Review problems:

- Chapter 1: 30-34, 38-40, 53-58
- Chapter 2: 2, 4-8, 10, 11, 14, 16, 17, 20, 22-24, 31, 33-36, 41, 45
- Chapter 3: 3, 6, 8, 13, 17, 18, 20, 22, 24, 25, 31, 32, 33
- Chapter 4: 4, 5, 6, 9, 10, 11, 15, 18, 19, 20, 22, 31, 32, 33
  More difficult: 24, 25, 29, 36
- Chapter 5: 4, 5, 6, 8, 9, 10, 13, 14, 15, 16, 22, 23, 24, 25, 26, 35, 47, 58
- Chapter 6: 1, 3, 5, 7, 8, 9, 12, 18, 23
- Chapter 7: 1, 2, 5-10, 12, 13, 15-18, 20-22, 24-29, 31, 37, 42, 43, 48-51, 53, 54, 58
  More difficult: 19, 23, 30, 32, 34, 38

P435 Course Summary

Selected Griffiths problems in parentheses.

1. **Electric field:**

Divergence. Charge density. Gauss' law. Electric potential. Electrostatic energy.

You should know how to:

Calculate the charge density. (2.9)

Apply Gauss' law. (2.16)

Calculate potential differences (*e.g.*, do line integrals). (2.44)

Calculate fluxes (surface integrals). (2.10)

Calculate the field energy. (2.34)

2. Conductors

Equipotential surfaces. Induced charge. Capacitors. Method of images.

You should know how to:

Calculate capacitance. (2.39, 2.40)

Use images to solve (simple) problems. (3.34)

3. Laplace's equation:

Separation of variables

Boundary conditions: *V* or *E* at a surface. Multipole expansion.

Cartesian, cylindrical, spherical coordinates

You should know how to:

solve in various coordinate systems (3.39)

apply boundary conditions (3.37)

solve problems with electric (and magnetic) dipoles (3.31)

4. Electric fields in matter:

Polarization. *E*, *D*, and *P.* Linear dielectrics. Boundary conditions. Field energy.

You should know how to:

Calculate bound charges (4.10)

Calculate the force and torque on a dipole (4.6, 4.9)

Apply the boundary Conditions (4.16, 4.18 4.22)

Calculate the field energy and forces (4.26, section 4.4.4)

5. Magnetic fields:

Lorentz force. Biot-Savart and Ampere's laws. Vector potential.

You should know how to:

Calculate forces on moving charges and current carrying wires (5.40-5.42)
Calculate the field produced by a current (5.45)
Calculate the vector potential, given the current (5.22, 5.23)

6. Magnetic fields in matter:

Magnetization. *B*, *H*, and *M*. Bound currents. Boundary conditions.

You should know how to:

Calculate forces on magnetic dipoles (and current loops) (6.1, 6.3)
Calculate the bound currents and field of a magnetized object (6.7-6.9)
Apply boundary conditions (6.17, 6.18)

7. Time dependence:

Ohm's law. Electromotive force. Faraday's law. Inductance. Magnetic energy.
Maxwell's equations in vacuum and in matter

You should know how to:

Solve RC, LC, and RLC circuits (7.2, 7.3, 7.29)
Calculate inductance and field energy (7.26, 7.30)
Calculate induced currents (7.12)