LABORATORY FOR FINANCIAL ENGINEERING

The MIT Laboratory for Financial Engineering (LFE) (*http://lfe.mit.edu*) is a research center focused on the quantitative analysis of financial markets and institutions using mathematical, statistical, and computational models and methods. The goal of the LFE is to support and promote academic advances in financial engineering and computational finance that can be directly applied for the betterment of the world. To do that, LFE faculty, students, and staff engage with industry professionals, regulators, policymakers, and other stakeholders to develop and apply new financial technologies to practical and socially important settings.

The LFE's research projects fall into five areas, all focused on the interplay between financial markets and society.

- **Healthcare finance.** Driven by questions about how financial engineering can help cure cancer, LFE researchers are working to promote and develop new business models and financing structures for raising and deploying funds to support biomedical research and therapeutic development in a scalable and profitable manner. The work has grown beyond cancer to look at rare diseases, central nervous system disorders, vaccine programs, and other social challenges—like fusion energy and climate change—where transformative progress is only possible through public–private partnerships that combine fundamental scientific research with the right financial models and appropriate public policy.

- **Foundations of financial behavior and adaptive markets.** The LFE is working to understand the impact of human behavior on financial markets and policy through research that explores the psychophysiology and behavioral biases of market participants. In taking an interdisciplinary approach to understanding financial markets, the LFE aims to reconcile human behavior with the Efficient Markets Hypothesis, which serves as the basis for much of modern investment theory and practice today.

- **Financial technology and artificial intelligence.** Drawing upon computer science and artificial intelligence, research in this area applies techniques like machine learning and natural language processing to large datasets to develop real-world solutions to common industry challenges. As part of this research, the LFE also explores the positive and negative aspects of big data and financial technology, including privacy concerns and cybersecurity threats, and new technologies for addressing these issues.

- **Asset-market dynamics.** Explores quantitative models for portfolio management, trading, and asset allocation, including industry-level studies of the hedge fund industry, indexation and smart beta algorithms, and the impact of technology such as high-frequency trading on financial market dynamics.

- **Risk management.** Development of new methods for measuring and managing risks of various types, including systemic risk, in the financial system. A priority is to construct and test early warning signs for instabilities, and to understand the interplay between policy and the financial industry and its impact.

Students are encouraged to participate in current research projects, which include developing evolutionary and neurobiological models of individual risk preferences and financial-market dynamics; developing new approaches to financing biomedical innovation as well as analytics to better measure the risks and rewards of therapeutic development; developing models of investor behavior; measuring illiquidity risk in hedge-fund returns; and examining the public policy implications of this research.

Professor Andrew W. Lo is the director of the laboratory. For further information, visit the LFE website (*http://lfe.mit.edu*) or contact Jayna Cummings (*jcummin@mit.edu*), 617-258-5727.