AN INTRODUCTION TO MULTIVARIABLE CALCULUS FOCUSING ON APPLICATIONS TO ENGINEERING PROBLEMS. TOPICS INCLUDE VECTOR-VALUED FUNCTIONS, VECTOR ANALYSIS, PARTIAL DIFFERENTIATION, MULTIPLE INTEGRALS, VECTOR CALCULUS, AND THE THEOREMS OF GREEN, STOKES, AND GAUSS. PREREQUISITE: MATH 115 OR EQUIVALENT. QR

APHY 194a / ENAS 194a, ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS WITH APPLICATIONS  
Basic theory of ordinary and partial differential equations useful in applications. First- and second-order equations, separation of variables, power series solutions, Fourier series, Laplace transforms. Prerequisites: ENAS 151 or MATH 120 or equivalent, and knowledge of matrix-based operations. QR

APHY 320a / EENG 320a, INTRODUCTION TO SEMICONDUCTOR DEVICES  
An introduction to the physics of semiconductors and semiconductor devices. Topics include crystal structure; energy bands in solids; charge carriers with their statistics and dynamics; junctions, p-n diodes, and LEDs; bipolar and field-effect transistors; and device fabrication. Additional lab one afternoon per week. Prepares for EENG 325 and 401. Recommended preparation: EENG 200. PHYS 180 and 181 or permission of instructor. QR, SC

APHY 418b / EENG 402b, ADVANCED ELECTRON DEVICES  
The science and technology of semiconductor electron devices. Topics include compound semiconductor material properties and growth techniques; heterojunction, quantum well and superlattice devices; quantum transport; graphene and other 2D material systems. Formerly EENG 418. Prerequisite: EENG 320 or equivalent. QR, SC

* APHY 420a / PHYS 420a, THERMODYNAMICS AND STATISTICAL MECHANICS  
This course is subdivided into two topics. We study thermodynamics from a purely macroscopic point of view and then we devote time to the study of statistical mechanics, the microscopic foundation of thermodynamics. Prerequisites: PHYS 301, 410, and 440 or permission of instructor. QR, SC