University of Texas Rio Grande Valley -- M.S. Mathematics w/ Statistics Concentration
Xavier Rios

SEMESTER	COURSE #	NAME	DESCRIPTION
Spring 2025	**MATH 6365**	**Probability and Statistics**	Topics in this course include set theory and concept of probability, conditional probability, random variables, discrete and continuous probability distributions, distribution and expectations of random variables, moment generating functions, transformation of random variables, order statistics, central limit theorem and limiting distributions.
	MATH 6375	**Numerical Analysis**	This course provides a fundamental introduction to numerical techniques used in mathematics, computer science, physical sciences and engineering. The course covers basic theory on classical fundamental topics in numerical analysis such as: computer arithmetic, approximation theory, numerical differentiation and integrations, solution of linear and nonlinear algebraic systems, numerical solution of ordinary differential equations and error analysis of the abovementioned topics. Connections are made to contemporary research in mathematics and its applications to the real world.
	PHYS 6352	Computational Physics	The course will cover introduction to numerical techniques for solving physics problems, theory of computation and applications to various branches of physics, sample problems might include chaotic motion and nonlinear dynamics, particle trajectories, Monte Carlo simulations, dynamical and statistical descriptions of many body problems, hyperbolic, parabolic, and elliptic differential equations.
Summer 2025	**MATH 6330**	**Linear Algebra**	Topics include the proof-based theory of matrices, determinants, vector spaces, linear spaces, linear transformations and their matrix representations, linear systems, linear operators, eigenvalues and eigenvectors, invariant subspaces of operators, spectral decompositions, functions of operators and applications to science, industry and business.
	MATH 6352	**Analysis I**	The purpose of this course is to provide the necessary background for all branches of modern mathematics involving analysis and to train the student in the use of axiomatic methods. Topics include metric spaces, sequences, limits, continuity, function spaces, series, differentiation and the Riemann integral.
	MATH 6364	**Statistical Methods**	This is a course in the concepts, methods and usage of statistical data analysis. Topics include test of hypotheses and confidence intervals; linear and multiple regression analysis; concepts of experimental design, randomized blocks and factorial analysis; a brief introduction to non-parametric methods; and the use of statistical software.

Fall 2025	STAT 6382	Statistical Computing	This is a course in modern computationally-intensive statistical methods including simulation, optimization methods, Monte Carlo integration, maximum likelihood/EM parameter estimation, Markov chain Monte Carlo methods, resampling methods, and non-parametric density estimation.
	MATH 6331	**Algebra I**	This course is an extension of the undergraduate course in abstract algebra. Topics include polynomial rings over a field and finite field extensions.
	MATH 7300	Thesis I	First part of two course sequence.
Spring 2026	STAT 6384	Biostatistics	This course is a survey of crucial topics in biostatistics; application of regression in biostatistics; analysis of correlated data; logistic and Poisson regression for binary or count data; survival analysis for censored outcomes; design and analysis of clinical trials; sample size calculation by simulation; bootstrap techniques for assessing statistical significance; data analysis using R.
	MATH 6333	Statistical Learning	This course introduces the statistical methods for supervised and unsupervised learning, including topics of regression and classification, such as linear regression, multiple regression, logistic regression, K-nearest neighbors, polynomial regression, splines regression, tree regression, random forests, ridge regression and the Lasso, linear and quadratic discriminant analysis, support vector machines, artificial neural networks regularization techniques, and boosting techniques. During the course, we will apply these techniques in several case studies.
	MATH 7301	Thesis II	Second part of two course sequence.