

Physics 21

Fall Semester 2016

<http://www.lehigh.edu/inphy21/>

Time Plan

| Wk | Date | Day | reading assignment | Topic | HW & Quizzes |
|----|-------|-----|--|--|--------------------------------|
| 1 | 08/30 | Tu | 25.1-25.3, 25.4 , 25.5 | Point charges, electric fields, Coulomb law | |
| | | W | | Vectors, Sum of Electric fields. | |
| | | Th | 26.1 , 26.2-26.3 26.5 , (29.6) | Typical electric fields. Parallel plates. Energy density of electric field. | MPa1 |
| | | F | 26.3-26.4, 26.7 | Integrals (to find field), Dipole | Quiz 1 LHW1 narrative |
| 2 | 09/06 | Tu | 27.1-27.3, 27.4 , 27.5-27.6 | Electric Field, its flux, and Gauss law, Conductors | MPb1 |
| | | W | 27.5 | Applications of Gauss | |
| | | Th | 28.1, 28.2 , 28.3-28.5, 28.6 , (29.1, 29.3) | Electric potential energy, electric potential. Gradient of potential | MPa2 |
| | | F | 28.2, 28.7 | Potential from point charges and from charge distributions. | Quiz 2, LHW1 LHW2 narrative |
| 3 | 09/13 | Tu | 29.1 , 29.2, 29.3 , 29.4 29.6, 29.7 | Electric field at surface of conductor. Electric polarization. Dielectrics | MPb2 |
| | | W | | Review of Electrostatics | |
| | | Th | 32.1-32.2, 32.3 | Magnetic field of a moving charge. Simple electric currents. | MPa3 |
| | | F | 32.3 | B-field of moving charge, vector product | Quiz 3, LHW2 LHW3 narrative |
| 4 | 09/20 | Tu | 32.4 , 32.5, 32.6 | Magnetic fields and electric currents. Field lines, Ampère Law. Solenoid. | MPb3 |
| | | W | 32..3 | Reminder of vector product. | |
| | | Th | 32.7 , 32.8 , 32.9 | Magnetic force on moving charge and current carrying wires. Magnetic Torque on loops. | MPa4 |
| | | F | 32.9 | Lorentz force. Force between wires. | Quiz 4, LHW3 LHW4 narrative |
| 5 | 09/27 | Tu | 33.1, 33.2 , 33.3 , 33.4 | Magnetic flux, Electromotive force (emf). | MPb4 |
| | | W | | Review | |
| | | Th | Ch. 25 to 32 | Review, difference between magnetic and electric fields, forces on wires and on loops. | MID-TERM 1 |
| | | F | | Electromotive force (emf). | LHW4 LHW5 narrative |

Note: reading assignments give section numbers in textbook that discuss lecture topics. Bold-faced section numbers are “milestone” section numbers where important concepts are presented.

| Wk | Date | Day | reading assignment | Topic | HW & Quizzes |
|----|-------|-----|--|---|--------------------------------|
| 6 | 10/04 | Tu | 33.3 , 33.4, 33.5 33.6. | Faraday Law, Lenz, Eddy currents, General form of Ampère Law. Displacement current. | MPb5 |
| | | W | 33.7 | Examples of induction, eddy currents | |
| | | Th | 34.2, 34.3, 34.4 , 34.5 | Maxwell's equations. Electromagnetic waves.. | MPa6 |
| | | F | | Light: E and B fields. | Quiz 5, LHW5 LHW6 narrative |
| 7 | 10/11 | Tu | 34.6 . 34.7. 34.1 | Speed of Light. Poynting vector. Electrodynamics in different reference frames | MPb6 |
| | | W | 34.6 | Light: E and B fields, Energy density, Intensity. | |
| | | Th | 34.1, 36.1, 36.2, 36.3 | The need for the theory of relativity. | MPa7 |
| | | F | 34.6 | Poynting vector and momentum | Quiz 6, LHW6 LHW7 narrative |
| 8 | 10/18 | Tu | Pacing Break | | |
| | | W | 29.7 | Review. Gauss law in dielectrics | |
| | | Th | 26.5, 29.5 -7. 30.1-3, 30.5. 31.1, 31.4 | Capacitors, Electric current, Resistivity and resistance. Introduction to circuits. | MPa8 |
| | | F | 30.5, 31.4, 29.5 | Repeat resistors and capacitors. | Quiz 7, LHW7 LHW8 narrative |
| 9 | 10/25 | Tu | 31.2, 31.3, 31.6, 31.7 , 31.8, 31.9 | Kirchhoff rules, RC Circuits, power, and energy in capacitors | MPb8 |
| | | W | 31.5 | Batteries, internal resistance | |
| | | Th | 33.8 , 33.9, 33.10 | Inductance, LC and LRC circuits, Energy density of magnetic field | MPa9 |
| | | F | 33.7 | Mutual inductance, transformers | Quiz 8, LHW8 LHW9 narrative |
| 10 | 11/01 | Tu | | Circuits with switches, time dependent currents and voltages. | MPb9 |
| | | W | | Review | |
| | | Th | | Review of Electrodynamics, Maxwell's equations, electromagnetic waves, circuits. | MID-TERM 2 |
| | | F | | | LHW9 LHW10 narrative |

Note: reading assignments give section numbers in textbook that discuss lecture topics. Bold-faced section numbers are “milestone” section numbers where important concepts are presented.

| Wk | Date | Day | reading assignment | Topic | HW & Quizzes | |
|----|-------|-----|--|---|-----------------------------------|--|
| 11 | 11/08 | Tu | 35.6 , 35.1-35.5 | AC Circuits, root mean square values, power | MPb10 | |
| | | W | | AC currents and voltages | | |
| | | Th | 20.1-20.4, 21.1 , 21.5 | Waves | MPa11 | |
| | | F | 20.1-20.4 | Reminder of waves | Quiz 9, LHW10 LHW11 narrative | |
| 12 | 11/15 | Tu | 20.5, 21.1,21.2 22.1, 22.2, 34.7 | Light. Refractive Index. Light Polarization. Wave optics | MPb11 | |
| | | W | 20.1-20.4 | Waves, amplitude, phase, frequency, wavelength | | |
| | | Th | 21.5-21.7 22.2, 22.3 , 22.4 | Superposition, Interference. Two slit interference pattern, single slit diffraction. | MPa12 | |
| | | F | 34.7 | Light waves, polarization. | Quiz 10, LHW11 LHW12 narrative | |
| 13 | 11/22 | Tu | 22.3 . 22.5, 22.6 23.1-23.4 | Diffraction grating, interferometers. Reflection and refraction, lenses. | MPb12 | |
| | | W | Thanksgiving Break | | | |
| | | Th | | | | |
| | | F | | | | |
| 14 | 11/29 | Tu | 23.6-23.8, 24.1-24.4 | Ray Optics, Mirrors and Lenses. Imaging. | MPb13 | |
| | | W | | Wavelength and color | | |
| | | Th | 24.5 | Resolving power | MPa14 | |
| | | F | 23.3 | Examples of refraction, total internal reflection. | Quiz 11, LHW12 LHW13 narrative | |
| 15 | 12/06 | Tu | 24.5 38.3, 38.4 | Summary of optics. Two slit interference with electrons. | MPb14 | |
| | | W | 24.4 | Imaging examples. Telescopes. | | |
| | | Th | | Summary. Where to go from here? Electro- dynamics, relativity, and quantum physics. | MPa15 | |
| | | F | | Review | LHW13 | |

Note: reading assignments give section numbers in textbook that discuss lecture topics. Bold-faced section numbers are “milestone” section numbers where important concepts are presented.