ENGINEERING SCIENCE & APPLIED MATH (ES_APPM)

ES_APPM 252-1 Honors Calculus for Engineers (1 Unit) Alternative to standard calculus sequence. Covers more material at a deeper level with more applications. Satisfies same requirements as MATH 230-0 and MATH 234-0. Prerequisite: invitation or consent of instructor.

ES_APPM 252-2 Honors Calculus for Engineers (1 Unit) Alternative to standard calculus sequence. Covers more material at a deeper level with more applications. Satisfies same requirements as MATH 230-0 and MATH 234-0. Prerequisite: invitation or consent of instructor.

ES_APPM 311-1 Methods of Applied Mathematics (1 Unit) Ordinary differential equations; Sturm-Liouville theory, properties of special functions, solution methods including Laplace transforms. Fourier series: eigenvalue problems and expansions in orthogonal functions. Partial differential equations: classification, separation of variables, solution by series and transform methods. Prerequisite: GEN_ENG 205-4, GEN_ENG 206-4, or MATH 250-0.

ES_APPM 311-2 Methods of Applied Mathematics (1 Unit) Ordinary differential equations; Sturm-Liouville theory, properties of special functions, solution methods including Laplace transforms. Fourier series: eigenvalue problems and expansions in orthogonal functions. Partial differential equations: classification, separation of variables, solution by series and transform methods. Prerequisite: GEN_ENG 205-4, GEN_ENG 206-4, or MATH 250-0.

ES_APPM 312-0 Complex Variables (1 Unit) Imaginary numbers and complex variables, analytic functions, calculus of complex functions, contour integration with application to transform inversion, conformal mapping. Prerequisite: GEN_ENG 205-4, GEN_ENG 206-4, or MATH 250-0.

ES_APPM 322-0 Applied Dynamical Systems (1 Unit) Example-oriented survey of nonlinear dynamical systems, including chaos. Combines numerical exploration of differential equations describing physical problems with analytic methods and geometric concepts. Applications to mechanical, fluid dynamical, electrical, chemical, and biological systems. Prerequisites: ES_APPM 311-1 and ES_APPM 311-2 or equivalent or consent of instructor.

ES_APPM 345-0 Applied Linear Algebra (1 Unit) Understanding and implentation of algorithms to calculate matrix decompositions such as eigenvalue/vector, LU, QR, and SVD decompositions. Applications include data-fitting, image analysis, and ranking algorithms.

ES_APPM 346-0 Modeling and Computation in Science & Engineering (1 Unit) Advanced techniques for initial value problems, differential algebraic systems, bifurcations, chaos, and partial differential equations. Applications drawn from different physical areas. Prerequisites: MATH 234-0, MATH 240-0, and MATH 250-0; or GEN_ENG 205-4 and PHYSICS 135-1, PHYSICS 135-2; or equivalent; familiarity with a programming language; or consent of instructor.

ES_APPM 370-1 Introduction to Computational Neuroscience (1 Unit) From neurons to networks. Ion channels, Hodgkin-Huxley framework, simplified models, cable equation, synapses, spike triggered average, and optimal stimulus. Feedforward and recurrent firing rate networks. Statistical approach, Bayesian modeling. Brief introduction to numerical methods.

ES_APPM 395-0 Special Topics (1 Unit)

ES_APPM 398-0 Introduction to Applied Math Research (0 Unit) This is a seminar course where ESAM faculty present their current and planned research topics in applied mathematics.

ES_APPM 399-0 Projects (1 Unit) Special studies to be carried out under faculty direction. Credit to be arranged.