

# FINANCIAL ENGINEERING, MS

*for the degree of Master of Science in Financial Engineering*

**Financial Engineering (FE)** is the application of quantitative methods to the analysis of financial markets and financial products. The quantitative techniques may include Mathematics, Statistics, Computer Science, Machine Learning, Neural Nets, and generalized Data Analytics. The applications include searching for opportunities as well as deriving solutions to financial problems. All financial markets are a subject for FE, from public exchanges to private over-the-counter markets. Similarly, all financial products, from equities, bonds and derivatives to bitcoins are candidates for quantification. An overarching theme for FE involves balancing reward against techniques for the measurement, management, and mitigation of risk.

## Admission

Applicants to the MSFE Program will have a Bachelor's degree with one year of calculus, one semester of linear algebra and differential equations, one semester of programming (preferably in C/C++), and one semester of probability and statistics. Knowledge of basic finance and economics is helpful but not necessary. Given its technical emphasis, applicants to this program typically will have completed a Bachelor's degree in an engineering field, mathematics, physics, computer science, or economics that provides sufficient preparation to facilitate a fast-paced, in-depth learning environment.

All applicants are expected to have a minimum grade point average of at least 3.25 (A=4.00) for the last two years of undergraduate study and a 3.50 for any previous graduate work completed. Scores on the Graduate Record Examination (GRE) (<http://www.ets.org/>) general test are required of all applicants. GMAT (<https://www.gmac.com/gmat-other-assessments/about-the-gmat-exam/the-gmat-advantage/>) scores will also be considered.

All applicants whose native language is not English are required to submit TOEFL (<http://www.toefl.org/>) or International English Language Testing System (IELTS) (<http://www.ielts.org/>) scores as evidence of English proficiency. Minimum admission requirements (<https://grad.illinois.edu/admissions/instructions/04c/>) are set by the Graduate College. Under certain circumstances applicants may be exempt (<https://grad.illinois.edu/admissions/instructions/04c/>) from the TOEFL/IELTS requirement.

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Covering topics in finance, economics, numerical methods, stochastic calculus, and computer programming, the MSFE is a rigorous, three-semester, 48-credit, resident degree program with a summer internship opportunity. Twelve courses each of 4 graduate credits are required for graduation; they are expected to be taken in sequence in the respective semesters.

For additional details and requirements refer to the program's web site (<http://msfe.illinois.edu/>) and the Graduate (<http://www.grad.illinois.edu/gradhandbook/>) College (<http://www.grad.illinois.edu/gradhandbook/>) Handbook (<http://www.grad.illinois.edu/gradhandbook/>).

Code	Title	Hours
<b>Core Coursework</b>		<b>28</b>
FIN 500	Introduction to Finance	4
FIN 512	Financial Derivatives	4
FIN 516	Term Structure Models	2
FIN 553	Machine Learning in Finance	4
IE 522	Statistical Methods in Finance	4
IE 523	Financial Computing	4
IE 524	Optimization in Finance	2
IE 525	Stochastic Calculus & Numerical Models in Finance (2 times)	4
<b>Elective Coursework (approved by academic advisor)</b>		<b>16</b>
<b>Professional Development</b>		<b>4</b>
IE 527	MSFE Professional Development	0
IE 583	MSFE Practicum Project	4
	or FIN 583 Practicum	
<b>Total Hours</b>		<b>48</b>

## Other Requirements

### Requirement

A minimum of 36 credit hours must be taken from the University of Illinois Urbana-Champaign campus.

Minimum GPA: 2.75

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1. Comprehension of common financial engineering techniques (toolkit)
2. Ability to identify and apply the appropriate techniques (tools) to real financial engineering opportunities and problems
3. Ability to minimally code to analysis
4. Awareness & knowledge of the financial environment
5. Ability to assess & articulate results to non-technical peers

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## Graduate Degree Programs in Financial Engineering

The Master of Science in Financial Engineering (MSFE) degree program is jointly sponsored by the Department of Industrial and Enterprise Systems Engineering (ISE) (<https://ise.illinois.edu>) in The Grainger College of Engineering and the Department of Finance (<https://giesbusiness.illinois.edu/finance/>) in the Gies College of Business. Graduates from this program receive the MSFE degree awarded by the Graduate College. The MSFE program complements other graduate programs offered by the sponsoring departments. The Master of Science in Financial Engineering (terminal master's) can be completed in 18 months with an option to extend to 24 months, beginning in August each year. The second and subsequent semesters allow students the flexibility to pursue specialized tracks within the program, such as data analytics and electronic trading. A corporate-sponsored "practicum", provides students opportunities to address real world financial modeling problems and provides access to state-of-the-art analytic tools and software products.

## Concentrations

- Advanced Analytics in Industrial & Enterprise Systems Engineering (<http://catalog.illinois.edu/graduate/engineering/concentration/advanced-analytics-industrial-enterprise-systems-engineering/>)
- Automated Trading Practices (<http://catalog.illinois.edu/graduate/engineering/financial-engineering-ms/automated-trading-practices/>)
- Data Analytics in Finance (<http://catalog.illinois.edu/graduate/bus/concentration/finance/data-analytics-finance/>)

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**Department Head (Industrial & Enterprise Systems Engineering):** Jeff Shamma

**Department Head (Finance):** Louis Chan

Program Director: Liming Feng

Financial Engineering website (<http://msfe.illinois.edu>)

Financial Engineering faculty (<https://msfe.illinois.edu/about/faculty/>)

3252 Digital Computer Lab, 1304 W Springfield Ave, Urbana, IL 61801

(217) 300-7346

MSFE email ([msfe@illinois.edu](mailto:msfe@illinois.edu))

**Gies College of Business**

Gies College of Business (<https://giesbusiness.illinois.edu/>) website

(<https://las.illinois.edu/>)

**Grainger College of Engineering**

Grainger College of Engineering website (<https://grainger.illinois.edu/>)

**Admissions**

Financial Engineering Admissions Requirements (<https://msfe.illinois.edu/admissions/>)

Graduate College Admissions & Requirements (<https://grad.illinois.edu/admissions/apply/>)

Financial Engineering Application Inquiries ([msfe-apply@illinois.edu](mailto:msfe-apply@illinois.edu))