The essential 116b. What you should know:

Electric Field lines: How to draw them, what do they mean?

Coulomb force: How to calculate it (vectors), when is it attractive/repulsive

Gauss's Law: Know how to work the 3 different shapes to find the E field

Charge conservation:(remember the charge on the 2 spheres?)

Electric Potential and Potential Energy(Different shapes and configurations)

Capacitors: dielectrics, serial, parallel, Q=CV, stored energy

Current, current conservation, drift velocity, resistivity, resistance(parallel, series)

V=IR, Circuits, Power dissipation, (roughly!)temperature dependence on resistivity

Capacitors in a circuit, switches in a circuit, RC circuits

Magnetic fields(wire, solenoid, toroid, loops) 4 eqns to apply(and Right Hand Rule):

$F=qvxB$, $dF=IdlxB$, $dB=(Uo/4pi)(Idl \times \bar{r})/(r^3)$, $\oint B.ds = Uo\ Ienclosed$

Induced EMF, $= -d(flux)/dt$, $= -L\ dI/dt$, RL circuits, inductance, Stored energy in an inductor

know how to deal with: Sliding rail, moving hoops, changing B, rotating hoop and eddy currents

Electric fields from changing B, and B from changing E (B inside a capacitor)

Resonance, average power, reactance, impedance

Poynting vector $S= (1/Uo)E \times B$, E,B wave $E=Eo \sin(Kx-wt)$ $k=2pi/wavelength$

$w = 2pi/f$, $c = wavelength*f = 300000000m/s$ in vacuum

Polarization: know how to deal with multiple polarizers and intensity (prop to E*E)

Snell's Law $n1 \sin(theta1) = n2 \sin(theta2)$, Critical angle (total internal reflection)

Brewster's Angle (condition for maximum Polarization on reflection)

n1 wavelength1 = n2 wavelength2, some materials n depends on wavelength (prism)

$1/p + 1/q = 1/f$, Magnification, real/virtual images, ray tracing, multiple lens/mirrors

apparent depth, lens maker's equation

Single and double slit equations and interference patterns, what causes interference:

Rayleigh Criteria for hole and single slit, Brag's Law

Change of 180 degrees on reflection $n1<n2$, soap bubbles, diffraction gratings, Resolving power

Constructive: path diff of integer wavelengths, phase angle of integer 2pi values

Destructive: path difference of 1/2 + integer wave length, phase angle of pi+m.pi

moving clocks look like they run slower, moving lengths appear shorter

Source moving 1)away is "red" shifted, 2) towards is "blue" shifted. Can't add velocities to get > c

Relativistic relationship between energy momentum and rest mass, E = mcc = rest mass

Photons are quanta, Blackbody Radiation, Photoelectric effect, Stopping Potential, Compton effect

Uncertainty Principle (single slit), Bohr atom, angular momenta quantization, Energy levels

Energy transitions of electron = photon absorbed or released, Energy levels for any particle

Tunnelling, Shape of a wave function, infinite square well

Nuclear Binding energy, Nuclear Decays, Types of radiation, Fission, Fusion, Q value

Current Tests, Old Tests, Homework, Lectures (in order of studying I would do)