SFU Dean of Graduate Studies

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**MEMORANDUM**

| | | | |
|---|---|---|---|
| ATTENTION | Senate | DATE | 7 February 2013 |
| FROM | Wade Parkhouse, Dean of Graduate Studies | No. | GS2013.05 |
| RE: | Department of Statistics and Actuarial Science | | |

**For information:**
Acting under delegated authority at its meeting of 4 February 2013, SGSC approved the following curriculum revision:

**Effective Date is Fall 2013**

**Faculty of Science**

a) Department of Statistics and Actuarial Science

1. New courses:
   STAT 830-4 Statistical Theory I
   STAT 831-4 Statistical Theory II
   STAT 840-4 Statistical Genetics
   STAT 841-4 Advanced Design of Experiments
   STAT 842-4 Environmetrics
   STAT 843-4 Functional Data Analysis
   STAT 850-4 Linear Models and Applications
   STAT 851-4 Generalized Linear Models and Discrete Data Analysis
   STAT 852-4 Modern Methods in Applied Statistics
   STAT 853-4 Applications of Statistical Computing
   STAT 854-4 Biometrics: Methods in Biomedical Studies
   STAT 856-4 Longitudinal Data Analysis
   STAT 857-4 Space-Time Models

2. Changes to course numbers to reflect a new suite of STATS courses:
   STAT 832-4 from STAT 870-4 Applied Probability Models
   STAT 855-4 from STAT 806-4 Lifetime Data Analysis

3. Courses to be deleted from the calendar:
   STAT 801-4 Statistics
   STAT 802-4 Multivariate Analysis
   STAT 804-4 Time Series Analysis
   STAT 805-4 Non-Parametric Statistics and Discrete Data Analysis

ii) Where applicable, deleted courses to be removed from electives for:
FAS: MoCSSy Certificate
BUS: BUS PhD

4. MSc in Actuarial Science:
i) Change to program requirements
ii) Change to program length
iii) Minor editorial changes

5. MSc in Statistics:
i) Change to general description
ii) Change to program requirements
iii) Change to program length
iv) Minor editorial changes

**GS2013.05**

SFU
Faculty of Science
Dean's Office
TASC 11 - 9900
8888 – University Drive
Burnaby, BC V5A 1S6



**TO:** W. Parkhouse
Dean of Graduate Studies

**FROM:** P. Ruben, Chair & Associate Dean
Faculty of Science Graduate Studies Committee

**RE: Statistics & Actuarial Science**

**DATE:** December 14, 2012

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The following Graduate program, new courses and course changes have been approved by the Faculty of Science and are forwarded for approval by the Senate Graduate Studies Committee. Please include them on the next SGSC agenda.

**Statistics & Actuarial Science**

New courses: STAT 830, 831, 840, 841, 842, 843, 850, 851, 852, 853, 854, 856, 857
Number changes: STAT 870 to STAT 832, STAT 806 to STAT 855
Courses to be deleted: STAT 801, 802, 804 and 805

Changes to MSc in Statistics
From: STAT 801, STAT 811, 812 plus at least 4 of a list of our other grad courses.
To: Courses to be used: STAT 830, 850, 851, 852, 853, 811, 812 – (24 credit hours)

Changes to MSc in Actuarial Science
From: STAT 801, two of ACMA 820, 821, 822
To: STAT 830, two of ACMA 820, 821, 822

P. Ruben

Enclosure

c. C. Cupples

SFU

Department of Statistic
&Actuarial Science

# MEMO

December 12, 2012

To: Peter Rueben
From: Tim Swartz
Subject: Proposed Graduate Program and Course Changes

Dear Peter,

I attach a package of modifications to our graduate programs approved by the Department of Statistics and Actuarial Science on 9 November 2012. There are a set of new course proposals, some course change proposals and a modified calendar entry for our MSc programs in statistics and in actuarial science. The new courses and program changes were reviewed by Leslie Rimmer in the Library who indicated "... the Library will be able to support these courses with no additional resources from the department". [In the calendar entries new, modified or moved material is highlighted in yellow. Deletions are indicated by striking.]

The modifications to our course offerings are the result of recommendations from our last external review and also an attempt to improve continually our programs so that they remain among the best in the country. In addition, new calendar entries are being added in preparation for a new stream in Biostatistics and also a combined undergraduate/graduate degree in Applied Statistics. Both will be proposed formally at a later date, along with changes to our PhD program. Lastly, we have attempted to rationalize the course numbering; this entails some minor changes.

I summarize the proposed changes below.

**New courses:**

| Course # | Course Title |
|---|---|
| STAT 830 | Statistical Theory I |
| STAT 831 | Statistical Theory II |
| STAT 840 | Statistical Genetics |
| STAT 841 | Advanced Design of Experiments |
| STAT 842 | Environmetrics |
| STAT 843 | Functional Data Analysis |
| STAT 850 | Linear Models and Applications |
| STAT 851 | Generalized Linear Models and Discrete Data Analysis |
| STAT 852 | Modern Methods in Applied Statistics |
| STAT 853 | Applications of Statistical Computing |
| STAT 854 | Biometrics: Methods in Biomedical Studies |
| STAT 856 | Longitudinal Data Analysis |
| STAT 857 | Space-Time Models |

**Re-numbered courses:**

| New Course # | Old Course Number | Course Title |
|---|---|---|
| STAT 832 | STAT 870 | Probability Models |
| STAT 855 | STAT 806 | Lifetime Data Analysis |

**Deleted courses:**

| Course # | Course Title |
|---|---|
| STAT 801 | Statistics |
| STAT 802 | Multivariate Analysis |
| STAT 804 | Time Series Analysis |
| STAT 805 | Non-parametric Statistics and Discrete Data Analysis |

**Changes to Calendar**

The bulk of the calendar changes are driven by the new courses but we are also increasing the number of specifically required courses in the MSc program in Statistics. The only requirements being changed are in our MSc program in statistics; in the MSc program in Actuarial Science we are changing the list of courses from which students may choose some of their credits to reflect the new suite of statistics courses. Total credit hours required are unchanged for both programs.

**MSc in Statistics**

Old requirements for the MSc program in statistics: STAT 801-4, STAT 811-2, STAT 812-2 plus at least 4 of a list of our other grad courses. In total 30 credit hours are required. Students are permitted to use up to 6 units of 400 level undergraduate work.

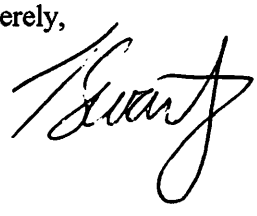
New requirements for the MSc program in statistics: STAT 830-4, STAT 850-4, STAT 851-4, STAT 852-4, STAT 853-4, STAT 811-2, STAT 812-2 – this comes to 24 credit hours. In total 30 credit hours are required. Students are permitted to use up to 6 units of 400 level undergraduate work.

**MSc in Actuarial Science**

Old requirements for the MSc program in actuarial science: STAT 801-4, two of ACMA 820-4, ACMA 821-4, ACMA 822-4; plus at least 2 of a list of our other grad courses. In total 30 credit hours are required. Students are permitted to use up to 6 units of 400 level undergraduate work.

New requirements for the MSc program in actuarial science: STAT 830-4, two of ACMA 820-4, ACMA 821-4, ACMA 822-4; plus at least 2 of a list of our other grad courses – that list is changed, of course, to reflect the changes in STAT grad courses. In total 30 credit hours are required. Students are permitted to use up to 6 units of 400 level undergraduate work.

Sincerely,



SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) STAT | Number (eg. 810) 830 | Units (eg. 4) 4 |
|---|---|---|

Course Title (max 80 characters)
Statistical Theory I

Short Title (appears on transcripts, max 25 characters)
Statistical Theory I

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified

The statistical theory that supports modern statistical methodologies. Distribution theory, methods for construction of tests, estimators, and confidence intervals with special attention to likelihood and Bayesian methods. Properties of the procedures including large sample theory will be considered. Consistency and asymptotic normality for maximum likelihood and related methods (e.g., estimating equations, quasi-likelihood), as well as hypothesis testing and p-values. Additional topics may include: nonparametric models, the bootstrap, causal inference, and simulation.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)

STAT 450 or permission of the instructor. Students with credit for STAT 801 may not take this course for further credit.

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply) ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 5 | Fall 2013 | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)

Following recent review of our programs and the discipline, we determined that the material in this course is both fundamental to modern statistical application and useful in its own right.

## 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 ☐ information about their competency to teach the course is appended
Derek Bingham, Jiguo Cao, Richard Lockhart, BoxinTang

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 830 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Statistical Theory I | | |

## 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 |
|---|---|---|
| | | |
| | | |
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| | | |

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

| Department Graduate Program Committee<br>Tim Swartz | Signature | Date DEC 12 2012 |
|---|---|---|
| Department Chair<br>Richard Lockhart | Signature | Date DEC 12 2012 |

**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<br>PETER RUBEN | Signature | Date 14 Dec 2012 |
|---|---|---|

**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<br>W Parkhouse | Signature | Date Feb 14/13 |
|---|---|---|

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline
# STAT 830 Statistical Theory I

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**Day Course**

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:**

STAT 450 or permission of the instructor. Students with credit for STAT 801 may not take this course for further credit.

**Textbook:**

Recommended:
*All of Statistics: A Concise Course in Statistical Inference*, by Larry Wasserman, Publisher: Springer.

**Calendar Description:**

The statistical theory that supports modern statistical methodologies. Distribution theory, methods for construction of tests, estimators, and confidence intervals with special attention to likelihood and Bayesian methods. Properties of the procedures including large sample theory will be considered. Consistency and asymptotic normality for maximum likelihood and related methods (e.g., estimating equations, quasi-likelihood), as well as hypothesis testing and p-values. Additional topics may include: nonparametric models, the bootstrap, causal inference, and simulation.

**Outline:**

1. Probability: random variable, expectation, inequalities, and convergence
2. Inference
3. The likelihood function
4. Maximum likelihood estimation (MLE) and asymptotic properties
5. Methods related to MLE's (estimating equations and quasi-likelihood
6. Hypothesis testing
7. The Neyman-Pearson approach, p-values, likelihood ratio tests, and confidence intervals
8. The bootstrap
9. The postulates of Bayesian inference, Bayes's theorem
10. The Bayesian approach, estimation, hypothesis testing, Bayes factors, credible intervals
11. Invariance, Jeffrey's priors, asymptotics
12. Causal inference
13. Simulation

**Grading Scheme:**

Assignments – 25%
Midterms – 25% each of 2
Final – 25%

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

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RECEIVED
DEC 21 2012
DEAN OF GRADUATE STUDIES OFFICE

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) | Number (eg. 810) | Units (eg. 4) |
|---|---|---|
| STAT | 831 | 4 |

Course Title (max 80 characters)
Statistical Theory II

Short Title (appears on transcripts, max 25 characters)
Statistical Theory II

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified

Advanced mathematical statistics for PhD students. Topics in probability theory including densities, expectation and random vectors and matrices are covered. The theory of point estimation including unbiased and Bayesian estimation, conditional distributions, variance bounds and information. The theoretical framework of hypothesis testing is covered. Additional topics that may be covered include modes of convergence, central limit theorems for averages and medians, large sample theory and empirical processes.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)

STAT 830 or permission from the instructor

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply) ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 5 | TBD | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)

Following recent review of our programs and the discipline, we determined that the material in this course is both fundamental to modern statistical application and useful in its own right.

## 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 ☐ information about their competency to teach the course is appended
Derek Bingham, Jiguo Cao, Richard Lockhart, Boxin Tang

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 831 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Statistical Theory II | | |

## 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 |
|---|---|---|
| | | |
| | | |
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| | | |
| | | |

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

| | | |
|---|---|---|
| Department Graduate Program Committee<br>Tim Swartz | Signature | Date<br>DEC 12 2012 |
| Department Chair<br>Richard Lockhart | Signature | Date<br>DEC 12 2012 |

**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<br>W Parkhouse | Signature | Date<br>Feb 14/13 |

**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<br>PETER RUBEN | Signature | Date<br>14 Dec 2012 |

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline
# STAT 831 Statistical Theory II

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**Day Course**

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:**

STAT 830 or permission from the instructor

**Textbook:**

Recommended:
*Theoretical Statistics: Topics For A Core Course*, by Robert Keener, Publisher: Springer.

**Calendar Description:**

Advanced mathematical statistics for PhD students. Topics in probability theory including densities, expectation and random vectors and matrices are covered. The theory of point estimation including unbiased and Bayesian estimation, conditional distributions, variance bounds and information. The theoretical framework of hypothesis testing is covered. Additional topics that may be covered include modes of convergence, central limit theorems for averages and medians, large sample theory and empirical processes.

**Outline:**

1. Probability and measure
2. Exponential families
3. Conditional distributions
4. Sufficiency and completeness and the relationships with unbiased estimation
5. Bayesian estimation
6. Estimating equations and maximum likelihood
7. Hypothesis tests and optimality
8. Large sample theory for likelihood tests
9. Bootstrap methods

**Grading Scheme:**

Assignments – 25%
Midterms - 25%
Final – 50%

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) STAT | Number (eg. 810) 840 | Units (eg. 4) 4 |
|---|---|---|

Course Title (max 80 characters)
Statistical Genetics

Short Title (appears on transcripts, max 25 characters)
Statistical Genetics

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified

An introduction to the models and methods of Statistical Genetics. A basis for further statistical studies, whether in quantitative genetics, human and medical genetics, population and evolutionary genetics, or computational molecular genetics, is established. Specific topics can include statistical models for Mendelian genetic traits, population genetics: Hardy-Weinberg equilibrium, allelic variation, population subdivision, co-ancestry coefficients, the coalescent, pedigree relationships and gene identity, meiosis and recombination linkage detection and an Introduction to linkage analysis.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)

STAT 450 or permission of the instructor

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply) ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 5 | TBD | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)

This course has been offered as a special topics course several times. The department's revision of the graduate program provided an opportunity to create a formal structure and curriculum for it and to include it in the calendar. Moreover, there is substantial interest in this area from a research perspective, as well as a strong industry demand.

## 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 ☐ information about their competency to teach the course is appended
Jinko Graham, Brad McNeney

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 840 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Statistical Genetics | | |

## 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 |
|---|---|---|
| | | |
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| | | |

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

| | | |
|---|---|---|
| Department Graduate Program Committee<br>Tim Swartz | Signature | Date<br>DEC 12 2012 |
| Department Chair<br>Richard Lockhart | Signature | Date<br>DEC 12 2012 |

**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<br>Peter McRae | Signature | Date<br>14 Dec 2012 |

**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<br>W Parthouse | Signature | Date<br>Feb 14/13 |

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline
# STAT 840 Statistical Genetics



**Day Course**

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:**

STAT 450 or permission from the instructor

**Textbook:**

Recommended:

*Genetic Data Analysis II*, by Bruce Weir, published by Sinauer, 1996.

*Statistical Inferences from Genetic Data on Pedigrees*, by Elizabeth Thompson, published by NSF-CBMS Regional Conference Series in Probability and Statistics. Volume 6. IMS, 2000.

**Calendar Description:**

An introduction to the models and methods of Statistical Genetics. A basis for further statistical studies, whether in quantitative genetics, human and medical genetics, population and evolutionary genetics, or computational molecular genetics, is established. Specific topics can include statistical models for Mendelian genetic traits, population genetics: Hardy-Weinberg equilibrium, allelic variation, population subdivision, co-ancestry coefficients, the coalescent, pedigree relationships and gene identity, meiosis and recombination linkage detection and an introduction to linkage analysis.

**Outline:**

1. Introduction to genetics
2. Models for population genetics
3. Pedigrees and pedigree data with respect to one locus
4. Models for linkage between two loci and linkage between multiple loci

**Grading Scheme:**

Assignments 50%
Projects 50%

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) STAT | Number (eg. 810) 841 | Units (eg. 4) 4 |
|---|---|---|

Course Title (max 80 characters)
Advanced Design of Experiments

Short Title (appears on transcripts, max 25 characters)
Adv. Design of Exper.

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified

An advanced treatment of experimental design. Topics can include: factorial designs, multi-stratum experiments, orthogonal arrays, optimal design and robust parameter design.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)

STAT 830 or permission of the instructor

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply) ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 10 | TBD | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)

This course has been offered as a special topics course several times. The department's revision of the graduate program provided an opportunity to create a formal structure and curriculum for it and to include it in the calendar. Moreover, there is substantial interest in this area from a research perspective among our faculty and students.

## 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 ☐ information about their competency to teach the course is appended
Derek Bingham, Carl Schwarz, Boxin Tang

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 841 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Advanced Design of Experiments | | |

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

| | | |
|---|---|---|
| Department Graduate Program Committee<br>Tim Swartz | Signature | Date DEC 12 2012 |
| Department Chair<br>Richard Lockhart | Signature | Date DEC 12 2012 |

**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<br>PETER RUBEN | Signature | Date<br>14 Dec 2012 |

**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<br>W Parkhouse | Signature<br>W Parkhouse | Date<br>Feb 14/13 |

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline
# STAT 841 Advanced design of experiments

15

Day Course

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:**

Statistics 830 or permission from the instructor

**Textbook:**

Required:

1. *Experiments: Planning, Analysis, and Parameter Design Optimization*, Jeff Wu and Michael Hamada, Wiley.

Supplemental

1. *A Modern Theory of Factorial Designs*, Rahul Mukerjee and Jeff Wu, Wiley

**Calendar Description:**

An advanced treatment of experimental design. Topics can include: factorial designs, multi-stratum experiments, orthogonal arrays, optimal design and robust parameter design.

**Outline:**

1. Fundamentals of factorial design
2. Two-level designs
3. S-level designs
4. Ranking experiment designs
5. Robust parameter designs for industry
6. Designs with randomization restrictions

Grading Scheme:

Assignments/projects 70%
Exams 30%

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) STAT | Number (eg. 810) 842 | Units (eg. 4) 4 |
|---|---|---|

Course Title (max 80 characters)
Environmetrics

Short Title (appears on transcripts, max 25 characters)
Environmetrics

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified

A practical introduction to analyzing (complex) ecological data using modern statistical methods. A foundation for application of environmental models and methods in scientific research and policy.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)

STAT 830 or permission of the instructor

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply). ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 10 | TBD | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)

This course has been offered as a special topics course several times. The department's revision of the graduate program provided an opportunity to create a formal structure and curriculum for it and to include it in the calendar. Moreover, there is substantial interest in this area from a research perspective among our faculty and students.

## 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 ☐ information about their competency to teach the course is appended
Rick Routledge, Carl Schwarz, Steve Thompson

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 842 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Environmetrics | | |

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

| Department Graduate Program Committee<br>Tim Swartz | Signature | Date<br>DEC 12 2012 |
|---|---|---|
| Department Chair<br>Richard Lockhart | Signature | Date<br>DEC 12 2012 |

**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<br>PETER RUBOW | Signature | Date<br>14 Dec 201 |
|---|---|---|

**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<br>W Parkhouse | Signature | Date<br>Feb 14/13 |
|---|---|---|

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline
# STAT 842 Environmetrics

Day Course

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:**

Statistics 830 or permission from the instructor.

**Textbook:**

Required:

1. Analyzing Ecological Data (2007) by Zuur, Ieno & Smith (http://www.highstat.com/book1.htm)

Supplemental

1. Mixed Effects Models and Extensions in Ecology with R (2009). Zuur, Ieno, Walker, Saveliev and Smith (http://www.highstat.com/book2.htm)
2. Multivariate analysis of ecological communities , Digby and Kempton
3. Multivariate Statistics in Wildlife and Ecological Research, McGarigal,
4. Numerical Ecology, Legendre and Legendre)

**Calendar Description:**

A practical introduction to analyzing (complex) ecological data using modern statistical methods. A foundation for application of environmental models and methods in scientific research and policy.

**Outline:**

Topics covered include:

1. Data management

- database design (third normal forms)
- dealing with missing data
- accessing databases from R and SAS

2. Regression methods

- ordinary regression
- partial least squares
- principal component regression
- canonical correlation analysis

3. General additive models (GAM)

4. Mixed effect modelling

- variance heterogeneity,
- specialized covariance structures (e.g. spatial, time series)

5. Generalized linear models

- poisson/logistic/negative binomial regression
- over-dispersion
- zip/zib, zero truncated poisson models
- generalized linear mixed models

6. Ordination

- Bray-Curtis ordination
- Principal component analysis and redundancy analysis
- Partial RDA and variance partitioning.
- Correspondence analysis
- non-metric multidimensional scaling

7. Case studies in ecology

- generated from consulting service and experiences
- students will be expected to analyze, write up a 10 page report, and prepare a 30 minute presentation

Grading Scheme:

Assignments/projects 80%
Exams 20%

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***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) STAT | Number (eg. 810) 843 | Units (eg. 4) 4 |
|---|---|---|

Course Title (max 80 characters)
Functional Data Analysis

Short Title (appears on transcripts, max 25 characters)
Functional Data

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified

An introduction to smoothing and modelling of functional data. Basis expansion methods, functional regression models and derivative estimation are covered.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)

STAT 830 or permission of the instructor

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply) ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 10 | TBD | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)

Following recent review of our programs and the discipline, we determined that the material in this course is fundamental to modern statistical application and closely aligned with the research interests of our faculty. Techniques taught here are applied directly to many problems and underlie the development of analyses for many more complex problems.

## 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 ☐ information about their competency to teach the course is appended
David Campbell, Jiguo Cao

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 843 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Functional Data Analysis | | |

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

| | | |
|---|---|---|
| Department Graduate Program Committee<br>Tim Swartz | Signature | Date<br>DEC 12 2012 |
| Department Chair<br>Richard Lockhart | Signature | Date<br>DEC 12 2012 |

**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<br>PETER RUBEN | Signature | Date<br>14 Dec 2012 |

**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<br>W Parkhouse | Signature | Date<br>Feb 14/13 |

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline
# STAT 843 Functional Data Analysis

Day Course

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:**

Statistics 830 or permission from the instructor.

**Textbook:**

Ramsay, J. O. and B. W. Silverman (2005). *Functional Data Analysis (Second ed.).* New York: Springer

**Calendar Description:**

An introduction to smoothing and modelling functional data. Basis expansion methods, functional regression models and derivative estimation are covered.

**Outline:**

Topics covered include:

1. Basis expansions and data smoothing
2. Roughness penalty smoothing
3. Bias/variance tradeoff and the smoothing parameter
4. Functional principal components
5. Functional regression models
6. Derivative estimation
7. Principal differential analysis
8. Differential equation models

Grading Scheme:

Assignments/projects 60%
Exams 40%

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) STAT | Number (eg. 810) 850 | Units (eg. 4) 4 |
|---|---|---|

Course Title (max 80 characters)
Linear Models and Applications

Short Title (appears on transcripts, max 25 characters)
Linear Models and Appls

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified

A modern approach to normal theory for general linear models including models with random effects and "messy" data. Topics include experimental units, blocking, theory of quadratic forms, linear contrasts, analysis of covariance, heterogeneous variances, factorial treatment structures, means comparisons, missing data, multi-unit designs, pseudoreplication, repeated measures mixed model formulation and estimation and inference.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)

STAT 350 or equivalent

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply) ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 10 | Fall 2013 | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)

Following recent review of our programs and the discipline, we determined that the material in this course is both fundamental to modern statistical application and useful in its own right. Techniques taught here are applied directly to many problems and underlie the development of analyses for many more complex problems.

## 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 ☐ information about their competency to teach the course is appended
All faculty members can teach this, but it will most often be taught by Loughin, Schwarz and Bingham

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 850 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Linear Models and Applications | | |

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

| | | |
|---|---|---|
| Department Graduate Program Committee<br>Tim Swartz | Signature | Date DEC 12 2012 |
| Department Chair<br>Richard Lockhart | Signature | Date DEC 12 2012 |

**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<br>PETER RUBEN | Signature | Date 14 Dec 2012 |

**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<br>W Parkhouse | Signature | Date<br>Feb 14/13 |

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline
# STAT 850 Linear Models and Applications

24

**Day Course**

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:**

Statistics 350 or equivalent

**Textbook:**

*Analysis of Messy Data, Volume I: Designed Experiments*, by George A. Milliken, Dallas E. Johnson Publisher: Chapman-Hall

**Calendar Description:**

A modern approach to normal theory for general linear models including models with random effects and "messy" data. Topics include experimental units, blocking, theory of quadratic forms, linear contrasts, analysis of covariance, heterogeneous variances, factorial treatment structures, means comparisons, missing data, multi-unit designs, pseudoreplication, repeated measures mixed model formulation and estimation and inference.

**Outline:**

1. Basics of experimental designs
2. Experimental designs with several sizes of experimental units
3. Mathematics of linear mixed models: identifiably, expected mean squares and quadratic forms.
4. Methods of estimating variance components
5. Analysis of multi-way models
6. Analysis of mixed models
7. Analysis of nested models

Grading Scheme:

Assignments 30%
Midterm exam 30%
Final Exams 40%

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) STAT | Number (eg. 810) 851 | Units (eg. 4) 4 |
|---|---|---|

Course Title (max 80 characters)
Generalized Linear Models and Discrete Data Analysis

Short Title (appears on transcripts, max 25 characters)
GLM and Discrete Data

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified

The theory and application of statistical methodology for analyzing non-normal responses. Special emphasis on contingency tables, logistic regression, and log-linear models. Other topics can include mixed-effects models and models for overdispersed data.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)

STAT 830 and STAT 850 or permission of instructor

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply) ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 10 | Spring 2014 | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)

Following recent review of our programs and the discipline, we determined that the material in this course is both fundamental to modern statistical application and useful in its own right. Techniques taught here are applied directly to many problems and underlie the development of analyses for many more complex problems.

## 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 ☐ information about their competency to teach the course is appended
Rachel Altman, Joan Hu, Rick Routledge

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 851 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Generalized Linear Models and Discrete Data Analysis | | |

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

| Department Graduate Program Committee<br>Tim Swartz | Signature | Date DEC 12 2012 |
|---|---|---|
| Department Chair<br>Richard Lockhart | Signature | Date DEC 12 2012 |

**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<br>PETER RUBOW | Signature | Date<br>14 Dec 2012 |
|---|---|---|

**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<br>W Parthouse | Signature | Date<br>Feb 14/13 |
|---|---|---|

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline

## STAT 851 Generalized Linear Models and Discrete Data Analysis

Day Course

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:**

Statistics 830 and Statistics 850 or permission from the instructor

**Textbook:**

Recommended:

1. *Generalized Linear Models, 2nd Edition*, by P. McCullagh and J.A. Nelder. Publisher: CRC Press.
2. *Categorical Data Analysis, 2nd Edition*, by Alan Agresti. Publisher: Wiley
3. *Extending the Linear Model with R: Generalized Linear, Mixed Effects and Nonparametric Regression Models*, by Julian Faraway. Publisher: CRC Press.

**Calendar Description:**

The theory and application of statistical methodology for analyzing non-normal responses. Special emphasis on contingency tables, logistic regression, and log-linear models. Other topics can include mixed-effects models and models for overdispersed data.

**Outline:**

1. Analysis of contingency tables
2. Generalized linear models (GLMs)
    a. The exponential family
    b. Link functions
    c. Relationship to linear models
    d. Iterated reweighted least-squares estimation
3. Models for overdispersed data
    a. Quasi-likelihood
    b. Introduction to estimating functions
4. Models for multinomial data
    a. Log-linear models
    b. Ordinal responses

Grading Scheme:

Assignments – 50%
Midterm – 20%
Final – 30%

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) | Number (eg. 810) | Units (eg. 4) |
|---|---|---|
| STAT | 852 | 4 |

Course Title (max 80 characters)
Modern Methods in Applied Statistics

Short Title (appears on transcripts, max 25 characters)
Modern Meth Appl Stat

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified

An advanced treatment of modern methods of multivariate statistics and non-parametric regression. Topics may include: (1) dimension reduction techniques such as principal component analysis, multidimensional scaling and related extensions; (2) classification and clustering methods; (3) modern regression techniques such as generalized additive models, Gaussian process regression and splines.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)

STAT 830 and STAT 853 or permission of instructor

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply) ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 15 | Fall 2013 | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)

Following recent review of our programs and the discipline, we determined that the material in this course is both fundamental to modern statistical application and useful in its own right. Techniques taught here are applied directly to many problems and underlie the development of analyses for many more complex problems.

## 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 ☐ information about their competency to teach the course is appended
David Campbell, Tom Loughin, Brad McNeney

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 852 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Modern Methods in Applied Statistics | | |

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

| | | |
|---|---|---|
| Department Graduate Program Committee<br>Tim Swartz | Signature | Date<br>DEC 12 2012 |
| Department Chair<br>Richard Lockhart | Signature | Date<br>DEC 12 2012 |

**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<br>PETER RUBEN | Signature | Date<br>14 Dec 2012 |

**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<br>W Parkhouse | Signature<br>W Parkhouse | Date<br>Feb 14/13 |

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline
# STAT 852 Modern Methods in Applied Statistics

30

Day Course

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:**

Statistics 830 and Statistics 853, or permission from the instructor.

**Textbook:**

Recommended: *The elements of statistical learning: data mining, inference, and prediction,* by Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, Publisher: Springer.

**Calendar Description:**

An advanced treatment of modern methods of multivariate statistics and non-parametric regression. Topics may include: (1) dimension reduction techniques such as principal component analysis, multidimensional scaling and related extensions; (2) classification and clustering methods; (3) modern regression techniques such as generalized additive models, Gaussian process regression and splines.

**Outline:**

1. Linear Methods: Principal components analysis and metric multidimensional scaling
2. Nonlinear Methods: ISOMAP and locally linear embedding
3. Classification, starting with a conceptual framework, and continuing with a discussion of specific classification methods, including LDA, QDA, and KNN
4. Additive models, tress and related methods
5. Gaussian process regression, splines and reproducing kernel Hilbert spaces

**Grading Scheme:**

Assignments 50%
Projects 50%

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) STAT | Number (eg. 810) 853 | Units (eg. 4) 4 |
|---|---|---|

Course Title (max 80 characters)
Applications of Statistical Computing

Short Title (appears on transcripts, max 25 characters)
Statistical Computing

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified

An introduction to computational methods in applied statistics. Topics can include: the bootstrap, Markov Chain Monte Carlo, EM algorithm, as well as optimization and matrix decompositions. Statistical applications will include frequentist and Bayesian model estimation, as well as inference for complex models. The theoretical motivation and application of computational methods will be addressed.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)

STAT 830 or equivalent or permission of instructor

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply) ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 15 | Fall 2014 | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)

The course is being proposed as part of a revamping of our graduate program. Statistical computing is a fundamental skill (a research and a job skill) for our graduate students and also an active area of research for several of our faculty members. Its absence is a glaring omission from our program, and this course fixes that problem.

## 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 ☐ information about their competency to teach the course is appended
David Campbell, Jinko Graham, Brad McNeney

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 853 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Applications of Statistical Computing | | |

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

| | | |
|---|---|---|
| Department Graduate Program Committee<br>Tim Swartz | Signature | Date<br>DEC 12 2012 |
| Department Chair<br>Richard Lockhart | Signature | Date<br>DEC 12 2012 |

**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<br>PETER RUBEN | Signature | Date<br>14 Dec, 2012 |

**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<br>W Parkhouse | Signature | Date<br>Feb 14/13 |

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline
# STAT 853 Applications of Statistical Computing

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:** Statistics 830 or equivalent or permission from the instructor

**Textbook:**

Recommended:

1. *Numerical Analysis for Statisticians (2nd ed.),* by K. Lange, published by Springer, 2010; and
2. *Markov Chain Monte Carlo in Practice*, by W.R. Gilks, S. Richardson and D.J. Spiegelhalter, published by Chapman and Hall, 1996.

**Calendar Description:**

An introduction to computational methods in applied statistics. Topics can include: the bootstrap, Markov Chain Monte Carlo, EM algorithm, as well as optimization and matrix decompositions. Statistical applications will include frequentist and Bayesian model estimation, as well as inference for complex models. The theoretical motivation and application of computational methods will be addressed.

**Outline:**

1. Review of numerical issues
2. Likelihood inference: maximum likelihood methods and the EM algorithm
3. Applied Bayesian inference: sampling from posterior distributions
4. Optimization and root-finding
5. Estimation, posterior distributions, Bayes factors

**Grading Scheme:**

Assignments 25%
Projects 75%

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) STAT | Number (eg. 810) 854 | Units (eg. 4) 4 |
|---|---|---|

Course Title (max 80 characters)
Biometrics: Methods in Biomedical Studies

Short Title (appears on transcripts, max 25 characters)
Biometrics

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified

Principles, methods and applications of basic statistical approaches in biomedical studies are presented. Topics include introduction to epidemiology; design of cohort and case-control studies; experimental versus observational data, and cross-sectional versus longitudinal studies; issues of confounding, causation and missing data; design of clinical trials; data monitoring and interim analysis.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)
STAT 450 or permission of the instructor

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply) ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 15 | TBD | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)
This course has been offered as a special topics course. The department's revision of the graduate program provided an opportunity to create a formal structure and curriculum for it and to include it in the calendar.

## 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 ☐ information about their competency to teach the course is appended
Rachel Altman, Jinko Graham, Joan Hu, Brad McNeney

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 854 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Biometrics: Methods in Biomedical Studies | | |

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

| | | |
|---|---|---|
| Department Graduate Program Committee<br>Tim Swartz | Signature | Date<br>DEC 12 2012 |
| Department Chair<br>Richard Lockhart | Signature | Date<br>DEC 12 2012 |

**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<br>PETER RUBEN | Signature | Date<br>14 Dec 2012 |

**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<br>W Parkhouse | Signature<br>W Parkhouse | Date<br>Feb 14/13 |

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline:
# STAT 854 Biometrics: Methods in Biomedical Studies

36

**Day Course**

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:**

STAT 450 or permission of the instructor

**Textbook:**

Recommended:

1. *Fundamentals of Clinical Trials*, L M Friedman, C D Furberg, and D L DeMets, Springer-Verlag, New York.
2. *Clinical Trials: A Methodologic Perspective*, Second Edition, Piantadosi S., New York, NY: John Wiley & Sons.
3. *Statistical Methods in Cancer Research, Vol. 1 - The Analysis of Case-Control Studies,* Breslow and Day, IARC.

**Calendar Description:**

Principles, methods and applications of basic statistical approaches in biomedical studies are presented. Topics include introduction to epidemiology; design of cohort and case-control studies; experimental versus observational data, and cross-sectional versus longitudinal studies; issues of confounding, causation and missing data; design of clinical trials; data monitoring and interim analysis.

**Outline:**

1. History, concepts and terminology of epidemiology.
2. Measures of disease occurrence and association.
3. Design of medical studies: cohort and case-control studies; controlled clinical experiments.
4. Models and analysis in prospective and retrospective studies.
5. Confounding, causal diagrams, and missing data.
6. Clinical trial design principles: bias control, random error control, randomization, blocking, masking
7. Types of clinical trials: phases of trial, translational, dose-finding, cross-over, safety and efficacy, and comparative trials.
8. Study monitoring: sequential methods.

**Grading Scheme:**

Assignments 50%
Projects 50%

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) STAT | Number (eg. 810) 856 | Units (eg. 4) 4 |
|---|---|---|

Course Title (max 80 characters)
Longitudinal Data Analysis

Short Title (appears on transcripts, max 25 characters)
Longitudinal Data

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified

Methods for the analysis of repeated measures, correlated outcomes and longitudinal data, including unbalanced and incomplete data sets, characteristic of biomedical research are covered. Topics include covariance pattern models, random or mixed-effects models, multilevel models, generalized estimating equations, inference for multistate processes and counting processes, and methods for handling missing data.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)
STAT 450 or permission of the instructor

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply) ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 15 | TBD | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)

This course has been offered as a special topics course several times. The department's revision of the graduate program provided an opportunity to create a formal structure and curriculum for it and to include it in the calendar.

## 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 ☐ information about their competency to teach the course is appended
Rachel Altman, Joan Hu, Michelle Zhou

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 856 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Longitudinal Data Analysis | | |

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

| Department Graduate Program Committee<br>Tim Swartz | Signature | Date<br>DEC 12 2012 |
|---|---|---|
| Department Chair<br>Richard Lockhart | Signature | Date<br>DEC 12 2012 |

**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<br>PETER RUBOW | Signature | Date<br>14 Dec 2012 |
|---|---|---|

**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<br>W Parkhouse | Signature | Date<br>Feb 14/13 |
|---|---|---|

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline
# STAT 856 Longitudinal Data Analysis

**Day Course**

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:**

STAT 450 or permission of the instructor

**Textbook:**

Recommended: *Analysis of Longitudinal Data*, by Peter Diggle, Patrick Heagerty, Kung-Yee Liang, Scott Zeger, Oxford Statistical Science Series

**Calendar Description:**

Methods for the analysis of repeated measures, correlated outcomes and longitudinal data, including unbalanced and incomplete data sets, characteristic of biomedical research are covered. Topics include covariance pattern models, random or mixed-effects models, multilevel models, generalized estimating equations, inference for multistate processes and counting processes, and methods for handling missing data.

**Outline:**

1. Examples of longitudinal studies and approaches to longitudinal analysis.
2. Exploring correlation structures; parametric models for correlation
3. Contrasting marginal, random effects and transitional models
4. Random effects and conditional models
5. Marginal models using generalized estimation equations
6. Unbalanced and incomplete data
7. Multilevel models
8. Multi-state and transition models and methods for prospective cohort data
9. Counting processes
10. Fitting smooth curves

**Grading Scheme:**

Assignments 50%
Projects 50%

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

SFU SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# New Graduate Course Proposal Form

## PROPOSED COURSE

| Subject (eg. MAPH) STAT | Number (eg. 810) 857 | Units (eg. 4) 4 |
|---|---|---|

Course Title (max 80 characters)
Space-Time Models

Short Title (appears on transcripts, max 25 characters)
Space-Time Models

Course Description for SFU Calendar ☐ see attached document ☐ Learning outcomes identified
The theory and application of statistical approaches for the analysis of spatial and time dependent data. Topics will include: point pattern analysis, spatial autocorrelation analysis, geostatistics, lattice processes, modeling spatial count and binary data, spatio-temporal models and time series analysis.

Available Course Components: ☑ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | This is a capstone course ☐ Yes ☑ No

Prerequisites (if any) ☐ see attached document (if more space is required)
STAT 830 or permission of the instructor

☐ This proposed course is combined with an undergrad course: Course number and units: _____

Additional course requirements for graduate students ☐ See attached document (if this space is insufficient)

Campus at which course will be offered (check all that apply) ☑ Burnaby ☐ Vancouver ☐ Surrey ☐ GNW ☐ _____

| Estimated enrolment | Date of initial offering | Course delivery (eg. 3 hrs/week for 13 weeks) |
|---|---|---|
| 15 | TBD | 4 hrs/week for 13 weeks |

☐ Yes ☑ 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 ☐ See attached document (if more space is required)
This course has been offered as a special topics course several times. The department's revision of the graduate program provided an opportunity to create a formal structure and curriculum for it and to include it in the calendar.

## 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 ☐ information about their competency to teach the course is appended
Richard Lockhart, Gary Parker, Jiguo Cao

Number of additional faculty members required in order to offer this course
0

Additional space required in order to offer this course ☐ see attached document
0

Additional specialized equipment required in order to offer this course ☐ see attached document
None

Additional Library resources required (append details) ☐ Annually $ 0 _____ ☐ One-time $ 0 _____

## PROPOSED COURSE *from first page*

| Program (eg. MAPH) STAT | Number (eg. 810) 857 | Units (eg. 4) 4 |
|---|---|---|
| Course title (max 80 characters)<br>Space-Time Models | | |

## 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<br>Tim Swartz | Signature | Date<br>DEC 12 2012 |
| Department Chair<br>Richard Lockhart | Signature | Date<br>DEC 12 2012 |

**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<br>PETER RUBEN | Signature | Date<br>14 Dec 2012 |

**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<br>W Farthouse | Signature | Date<br>Feb 14/13 |

## 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 | Contact name | Contact email |
|---|---|---|
| Stat & Act Sci | Sadika Jungic | sjungic@sfu.ca |

# Proposed Course Outline
# STAT 857 Space-Time Models

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**Day Course**

*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca*

**Instructor: TBA**

**Prerequisite:**

STAT 830 or permission from the instructor

**Textbook:**

Recommended:
*Statistics for Spatial Data*, by Noel Cressie, Publisher: Wiley.

**Calendar Description:**

The theory and application of statistical approaches for the analysis of spatial and time dependent data. Topics will include: point pattern analysis, spatial autocorrelation analysis, geostatistics- lattice processes, modeling spatial count and binary data, spatio-temporal models.

**Outline:**

1. Visualization and exploration of spatial data, smoothing of maps for rates
2. Point pattern analysis: assessing whether a pattern of locations is clustered, spatial point processes, nearest neighbour statistics, bivariate and space-time point patterns
3. Spatial autocorrelation analysis: descriptive statistics for spatial autocorrelation, constructing spatial weights, visualizing spatial, autocorrelation, local indicators of spatial association, multivariate spatial correlation
4. Geostatistics: variograms, kriging
5. Lattice processes; Markov chains; Markov random fields; neighbourhoods; joint distributions; joint distributions from conditionals; pairwise interactions
6. Conditional exponential distributions and pairwise only distributions; conditional autoregressive models; selection of neighbourhoods; auto-Poisson distribution; auto-binomial distribution
7. Spatial simultaneous and conditional models; moving average models; autoregressive moving average models; parameter estimation; connections to time series analysis
8. Mixture models; zero-heavy spatial count data
9. Extensions to spatio-temporal analyses

**Grading Scheme:**

Assignments 50%
Projects 50%

***Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.***

From: Leslie Rimmer <<mailto:lsrimmer@sfu.ca>lsrimmer@sfu.ca>
Date: Wed, Aug 3, 2011 at 11:00 AM
Subject: Re: Proposed changes for the MSc program in Statistics
To: Derek Bingham <<mailto:dbingham@stat.sfu.ca>dbingham@stat.sfu.ca>
Cc: walter <<mailto:walter@sfu.ca>walter@sfu.ca>, Gwen Bird <<mailto:gbird@sfu.ca>gbird@sfu.ca>

Dear Derek,

I have reviewed the course proposals and outlines you sent, and have determined that the library will be able to support these courses with no additional resources from the department. I have therefore added them to the list at <http://www.lib.sfu.ca/collections/course-assessments>http://www.lib.sfu.ca/collections/course-assessments to indicate library sign off, as they move through the approval process.

Best regards,
Leslie

---

From: "Derek Bingham" <<mailto:dbingham@stat.sfu.ca>dbingham@stat.sfu.ca>

To: "Leslie Rimmer" <<mailto:lsrimmer@sfu.ca>lsrimmer@sfu.ca>
Sent: Friday, July 29, 2011 11:04:54 AM
Subject: Re: Proposed changes for the MSc program in Statistics

Hi Leslie,

Thanks for looking into this. There is no specific deadline, but in the next week or so would be great. If this is too short notice, just drop me a line.

All courses are at Burnaby and the enrollment is 10-15.

Derek

On Fri, Jul 29, 2011 at 10:58 AM, Leslie Rimmer <<mailto:lsrimmer@sfu.ca>lsrimmer@sfu.ca> wrote:

Hi Derek,

In addition to the deadline I asked for I also need to know at which campus

these courses will be be held as well as the estimated enrolment for each. This information was missing from the course proposals. If you could give me that information I can proceed with the assessment.

I realize we're going into a long weekend and I may not hear from until next week which is fine. Have a good long weekend!

Best,

Leslie

---

*From: *"Leslie Rimmer" <<mailto:lsrimmer@sfu.ca>lsrimmer@sfu.ca>

*To: *"Derek Bingham" <<mailto:dbingham@stat.sfu.ca>dbingham@stat.sfu.ca>

*Sent: *Tuesday, July 26, 2011 1:52:45 PM

*Subject: *Re: Proposed changes for the MSc program in Statistics

Hi Derek,

Gwen mentioned she had been chatting with you. Thank you for sending the files for the course assessments. I'll take a look and let you know if I have any questions. Would you mind letting me know when you need this? Sometimes these assessments take awhile to complete and I'm concerned about the deadline.

Best,
Leslie

44(a)

**SFU Connect** **sheilagh@sfu.ca**

## New courses: STAT 830, 831, 840, 841, 842, 843, 850, 851, 852, 853, 854, 856, 857

**From :** Rosemary Hotell <hotell@sfu.ca> Fri, Dec 21, 2012 03:01 PM

**Subject :** New courses: STAT 830, 831, 840, 841, 842, 843, 850, 851, 852, 853, 854, 856, 857 1 attachment

**To :** fgsc-list@sfu.ca

Please check the attached new courses for overlap and/or any other difficulties.

Please indicate your comments to me (Rosemary Hotell hotell@sfu.ca).

Thanks.

--

Rosemary Hotell
Dean of Science Office, TASC2 9905
Simon Fraser University
Telephone: 778.782.3772
Fax: 778.782.3424

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15 MB

SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# Graduate Course Minor Change Form

This form is for an SFU department or program to request a minor change to an existing graduate course. After approval and signature by the faculty graduate studies committee, this form should be forwarded to the Dean of Graduate Studies for approval by the Senate Graduate Studies Committee (SGSC). SGSC will forward the approval to Senate for information.

## DEPARTMENT

| Department / School / Program | Contact name | Contact email |
|---|---|---|
| Statistics and Act. Science | Derek Bingham | dbingham@sfu.ca |

Please revise the following elements of the indicated graduate course:
☑ Catalogue number ☐ Units ☐ Title ☐ Description ☐ Other: _____

## CURRENT COURSE

*Please complete only the fields to be changed.*

| Program (eg. ECON) | Number (eg. 810) | Units (eg. 4) |
|---|---|---|
| STAT | 870 | |

Course title (max 80 characters)

Short title (appears on transcripts, max 25 characters)

Course description for SFU Calendar ☐ see attached

Available course components ☐ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading basis ☐ Graded ☐ Satisfactory / Unsatisfactory ☐ In Progress / Complete ☐ _____

Prerequisites (if any)

This is combined with an undergrad course. ☐ Yes ☐ No

Course number and units: _____

Additional course requirements for graduate students

## REVISED COURSE

*Please complete only the fields to be changed.*

| Program (eg. ECON) | Number (eg. 810) | Units (eg. 4) |
|---|---|---|
| STAT | 832 | |

Course title (max 80 characters)

Short title (appears on transcripts, max 25 characters)

Course description for SFU Calendar ☐ see attached

Available course components ☐ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading basis ☐ Graded ☐ Satisfactory / Unsatisfactory ☐ In Progress / Complete ☐ _____

Prerequisites (if any)

This is combined with an undergrad course. ☐ Yes ☐ No

Course number and units: _____

Additional course requirements for graduate students

## APPROVALS

| | | |
|---|---|---|
| Peter Rubba | | 13 Feb 2013 |
| Faculty graduate studies committee name | Signature | Date |
| W Parkhouse | | Feb 14/13 |
| Senate graduate studies committee name | Signature | Date |

SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES

# Graduate Course Minor Change Form

This form is for an SFU department or program to request a minor change to an existing graduate course. After approval and signature by the faculty graduate studies committee, this form should be forwarded to the Dean of Graduate Studies for approval by the Senate Graduate Studies Committee (SGSC). SGSC will forward the approval to Senate for information.

## DEPARTMENT

| Department / School / Program | Contact name | Contact email |
|---|---|---|
| Statistics and Act. Science | Derek Bingham | dbingham@sfu.ca |

Please revise the following elements of the indicated graduate course:
☑ Catalogue number ☐ Units ☐ Title ☐ Description ☐ Other: _____

## CURRENT COURSE

*Please complete only the fields to be changed.*

| Program (eg. ECON) | Number (eg. 810) | Units (eg. 4) |
|---|---|---|
| STAT | 806 | |

Course title (max 80 characters)

Short title (appears on transcripts, max 25 characters)

Course description for SFU Calendar ☐ see attached

Available course components ☐ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading basis ☐ Graded ☐ Satisfactory / Unsatisfactory ☐ In Progress / Complete ☐ _____

Prerequisites (if any)

This is combined with an undergrad course. ☐ Yes ☐ No

Course number and units: _____

Additional course requirements for graduate students

## REVISED COURSE

*Please complete only the fields to be changed.*

| Program (eg. ECON) | Number (eg. 810) | Units (eg. 4) |
|---|---|---|
| STAT | 855 | |

Course title (max 80 characters)

Short title (appears on transcripts, max 25 characters)

Course description for SFU Calendar ☐ see attached

Available course components ☐ Lecture ☐ Seminar ☐ Laboratory ☐ Practicum ☐ Online ☐ _____

Grading basis ☐ Graded ☐ Satisfactory / Unsatisfactory ☐ In Progress / Complete ☐ _____

Prerequisites (if any)

This is combined with an undergrad course. ☐ Yes ☐ No

Course number and units: _____

Additional course requirements for graduate students

## APPROVALS

| | | |
|---|---|---|
| PETER RUBEN | | Feb 2013 |
| Faculty graduate studies committee name | Signature | Date |
| W Barthouse | | Feb. 14/13 |
| Senate graduate studies committee name | Signature | Date |

**SGSC checklist: Course deletion form**

## ☒ Course Number/Credit

Course number Credit

Stat 801 - 4

## ☒Title

(1) LONG title
Statistics

(2) SHORT title

## ☒ Rationale for the deletion:

New graduate program and new graduate courses are being proposed.

## ☒Effective Term and Year

20XX Fall

Before submission to SGSC:

☒ check that this course is not needed for degree completion

☒ check that this course is not cross-listed with other units.

☒ ensure that all entries are deleted throughout the calendar.

☐ if this deletion affects the unit's admissions or program requirements, please revise as necessary and attach the new calendar language.

**SGSC checklist: Course deletion form**

## ☒ Course Number/Credit

Course number Credit

Stat 802 - 4

## ☒Title

(1) LONG title

Multivariate Analysis

(2) SHORT title

## ☒ Rationale for the deletion:

New graduate program and new graduate courses are being proposed.

## ☒ Effective Term and Year

20XX Fall.

Before submission to SGSC:

☒ check that this course is not needed for degree completion

☒ check that this course is not cross-listed with other units.

☒ ensure that all entries are deleted throughout the calendar.

☐ if this deletion affects the unit's admissions or program requirements, please revise as necessary and attach the new calendar language.

**SGSC checklist: Course deletion form**

## ☒ Course Number/Credit

Course number Credit

Stat 804 - 4

## ☒Title

(1) LONG title

Time Series Analysis

(2) SHORT title

## ☒ Rationale for the deletion:

New graduate program and new graduate courses are being proposed.

## ☒Effective Term and Year

20XX Fall.
2013

Before submission to SGSC:

☒ check that this course is not needed for degree completion

☒ check that this course is not cross-listed with other units. > In Mass, Plus PhD

☒ ensure that all entries are deleted throughout the calendar.

☐ if this deletion affects the unit's admissions or program requirements, please revise as necessary and attach the new calendar language.

**SGSC checklist: Course deletion form**

## ☒ Course Number/Credit

Course number Credit

Stat 805 - 4

## ☒ Title

(1) LONG title

Non-Parametric Statistics and Discrete Data Analysis

(2) SHORT title

## ☒ Rationale for the deletion:

New graduate program and new graduate courses are being proposed.

## ☒ Effective Term and Year

20XX Fall.

Before submission to SGSC:

☒ check that this course is not needed for degree completion

☒ check that this course is not cross-listed with other units. in MACSy, Bus fin

☒ ensure that all entries are deleted throughout the calendar.

☐ if this deletion affects the unit's admissions or program requirements, please revise as necessary and attach the new calendar language.

**SFU Connect** **sheilagh@sfu.ca**

## STAT courses to be deleted affect MoCCSy and BUS PhD electives

**From :** Sheilagh MacDonald <sheilagh@sfu.ca> Fri, Jan 18, 2013 02:10 PM

**Subject :** STAT courses to be deleted affect MoCCSy and BUS PhD electives 1 attachment

**To :** Colleen Collins <dodd@sfu.ca>, Rob Cameron <cameron@sfu.ca>

**Cc :** Mary Ann Pope <mpope@sfu.ca>, Rosemary Hotell <hotell@sfu.ca>

Dear Colleen and Rob,
the attached STAT deletions will affect course offerings for Modelling of Complex Social Systems and the BUS PhD. (See calendar language.)

Wade suggests that you review the proposed STAT courses; you might want to substitute a new course for a deletion. Please see the email Rosemary Hotell sent out for cross-listing review on December 21st, 2012.

Sheilagh

**SKMBT_36313010318041.pdf**
2 MB

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- CRIM 821-3 Criminal Justice Policy Analysis: A Systems Approach
- CRIM 862-3 Research Methods III

Graduate students in criminology will complete 800 division courses.

### Geography

- GEOG 352-4 Spatial Analysis
- GEOG 451-4 Spatial Modeling
- GEOG 453W-4 Remote Sensing of Environment
- GEOG 455-4 Theoretical and Applied GIS
- GEOG 457-4 Geovisualization Interfaces
- GEOG 604-5 Research Design and Analytical Techniques in Human Geography
- GEOG 606-5 Research Design and Analytical Techniques in Physical Geography
- GEOG 651-4 Advanced Spatial Analysis and Modeling
- GEOG 653-4 Theoretical and Applied Remote Sensing
- GEOG 655-4 Advanced Principles of Geographic Information Science

Graduate students in geography will complete 600 division courses.

### Health Sciences

- HSCI 802-4 Principles of Epidemiology for Public Health
- HSCI 805-3 Intermediate Epidemiologic Methods
- HSCI 803-3 Qualitative and Survey Research Methods
- HSCI 815-3 Concepts of Population and Public Health Practice
- HSCI 824-3 Comparative Health Systems
- HSCI 826-3 Program Planning and Evaluation in Global Health
- HSCI 827-3 Analysis of the Canadian Health Care Delivery System
- HSCI 835-3 Social and Behavioural Contexts of Health and Disease
- HSCI 845-3 Environmental and Occupational Health
- HSCI 806-3 Principles of Demographic Analysis

### Mathematics

- MACM 316-3 Numerical Analysis I
- MACM 409-3 Numerical Linear Algebra: Algorithms, Implementation and Applications
- MACM 416-3 Numerical Analysis II
- MATH 308-3 Linear Optimization
- MATH 309-3 Continuous Optimization
- MATH 348-3 Probabilistic Models in Operations Research
- MATH 408-3 Discrete Optimization
- MATH 445-3 Graph Theory
- MATH 448-3 Network Flows
- MATH 708-3 Discrete Optimization
- MATH 709-3 Numerical Linear Algebra and Optimization
- MATH 7163 Numerical Analysis II
- MATH 745-3 Graph Theory
- MATH 748-3 Network Flows

Graduate students in mathematics will complete 700 division courses.

### Statistics

- STAT 302-3 Analysis of Experimental and Observational Data
- STAT 350-3 Linear Models in Applied Statistics
- STAT 403-3 Intermediate Sampling and Experimental Design
- STAT 410-3 Statistical Analysis of Sample Surveys
- STAT 430-3 Statistical Design and Analysis of Experiments
- STAT 602-3 Generalized Linear and Nonlinear Modeling
- STAT 650-5 Quantitative Analysis in Resource Management and Field Biology
- STAT 802-4 Multivariate Analysis
- STAT 804-4 Time Series Analysis
- STAT 805-4 Non-Parametric Statistics and Discrete Data Analysis
- STAT 806-4 Lifetime Data Analysis
- STAT 870-4 Applied Probability Models

Graduate students in statistics will complete 800 division courses.

Return to the Dean of Graduate Studies index page.

5.3

Core courses will be offered once a year.

### Core Courses (for finance students only)

Finance students only complete all of

- BUS 815-4 Portfolio Theory

or

- ECON 815-4 Portfolio Theory
- ECON 803-4 Microeconomic Theory II
- ECON 837-4 Econometric Theory I

Core courses will be offered once a year.

### Research Methods

The research methods minor area requires three research methods courses approved by both the PhD program director and the student's senior supervisor. These courses are deemed pertinent to the student's specific research. Other courses will be considered if they meet the needs of the PhD candidate. Examples of some possible courses are as follows.

- ECON 835-4 Econometrics
- ECON 836-4 Applied Econometrics
- ECON 837-4 Econometric Theory I
- ECON 838-4 Econometrics Theory IIA
- ECON 863-4 Fisheries Economics 4
- ECON 867-4 Regional Development Problems

- PSYC 911-3 Research Design II: Research Studies
- STAT 602-3 Generalized Linear and Nonlinear modelling
- STAT 801-4 Statistics
- STAT 802-4 Multivariate Analysis
- STAT 805-4 Non-parametric and Discrete Data Analysis
- STAT 806-4 Lifetime Data Analysis

These three required research methods courses will be completed in the first five terms. The student's supervisor can add to, or substitute, minor courses in consultation with the director of the PhD program.

### Course Specialization

These three to five courses are set and administered by the senior supervisor in consultation with the student's supervisory committee and the PhD program director. These courses can include Beedie School of Business graduate courses, directed studies courses, special topics, as well as approved graduate courses in other programs or universities. It is highly recommended that at least one of the major courses be given by the student's senior supervisor. In special cases, the senior supervisor can recommend, in consultation with the PhD director, that the student complete fewer, or more, courses than required in the major. At least two courses should be completed at Simon Fraser University.

### Qualifying Courses

Students without prior business education or those who lack some specific background, or combination of education and experience, may be required to complete qualifying courses after PhD program admission. These requirements are at the discretion of the PhD director in consultation with potential senior supervisors. The number of qualifying courses may vary widely depending on the student's specific background and their intended area of study.

### Third Term Project (Summer Project)

PhD students will generate a research project in their third term that will be graded by the senior supervisor on a pass/fail basis. The student can rewrite the project once. If the grade is still deficient, they will be asked to withdraw from the program. Those who pass the research project will present it in an open research presentations. Questions and answers emerging in this context should assist the student to develop their research.

### PhD Comprehensive Exam

PhD students must pass a comprehensive exam in the sixth term of the program. This will include written examinations in each student's major and methodology minor, followed by an oral exam.

### Dissertation Proposal Defence

# Proposed Calendar Changes MSc program in Actuarial Science.

**FROM:**

**Actuarial Science Master of Science Program**

*Department of Statistics and Actuarial Science | Faculty of Science*
*Simon Fraser University Calendar ~~2012~~ 2013 Fall*

**Admission Requirements**
~~See the Graduate General Regulations for admission requirements.~~
See Graduate General Regulation Section 1.3 for further information.

Applicants whose first language is not English normally submit ~~the~~ Test of English as a Foreign Language (TOEFL) results.

~~Applicants with degrees in areas other than statistics are encouraged to apply provided they have some formal training in statistical theory and practice.~~

**Program Requirements**

~~Students complete at least 36 units in actuarial and related fields beyond those that were completed for the bachelor's degree. This is comprised of 30 units of course work plus a 6 unit project.~~

~~Of the 30 units of course work, a minimum of 24 units will be graduate courses or seminars, and the remaining 6 units are chosen from graduate courses or those 400 division undergraduate courses which may be completed for credit for a BSc degree.~~

The MSc in Actuarial Science requires a total of 36 units consisting of a 6 unit project and a further 30 units of course work of which at least 24 must be at the graduate level.
~~Students normally complete 30 units including~~
Normally these courses must include

- ~~STAT 801-4 Statistics~~
- Stat 830-4 Statistical Theory I

and at least two of

- ACMA 820-4 Stochastic Analysis of Insurance Portfolios
- ACMA 821-4 Advanced Actuarial Models
- ACMA 822-4 Risk Measures and Ordering

and at least two of

- ACMA 850-4 Actuarial Science, Selected Topics
- ~~STAT 802-4 Multivariate Analysis~~
- ~~STAT 804-4 Time Series Analysis~~
- ~~STAT 805-4 Non-Parametric Statistics and Discrete Data Analysis~~
- STAT 850-4 Linear Models and Applications

# Proposed Calendar Changes MSc program in Actuarial Science.

- STAT 851-4 Generalized Linear Models and Discrete Data Analysis
- STAT 852-4 Modern Methods in Applied Statistics
- STAT 853-4 Applications of Statistical Computing
- STAT ~~806-4~~ 855-4 Lifetime Data Analysis
- ~~STAT 870-4 Applied Probability Models~~
- ~~STAT 890-4 Statistics: Selected Topics~~
- STAT 856-4 Longitudinal Data Analysis
- STAT 857-4 Space-Time Models
- STAT 890-4 Statistics: Selected Topics

**Project**

**All ~~As well~~, students submit and successfully defend a 6 unit project (STAT 898-6 ) based on an actuarial science problem. ~~See the Graduate General Regulations for further information.~~ See the Graduate General Regulations Section 1.10 for further information.**

**Program Length**

This MSc program is expected to take 6 semesters. Typically, the course work takes four semesters, and the project, including the defense, is expected to require up to two semesters. Those without strong undergraduate backgrounds may be required to take certain undergraduate courses in the Department in addition to the program requirements.

**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.

# Proposed Calendar Changes MSc program in Actuarial Science.

**TO:**

**Actuarial Science Master of Science Program**

*Department of Statistics and Actuarial Science | Faculty of Science*
*Simon Fraser University Calendar 2013 Fall*

**Admission Requirements**

See Graduate General Regulation Section 1.3 for further information.

Applicants whose first language is not English normally submit Test of English as a Foreign Language (TOEFL) results.

**Program Requirements**

The MSc in Actuarial Science requires a total of 36 units consisting of a 6 unit project and a further 30 units of course work of which at least 24 must be at the graduate level.

Normally these courses must include

- Stat 830-4 Statistical Theory I

and at least two of

- ACMA 820-4 Stochastic Analysis of Insurance Portfolios
- ACMA 821-4 Advanced Actuarial Models
- ACMA 822-4 Risk Measures and Ordering

and at least two of

- ACMA 850-4 Actuarial Science, Selected Topics
- STAT 850-4 Linear Models and Applications
- STAT 851-4 Generalized Linear Models and Discrete Data Analysis
- STAT 852-4 Modern Methods in Applied Statistics
- STAT 853-4 Applications of Statistical Computing
- STAT 855-4 Lifetime Data Analysis
- STAT 856-4 Longitudinal Data Analysis
- STAT 857-4 Space-Time Models
- STAT 890-4 Statistics: Selected Topics

**Project**
All students must submit and successfully defend a 6 unit project (STAT 898-6) based on an actuarial science problem. See the Graduate General Regulations Section 1.10 for further information.

# Proposed Calendar Changes MSc program in Actuarial Science.

**Program Length**
This MSc program is expected to take 6 semesters. Typically, the course work takes four semesters, and the project, including the defense, is expected to require up to two semesters. Those without strong undergraduate backgrounds may be required to take certain undergraduate courses in the Department in addition to the program requirements.

**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.

## FROM:

## Statistics Master of Science Program

*Department of Statistics and Actuarial Science | Faculty of Science*
*Simon Fraser University Calendar ~~2012~~ 2013 Fall*

The master of science (MSc) program offers a wide range of statistical techniques and provides experience in practical statistics application. It teaches statistical expertise for careers in either theoretical or applied statistics.

The MSc program in statistics combines applied and theoretical training in state of the art statistical methodology, hands-on consulting experiences, a project in data analysis or in the development of new statistical methodology, and the opportunity to gain work experience through co-operative education. The program prepares graduates for careers as statisticians in industry, government, consulting, and research organizations. In addition, graduates receive the foundational training to continue on to PhD studies.

~~Students with a good undergraduate background in statistics will normally complete the course work shown below in four terms. The project, including the defence, is expected to require two terms or less. Students with backgrounds in other disciplines, or with an inadequate background in statistics, may be required to complete certain undergraduate courses in the department in addition to the requirements shown below.~~

**Admission Requirements**
~~See the Graduate General Regulations for admission requirements.~~
See Graduate General Regulation Section 1.3 for further information.

Applicants whose first language is not English normally submit ~~the~~ Test of English as a Foreign Language (TOEFL) results.

Applicants with degrees in areas other than statistics are encouraged to apply provided they have some formal training in statistical theory and practice.

**Program Requirements**
~~Students complete at least 30 units in statistics and related fields beyond those that were completed for the bachelor's degree. Of these 30, at least 24 will be graduate courses or seminars, and the remaining six are chosen from graduate courses or those 400 division undergraduate courses which may be completed for credit for the BSc in statistics. Normally these courses will include~~

The MSc in Statistics requires a total of 36 units consisting of a 6 unit project and a further 30 units of course work of which at least 24 must be at the graduate level.

Normally these courses must include
- ~~STAT 801-4 Statistics~~
- STAT 811-2 Statistical Consulting I
- STAT 812-2 Statistical Consulting I

~~And at least four of~~
- ~~STAT 802-4 Multivariate Analysis~~
- ~~STAT 804-4 Time Series Analysis~~
- ~~STAT 805-4 Non-Parametric Statistics and Discrete Data Analysis~~
- ~~STAT 806-4 Lifetime Data Analysis~~
- ~~STAT 870-4 Applied Probability Models~~
- ~~STAT 890-4 Statistics: Selected Topics~~
- ~~STAT 891-2 Seminar~~
- **STAT 830-4 Statistical Theory I**
- **STAT 850-4 Linear Models and Applications**
- **STAT 851-4 Generalized Linear Models and Discrete Data Analysis**
- **STAT 852-4 Modern Methods in Applied Statistics**
- **STAT 853-4 Applications of Statistical Computing**

**Project**

~~As well,~~ All students submit and successfully defend a 6 unit project (STAT 898-6) based on a statistical analysis problem. See the Graduate General Regulations Section 1.10 for further information.

~~As well, students must submit and successfully defend a project based on some problem of statistical analysis, as outlined in the Graduate General Regulations. This problem will often arise out of the statistical consulting service.~~
~~See Graduate General Regulations Section 1.10 for further information.~~

Program Length

Students with a good undergraduate background in statistics will normally complete the course work in up to four terms. The project, including the defense, is expected to require up to two terms. Students with backgrounds in other disciplines, or with an inadequate background in statistics, may be required to complete certain undergraduate courses in the department in addition to the requirements shown above.

**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.

# TO:
# Statistics Master of Science Program

*Department of Statistics and Actuarial Science | Faculty of Science*
*Simon Fraser University Calendar 2013 Fall*

The master of science (MSc) program offers a wide range of statistical techniques and provides experience in practical statistics application. It teaches statistical expertise for careers in either theoretical or applied statistics.

The MSc program in statistics combines applied and theoretical training in state of the art statistical methodology, hands-on consulting experiences, a project in data analysis or in the development of new statistical methodology, and the opportunity to gain work experience through co-operative education. The program prepares graduates for careers as statisticians in industry, government, consulting, and research organizations. In addition, graduates receive the foundational training to continue on to PhD studies.

**Admission Requirements**

See Graduate General Regulation Section 1.3 for further information.

Applicants whose first language is not English normally submit Test of English as a Foreign Language (TOEFL) results.

Applicants with degrees in areas other than statistics are encouraged to apply provided they have some formal training in statistical theory and practice.

**Program Course Requirements**

The MSc in Statistics requires a total of 36 units consisting of a 6 unit project and a further 30 units of course work of which at least 24 must be at the graduate level.

Normally these courses must include

- STAT 811-2 Statistical Consulting I
- STAT 812-2 Statistical Consulting I
- STAT 830-4 Statistical Theory I
- STAT 850-4 Linear Models and Applications
- STAT 851-4 Generalized Linear Models and Discrete Data Analysis
- STAT 852-4 Modern Methods in Applied Statistics
- STAT 853-4 Applications of Statistical Computing

**Project**

All students submit and successfully defend a 6 unit project (STAT 898-6 ) based on a statistical analysis problem. See the Graduate General Regulations Section 1.10 for further information.

**Program Length**

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