FINANCIAL OPERATIONS SYSTEMS ENGINEERING (FOSE)

500 Level Courses

FOSE 501: *Financial Operations Research - Deterministic Models.* 3 credits.
Survey of deterministic methods for solving real-world decision problems. Covers linear programming model and simplex method of solution, duality, and sensitivity analysis; transportation and assignment problems; shortest path and maximal flow problems; and introduction to integer and nonlinear programming. Emphasizes modeling and problem solving. Offered by Systems Engr & Operations Rsch (https://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/). May not be repeated for credit.
Recommended Prerequisite: MATH 203

Registration Restrictions:
Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Junior Plus, Non-Degree or Senior Plus.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Graduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

FOSE 502: *Financial Operations Systems Engineering I.* 3 credits.
Introduces the basic analytics for financial engineering and econometrics. Topics include financial transactions and econometric data management, correlation, linear and multiple regressions for financial and economic predictions, financial time series analysis, portfolio theory, pricing models, and risk analysis. Provides a foundation of basic theory and methodology as well as applied examples with techniques to analyzing large financial and econometric data. Hands-on experiments with programming language will be emphasized throughout the course. Offered by Systems Engr & Operations Rsch (https://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/). May not be repeated for credit.
Registration Restrictions:
Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Junior Plus, Non-Degree or Senior Plus.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Graduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

FOSE 503: *Quantitative Methods & Data Analytics for Financial Operations.* 3 credits.
Introduces the basic analytics for financial engineering and econometrics. Topics include financial transactions and econometric data management, correlation, linear and multiple regressions for financial and economic predictions, financial time series analysis, portfolio theory, pricing models, and risk analysis. Provides a foundation of basic theory and methodology as well as applied examples with techniques to analyzing large financial and econometric data. Hands-on experiments with programming language will be emphasized throughout the course. Offered by Systems Engr & Operations Rsch (https://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/). May not be repeated for credit.
Recommended Prerequisite: STAT 515

Schedule Type: Lecture

Grading:
This course is graded on the Graduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

600 Level Courses

FOSE 626: *Simulation Methods for Financial Operations and Analytics.* 3 credits.
This course introduces Monte Carlo simulation methods for financial operations and analytics, with an emphasis on their use in modern financial operations and risk analysis. Topics include the generation of random numbers and random variates, generation of Monte Carlo sample paths, variance reduction techniques, quasi-Monte Carlo, discretization methods, and sensitivity estimation. The course examines the simulation-based analysis of financial instruments and models, with applications to enterprise risk management, capital assessment, and stress testing. Students will develop a solid foundation in both the theoretical principles and practical implementation of simulation methodologies, supported by applied examples drawn from institutional financial contexts. Extensive hands-on experimentation using Python will be emphasized throughout the course. Offered by Systems Engr & Operations Rsch (https://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/). May not be repeated for credit.
Registration Restrictions:
Required Prerequisites: (FOSE 503[B-] or 503[XS]).
[B-] Requires minimum grade of B-.
[XS] Requires minimum grade of XS.

Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Junior Plus, Non-Degree or Senior Plus.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Graduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)