Things you should know

1. The Maxwell equations governing static electric fields, with and without a medium. Gauss' law and Stokes law, as well as the resulting boundary conditions for E and D.

2. The definition of the Green function, as well as the formal solution of a boundary problem in terms of the Green function.

3. Methods for determining the Green function, in particular the method of images and the expansion in terms of a complete set of functions.

4. The general solution of the Poisson equation in spherical and cartesian coordinates. Solving boundary problems by expanding in terms of these solutions.

5. The energy density of an electric field and the multipole expansion of the potential.

6. The Maxwell equations governing static magnetic fields, with and without a medium. Also, the resulting boundary conditions for B and H.

7. Computing the B field in terms of a given current: Ampere's law and the Biot-Savart formula.

8. Solving boundary problems using i) the vector potential, ii) the scalar potential, iii) the scalar potential for cases with a fixed M ("hard" ferromagnets).

9. The Lorentz force, and the force on a current.