

Week	Tuesday	Thursday	Major Learning Goals The student should be able to:
1 Jan 7	Administration, General Properties of Nuclei, Size, Mass and Energy Units Ch 42: 1 43	Binding energy, Radioactive Decay Mechanisms, Half-life. Ch 42: 2, 5, 6	<ul style="list-style-type: none"> describe the structure of the nucleus in terms of the simple nucleon model understand the difference between, nuclide mass, atomic mass number, atomic mass use $E=mc^2$ to determine the binding energy of a nucleus describe the basic types of decay mechanisms and write the appropriate decay equations
2 Jan 14	Decay Rate, Time Constant, Radioactive Dating, Formation of the Elements, Indicators for Stability Ch 42: 5,	Nuclear Models, Biological Applications (NMR later) Ch 42: 3, 4, 7 Review of Charge and Coulomb's Law Ch 25: 1-4 See Mastering Physics	<ul style="list-style-type: none"> describe how half-life relates to decay constant and activity of a sample know the predictors for nuclear stability describe how radioactive materials are used in medicine contrast the different behaviours of charged conductors and insulators explain why a neutral object may be attracted to a charged object
3 Jan 21	Coulomb's Law for Multicharges, Electric Field, Electric Field lines Ch 25: 4, 5 Ch 26: 1, 2 26	Motion of Charges in Uniform Electric Fields. Ch 26: 6, 7	<ul style="list-style-type: none"> apply the principle of superposition to determine the electric field due multiple charges appreciate the limitations of electrostatics predict the motion of a charge in an electric field
4 Jan 28	Electric Flux Gauss's law. Using Gauss's Law Electric fields due to spherical, planar and linear charge distributions Ch 27: 1-4	Conductors in Electrostatic Equilibrium. Unit vectors and the Dot Product. Ch 27: 5, 6 (Ch26: 3, 4) Ch 11: 3	<ul style="list-style-type: none"> apply the concept of electric flux to calculate the electric flux through different surfaces use symmetry and Gauss's Law to predict the electric field due to some continuous charge distributions
5 Feb 4	Work done in a uniform electric field. Electric Potential and Electric Potential Energy. Equipotential surfaces Ch 29: 1, 2, 4, 6, 7	Absolute Potential, Potential due to a point charge. Potential Energy of a system of point charges. Ch 29: 2, 6	<ul style="list-style-type: none"> describe the relationship between electric potential energy and electric potential and to calculate their values for a system of point charges explain what an electron volt represents
6 Feb 11	Midterm 1	Relationship between Electric Potential and Electric Field revisited. Capacitors Ch 26 5 Ch 30: 1, 2, 3	<ul style="list-style-type: none"> determine the electric potential due to continuous charge distributions with spherical or planar symmetry describe the relationship between equipotential surfaces and electric field explain how the charge of a parallel capacitor is related to the electric field and potential difference between its plates

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7 Feb 25	Equivalent capacitance. Energy stored in Capacitors, Dielectrics. Ch 29: 5 +class notes Ch 30: 6, 7	Current Model Batteries and emf Ch 28: 1, 2, 3, 4, 5 Ch 30: 4, 5	<ul style="list-style-type: none"> describe what a capacitor is and some of its applications determine the equivalent capacitance for combinations of capacitors explain the effect when a dielectric is inserted between the plates of a capacitor use the charge and field model to understand the mechanism of current flow
8 Mar 3	DC Circuits, Real Batteries, Kirchoff's Laws, Ch 31: 1-9	RC Time Constant and RC circuits. Charges in Magnetic Fields, Vector Cross Product Ch 31: 10 Ch 32: 1, 2, 3, 7	<ul style="list-style-type: none"> distinguish terminal voltage from emf apply Kirchoff's laws to multiloop circuits understand energy transfer and power loss in circuits predict the time dependence of current, charge and potential difference for charging and discharging in an RC circuit. predict the motion of a charge in a magnetic field
9 Mar 10	Combining Electric and Magnetic fields, Cyclotron, Hall Effect etc Ch 32: 7	Currents in Magnetic Fields. Torques: Dipoles in Electric Fields, Current loops in Magnetic Fields, NMR Ch 32: 5, 8, 9 Ch 29: 3	<ul style="list-style-type: none"> describe the operation of some common devices that use combined electric and magnetic fields be able to calculate the torque on and potential energy of an electric dipole in an electric field and a current loop in a magnetic field
10 Mar 17	Sources of Magnetic Fields. Ampere's Law. Motional emf, magnetic flux, Ch 32: 3, 4, 6 Ch 33: 1, 2, 3, 5	Faraday's Law, Lenz's Law, Eddy Currents. Inductors, LC oscillations, LR circuits Ch 33: 4, 8, 9, 10	<ul style="list-style-type: none"> use Ampere's Law to calculate the magnetic field due to currents in wires, loops, and solenoids know the relationship between magnetic flux and induced emf use Lenz's law for induced currents predict the time dependence of current, through and potential difference across the resistor and inductor in an RL circuit
11 Mar 24	Midterm 2	Switches in RLC circuits, AC circuits Ch 35: 1, 2	<ul style="list-style-type: none"> distinguish the terms, resistance, reactance and impedance analyze a series <i>RLC</i> circuit and to describe how a tuning circuit works
12 Mar 31	Series RLC circuits, Power in AC circuits, Transformers Ch 35: 4, 5, 6	Induced fields, Displacement current Ch 33: 6 Ch 34:4	<ul style="list-style-type: none"> determine the potential difference, impedance, current, phase angle, and power for a series RLC circuit
13 Apr 7	E and M fields interact with matter. Maxwell's Equations, Electromagnetic Waves Ch 34:1, 5, 6	Review/ Applications	<ul style="list-style-type: none"> describe radiation pressure appreciate that electric and magnetic fields are interdependent and that they can exist without source charges or currents