

Financial Engineering

Proposed Joint Undergraduate Degree Program from the Department of Mechanical and Industrial Engineering and the Department of Agricultural Economics and Economics

Financial engineering is a multidisciplinary field that emphasizes the engineering of new financial economic instruments as well as the combining of existing instruments to manage risk, create strategic business opportunities, lower costs, and access new markets. The management of risk is essential in today's highly leveraged domestic markets as well as the global business environment. Successful market, credit, and production risk management requires complex financial economic modeling and analysis.

Financial engineers have rigorous training in financial economics and engineering mathematics:

- Mathematics similar to engineering, but expanded to include more statistics and probability theory
- Financial economics with a solid background in classical economic theory and markets (capital, commodity, and derivative)
- Software engineering and modeling

Financial engineers are commonly employed in banking, corporate finance, securities, insurance, manufacturing, agricultural businesses, and other industries that require sophisticated financial management skills. To remain competitive, regional industries as well as national and international firms will employ financial engineers because of the increased complexity and sophistication of business risk management. Due to their rigorous training, the demand for financial engineering graduates is high with a forecasted growth rate of 18 to 20% annually over the next seven years, according to the Occupational Outlook Handbook. PayScale reports that financial engineer annual salaries range from \$74,000 to \$115,000. Duff & Phelps reports average salaries of \$97,000 with less than one year of experience.

The financial engineering program will be jointly managed by the Department of Mechanical and Industrial Engineering and the Department of Agricultural Economics and Economics. This group of faculty has both academic and business world experience in financial engineering. Their established contacts with industry will facilitate student internships and employment. Relatively limited resources will be needed to fund this program as many of the required courses are currently offered.

We anticipate that the program, after start up, will attract about 95 majors (cross-institutional comparisons available upon request.) No other financial engineering programs exist in the Montana University System or in the Pacific Northwest. Geographically the closest undergraduate programs are in California. This is an opportunity for MSU to develop a highly recognizable, prestigious program that provides solid employment opportunities.

The following page outlines a preliminary draft of the requirements for a major and minor in financial engineering.

Course Requirements for Financial Engineering Major and Minor

Courses		Major	Minor	Core
Lower Division				
CHMY 141	College Chemistry I	4		IN
<i>Take one of the following</i>				
CLC 101	Knowledge and Community	3		US
COM 110	Public Communication	3		US
CSCI 111	Programming with Java I	4		
CSCI 132	Basic Data Structures and Algorithms	4		
CSCI 232	Data Structures and Algorithms	4		
D Elec	Diversity Elective	3		D
ECNS 251***	Honors Economics	4		IS
EFIN 101*	Introduction to Financial Engineering	1	1	
IA Elec	Inquiry Arts Elective	3		IA
IH Elec	Inquiry Humanities Elective	3		IH
M 171	Calculus I	4		Q
M 172	Calculus II	4		
M 221	Introduction to Linear Algebra	3		
M 273	Multivariable Calculus	4		
M 274	Introduction to Differential Equations	4		
PHSX 220	Physics I	4		CS
WRIT 101**	College Writing I	3		W
Total		59	1	
Upper Division				
ECNS 309	Managerial Economics	3		
ECNS 301	Intermediate Microeconomics with Calculus	3	3	
ECNS 313	Money & Banking	3	3	
ECNS 406	Industrial Organization	3		
ECNS 4xx****	Econometrics I	3		
EGEN 325	Engineering Economic Analysis	3	3	
EIND 300	Engineering Management & Ethics	3		
EIND 364	Principles of Operations Research I	3	3	
EIND 373	Production Inventory Cost Analysis	3		
EIND 354	Engineering Probability and Statistics I	3	3	
EIND 457	Regression & Multivariate Analysis for Engineers	3		
EIND 464	Principles of Operations Research II	3		
EIND 4xx****	Managerial Forecasting & Decision Analysis	3		
EFIN 301*	Engineering & Economic Financial Management I	3	3	
EFIN 401*	Engineering & Economic Financial Management II	3	3	
EFIN 499*	Financial Engineering Senior Project	3		R
	Professional Electives	9		
	Technical Electives	9		
	Minor Economics Elective		3	
	Minor Engineering Elective		3	
Total		66	27	

* New class.

** Students exempt from MSU writing requirement should substitute WRIT 221.

*** May substitute ECNS 202 and ECNS 204.

**** New co-convened undergraduate courses, EIND 4xx with EIND 558, ECNS 4xx with ECNS 561
Professional Electives: BFIN 420, BFIN 441, BFIN 452, BFIN 458, BFIN 466, ECNS 314, ECNS 403, ECNS 432, ECNS 345, EGEN 310, EIND 425, EIND 434, EGEN 492.

Technical Electives: CSCI 440, CSCI 446, CSCI 447, ECNS 501, ECNS 502, ECNS 562, EIND 422, EIND 458, EFIN 498*, M441, STAT 408, STAT 436.

Minor Economics Elective: ECNS 309, ECNS 406, ECNS 4xx.

Minor Engineering Elective: EIND 464, EIND 457, EIND 4xx.

Note: May substitute EIND 373 and ECNS 345 as prerequisite for BFIN 352, BFIN 452, and BFIN 458. A minimum of 125 credits is required for graduation; 42 of these credits must be in courses numbered 300 or above.