This unit explores the electrostatic potential $V(\vec{r})$ (and the gravitational potential $\Phi(\vec{r})$) due to continuous sources in 1-, 2-, and 3-dimensions and in rectangular, cylindrical, and curvilinear coordinates.

Questions we will explore: How do potentials vary in space? How do equipotential surfaces and the superposition principle help you answer these questions graphically? How does the potential field fall-off as you move away from the charges? How do power series approximations help you answer these questions algebraically?

Key Activities/Problems

- Electrostatic Potential Due to a Ring of Charge
- Constants, Variables, and Parameters
- Potential Due to a Ring of Charge–Limiting Cases
- Multipole Expansions

At the end of this unit, you should be able to:

- Find an integral expression for the electric (or gravitational) potential from a continuous source.
- Recognize the difference between constants, parameters, and variables and know how these identifications can change while doing a complicated problem.
- Do a power series expansion of the integrand in an integral expression so that you can integrate term-by-term.