1-2014

PHSX 425.01: Electricity and Magnetism II

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PHYSICS 425 – ELECTRICITY & MAGNETISM II

Spring Semester 2014

LECTURES: Mon. Wed. & Fri. 1:10 p.m. – 2:00 p.m., CHCB 230

INSTRUCTOR:
Eijiro ('Ebo') Uchimoto
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Office hours: Mon. 9 – 10 a.m., Tue. 12 noon – 1 p.m., Wed. 3 – 4 p.m.,
Thu. 1 – 2 p.m., Fri. 2 – 3 p.m., (and by appointment).

TEXTBOOK: Introduction to Electrodynamics, 3rd ed. by David J. Griffiths.
(Prentice Hall, 2013) ISBN 0-13-805326-X

PREREQUISITE: PHSX 423 – Electricity & Magnetism I

SCOPE:
- Electrostatics & magnetostatics in matter
- Electrodynamics including induction, electromagnetic waves, and radiation
- Conservation laws, potential formulation, and four vectors

OUTCOMES:
- Will acquire physical understanding and working knowledge of electrostatics and magnetostatics in matter.
- Will acquire physical understanding and working knowledge of electrodynamics including induction, electromagnetic waves, and radiation
- Will be fully exposed to conservation laws, potential formulation and four vectors

HOMEWORK: Reading assignment and problem sets.

EXAMS: Three midterm exams (**Wed. 2/26/14, Fri. 3/28/14, and Fri. 5/2/14**)
Closed book but each student is permitted to bring one 3" x 5" card.

One final exam (**3:20 p.m. – 5:20 p.m. Wed. 5/14/14**)
Closed book but each student is permitted to bring three 3" x 5" cards.

GRADING:

problem sets	25 %	[This course can be taken for
midterm exams	45 % (15 % each)	a traditional letter grade only.]
final exam	30 %	

Drop/add by CyberBear through Fri. 2/14/14; drop/add by paper form through Mon. 4/7/14, drop/add by petition through Fri. 5/9/14.

This course is accessible to and usable by otherwise qualified students with disabilities. To request reasonable program modifications, please consult with the instructor. Disability Services for Students will assist the instructor and student in the modification process. For more information, visit the Disability Services website at http://www.umt.edu/disability.

TENTATIVE COURSE OUTLINE:

Week	Dates	Topics	Sections in the Text
1	1/27, 29, 31	Force and torque on an electric dipole, polarization, electric field due to a polarized object, bound charges	**4.1 & 4.2**
2	2/3, 5, 7	Electric displacement, liner dielectrics	**4.3 & 4.4**
3	2/10, 12, 14	Force and torque on a magnetic dipole, magnetization, magnetic field due to a magnetized object, bound current	**6.1, 6.2 & 6.3**
4	2/19, 21	The H field, linear and nonlinear media	**6.4**
5	2/24, 26, 28	**Exam #1** (2/26) Ohm's law, electromotive force	 **7.1**
6	3/3, 5, 7	Electromagnetic induction, inductance, magnetic energy, Maxwell's equations in vacuum	**7.1 & 7.2**
7	3/10, 12, 14	Maxwell's equations in matter Conservation of charge and energy	**7.3** **8.1 & 8.2**
8	3/17, 19, 21	Maxwell's stress tensor conservation of momentum no work done by magnetic field	**8.2 & 8.3**
9	3/24, 26, 28	Electromagnetic waves in vacuum **Exam #2** (3/28)	**9.1 & 9.2**
		****** SPRING VACATION WEEK ******	
10	4/7, 9, 11	Electromagnetic waves in matter, Fresnel equations, absorption and dispersion	**9.3 & 9.4**
11	4/14, 16, 18	Introduction to wave guides potential formulation	**9.5** **10.1**
12	4/21, 23, 25	Retarded potentials, Lienard-Wiechert potentials	**10.2 & 10.3**
13	4/28, 30, 5/2	Selected topics from radiation and relativity **Exam #3** (5/2)	**TBA**
14	5/5, 7, 9	more on relativity, review	**TBA**
15	5/16	**FINAL EXAM WEEK**	**Final Exam** (5/14)