

**IEOR E4731: Credit Risk and Credit Derivatives**  
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Credit Risk is the distribution of financial losses generated in a financial transaction when unpredictable changes to the credit quality of a counterparty occur.

Forecasting and measuring credit risk embedded into financial transactions is fundamental for investment banks and insurance companies, which need to manage the risk in their portfolios on a daily basis.

Risks originating in a specific asset class, or financial losses experienced by a specific bank may become systemic and trigger catastrophic losses to the financial network.

Sophisticated mathematical methodologies are needed to correctly capture, predict, and resolve these risks, drawing on tools from probability theory, statistics, stochastic calculus, and engineering.

This class will provide students with a rigorous, yet practical, understanding of the sophisticated mathematical and statistical techniques underlying the majority of credit risk frameworks. Besides illustrating strengths and weakness of current models, such as the Merton, Black Cox, and the doubly stochastic framework, the course will provide you with all necessary tools needed for developing new credit models, including the design of stable and resilient financial networks

Although the focus of the class is primarily on financial mathematics, most of the techniques learned can be useful in other contexts, to analyze project failure, systems reliability, and event risk. As such, they can be applied to different areas of applied mathematics, statistics and engineering.

This class will be beneficial to students with mathematical maturity, coming from Engineering, Data Science, Statistics, and Applied Mathematics, who are interested in exploring and understanding the fascinating and rapidly evolving field of default risk.

Students wishing to make a career in Wall Street as quants will benefit greatly and be able to contribute successfully to the new generation of credit models. Students wishing to explore research opportunities will be exposed to the cutting edge and transformative world of default risk modeling.



