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SEP 30 2011

Washington State University
MAJOR CURRICULAR CHANGE FORM -- COURSE

(Submit original signed form and ten copies to the Registrar's Office, zip 1035.)

Future Effective Date: 05/15/2012 ☒ New course ☒ Temporary course ☐ Drop service course
(effective date cannot be retroactive) ☐ There is a course fee associated with this course (see instructions)

- ☐ Variable credit ☐ Repeat credit (cumulative maximum _____ hours)
☐ Increase credit (former credit _____) ☐ Lecture-lab ratio (former ratio _____)
☐ Number (former number _____) ☐ Prefix (former prefix _____)
☐ Crosslisting (between WSU departments) ☐ Cooperative listing (UI prefix and number _____)
(Must have both departmental signatures) taught by: WSU ☐ UI ☐ jointly taught ☐
☐ Conjoint listing (400/500) ☐ S, F grading
☐ Request to meet Writing in the Major [M] requirement (Must have All-University Writing Committee Approval)
☐ Request to meet GER in _____ (Must have GenEd Committee Approval) ☐ Fulfills GER lab (L) requirement
☐ Professional course (Pharmacy & Vet Med only) ☐ Graduate credit (professional programs only)
☐ Other (please list request) _____

Math 575 Asset Pricing in Financial Engineering
course prefix course no. title

credit	lecture hrs per week	lab hrs per week	studio hrs per week	
3	3			<u>Math 315</u> sent email to contact letting them know of removal of prereq prerequisite 10-6-11 <u>PreReq: a course in advanced calculus</u>

Description (20 words or less) This course provides an introduction to concepts and mathematical methods for various models on valuation of stocks and options, with rigorous mathematical analysis on pricing and hedging techniques.

Instructor: Hongming Yin Phone number: (509) 335-7263 Email: hyin@math.wsu.edu
Contact: Hongming Yin Phone number: (509) 335-7263 Email: hyin@math.wsu.edu
Campus Zip Code: _____

- Please attach rationale for your request, a current and complete syllabus, and explain how this impacts other units in Pullman and other branches (if applicable).
- Secure all required signatures and provide 10 copies to the Registrar's Office.

[Signature] 9/30/2011 [Signature] _____
Chair/date Dean/date General Education Com/date

Chair (if crosslisted/interdisciplinary)* Dean (if crosslisted/interdisciplinary)* Graduate Studies Com/date

All-University Writing Com/date Academic Affairs Com/date Senate/date

*If the proposed change impacts or involves collaboration with other units, use the additional signature lines provided for each impacted unit and college.

Math 575: Asset Pricing in Financial Engineering

Prerequisite: Advanced Calculus (WSU Math 273), some knowledge of Differential Equations (WSU Math 315) is desired, but not required.

This course provides an introduction to concepts and mathematical methods for various models on valuation of stocks and options. A fundamental feature of the course is that rigorous mathematical analysis is used for derivations of basic models. Some hedging techniques will be also introduced in the courses. The topics covered in this course are essential in modern financial engineering.

This course is one of the seven core courses for the Computational Finance Option in the Mathematics MS Degree Program that is being developed by the Department of Mathematics. Computational financial mathematics is a cross-disciplinary field which utilizes computational methods (such as numerical analysis, simulation, and optimization) to investigate financial investment strategies, analyze financial risk, and to make trading and hedging decisions.

No similar courses are currently offered at WSU. Students from the College of Business will benefit from our offering.

Math 575: Asset Pricing in Financial Engineering

Course Name: Asset Pricing in Financial Engineering

Instructor: Dr. Hong-Ming Yin

303 Neill Hall, WSU Pullman Campus

Telephone: (509)335-7263. Email: hyin@wsu.edu

Course Objective: This course will introduce basic tools to derive pricing models for various assets such as stocks and security options. It will also introduce the basic hedging techniques by using options in financial markets. One of the fundamental elements for this course is that the rigorous mathematical analysis is used throughout the course. Particularly, various models for option prices of stocks and index will be derived.

Course Prerequisite: Advanced Calculus (Math 273), Differential Equations (Math 315) is preferred, but not required.

Credits of the Course: 3 credits

Textbook: This course will be based on materials from several textbooks. Major topics include the following:

- (a) valuation of stocks,
- (b) valuation of options by binomial tree methods,
- (c) valuation of options by continuous stochastic differential equations,
- (d) solution formulas for European options and American options,
- (e) numerical methods for computing option pricing,
- (f) hedging techniques and asset management.

The main reference books are as follows:

- (1) The mathematics of Finance: Modeling and Hedging,
Edited by: Joseph Stampfli and Victor Goodman, The Brook/Cole Publishing, 2001.
- (2) Mathematical Modeling and Methods of Option Pricing,
Edited by: Lishang Jiang, World Scientific Publishing, 2006.
- (3) Valuing a Stock, second edition
Edited by G. Gray, P. J. Cusatis and J. Woolridge, McGraw-Hill, 2004.

Course Grade:

There are several homework assignments (50%) and a final project (50%). The final grade will be based on homework assignments and a project. Project topics will be designed from the materials covered in the course. The students will select a topic and conduct some self-reading and research for the topic.

Other University Policies**(a) Academic Integrity**

The Department of Mathematics and WSU are intolerant of **any form** of academic dishonesty. For information, see: <http://www.conduct.wsu.edu/default.asp?PageID=343> also

see: <http://www.wsulibs.wsu.edu/plagiarism/main.html>

(b) WSU Disability Statement

Reasonable accommodations are available for students with a documented disability. Please notify Dr. Anelli the first week of class of any accommodations need. Late notification may cause requested accommodations to be unavailable. All accommodations must be approved through Disability Resource Center (DRC), Administration Annex 205, 335-1566.

(c) WSU Safety

Please familiarize yourself with information regarding campus emergencies/school closings by visiting this website: <http://oem.wsu.edu/emergencies>

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Math 575: Asset Pricing in Financial Engineering

Course Name: Asset Pricing in Financial Engineering

Instructor: Dr. Hong-Ming Yin

303 Neill Hall, WSU Pullman Campus

Telephone: (509)335-7263. Email: hyin@wsu.edu

Course Objective: This course will introduce basic tools to derive various asset pricing models such as stocks and security options. It will also introduce the basic hedging techniques by using options in financial markets. One of the fundamental elements for this course is that the rigorous mathematical analysis is used throughout the course. Particularly, various models for option prices of stocks and index will be derived.

Familiar with Advanced Calculus is desired, some knowledge on Differential Equations (Math 315) is preferred, but not required.

Credits of the Course: 3 credits.

Textbook: There is no single text book for this course. This course will be based on materials from several textbooks. Major topics contain

- (a) Valuation of stocks.
- (b) Valuation of options by binomial tree methods.
- (c) Valuation of options by continuous stochastic differential equations.
- (d) Solution Formulas for European Options and American Options.
- (e) Numerical methods for Computing option pricing.
- (f) Hedging techniques and asset Management.

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Edited by G. Gray, P. J. Cusatis and J. Woolridge, McGraw-Hill, 2004.

Course Grade:

There are five homework assignments with 10 points each. Each homework assignment will consist of some proofs and some computations. A final project will be worthy 50 points. The final grade will be based on Homework assignments and a project. Project topics will be designed from the materials

Timeline for the course Math 575.

	Major Topics		Remarks
Week 1	Interest Rate and Money Market		
Week 2	Bonds and Fixed Income Models		
Week 3	Arbitraging and Hedging, Game theory		
Week 4	Security valuation Models: Value and Growth		This topic will have total six lectures
Week 5	Discounted Cash-flow model		
Week 6	Security option pricing models: Binomial tree Method for European option-pricing	Discrete Black-Scholes-Merton Model.	This topic will have total nine lectures.
Week 7	Binomial tree method for American option-Pricing.		
Week 8	Brownian motion and Ito integration		
Week 9	Continuous Option-Pricing Model for European options		This topic will have total nine lectures.
Week 10	Numerical Methods for Solutions of European Options		
Week 11	Properties of European Option Prices.		
Week 12	Continuous Model for American option-Pricing models		This topic will have about 9 lectures.
Week 13	Optimal Exercise strategy		
Week 14	Numerical Solutions for American option pricing model		
Week 15	Asian Option and other exotic option models		