



Dean of Graduate Studies

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GradStudies

**MEMORANDUM**

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**ATTENTION** Senate  
**FROM** Wade Parkhouse, Dean of Graduate Studies  
**RE:** Graduate Diploma in Financial Engineering under Special Arrangements

**DATE** 12 November 2013  
**No.** GS2013.22

**For information:**

At its meeting of 9 September, 2012, SGSC approved the Graduate Diploma in Financial Engineering under Special Arrangements.

**Effective Date: May 2014****Beedie School of Business and the Department of Statistics and Actuarial Science**

Full Program Proposal: Graduate Diploma in Financial Engineering under Special Arrangements [GS2013.22]

1. New courses:  
ACMA 815-2 Rate of Return Models  
ACMA 816-2 Stochastic claims processes

**Timeline:**

<b>August 23, 2013</b>	<b>Full Program Proposal approved by Beedie School of Business</b>
<b>Aug 22, 2013</b>	<b>Full Program Proposal approved by Department of Statistics and Actuarial Science</b>
<b>September 9, 2013</b>	<b>New courses were submitted</b>
<b>September 9, 2013</b>	<b>Approved by SGSC</b>
<b>November 2013</b>	<b>Sent to Senate and SCUP</b>

**GS2013.22**

**Graduate Diploma in Financial Engineering under Cohort Special Arrangements  
Proposal  
September 9, 2013**

**Credential to be awarded:** Graduate Diploma in Financial Engineering under Cohort Special Arrangements

**Location of the program:** Burnaby and Vancouver (Segal)

**Faculties offering the program:** Beedie School of Business, Department of Statistics and Actuarial Science

**Anticipated start date:** Summer 2014.

**Description of the program:**

The Graduate Diploma in Financial Engineering is designed for current graduate students in the Department of Statistics and Actuarial Science who would like to develop applied skills in the field of finance and for students in the M.Sc. program in Finance who would like to deepen their theoretical understanding of relevant statistical and mathematical concepts. Students are required to take graduate courses in the Department of Statistics and Actuarial Science and in the M.Sc. Finance program of finance as described below. The goal of the diploma program is to prepare students for careers in quantitative finance. Specific job opportunities include quantitative analyst and risk management positions in investment banks, mutual, pension, and hedge fund management companies, compliance departments of financial institutions, and government regulatory agencies. The specific skills successful graduates are expected to possess include pricing of financial instruments, such as stocks, bonds, and derivatives, risk management for those instruments, and in-depth understanding of the theoretical underpinnings of the methods involved.

Since this is a small group of students with a common interest, they will be expected to work together on group projects in the required courses.

**Program requirements:**

Students must complete a total of 22 units of graduate courses, including

BUS 814-3: Derivative Securities I

BUS 818-3: Derivative Securities II

**One (1) of the following courses:**

ACMA 815-2: Rate of return models

ACMA 820-4: Stochastic Analysis of Insurance Portfolios

**Two (2) of the following courses:**

ACMA 816-2: Stochastic Claims Processes

STAT 830-4: Statistical Theory I

STAT 831-4: Statistical Theory II

STAT 832-4: Probability Models

STAT 843-4: Functional Data Analysis

STAT 853-4: Applications of Statistical Computing

**ONE of the following courses:**

BUS 865-3: Market Risk Management

BUS 857-3: Numerical Methods  
BUS 810-3: Fixed Income Security Analysis  
BUS 864-3: Credit Risk Management  
BUS 805-3: Financial Economics II

and

One or more elective courses from the above lists to meet the overall minimum required units.

Students may apply some courses completed for one credential towards the other credential as outlined in graduate regulation 1.7.6. Normally this would mean that students must complete minimally four (4) additional courses to be awarded this diploma beyond their MSc.

Optional Prep Courses

M.Sc. Prep Program – Economics Fundamentals (non-credit)  
BUS 802-3: Financial Economics I

**Work experience/work place term:** Not required.

**Target number of students:** We anticipate five students from both programs combined each year.

**Enrolment plan for the length of the program:** studying full-time, a student should complete the program in 1-2 years.

**Policies on student evaluation:** please refer to enclosed course outlines.

**Faculty participating in the Diploma Program:** The program is coordinated by Andrey Pavlov (apavlov@sfu.ca) and Gary Parker (gparker@stat.sfu.ca). All faculty members involved in both programs are further expected to contribute to the program.

**Policies on faculty appointments:** existing SFU faculty members or sessional instructors approved by the departments.

**Policies on program assessment:** an assessment will be conducted after 3 years.

**Level of support and recognition from other post-secondary institutions, (including plans for admissions and transfer within the BC post-secondary education system) and relevant regulatory or professional bodies, where applicable:** N/A

**Evidence of student interest and labour market demand:**

Informal conversations with students from both faculties were conducted to gauge interest. Anticipate 1-2 students from each faculty to enroll each year.

Graduates from the Department of Statistics and Actuarial Science who have been hired into finance related positions:

An average of 1 or 2 undergraduates go on to work in Finance type jobs each year. In addition, 2 or 3 others find employment in the insurance industry but with a job description that probably fits the Finance sector quite well.

At the graduate level, the average might be around 1 student per year working in investment/finance/financial engineering type of jobs. For example there are a few students working for consultants in Toronto pricing and reserving embedded options in insurance contracts.

Below are examples of graduates of the MSc in Finance program who have been hired to particular placements that benefited from the theoretical background in statistics that these students had (quantitative analyst positions). The Diploma would provide this background to all students who enroll.

LaHaye	Guillaume	Canada	2011-12	Markit
Saedi	Mehdi	Canada	2011-12	Markit
Sivorot	Steven	Canada	2011-12	Markit
Verla	Franclin	Cameroon	2011-12	Markit
Wolk	Jared	Canada	2011-12	Markit
Bernal	Milton	Canada	2010-11	Salman Partners
Looi	Lauren	South Africa / PR	2010-11	CIBC
Ziabakhshdeylami	Ashkan	Canada	2010-11	Deutsche Bank
Dason	Jeremy	Canada	2009-10	Mackie Research Capital
Hou	Shawn	China	2008-09	SwissRe

**Tuition:** Courses from each program are offered at the standard tuition levels for that program.

**Resources Needed:** There are no additional resources required from either department, as all courses in the program are already offered. There is no additional student support for the participants in the program.

**Brief description of any program and associated resources that will be reduced or eliminated when the new program is introduced:** N/A

**Related programs at SFU or other BC post-secondary institutions:** None

**Contacts for more information:**

Department of Statistics and Actuarial Science: Gary Parker [gparker@stat.sfu.ca](mailto:gparker@stat.sfu.ca)

MSc in Finance: Andrey Pavlov [apavlov@sfu.ca](mailto:apavlov@sfu.ca)

#### **Attachments**

Course outlines for all courses in the program

Beedie School of Business memo

Department of Statistics and Actuarial Science memo

**Calendar language** (new program so no previous language exists)

From:

To:

**Graduate Diploma in Financial Engineering**

The Graduate Diploma in Financial Engineering is designed for graduate students in the Department of Statistics and Actuarial Science who would like to develop applied skills in the field of finance, and for students in the M.Sc. Finance program seeking to deepen their theoretical understanding of relevant statistical and mathematical concepts so as to prepare students for careers in quantitative finance.

Students must complete a total of 22 units of graduate coursework, including:

BUS 814 - Derivative Securities I (3)

BUS 818 - Derivative Securities II (3)

Minimally one (1) of the following courses:

ACMA 815 - Rate of return models (2)

ACMA 820 - Stochastic Analysis of Insurance Portfolios (4)

Minimally two (2) of the following courses:

ACMA 816 - Stochastic Claims Processes (2)

STAT 830 - Statistical Theory I (4)

STAT 831 - Statistical Theory II (4)

STAT 832 - Probability Models (4)

STAT 843 - Functional Data Analysis (4)

STAT 853 - Applications of Statistical Computing (4)

Minimally one (1) of the following courses:

BUS 805 - Financial Economics II (3)

BUS 810 - Fixed Income Security Analysis (3)

BUS 857 - Numerical Methods (3)

BUS 864 - Credit Risk Management (3)

BUS 865 - Market Risk Management (3)

and one or more elective courses from the above lists to meet the overall minimum required units.

Students may apply some courses completed for one credential towards this credential as outlined in graduate regulation 1.7.6. Normally this would mean that students must complete minimally four (4) additional courses to be awarded this diploma beyond their MSc.

*For those with limited background in finance/economics, preparatory courses offered by the Beedie School of Business may be required.*

### **Academic Requirements within the Graduate General Regulations**

All graduate students must satisfy the academic requirements that are specified in the [graduate general regulations](#) (residence, course work, academic progress, supervision, research competence requirement, completion time, and degree completion), as well as the specific requirements for the program in which they are enrolled, as shown above.





MEMO

Beedie School of Business

Segal Graduate School of Business  
500 Granville Street,  
Vancouver, BC Canada  
V6C 1W6

ATTENTION: Wade Parkhouse, Dean of Graduate Studies | TEL:

FROM: Colleen Collins, Associate Dean, Beedie School of Business

RE: Proposal: Graduate Diploma in Financial Engineering

DATE: August 23, 2013

The Graduate Program Committee of the Beedie School of Business recommends the establishment of a Graduate Diploma in Financial Engineering -- a joint diploma of the Beedie School of Business and the Department of Statistics and Actuarial Science. The proposal is attached.

Thank you

A handwritten signature in black ink, appearing to read "Colleen Collins". The signature is fluid and cursive.

Colleen Collins  
Associate Dean

**Simon Fraser University**  
MEMORANDUM

<b>To:</b> Wade Parkhouse, Dean of Graduate Studies	<b>From:</b> Richard Lockhart, Chair Statistics & Act Sci
<b>Re:</b> Graduate Diploma Financial Engineering	<b>Date:</b> August 22, 2013

Dear Wade:

I write to confirm that the Department of Statistics and Actuarial Science joins the Beedie School of Business in recommending the establishment of a Graduate Diploma in Financial Engineering – a joint diploma of the Beedie School of Business and the Department of Statistics and Actuarial Science.

The proposal itself is being submitted by Business.

The proposed diploma is very inexpensive to implement requiring no increase in faculty workload. We think that the proposed Diploma will be attractive to some students who look to use their statistical or actuarial training in a financial context. The initial offering is expected to run by special arrangements – this fall if it can be processed quickly.

Sincerely,

Richard Lockhart



# New Graduate Course Proposal Form

## PROPOSED COURSE

Program (eg. MAPH) <b>ACMA</b>	Number (eg. 810) <b>815</b>	Units (eg. 4) <b>2</b>
Course Title (max 80 characters) <b>Rate of Return Models</b>		
Short Title (appears on transcripts, max 25 characters) <b>Rate of Return Models</b>		
Course Description for SFU Calendar <input type="checkbox"/> see attached document <input type="checkbox"/> Learning outcomes identified <b>An introduction to stochastic models for the rate of return. Time series. Stochastic differential equations. Covariance equivalence principle. Applications.</b>		
Available Course Components: <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Laboratory <input type="checkbox"/> Practicum <input type="checkbox"/> Online <input type="checkbox"/> _____		
Grading Basis <input checked="" type="checkbox"/> Letter grades <input type="checkbox"/> Satisfactory/Unsatisfactory <input type="checkbox"/> In Progress/Complete		This is a capstone course <input type="checkbox"/> Yes <input type="checkbox"/> No
Prerequisites (if any) <input type="checkbox"/> see attached document (if more space is required) <b>Permission of the Department. Students with credit for ACMA 820 may not take this course for further credit.</b>		
<input type="checkbox"/> This proposed course is combined with an undergrad course: Course number and units: _____		
Additional course requirements for graduate students <input type="checkbox"/> See attached document (if this space is insufficient)		
Campus at which course will be offered (check all that apply) <input type="checkbox"/> Burnaby <input type="checkbox"/> Vancouver <input type="checkbox"/> Surrey <input type="checkbox"/> GNW <input type="checkbox"/> _____		
Estimated enrolment <b>1-5</b>	Date of initial offering <b>Summer <del>Fall</del> 2014</b>	Course delivery (eg. 3 hrs/week for 13 weeks) <b>4 hrs/week for 6 weeks</b>
<input type="checkbox"/> Yes <input type="checkbox"/> No Practicum work done in this class will involve children or vulnerable adults (If the "Yes" box is checked, all students will require criminal record checks)		
Justification <input type="checkbox"/> See attached document (if more space is required) <b>First 6 weeks of an existing course, Acma-820. Required course for a proposed Graduate Diploma in Financial Engineering.</b>		

## RESOURCES

If additional resources are required to offer this course, the department proposing the course should be prepared to provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course <input type="checkbox"/> information about their competency to teach the course is appended <b>Gary Parker, Yi Lu, Barbara Sanders</b>
Number of additional faculty members required in order to offer this course <b>None</b>
Additional space required in order to offer this course <input type="checkbox"/> see attached document <b>None</b>
Additional specialized equipment required in order to offer this course <input type="checkbox"/> see attached document <b>None</b>
Additional Library resources required (append details) <input type="checkbox"/> Annually \$ _____ <input type="checkbox"/> One-time \$ _____ <b>None</b>

**PROPOSED COURSE** from first page

Program (eg. MAPH) <b>ACMA</b>	Number (eg. 810) <b>815</b>	Units (eg. 4) <b>2</b>
Course title (max 80 characters) <b>Rate of Return Models</b>		

**APPROVAL SIGNATURES**

When a department proposes a new course it must first be sent to the chairs of each faculty graduate program committee where there might be an overlap in course content. The chairs will indicate that overlap concerns have been dealt with by signing the appropriate space or via a separate memo or e-mail (attached to this form).

The new course proposal must also be sent to the Library for a report on library resources.

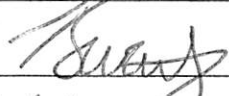

Once overlap concerns have been dealt with, signatures indicate approval by the department, home faculty and Senate Graduate Studies Committee.

**Other Faculties**

The signature(s) below indicate that the Dean(s) or designate of other Faculties affected by the proposed new course support(s) the approval of the new course.

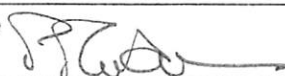
Name of Faculty	Signature of Dean or Designate	Date
<b>Business Administration</b>		

**Departmental Approval** (non-departmentalized faculties need not sign)

Department Graduate Program Committee	Signature 	Date <b>Sept 9/13</b>
Department Chair <b>RICHARD LOCANTINI</b>	Signature 	Date <b>Sept 9/13</b>

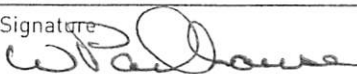
**Faculty Approval**

Faculty approval indicates that all the necessary course content and overlap concerns have been resolved, and that the Faculty/Department commits to providing the required Library funds and any other necessary resources.

Faculty Graduate Program Committee <b>PETER ROBSON</b>	Signature 	Date <b>12 Nov 13</b>
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**Senate Graduate Studies Committee Approval**

SGSC approval indicates that the Library report has been seen, and all resource issues dealt with. Once approved, new course proposals are sent to Senate for information.

Senate Graduate Studies Committee <b>W Parkhouse</b>	Signature 	Date <b>Nov 12/13</b>
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**CONTACT**

Upon approval of the course, the Office of the Dean of Graduate Studies will consult with the department or school regarding other course attributes that may be required to enable the proper entry of the new course in the student record system.

Department / School / Program <b>Statistics &amp; Actuarial Science</b>	Contact name <b>Gary Parker</b>	Contact email <b>gparker@stat.sfu.ca</b>
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**ACMA 815-2: Rate of return models**  
**Course outline**

**Pre-requisite:** Upper division probability and statistics course.

**Objective:** Study some basic models for the rate of return.

**Outline:**

1. White Noise process, Brownian motion, Ornstein-Uhlenbeck process or Vasicek model, second order stochastic differential equation, regime-switching model, Wilkie model, CIR.
2. The main features of these processes will be investigated.
3. Auto-Regressive Time Series of order one and two.
4. Covariance equivalence principle.
5. Estimation of these processes will be briefly discussed.

This course consists of the first 6 weeks of ACMA-820.

**Grading:**

Midterm: 40%

Final: 40%

Project: 20%



# New Graduate Course Proposal Form

## PROPOSED COURSE

Program (eg. MAPH) <b>ACMA</b>	Number (eg. 810) <b>816</b>	Units (eg. 4) <b>2</b>
Course Title (max 80 characters) <b>Stochastic claims processes</b>		
Short Title (appears on transcripts, max 25 characters) <b>Stochastic claims processes</b>		
Course Description for SFU Calendar <input type="checkbox"/> see attached document <input type="checkbox"/> Learning outcomes identified <b>Study the distribution of aggregate claims and introduce stochastic claims reserving methods in insurance. Individual versus collective models. Standard distribution-free methods. Other models.</b>		
Available Course Components: <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Laboratory <input type="checkbox"/> Practicum <input type="checkbox"/> Online <input type="checkbox"/> _____		
Grading Basis <input checked="" type="checkbox"/> Letter grades <input type="checkbox"/> Satisfactory/Unsatisfactory <input type="checkbox"/> In Progress/Complete		This is a capstone course <input type="checkbox"/> Yes <input type="checkbox"/> No
Prerequisites (if any) <input type="checkbox"/> see attached document (if more space is required) <b>Permission of the Department. Students with credit for ACMA 821 may not take this course for further credit.</b>		
<input type="checkbox"/> This proposed course is combined with an undergrad course: Course number and units: _____		
Additional course requirements for graduate students <input type="checkbox"/> See attached document (if this space is insufficient)		
Campus at which course will be offered (check all that apply) <input type="checkbox"/> Burnaby <input type="checkbox"/> Vancouver <input type="checkbox"/> Surrey <input type="checkbox"/> GNW <input type="checkbox"/> _____		
Estimated enrolment <b>1-5</b>	Date of initial offering <b>Summer <del>Spring</del> 2014</b>	Course delivery (eg. 3 hrs/week for 13 weeks) <b>4 hrs/week for 6 weeks</b>
<input type="checkbox"/> Yes <input type="checkbox"/> No Practicum work done in this class will involve children or vulnerable adults (If the "Yes" box is checked, all students will require criminal record checks)		
Justification <input type="checkbox"/> See attached document (if more space is required) <b>First 6 weeks of an existing course, Acma-821. Elective course for a proposed Graduate Diploma in Financial Engineering.</b>		

## RESOURCES

If additional resources are required to offer this course, the department proposing the course should be prepared to provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course <input type="checkbox"/> information about their competency to teach the course is appended <b>Yi Lu, Cary Tsai, Gary Parker</b>
Number of additional faculty members required in order to offer this course ~ <b>None</b>
Additional space required in order to offer this course <input type="checkbox"/> see attached document <b>None</b>
Additional specialized equipment required in order to offer this course <input type="checkbox"/> see attached document <b>None</b>
Additional Library resources required (append details) <input type="checkbox"/> Annually \$ _____ <input type="checkbox"/> One-time \$ _____ <b>None</b>

**PROPOSED COURSE** from first page

Program (eg. MAPH) <b>ACMA</b>	Number (eg. 810) <b>816</b>	Units (eg. 4) <b>2</b>
Course title (max 80 characters) <b>Stochastic claims processes</b>		

**APPROVAL SIGNATURES**

When a department proposes a new course it must first be sent to the chairs of each faculty graduate program committee where there might be an overlap in course content. The chairs will indicate that overlap concerns have been dealt with by signing the appropriate space or via a separate memo or e-mail (attached to this form).

The new course proposal must also be sent to the Library for a report on library resources.

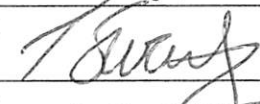

Once overlap concerns have been dealt with, signatures indicate approval by the department, home faculty and Senate Graduate Studies Committee.

**Other Faculties**

The signature(s) below indicate that the Dean(s) or designate of other Faculties affected by the proposed new course support(s) the approval of the new course.

Name of Faculty	Signature of Dean or Designate	Date

**Departmental Approval** (non-departmentalized faculties need not sign)

Department Graduate Program Committee	Signature 	Date <b>Sept 9/13</b>
Department Chair <b>RICHARD LOCKMAN</b>	Signature 	Date <b>Sept 9/13</b>

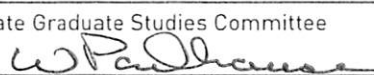
**Faculty Approval**

Faculty approval indicates that all the necessary course content and overlap concerns have been resolved, and that the Faculty/Department commits to providing the required Library funds and any other necessary resources.

Faculty Graduate Program Committee <b>PETER RUBIN</b>	Signature 	Date <b>12 Nov 13</b>
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**Senate Graduate Studies Committee Approval**

SGSC approval indicates that the Library report has been seen, and all resource issues dealt with. Once approved, new course proposals are sent to Senate for information.

Senate Graduate Studies Committee 	Signature <b>W. Parkhouse</b>	Date <b>Nov 12/13</b>
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**CONTACT**

Upon approval of the course, the Office of the Dean of Graduate Studies will consult with the department or school regarding other course attributes that may be required to enable the proper entry of the new course in the student record system.

Department / School / Program <b>Statistics &amp; Actuarial Science</b>	Contact name <b>Gary Parker</b>	Contact email <b>gparker@stat.sfu.ca</b>
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## ACMA 816-2: Stochastic claims processes

### Course outline

**Pre-requisite:** Upper division probability and statistics course.

**Objective:** Study the distribution of aggregate claims and introduce stochastic claims reserving methods in insurance.

**Outline:**

1. Collective risk model
2. Calculation of aggregate claims distribution
3. Individual risk model versus collective risk model
4. Reserves for Incurred But Not Reported (IBNR) claims
5. Three standard distribution-free methods
6. Bayesian models
7. Distributional models

This course consists of the first 6 weeks of ACMA-821.

**Grading:**

Midterm: 40%

Final: 40%

Project: 20%