UNIVERSITY OF MARYLAND

DEPARTMENT OF PHYSICS

PHYS 606 **Spring 2018**

TITLE: **Electrodynamics**

INSTRUCTOR: **T M. Antonsen Jr.**
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3339 A. V. Williams II
405-1635
Office hours: Tues 2:30-4, or by appointment

GRADER: **TBD**

ROOM: **PHYS 1402**

TIME: **Tu-Th** **11:00 – 12:50**

COURSE DESCRIPTION Classical Electrodynamics,
Static and dynamic electromagnetic fields, electromagnetic waves, radiation, special relativity

TEXT: Classical Electrodynamics, J. D. Jackson (John Wiley and Sons, 3rd edition, ISBN 0-471-30932-X)

EXAMS: There will be three exams: two midterms and a final exam. These will be take-home

HOMEWORK: Assignments will be posted on the web.
Assignments may involve computation.

GRADING: Your course grade will be computed on the basis of 400 points apportioned as follows:

Two midterms	**200**
Final	**100**
Homework	**100**
	400

Tentative Schedule

Topic	Text Chapters	Lectures[1]
Fundamentals of Electrostatics	1.1 – 1.8	1
Energy, Capacitance, Variational Approach	1.11 – 1.13	2, 3
Method of Images, Fields Near Corners, Finite Elements	2.1 – 2.6, 2.11, 2.12	4, 5
Fields Near Protrusions	3.4	6
Multipoles, Dielectrics	4.1 – 4.7	7, 8
	Exam 1	On around March 5, 2018
Magnetostatics, Ampere's Law, Biot-Savart Law, Scalar Potential, Vector Potential	5.1 – 5.12	9, 10
Faraday's Law, Magnetic Energy, Self and Mutual Inductance	5.15 – 5.17	11, 12
Maxwell's Displacement Current and Equations, Conservation Laws, Gauge transformations	6.1 – 6.9	13, 14
Plane Waves, Polarization, Reflection at Discontinuities	7.1 – 7.4	15, 16
Dispersion, frequency-dependent dielectrics, Foster's theorem, pulse propagation	7.5 – 7.11	17, 18
	Exam 2	On around April 20, 2018
Guided Waves, conducting waveguides, optical waveguides, cavities, transmission lines	8.1 – 8.5	19, 20
Radiation, moving charges, antennas, coherent/incoherent	9.1 – 9.4	21, 22
Special Relativity, transformations, Energy and Momentum, Charged Particle Motion in Strong Fields, Lagrangian Densitty	11.3 – 11.6	23, 24
Special Topics: by popular demand Diffraction Scattering Metamaterials Plasma Oscillations and Waves Surface Plasma Waves		25 - 27
	Final Exam	

1 Lecture is two 50 minute periods.