

**Fall 2007**  
**Electricity and Magnetism II**

**Physics 914**

**Tuesdays and Thursdays, 11:00-12:15**

**Brace 118**

**Instructor: Evgeny Tsymbal**

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Hours: after class or by appointment

Classes begin	28 August
Fall Semester Break	22 - 23 October
Thanksgiving Vacation	22 - 25 November
Last day of classes	13 December

**Homework:** Homework is due in a week from the day of assignment

**Exams**

Midterm Exams (in class, open book)	18 October, 27 November
Final Exam (in class, open book)	Monday, 17 December, 3:30-5:30, Brace 118

**Grading**

Performance in Class	5%
Homework	35%
Midterm Exams	15%
Final Exam	30%

**Final grade:**

A+	A	A-	B+	B	B-	C+	C	C-	D	F
93%	85%	80%	75%	70%	65%	60%	55%	50%	35%	<35%

**Course outline**

**1. Main results of Electrostatics and Magnetostatics**

*Electrostatics:* charge density, electric field, Coulomb's law, Gauss' law, scalar potential, dipole moment, electric polarization; *Magnetostatics:* current density, magnetic field, Biot and Savart law, Ampere's law, magnetic moment, magnetization, vector potential; boundary conditions

**2. Maxwell Equations**

Faraday's law, energy in magnetic field, inductance, displacement current, Maxwell equations, microscopic and macroscopic electromagnetism, conservation of energy, Poynting vector, Maxwell stress tensor, conservation of momentum

**3. Electromagnetic (EM) Waves**

Plane waves in vacuum, polarization of EM waves, energy and momentum, EM waves in matter, reflection and refraction, frequency dependence, dispersion in media, fields in conductors, optical conductivity, superposition of waves, propagation in dispersive medium, waveguides

**4. Potentials and Fields**

Potential formulation of Maxwell equations, retarded potentials, Jefimenko's equations

**5. EM radiation**

Radiation zones, localized oscillating source, electric dipole fields, magnetic dipole and quadrupole fields, angular distribution of multiple radiation

**Text:** J. D. Jackson, *Classical Electrodynamics* (Third Edition)

**Reference:** D. J. Griffiths, *Introduction to Electrodynamics*