power Sensor	Minimum 3 GHz Power Meter & Sensor: U2000A 10 MHz - 18 GHz USB Power Sensor
Spectrum Analyzer [optional] ^[2]	Minimum 3 GHz RF Spectrum Analyzer: N9320B, 9 kHz to 3 GHz

^[1] Refer to the Lab sheets section for the instrument selection.

^[2] These instruments are also the recommended models for the ME1000, ME1020, ME1100 and ME1400.

Training Kit Hardware Specifications

EM Hardware Kit

RF	
Microwave source output power	0 ±1 dBm
Microwave source output frequency (3 fixed points)	2.435, 2.500 & 2.585 GHz
Microwave source output frequency accuracy	±2 MHz
General	
Input voltage	5.0 V (min) 6.0 V (max)
Input current	30 mA (typical)
EMC designed to	IEC61326-1:2005 / EN61326-1:2006 CISPR11:2003/EN55011:2007 Group 1, Class A
Warranty	1 year

Ordering Information

Description	Package	Product Number
Teaching Slides	Not available	Purchase separately the textbook from Pearson (http://www.mypearsonstore.com/bookstore/fundamentals-of-applied-electromagnetics-0133356817) and get the slides at no cost
Training Kit	1 set	ME1200-200
Teaching Slides + Training Kit	Not available	
Instruments	Where applicable	Purchase separately from Keysight or its distributor

Training courses related to subject matter are available on request. Visit dreamcatcher.asia for details.

<p>For more information or enquiries:</p> <p>Website: dreamcatcher.asia/cw E-mail: cw.sales@dreamcatcher.asia</p> <p>Acehub Vista Sdn Bhd (785702-P) <i>A member of the DreamCatcher group</i></p> <p>70-03-79, D'Piazza Mall, JalanMahsuri 11900 Bayan Lepas, Penang Malaysia</p>	<p>© 2010-2011 Acehub Vista Sdn Bhd</p> <p>We reserve the right to change or alter the information in this material without prior notice. The information provided in this material is accurate as of the print date.</p> <p>Microsoft, Windows, and Office Programs are trademarks of Microsoft Corporation in the United States and/or other countries. All other copyrights and trademarks belong to their respective owners.</p> <p>Updated on 4th Dec 2019</p>
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The logo for DreamCatcher, featuring the word "dream" in a lowercase, cursive-style font, and "CATCHER" in a bold, uppercase, sans-serif font below it. The "C" in "CATCHER" is red, and the "A" is also red, while the other letters are black.