# MASTER OF FINANCIAL ENGINEERING (MFE)

**MFE 594: Research Topics**  
1-18 Credits/Maximum of 18  
Supervised student activities on research projects identified on an individual or small-group basis.

**MFE 801: Econometric Analysis**  
3 Credits  
The aim of this course is to develop basic econometric estimation and hypothesis testing tools necessary to analyze and interpret the empirical relevance of financial and other economic data. The focus will be on the theoretical foundations of econometric analysis and strategies for applying these basic econometric methods in empirical finance research. The course includes the following topics: multivariate regression; maximum likelihood estimation; hypothesis testing; omitted variables and misspecification; asymptotic theory; measurement error and instrumental variables; time-series modelling; predictability of asset returns; econometric tests of the Capital Asset Pricing Model and multifactor models, and volatility modelling.

**MFE 821: Numerical Optimization for Finance**  
3 Credits  
This course gives students an overview of the numerical optimization concepts and methods frequently used in financial engineering. Building upon students' knowledge of programming and calculus, this course explores computational finance applications. Many classes of optimization problems will be explored, including linear, non-linear, integer, and dynamic programming. This course will combine theory (optimality conditions, for example) and how to apply the methods to asset allocation, risk management, option pricing, and cash flow matching. Students will also be exposed to using current software tools to solve optimization problems.  
**Prerequisite:** (MFE 513, MFE 527, MFE 811)  
**Preparations:** Students must have basic understanding of programming, calculus, and finance. Three semesters of calculus and one semester of programming are recommended.

**MFE 895: Internship**  
1-18 Credits/Maximum of 18  
Supervised, professionally oriented, off-campus, non-group instruction including field experiences, practicums, or internships. Written and oral critique of activity is required.

**MFE 896: Individual Studies**  
1-9 Credits/Maximum of 9  
Creative projects with a professional orientation, including non-thesis research, that are supervised on an individual basis and which fall outside the scope of formal courses.

**MFE 897: Special Topics**  
1-9 Credits/Maximum of 9  
Formal courses given on a topical or special interest subject with a professional orientation that may be offered infrequently; several different topics may be taught in one year or semester.

**MFE 899: Foreign Studies**  
1-12 Credits/Maximum of 24  
Courses with a professional orientation offered in foreign countries by individual or group instruction.

**MFE 822: Stochastic Calculus in Finance**  
3 Credits  
This course is designed to give students an overview of the techniques of stochastic calculus. Building upon a student's calculus and statistical background, the course explores how to model systems that behave randomly. Applying the concepts to financial models, students will explore both discrete and continuous time processes. Major objectives in this course include covering the concepts of arbitrage and risk-neutral pricing, discrete-time models, continuous time models, Markov processes, Brownian motion, and the Black-Scholes model. Throughout the course, students will apply the techniques learned to real world problems in areas such as stock prices, bond interest rates, and portfolio management.  
**Prerequisite:** MFE 513, MFE 811