Washington State University
MAJOR CURRICULAR CHANGE FORM - COURSE

Submit original signed form and send copies to the Registrar’s Office, zip 1035.

Future Effective Date: 05/15/2012

☐ New course ☐ Temporary course ☐ Drop service course
☐ There is a course fee associated with this course (see instructions)

☐ Variable credit
☐ Increase credit (former credit)
☐ Number (former number)
☐ Crosslisting (between WSU departments)
(Other departmental signatures)
☐ Conjoint listing (400/500)
☐ Request to meet Writing in the Major [M] requirement
(Must have Air-University Writing Committee Approval)
☐ Request to meet GER in
(Must have GenEd Committee Approval)
☐ Professional course
(PHARMACY & VET MED only)
☐ Graduate credit
(Professional programs only)
☐ Other (please list request)

Math course prefix
576 course no.

Quantitative Risk Management

<table>
<thead>
<tr>
<th>3</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>credit</td>
<td>lecture hrs per week</td>
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</table>

Math 443
Sent email to contact letting them know of the removal of the prereq. 10-6-11

Description (20 words or less) This course provides an introduction to fundamental concepts in modern risk theory and mathematical methods in quantitative risk management. The course focuses on coherent risk measures, volatility modeling, multivariate dependence analysis using copulas, risk aggregation, and allocation, and extreme value theory.

Instructor: Haijun Li
Contact: Haijun Li
Campus Zip Code: 3113

Phone number: (509) 335-5279
Email: lih@math.wsu.edu

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Email: lih@math.wsu.edu

- 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.

Chair/date
Dean/date
General Education Com/date

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

Air-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 576: Quantitative Risk Management (3 credits)
Prerequisite: WSU Math 443

This course provides an introduction to concepts and mathematical methods in modern risk theory with emphasis on risk analysis and management in finance and insurance. The 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. In contrast to some courses on financial risk management offered by the Department of Finance and Management Science (such as Fin 456), this course focuses on the mathematical risk theory, which is essential for providing more quantitative training for graduate students in financial mathematics. On the other hand, this course would be also attractive to the graduate students in economics, engineering and finance at WSU who want to acquire quantitative risk management skills.
MATH 576: Quantitative Risk Management (3 credits)

(Prerequisite: MATH 443)

Instructor: Dr. Haijun Li
Office Locations: Neill 217
Phone: (509) 335-5279
Email: lih@math.wsu.edu
Office hours: by appointment (contact me to arrange day & time)

Required Textbook

Course Purpose
This course provides an introduction to fundamental concepts in modern risk theory and mathematical methods in quantitative risk management. Although some concepts and methods covered in this course can be applied to managing risks in other areas, this course focuses on risk analysis and management in finance and insurance.

Course Contents
This course covers basic concepts in financial risk management, stylized facts of risky assets, coherent risk measures, stochastic models of risk factors, volatility modeling, risk estimation, multivariate dependence analysis using copulas, risk aggregation and allocation, extreme value theory, tail risk analysis.

Learning Outcomes
Students will be able to (1) have a broader view on the relevant theoretical literature on financial risk management; (2) acquire state-of-the-art quantitative techniques for modeling financial risk factors and managing financial risk; (3) use an open source software to get hands-on experience with real financial data.

Grade Breakdown

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Homework assignments</td>
<td>30%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Projects</td>
<td>30%</td>
</tr>
<tr>
<td>Final exam</td>
<td>20%</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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Grade Distribution

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>93-100%</td>
</tr>
<tr>
<td>A-</td>
<td>89-92</td>
</tr>
<tr>
<td>B+</td>
<td>85-88</td>
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<tr>
<td>B</td>
<td>81-84</td>
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<tr>
<td>C</td>
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<tr>
<td>D+</td>
<td>65-67</td>
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<tr>
<td>D</td>
<td>60-64</td>
</tr>
</tbody>
</table>
B- .................. 78-80
C+ .................. 75-77
F .................. <60

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

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.

WSU Safety
Please familiarize yourself with information regarding campus emergencies/school closings by visiting this website: http://oem.wsu.edu/emergencies
MATH 576: Quantitative Risk Management (3 credits)

(Prerequisite: MATH 443)

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Office Locations: Neill 217
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Required Textbook
Princeton University Press, New Jersey

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Week-to-Week Course Outline
Week1: Loss distribution and risk factors
Week2: Stylized facts of risky assets and stochastic models of risk factors
Week3: Multivariate modeling and normal mixture distributions
Week4: Elliptical distributions
Week5: Copulas and basic properties
Week6: Dependence measures and tail dependence functions
Week7: Archimedean copulas
Week8: Fitting copulas to financial data
Week9: Coherent risk measures and their dual representations
Week10: Value-at-risk and tail conditional expectations
Week11: Risk aggregation and allocation
Week12: Generalized extreme value distributions and maximum domain of attraction
Week13: The Hill estimation for heavy tail index
Week14: Extreme value copulas and tail risk.
Week15: Fitting a multivariate tail risk model
Learning Outcomes
Students will be able to (1) have a broader view on the relevant theoretical literature on financial risk management; (2) acquire state-of-the-art quantitative techniques for modeling financial risk factors and managing financial risk; (3) use an open source software to get hands-on experience with real financial data.

Grade Breakdown
Homework assignments 30%
Midterm Exam 20%
Projects 30%
Final exam 20%
100%

Grade Distribution
A .......... 93-100%
A- .......... 89-92
B+ .......... 85-88
B .......... 81-84
B- .......... 78-80
C+ .......... 75-77
C .......... 71-74
C- .......... 68-70
D+ .......... 65-67
D .......... 60-64
F .......... < 50

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