I propose to take the four courses listed below as a concentration area in my MS-SEM degree. The first course, SYSM 6321 (Financial Engineering 1), is a foundational course that covers the basic quantitative methods in finance. It provides the preparation for other advanced courses in financial engineering as well as an introduction to the mathematics and software tools for work in the financial engineering field. The course FIN 6382 (Introductory Mathematical Finance) is also a fundamental course for introducing the mathematical concepts necessary in quantitative finance and financial engineering. The course FIN 6382 (Numerical Methods) is focused on the how to model and solve complex finance problems using numerical methods and computer algorithms. SYSM 7321 (Financial Engineering 2) addresses advanced topics in financial engineering with engineering methods such as optimization and control theory. Together, the four courses making up this concentration will give a very good background and understanding of basic financial engineering principles; together with my other courses in systems and management, I feel that I would be ready to move into a position in the risk management/quantitative finance industry.

Courses for Proposed Concentration

SYSM 6321 Financial Engineering I (3 credit hours) Introduction to finance and investments from an engineering perspective. Focuses on the principles underlying financial decision making which are applicable to all forms of investment: stocks, bonds, real estate, project budgeting, corporate finance and more. Intended for students with strong technical backgrounds who are comfortable with mathematical arguments. Primary components: deterministic finance (interest rates, bonds and simple cash-flow analysis); single-period uncertainty finance (portfolios of stocks and pricing theory). Prerequisites: Calculus I and II, basic probability (ENGR 3341 or equivalent)

FIN 6381 Introductory Mathematical Finance (3 credit hours) Quantitative Finance has seen remarkable progress in the last decades, both in the development of models and in the creation of new tools to mitigate risks. Mathematical Finance is a well-established scientific discipline, and Financial Engineering has expanded considerably. The course will focus on the mathematical modeling of financial markets and the techniques of valuation and hedging risk. In addition, the students will learn mathematical techniques broadly used in decision making, like dynamic programming and treatment of uncertainties.

FIN 6382 Numerical Methods in Finance (3 credit hours) Study of the numerical methods used in finance. Topics include numerical static and dynamic optimization, numerical solution of partial differential equations, and Monte Carlo methods. This course will primarily focus on building a strong understanding of the Numerical tools used in financial modeling and their implementation, using MATLAB and/or R. (1) Students will learn numerical techniques used for solving problems in finance, and (2) Students will learn to program in MATLAB and/or