

The exam may cover

- All in-class notes and clicker questions
- All tutorials and tutorial homework
- All Flip-It videos
- All MP assignments
- All Wolfson sections listed on the course schedule on Canvas

The exam is cumulative. The material covered after Exam 3 will also be covered on the Final Exam, but with no stronger emphasis than the other topics.

Exam 1

- Electric charge: quantization, attraction/repulsion, polarization
- Conductors and insulators
- Coulomb's Law and superposition
- Electric field definition
- Electric field of charge distributions
- Electric dipoles
- Electric field lines
- Electric flux
- Gauss's Law
- Using Gauss's Law with symmetry
- Conductors in equilibrium
- Electric field of infinite plate

Exam 2

- Work/Electric potential energy
- Electric potential
- Potential of point charge
- Relationship between electric field and electric potential
- Capacitance definition
- Parallel plate capacitors
- Energy stored in capacitors
- Dielectrics in capacitors
- Capacitors in series/parallel
- Electric current definition
- Drift velocity and current density
- Ohm's Law
- Conductivity and resistivity
- Power consumption of resistors
- Resistors in series/parallel
- Kirchhoff's Laws

Exam 3

- Ammeters and Voltmeters
- RC Circuits
- Bar magnets: field lines and force
- Magnetic force on moving charges/wires (equation + right hand rule)
- Cyclotron motion
- Biot-Savart Law
- B-field of: long straight wire, current loop, solenoid
- Magnetic dipole moment and torque on it
- Ampere's Law
- Magnetic flux
- EM induction as result of changing flux (Faraday's Law)
- Lenz's Law
- Motional EMF
- Eddy currents

Material after Exam 3

- Self-inductance
- LR Circuits
- Energy stored in inductors
- LC oscillators
- AC circuits: peak vs. rms values
- Resistors in ac circuits
- Transformers
- Maxwell's displacement current
- Plane EM waves: sinusoidal, speed, relationship between E- and B-field magnitude/direction
- EM wave intensity
- Malus's Law and polarization
- Reflection and refraction
- Snell's Law
- Total internal reflection