Courses that Fulfill the BME PhD Program Math Requirement:

Students can choose to take one of the following courses and pass with a B+ or higher. It is highly recommended to take the math course in the first year.

ENG BE 601-604 Linear Algebra/Ordinary Differential Equations/Partial Differential Equations/Statistical and Numerical Methods Pre-reqs: None. Students must take 2 of 4 courses including BE 601 and either BE 602, BE 603 or BE 604. All courses are 2 credits each. The goals are two-fold: To present pertinent mathematical concepts for graduate researchers in biomedical engineering, and moreover, to provide students with enough foundations to further explore advanced mathematical topics necessary for their research.


CAS MA 565 Mathematical Models in the Life Sciences Pre-reqs: CAS MA 226 OR CAS MA 231. An introduction to mathematical modeling, using applications in the biological sciences. Mathematics includes linear difference and differential equations, and an introduction to nonlinear phenomena and qualitative methods. An elementary knowledge of differential equations and linear algebra is assumed.

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

ENG ME 566 Advanced Engineering Mathematics Pre-reqs: CAS MA 225 OR CAS MA 226; 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)

GRS MA 681 Accelerated Introduction to Statistical Methods for Quantitative Research Pre-reqs: CAS MA 225 & CAS MA 242 or their equivalents. Introduction to statistical methods relevant to research in the computational sciences. Core topics include probability theory, estimation theory, hypothesis testing, linear models, GLMs, and experimental design. Emphasis on developing a firm conceptual understanding of the statistical paradigm through data analyses.

Students may petition for a different graduate-level course to count towards the math requirement, subject to approval by the BME Graduate Committee.