# ECE343 Spring 2025

# Objective 5.3: Electric Field from Scalar Potential



UNITED STATES
AIR FORCE
ACADEMY

| Lesson | Topics | Reading | Notes |
|---|---|---|---|
| 24 | BVP (Capacitor, Coax), Electric Potential | 5.16 | LO 5.3 |
| 25 | Electric Boundary Conditions | 5.18-5.22 | LO 5.4 |
| 26 | BC's/Capacitance | 5.23-5.24 | |
| 27 | Electrostatic Lab | Lab packet | |
| **Chapter 6: Steady Current & Conductivity** | | | |
| 28 | Current density, Conductivity, Resistance | Ch. 6 | |
| **Chapter 7: Magnetostatics** | | | |
| 29 | Magnetic Fields, Gauss' Law for Magnetism | 7.1-7.3 | LO 7.1-7.2 **GR 2** |
| 30 | Ampere's Law | 7.4-7.5, 7.9 | LO 7.3 |
| 31 | Ampere's Law Applied | 7.6-7.8 | LO 7.3 |
| 32 | Magnetic Boundary Conditions | 7.10-7.14 | LO 7.4 |
| 33 | Magnetostatics Lab | Lab packet | |
| **Chapter 8: Time-Varying Fields** | | | |
| 34 | Faraday's Law, Displacement Current, Maxwell Eqns | 8.3, 8.8, 8.9 | LO 8.1 |
| 35 | Faraday's Law, Displacement Current, Maxwell Eqns | 8.3, 8.8, 8.9 | LO 8.2-8.3 |
| **Chapter 9: Plane Waves in Lossless Media** | | | |
| 36 | Maxwell's Equations in lossless, source-free region | 9.1-9.2 | LO 9.1 |
| 37 | Maxwell's Equations in lossless, source-free region | 9.1-9.2 | LO 9.1 |
| 38 | Uniform Plane Waves & Polarization | 9.4-9.6 | LO 9.2-9.3 |
| 39 | Normal Incidence | Vol 2, 5.6-5.7 | LO 9.4-9.5 |
| 40 | Oblique Incidence | Vol 2, 5.6-5.7 | LO 9.5 |
| 41 | Oblique Incidence | Vol 2, 5.6-5.7 | LO 9.5 |
| 42 | Incidence Lab | TBD | LO 9.5 |

# Ch 5 Learning Objectives

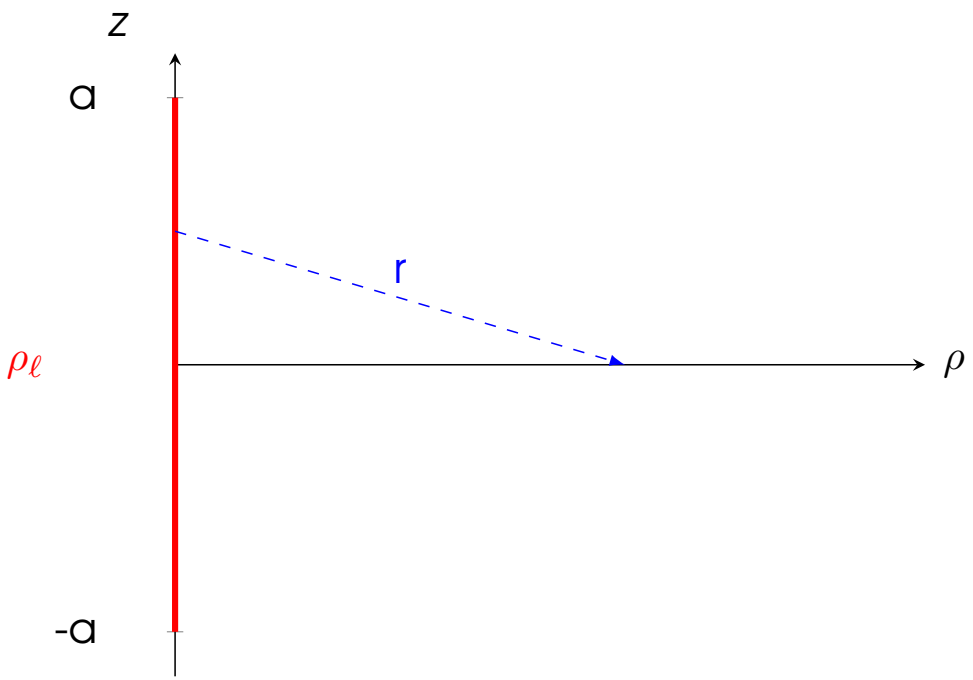
5.1 I can apply Coloumb's Law to use direct integration to calculate the electric field due to charge density in varoius geometries, including rectangular, cylindrical, and spherical coordinate systems.

5.2 I can apply the integral and differential forms of Gauss' Law to calculate the electric field due to charge density in various geometries, including rectangular, cylindrical, and spherical coordinate systems.

5.3 I can calculate the electric field from the scalar electric potential in a variety of geometries.

5.4 I can apply the electric field boundary conditions to calculate electric fields on both sides of a material boundary.

# Scalar Potential: Line Charge



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