

List of Topics for Midterm

ECE 206 – Fall 2019

October 16, 2019

Make sure you understand and know how to use each of the topics listed below.

- Integrals and multi-dimensional calculus
 - Double/triple integrals
 - Line/surface integrals
 - Equations and parameterizations of geometric surfaces
 - * circles, ellipses
 - * cylinders, cones, paraboloids, spheres
 - * planes ($ax + by + cz = d$)
 - Parameterization of curves and surfaces
 - * polar coordinates in 2D
 - * cylindrical and spherical coordinates in 3D
 - * Jacobian of transformations
 - normal vector to surfaces
 - oriented curves and surfaces
 - closed surfaces, boundaries of surfaces and regions
- Vector calculus
 - Vector fields, flow lines
 - Gradient, divergence, curl
 - radial vector fields $\mathbf{F} = f(r)\mathbf{r}$
 - circulation and flux integrals
 - conservative vector fields (scalar potential field)
 - solenoidal vector fields (vector potential field)
 - Main theorems of vector calculus
 - * Fundamental theorem of line integrals
 - * Stokes' theorem and Green's theorem
 - * Divergence theorem
 - Du Bois-Reymond Lemma
 - Vector calculus identities (product rules, second derivative rules)
- Maxwell's equations
 - Know how to derive from physical laws
 - Use Gauss' Law to determine total charge