

BME Math Requirement

(effective for PhD matriculants Fall 2009)

Choose one of the following courses in the first year and pass with a B or higher to fulfill the BME Math Requirement. Students should work closely with advisors when choosing which course is most appropriate.

ENG EC 505 Stochastic Processes Prereq: (ENGE401 & CASMA142) or equivalent and either ENGE431 or ENGEK500. Introduction to discrete and continuous-time random processes. Correlation and power spectral density functions. Linear systems driven by random processes. Optimum detection and estimation. Bayesian, Weiner, and Kalman filtering. 4 cr. either sem.

ENG EK 501 Mathematical Methods I: Linear Algebra and Complex Analysis Introduction to basic applied mathematics for science and engineering, emphasizing practical methods and unifying geometrical concepts. Topics include linear algebra for real and complex matrices. Quadratic forms, Lagrange multipliers and elementary properties of the rotation group. Vector differential and integral calculus. Complex function theory, singularities and multi-valued functions, contour integration and series expansions. Fourier and Laplace transforms. Elementary methods for solving ordinary linear differential and systems of differential equations with applications to electrical circuits and mechanical structures. 4 cr. either sem.

CAS MA 561 Methods of Applied Mathematics I Prereq: (CASMA226 OR CASMA231) Grad Prereq: (CASMA226 OR CASMA231) *Derivation and analysis of the classical equations of mathematical physics; heat equation, wave equation, and potential equation. Initial boundary value problems, method of separation of variables, eigenvalue problems, eigenfunction expansions. Fourier analysis. Existence and uniqueness of solution. 4 cr. 1st sem.

ENG ME 512 Engineering Analysis Prereq: (ENGME400) or equivalent Mathematical methods in aerospace and mechanical engineering; vectors and tensors; partial differential equations of heat and mass transfer, wave motion and potential theory, classification of second order PDEs; eigenfunction expansions, method of characteristics, Fourier and Laplace transforms; complex variable theory, residue integration, conformal mapping; Green's functions, integral equations, variational methods; perturbation methods for non-linear differential equations. (Formerly ENG AM 505) 4 cr. either sem.

ENG ME 566 Advanced Engineering Mathematics Prereq: (CASMA225 & CASMA226) Senior standing, and consent of instructor. Introduces students of engineering to various mathematical techniques which are necessary in order to solve practical problems. Topics covered include a review of calculus methods, elements of probability and statistics, linear algebra, transform methods, difference and differential equations, numerical techniques, and mathematical techniques in optimization theory. Examples and case studies focus on applications to several engineering disciplines. The intended audience for this course is advanced seniors and entering MS engineering students who desire strengthening of their fundamental mathematical skills in preparation for advanced studies and research. (Formerly ENG MN 566) 4 cr. On Demand

CAS PY 501 Mathematical Physics Introduction to complex variables and residue calculus, asymptotic methods, and conformal mapping; integral transforms; ordinary and partial differential equations; non-linear equations; integral equations.