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FACULTY OF ARTS & SCIENCE
NEW PROGRAM FORM for 2010-2011 CALENDAR

1. Department or Program	Mathematics

Mathematical Applications in Economics and Finance (Science Program)
Consult the Associate Chair for Undergraduate Studies, Department of Mathematics

Specialist program:

(NEW! 12- 12.5 full courses or their equivalent including one full course at the 400-level)

First Year:
ECO100Y1(70% or more), MAT137Y1/MAT157Y1, MAT223H1, MAT224H1

Second Year:
ECO206Y1, MAT237Y1, MAT244H1, MAT246H1 (waived for students taking MAT157Y1), STA257H1, STA261H1

Third Year:

1.APM346H1, ECO358H1, ECO359H1, MAT337H1, STA302H1/(ECO375H1, ECO376H1), STA347H1
and

2. One of: NEW! MAT332H1/MAT344H1, MAT334H1, MAT475H1

Fourth Year:

 APM462H1, STA457H1, APM466H1

Note:

1. Students who do not include PHL295H1 (Business Ethics) as part of their degree are expected to take another Arts and Science course with a significant emphasis on ethics and social responsibility.

2. Students planning to take specific 4th year courses should ensure they have the necessary 2nd and 3rd year prerequisites.

2. Academic Rationale

This program is designed to supply the student with a sufficient background to enter and successfully complete a master's degree in mathematical finance. It may also supply sufficient knowledge of quantitative methods in finance to enhance a career in that area without further academic training.

3. Learning Outcomes

Given the main purpose of the program, the 4th year courses are completely specified: there are no *choices*. By taking the following sequence of courses (ECO100Y1, ECO206H1, STA257H1, STA261H1, ECO358H1, STA302H1/(ECO375H1, ECO376H1), STA347H1) in economics and statistics, and (MAT137Y1/MAT157Y1, MAT223H1, MAT224H1, MAT237Y1, MAT244H1, MAT246H1, MAT337H1, APM346H1) in analysis and algebra

that culminate in

APM466H1 Mathematical Theory of Finance

APM462H1 Nonlinear Optimization

STA457H1 Time Series Analysis

students become thoroughly prepared for acceptance into top masters programs in the mathematics of finance.

Of course, parts of the analysis and algebra sequence are prerequisites of some of the courses in the economics and statistics sequence. Students also have the opportunity to deepen their knowledge of relevant mathematical techniques by choosing between (MAT332H1/MAT344H1 Introductory Combinatorics), (MAT334H1 Complex Variables), and (MAT475H1 Problem Solving).

4. Degree Objectives

a. DEPTH OF KNOWLEDGE

This question has been fully addressed under Learning Outcomes (Heading 3 above).

b. COMPETENCIES

i. Critical and Creative Thinking

Every mathematics course demands and develops the ability to analyze logical arguments, and moreover assigns students from time to time problems unlike any that they have seen before. Solving such problems is a challenge that requires creative thinking.

ii. Communication

Mathematical communication skills (in particular, the ability to express mathematical insights clearly and correctly, in the form of rigorous proofs) are developed throughout the curriculum and are explicitly emphasized in the analysis and algebra sequence (MAT137Y1/MAT157Y1, MAT223H1/240H1, MAT224H1/MAT247H1, MAT237Y1, MAT244H1, MAT337H1, APM346H1, APM462H1). In addition, for those who have not taken MAT157Y1, rigorous proofs are emphasized in MAT246H1. Clear presentation of solutions to problems is emphasized in the statistics and economics sequence (ECO100Y1, ECO206H1. STA257H1, STA261H1, ECO358H1, STA302H1/(ECO375H1, ECO376H1), STA347H1, STA457H1, APM466H1).

Currently, extra TA hours have been assigned in MAT157Y1 and MAT246H1 to help students with their proof-writing skills.

iii. Information Literacy

References for research in Mathematics, as in other fields, now include not only traditional sources, but also a tremendous range of online resources, including searchable review databases (MathSciNet), preprint servers (arXiv.org), specialized Math Wikis (such as the *Dispersive PDE Wiki*, housed at the university of Toronto Math Department), *wiki*-style online pedagogical resources (eg the *Tricki*, initiated by Fields medallist Tim Gowers) and Math Blogs (*eg* that of Fields Medalist Terence Tao). Students gain familiarity with these resources in the 300- and 400-level courses of the program.

iv. Quantitative Reasoning

Quantitative reasoning is a central part of all mathematics courses.

v. Social and Ethical Responsibility

A fundamental respect for honest argument is omnipresent in mathematics courses. Students who do not include PHL295H1 (Business Ethics) as part of their degree are

expected to take another Arts and Science course with a significant emphasis on ethics and social responsibility.

c. AN INTEGRATIVE, INQUIRY-BASED ACTIVITY

Please indicate which course(s) or other appropriate activities are eligible means for satisfying this program requirement. The attached Integrative, Inquiry-based Activity description provides both definition and guidelines, with examples of the many types of appropriate courses or other activities.

APM466H1 (Mathematical Theory of Finance) is the course at which all the other courses in this program lead. It sits at the pinnacle of the pyramid of its prerequisites.

5. **Departmental/College Resource Implications** The Office of the Dean requires a statement of the resource requirements for the proposed program, and an indication of whether you can meet these requirements through your existing resources, or have received additional resources from the Dean. Please give details of the resource areas below.

Estimated Enrolment per Academic Year in this program (please explain)	All years, including 1st and 2nd round = 319 This figure is taken from total POST enrolment supplied by the Faculty of Arts and Science.
New courses necessary to mount for this program	MAT332H1, MAT475H1
Additional Instructor(s) Requirements	0
Teaching Assistant(s) Requirements	40 hrs
Laboratory Equipment Requirements	0
Computing Resources Requirements	0
Other	0

DELETE the statement that DOES NOT apply:

I will provide these resources required for this Program from my existing budget.

DATE : October 7, 2009	**Name of Chair/Program Director:** Kumar Murty