# FALL 2019 MSIE ELECTIVES

**READ CAREFULLY:** The courses listed below are approved electives for MSIE students. If a course of your interest is not listed, you must obtain written approval from an advisor (info@ieor.columbia.edu). Include the course title, description and syllabus in your email. Courses below 4000-level (i.e. 3000, 2000, 1000 levels) are not permissible and do not count towards the MS degree.

**MS in Industrial Engineering**

IEOR E4207 Human Factors: Performance
IEME E4310 The Manufacturing Enterprise
IEOR E4403 Quantitative Corporate Finance (or IEOR E4578 Corporate Finance, Accounting & Investment Banking; may not take both)
IEOR E4404 Simulation
IEOR E4407 Game Theoretic Models of Operations
IEOR E4500 Applications Programming for FE (registration opens in August; priority to MSFE)
IEOR E4501 Tools for Analytics (waitlist approval; priority registration to MSBA first years)
IEOR E4506 Designing Digital Operating Models
IEOR E4520 Applied Systems Engineering
IEOR E4523-003 Data Analytics (waitlist approval; priority registration to MSBA first years)
IEOR E4525 Machine Learning for Financial Engineering & Operations Research
IEOR E4540 Data Mining for Engineers
IEOR E4550 Entrepreneurial Business Creation for Engineers
IEOR E4570 Entrepreneurship Bootcamp for Engineers (1.5 credits; waitlist approval)
IEOR E4571 Personalization: Theory & Application
IEOR E4576 Derivatives Marketing & Structuring (First Half Term – 1.5 credits)
IEOR E4620 Pricing Models for Financial Engineering
IEOR E4650 Business Analytics (2 sections)
IEOR E4700 Introduction to Financial Engineering
IEOR E4711 Global Capital Markets
IEOR E4722 Stochastic Control & Financial Applications
IEOR E4726 Applied Financial Risk Management
IEOR E4729 Model Based Trading
IEOR E4731 Credit Risk & Credit Derivatives
IEOR E4732 Computational Methods in Finance
IEOR E4735 Structured & Hybrid Products
IEOR E4742 Deep Learning for OR & FE
IEOR E4998 Managing Technological Innovations
IEOR E4999 Fieldwork

**IEOR Doctoral Courses** (please consult with your faculty advisor)

IEOR E6613 Optimization 1
IEOR E6711 Stochastic Modeling 1
IEOR E8100-001 PhD Seminar on Queuing Theory
IEOR E8100-002 Big Data & Machine Learning
IEOR E8100-003 Integer Programming
IEOR E8100-004 Prescriptive Analytics

**Business School** (register via cross-registration)

See: Pre-Approved List of CBS Electives

*DROM Section 060/061 will be listed shortly (priority registration to MSE and MSBA students)

# FALL 2019 MSOR ELECTIVES

**READ CAREFULLY:** The courses listed below are approved electives for MSOR students. If a course of your interest is not listed, you must obtain written approval from an advisor (info@ieor.columbia.edu). Include the course title, description and syllabus in your email. Courses below 4000-level (i.e. 3000, 2000, 1000 levels) are not permissible and do not count towards the MS degree.

**MS in Operations Research**

IEOR E4108 Supply Chain Management & Design [Cancelled, will be offered Spring 2020]
IEOR E4207 Human Factors: Performance
IEME E4310 The Manufacturing Enterprise
IEOR E4403 Quantitative Corporate Finance (or IEOR E4578 Corporate Finance, Accounting & Investment Banking; may not take both)
IEOR E4407 Game Theoretic Models of Operations
IEOR E4500 Applications Programming for FE (registration opens in August; priority to MSFE)
IEOR E4501 Tools for Analytics (waitlist approval; priority registration to MSBA first years)
IEOR E4506 Designing Digital Operating Models
IEOR E4520 Applied Systems Engineering
IEOR E4523-003 Data Analytics (waitlist approval)
IEOR E4525 Machine Learning for Financial Engineering & Operations Research
IEOR E4540 Data Mining for Engineers
IEOR E4550 Entrepreneurial Business Creation for Engineers
IEOR E4570 Entrepreneurship Bootcamp for Engineers (1.5 credits; waitlist approval)
IEOR E4571 Personalization: Theory & Application
IEOR E4576 Derivatives Marketing & Structuring (First Half Term – 1.5 credits)
IEOR E4620 Pricing Models for Financial Engineering
IEOR E4650 Business Analytics (2 sections)
IEOR E4700 Introduction to Financial Engineering
IEOR E4710 Fixed Income & Term Structure Modeling
IEOR E4711 Global Capital Markets
IEOR E4722 Stochastic Control & Financial Applications
IEOR E4726 Applied Financial Risk Management
IEOR E4729 Model Based Trading
IEOR E4731 Credit Risk & Credit Derivatives
IEOR E4732 Computational Methods in Finance
IEOR E4735 Structured & Hybrid Products
IEOR E4742 Deep Learning for OR & FE
IEOR E4998 Managing Technological Innovations
IEOR E4999 Fieldwork

**IEOR Doctoral Courses** (please consult with your faculty advisor)

IEOR E6613 Optimization 1
IEOR E6617 Machine Learning and High-Dimensional Data Analysis in OR
IEOR E6711 Stochastic Modeling 1
IEOR E8100-001 PhD Seminar on Queuing Theory
IEOR E8100-003 Integer Programming
IEOR E8100-004 Prescriptive Analytics

**Business School** (register via cross-registration)

See: Pre-Approved List of CBS Electives

*DROM Section 060/061 will be listed shortly (priority registration to MSE and MSBA students)

# FALL 2019 MSFE ELECTIVES

**READ CAREFULLY:** The courses listed below are approved electives for MSFE students. If a course of your interest is not listed, you must obtain written approval from an advisor (info@ieor.columbia.edu). Include the course title, description and syllabus in your email. Courses below 4000-level (i.e. 3000, 2000, 1000 levels) are not permissible and do not count towards the MS degree.

**MS in Financial Engineering Summer Electives**

IEOR E4721 Financial Correlations – Modeling, Trading, Risk Management and AI, Class 5/28-7/12
IEOR E4722 Modeling and Market-Making in Foreign Exchange (1.5 credits), Class 5/29-7/10 [Cancelled]
IEOR E4723 Alternative Investments (1.5 credits), Class 6/3-7/15

**MS in Financial Engineering Fall Electives**

IEOR E4403 Quantitative Corporate Finance (or IEOR E4578 Corporate Finance, Accounting & Investment Banking; may not take both)
IEOR E4500 Applications Programming for FE
IEOR E4525 Machine Learning for Financial Engineering & Operations Research
IEOR E4710 Fixed Income & Term Structure Modeling
IEOR E4722 Stochastic Control & Financial Applications
IEOR E4726 Applied Financial Risk Management
IEOR E4727 Programming for Financial Engineering
IEOR E4729 Model Based Trading
IEOR E4731 Credit Risk & Credit Derivatives
IEOR E4732 Computational Methods in Finance
IEOR E4735 Structured & Hybrid Products
IEOR E4742 Deep Learning for OR & FE
IEOR E4999 Fieldwork

**IEOR Doctoral Courses** (please consult with your faculty advisor)

IEOR E6613 Optimization 1
IEOR E6617 Machine Learning and High-Dimensional Data Analysis in OR
IEOR E6711 Stochastic Modeling 1
IEOR E8100-001 PhD Seminar on Queuing Theory
IEOR E8100-003 Integer Programming
IEOR E8100-004 Prescriptive Analytics

# FALL 2019 MS&E ELECTIVES

**READ CAREFULLY:** The courses listed below are approved electives for MS&E students. If a course of your interest is not listed, you must obtain written approval from an advisor (info@ieor.columbia.edu). Include the course title, description and syllabus in your email. Courses below 4000-level (i.e. 3000, 2000, 1000 levels) are not permissible and do not count towards the MS degree.

**Decision, Risk and Operations Electives** (9 credits total)

IEOR E4650 Business Analytics (2 sections)
DROM Section 060/061 will be listed shortly
MBA & eMBA courses registration via BOSS (see: Pre-Approved List of CBS Electives)

**Analysis Electives** (at least 3 credits; 9 credits total for Management & Analysis)

IEOR E4108 Supply Chain Management & Design [Cancelled, will be offered Spring 2020]
IEOR E4403 Quantitative Corporate Finance (or IEOR E4578 Corporate Finance, Accounting & Investment Banking; may not take both)
IEOR E4407 Game Theoretic Models of Operations
IEOR E4501 Tools for Analytics (waitlist approval; priority registration to MSBA first years)
IEOR E4520 Applied Systems Engineering
IEOR E4523-003 Data Analytics (waitlist approval)
IEOR E4525 Machine Learning for Financial Engineering & Operations Research
IEOR E4540 Data Mining for Engineers
IEOR E4742 Deep Learning for OR & FE

**Management Electives** (at least 3 credits; 9 credits total for Management & Analysis)

IEME E4310 The Manufacturing Enterprise
IEOR E4506 Designing Digital Operating Models
IEOR E4550 Entrepreneurial Business Creation for Engineers
IEOR E4570 Entrepreneurship Bootcamp for Engineers (1.5 credits; waitlist approval)
IEOR E4711 Global Capital Markets
IEOR E4998 Managing Technological Innovations

**Breadth Electives** (6 credits total)

IEOR E4207 Human Factors: Performance
IEOR E4500 Applications Programming for FE (registration opens in August; priority to MSFE)
IEOR E4571 Personalization: Theory & Application
IEOR E4576 Derivatives Marketing & Structuring (First Half Term – 1.5 credits)
IEOR E4620 Pricing Models for Financial Engineering
IEOR E4700 Introduction to Financial Engineering
IEOR E4722 Stochastic Control & Financial Applications
IEOR E4726 Applied Financial Risk Management
IEOR E4729 Model Based Trading
IEOR E4731 Credit Risk & Credit Derivatives
IEOR E4732 Computational Methods in Finance
IEOR E4735 Structured & Hybrid Products
IEOR E4999 Fieldwork

**IEOR Doctoral Courses** (please consult with your faculty advisor)

IEOR E6613 Optimization 1
IEOR E6617 Machine Learning and High-Dimensional Data Analysis in OR
IEOR E6711 Stochastic Modeling 1
IEOR E8100-001 PhD Seminar on Queuing Theory
IEOR E8100-003 Integer Programming
IEOR E8100-004 Prescriptive Analytics

# FALL 2019 MSBA ELECTIVES

**READ CAREFULLY:** The courses listed below are approved electives for MSBA students. If a course of your interest is not listed, you must obtain written approval from an advisor (info@ieor.columbia.edu). Include the course title, description and syllabus in your email. Courses below 4000-level (i.e. 3000, 2000, 1000 levels) are not permissible and do not count towards the MS degree.

**MS in Business Analytics**

IEOR E4108 Supply Chain Management & Design
IEOR E4207 Human Factors: Performance
IEME E4310 The Manufacturing Enterprise
IEOR E4403 Quantitative Corporate Finance (or IEOR E4578 Corporate Finance, Accounting & Investment Banking; may not take both)
IEOR E4407 Game Theoretic Models of Operations
IEOR E4500 Applications Programming for FE (registration opens in August; priority to MSFE)
IEOR E4506 Designing Digital Operating Models
IEOR E4520 Applied Systems Engineering
IEOR E4525 Machine Learning for Financial Engineering & Operations Research
IEOR E4540 Data Mining for Engineers
IEOR E4550 Entrepreneurial Business Creation for Engineers
IEOR E4570 Entrepreneurship Bootcamp for Engineers (1.5 credits; waitlist approval)
IEOR E4571 Personalization: Theory & Application
IEOR E4576 Derivatives Marketing & Structuring (First Half Term – 1.5 credits)
IEOR E4620 Pricing Models for Financial Engineering
IEOR E4700 Introduction to Financial Engineering
IEOR E4711 Global Capital Markets
IEOR E4722 Stochastic Control & Financial Applications
IEOR E4726 Applied Financial Risk Management
IEOR E4729 Model Based Trading
IEOR E4731 Credit Risk & Credit Derivatives
IEOR E4732 Computational Methods in Finance
IEOR E4735 Structured & Hybrid Products
IEOR E4742 Deep Learning for OR & FE
IEOR E4998 Managing Technological Innovations
IEOR E4999 Fieldwork

**IEOR Doctoral Courses** (please consult with your faculty advisor)

IEOR E6613 Optimization 1
IEOR E6617 Machine Learning and High-Dimensional Data Analysis in OR
IEOR E6711 Stochastic Modeling 1
IEOR E8100-001 PhD Seminar on Queuing Theory
IEOR E8100-003 Integer Programming
IEOR E8100-004 Prescriptive Analytics

**Business School** (MSE & MSBA students register via BOSS)

See: Pre-Approved List of CBS Electives

*DROM Section 060/061 will be listed shortly