From Reaction Engineering to Financial Engineering
– The Peripatetic Career of a Chemical Engineer

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"A chemical engineer can do anything." – Anonymous Chemical Engineer

Financial engineering, a/k/a mathematical finance, plays a dominant role in modern finance and banking. It is the intellectual underpinning of all index funds and large pension portfolios, as well as innumerable structured products offered by banks to their corporate and retail customers. Interestingly, despite research work dated as early as 1900, the term financial engineering didn't even exist four decades ago when financial products based on its theories started to grow rapidly. The field's speed of ascension and impact on society have few parallels in modern history; yet till today financial engineering remains poorly understood by the public and its operations largely shrouded in mystery.

Broadly speaking, financial engineering incorporates advanced mathematical, statistical and computational tools into the once docile discipline of financial economics, and, since mid-70's, propelled the rise of two hugely successful applications – modern portfolio theory and financial derivatives, today encompassing trillions of dollars of assets. Sophisticated machineries notwithstanding, the basic principles behind both applications can be explained with rudimentary mathematics all chemical engineers have learned in undergraduate courses.

This talk will use one person's journey, from a chemical engineer studying zeolite catalysts to a financier negotiating complicated transactions, as a quick tour over some key concepts in financial engineering, with real world cases as well as personal perspectives. Through examples, this talk highlights how simple ideas can untangle seemingly intractable problems and drive powerful innovations, sharing the same characteristics underlying the chemical engineering science.