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.

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) in The Grainger College of Engineering and the Department of Finance (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 (p. 1)
- Data Analytics in Finance (http://catalog.illinois.edu/graduate/bus/concentration/finance/data-analytics-finance/)

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.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IE 421</td>
<td>High Frequency Trading Technology</td>
<td>4</td>
</tr>
<tr>
<td>Pick 1 Algo Trading Course:</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>FIN 554</td>
<td>Algorithmic Trading Systems Design and Testing</td>
<td></td>
</tr>
<tr>
<td>FIN 556</td>
<td>Algorithmic Market Microstructure</td>
<td></td>
</tr>
<tr>
<td>Pick 1 Stochastic &amp; Learning Foundations Course</td>
<td>Complete 4 hours from the Stochastic &amp; Learning Foundations Course List or choose an additional 4 hours from the Algo Trading Course List.</td>
<td>4</td>
</tr>
<tr>
<td>IE 410</td>
<td>Advanced Topics in Stochastic Processes &amp; Applications</td>
<td></td>
</tr>
<tr>
<td>IE 434</td>
<td>Deep Learning: Mathematics and Applications</td>
<td></td>
</tr>
</tbody>
</table>

Information listed in this catalog is current as of 12/2022
IE 518  Queueing Systems
IE 531  Algorithms for Data Analytics
IE 534  Deep Learning

Total Hours  These 12 hours may be used toward the major degree requirements.  12

for the degree of Master of Science in Financial Engineering, Automated Trading Practices concentration

department head (Industrial & Enterprise Systems Engineering): Jeff Shamma
department head (Finance): Louis Chan
interim program director: Liming Feng

overview of admissions requirements: https://msfe.illinois.edu/admissions/requirements.aspx
overview of grad college admissions requirements: https://grad.illinois.edu/admissions/apply (https://grad.illinois.edu/admissions/apply/)

program website: http://msfe.illinois.edu
program faculty: https://msfe.illinois.edu/about/faculty (https://msfe.illinois.edu/about/faculty/)
college websites: https://grainger.illinois.edu (https://grainger.illinois.edu/)

contact: Application Inquiries (msfe-apply@illinois.edu)
address: 3252 Digital Computer Lab, 1304 W Springfield Ave, Urbana, IL 61801
phone: (217) 333-3284
email: msfe@illinois.edu

Information listed in this catalog is current as of 12/2022