SFU GRADUATE STUDIES AND POSTDOCTORAL FELLOWS

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**MEMORANDUM**

| | | | |
|---|---|---|---|
| ATTENTION | Senate | DATE | July 11, 2016 |
| FROM | Wade Parkhouse, Chair of Senate Graduate Studies Committee (SGSC) | No. | GS2016.20 |
| RE: | Faculty of Science | | |

**For information:**
Acting under delegated authority at its meeting of July 4, 2016, SGSC approved the following new courses **effective Spring 2017**:

Department of Physics
a) New course: PHYS 890 General Relativity and Gravitation
b) New course: PHYS 891: Cosmology

Department of Statistics and Actuarial Science
a) New course: STAT 641 Introduction to Statistical Computing and Exploratory Data Analysis – R
b) New course: STAT 642 Introduction to Statistical Computing and Exploratory Data Analysis - SAS

SFU

MEMO

Faculty of Science

ATTENTION Wade Parkhouse, Dean, Graduate Studies

FROM Peter Ruben, Associate Dean, Research and Graduate Studies, Faculty of Science

RE Faculty of Science, New Courses and Major Program Changes

DATE May 12, 2016

TIME 2:07 PM

The following curriculum changes have been approved by the Faculty of Science and are forwarded to the Senate Graduate Studies Committee for approval. These curriculum items should be effective for Spring 2017. Please include them on the next SGSC agenda.

~~**Department of Biological Sciences**~~
~~Course change (title, description, perquisite): BISC 827~~

~~**Department of Earth Science**~~
~~New course: EASC 628 Advanced mineral deposits~~

**Department of Statistics and Actuarial Science**
New course: STAT 641 Introduction to Statistical Computing and Exploratory Data Analysis – R
New course: STAT 642 Introduction to Statistical Computing and Exploratory Data Analysis – SAS

**Department of Physics**
New course: PHYS 890: General Relativity and Gravitation
New course: PHYS 891: Cosmology

~~**Department of Mathematics**~~
~~Program change: MSc Mathematics, PhD in Mathematics~~
~~New course: MATH 801 Computer Algebra~~
~~New course: MATH 846 Cryptography~~
~~New course: MATH 875 PhD Preliminary Examination~~
~~New course: MATH 876 PhD Comprehensive Examination~~
~~COURSE CHANGE, MATH 701 Computer Algebra~~

SFU SIMON FRASER UNIVERSITY
GRADUATE STUDIES & POSTDOCTORAL FELLOWS

# New Graduate Course Proposal

**Attach a separate document if more space is required.**

| Course Subject (eg. PSYC) PHYS | Number (eg. 810) 890 | Units (eg. 4) 3 |
|---|---|---|

Course title (max 100 characters including spaces and punctuation)
General Relativity and Gravitation

Short title (for enrollment/transcript - max 30 characters)
Relativity and Gravitation

Course description for SFU Calendar *
Gravity and space-time, Einstein's equations and their solution, tests of relativity, black holes, stellar equilibrium and collapse, and cosmological models.

Rationale for introduction of this course
This course is the graduate level offering of undergraduate course PHYS 490.

| Term of initial offering Fall 2017 (1177) | Course delivery (eg 3 hrs/week for 13 weeks) 3 hrs/week |
|---|---|
| Frequency of offerings/year 1x per 2 years | Estimated enrollment/offering 5 |

Equivalent courses (These are previously approved courses that replicate the content of this course to such an extent that students should not receive credit for both courses.)
PHYS 490

Prerequisite and/or Corequisite **
N/A

Educational Goals (optional)

Criminal record check required? ☐ Yes ☑ No If yes, then add this requirement as a prerequisite.

Campus where course will be taught ☑ Burnaby ☐ Surrey ☐ Vancouver ☐ Great Northern Way ☐ Off campus

Course Components ☑ Lecture ☐ Seminar ☐ Lab ☐ Research ☐ Practicum ☐ Online ☐ _____

| Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | | Capstone course? ☐ Yes ☑ No |
|---|---|---|
| Repeat for credit? *** ☐ Yes ☑ No | Total repeats allowed? 0 | Repeat within a term? ☐ Yes ☑ No |
| Required course? ☐ Yes ☑ No | Final exam required? ☑ Yes ☐ No | Additional course fees? ☐ Yes ☑ No |

Combined with an undergrad course? ☑ Yes ☐ No If yes, identify which undergraduate course and what the additional course requirements are for graduate students:
PHYS 490; graduate students will be required to complete additional problem sets.

* Course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description.
** If a course is only available to students in a particular program, that should be stated in the prerequisite.
*** This applies to a Special Topics or Directed Readings course.

## 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 |
|---|
| Andrei Frolov, Levon Pogosian, Andrew Debenedictis |
| Additional faculty members, space, and/or specialized equipment required in order to offer this course |
| N/A |

## CONTACT PERSON

| Department / School / Program | Contact name | Contact email |
|---|---|---|
| Physics | Eldon Emberly | eemberly@sfu.ca |

## DEPARTMENTAL APPROVAL

**REMINDER:** New courses must be identified on a cover memo and confirmed as approved when submitted to FGSC/SGSC. Remember to also include the course outline.

Non-departmentalized faculties need not sign

| | | |
|---|---|---|
| Department Graduate Program Committee<br>Eldon Emberly | Signature<br>Eldon Emberly | Date<br>Aug 25, 2015 |
| Department Chair<br>Jeff Sonier | Signature<br>Jeff Sonier | Date<br>Aug. 18, 2015 |

## LIBRARY REVIEW

**Library review done?** ☑ YES

Course form, outline, and reading list must be sent by FGSC to lib-courseassessment@sfu.ca for a review of library resources.

## OVERLAP CHECK

**Overlap check done?** ☑ YES

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content.

## FACULTY APPROVAL

This 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 Studies Committee (FGSC) | Signature | Date |
|---|---|---|
| Peter Ruben | PETER RUBEN | 17 August 2015 |

## SENATE GRADUATE STUDIES COMMITTEE APPROVAL

| Senate Graduate Studies Committee (SGSC) | Signature | Date |
|---|---|---|
| Wade Parkhouse | Wade Parkhouse | JUL 11 2016 |

**ADMINISTRATIVE SECTION (for DGS office only)**

**Course Attribute:** _____
**Course Attribute Value:** _____
**Instruction Mode:** _____
**Attendance Type:** _____

**If different from regular units:**
**Academic Progress Units:** _____
**Financial Aid Progress Units:** _____

# PHYS 890: Relativity and Gravitation

Professor Andrei Frolov
frolov@sfu.ca
P8456 / 778-782-3787

## Course Description:

Gravity and space-time, Einstein's equations and their solution, tests of relativity, black holes, stellar equilibrium and collapse, and cosmological models.

## Recommended Textbooks:

*Spacetime and Geometry: An Introduction to General Relativity*, S. Carroll
*Gravity: An Introduction to Einstein's General Relativity*, J. B. Hartle

## Topics:

Review of special relativity and flat spacetime
Manifolds, tensors, covariant derivatives, and curvature
Gravity as geometry, geodesic motion
Einstein's equations, Newtonian limit, gravitational waves
Black holes: Schwarzschild solution, horizons, gravitational collapse
Cosmology: Homogeneous expanding Universe model, large scale structure
*Early Universe: inflation, reheating, nucleosynthesis, microwave background*
*Quantum effects: evaporation of black holes, primordial fluctuations*
*Cool but esoteric stuff: Extra dimensions, wormholes, warp drives, time machines*

## Grading:

Your progress will be marked on absolute scale. At the end of the course, assignment and exam marks will be combined in a weighted average, from which the final grade will be derived (with thresholds to be determined by me). The relative weights are:
Assignments 45%
Mid-term(take-home) 15%
Final exam (open-book) 40%
Assignments are to be handed in on a due day by beginning of the class. Late assignments are accepted, but will be penalized at 5% of the mark per day late. *Late exams will not be accepted.* Failure to submit an assignment or attend an exam will result in zero marks. Attendance of lectures is at your discretion, but no notes will be provided.

SFU SIMON FRASER UNIVERSITY
GRADUATE STUDIES & POSTDOCTORAL FELLOWS

# New Graduate Course Proposal

**Attach a separate document if more space is required.**

| Course Subject (eg. PSYC) PHYS | Number (eg. 810) 891 | Units (eg. 4) 3 |
|---|---|---|

Course title (max 100 characters including spaces and punctuation)
Cosmology

Short title (for enrollment/transcript - max 30 characters)
Cosmology

Course description for SFU Calendar *
Topics in Cosmology actively investigated today. The course includes a review of the current cosmological model and observations that support it. Theoretical issues associated with the remaining unsolved problems in Cosmology are discussed, as well as the type of observations that can test the existing ideas. The course assumes a basic knowledge of General Relativity.

Rationale for introduction of this course
Course fills a gap in Physics graduate course curriculum.

| Term of initial offering Spring 2017 (1171) | Course delivery (eg 3 hrs/week for 13 weeks) 3 hrs/week |
|---|---|
| Frequency of offerings/year 1x per 2 years | Estimated enrollment/offering 5 |

Equivalent courses (These are previously approved courses that replicate the content of this course to such an extent that students should not receive credit for both courses.)
N/A

Prerequisite and/or Corequisite **
N/A

Educational Goals (optional)

Criminal record check required? ☐ Yes ☑ No If yes, then add this requirement as a prerequisite.

Campus where course will be taught ☑ Burnaby ☐ Surrey ☐ Vancouver ☐ Great Northern Way ☐ Off campus

Course Components ☑ Lecture ☐ Seminar ☐ Lab ☐ Research ☐ Practicum ☐ Online ☐ _____

| Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | | Capstone course? ☐ Yes ☑ No |
|---|---|---|
| Repeat for credit? *** ☐ Yes ☑ No | Total repeats allowed? 0 | Repeat within a term? ☐ Yes ☑ No |
| Required course? ☐ Yes ☑ No | Final exam required? ☐ Yes ☑ No | Additional course fees? ☐ Yes ☑ No |

Combined with an undergrad course? ☐ Yes ☑ No If yes, identify which undergraduate course and what the additional course requirements are for graduate students:

* Course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description.
** If a course is only available to students in a particular program, that should be stated in the prerequisite.
*** This applies to a Special Topics or Directed Readings course.

## 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 |
|---|
| Levon Pogosian, Andrei Frolov |
| **Additional faculty members, space, and/or specialized equipment required in order to offer this course** |
| N/A |

## CONTACT PERSON

| Department / School / Program | Contact name | Contact email |
|---|---|---|
| Physics | Eldon Emberly | eemberly@sfu.ca |

## DEPARTMENTAL APPROVAL

**REMINDER:** New courses must be identified on a cover memo and confirmed as approved when submitted to FGSC/SGSC. Remember to also include the course outline.

Non-departmentalized faculties need not sign

| | | |
|---|---|---|
| Department Graduate Program Committee<br>Eldon Emberly | Signature | Date<br>March 11, 2016 |
| Department Chair<br>Jeff Sonier | Signature | Date<br>March 15, 2016 |

## LIBRARY REVIEW

**Library review done?** ☒ YES

Course form, outline, and reading list must be sent by FGSC to lib-courseassessment@sfu.ca for a review of library resources.

## OVERLAP CHECK

**Overlap check done?** ☒ YES

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content.

## FACULTY APPROVAL

This 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 Studies Committee (FGSC) | Signature | Date |
|---|---|---|
| Peter Ruben | | 30 March 2016 |

## SENATE GRADUATE STUDIES COMMITTEE APPROVAL

| Senate Graduate Studies Committee (SGSC) | Signature | Date |
|---|---|---|
| Wade Parkhouse | | JUL 11 2016 |

**ADMINISTRATIVE SECTION (for DGS office only)**

**Course Attribute:** _____
**Course Attribute Value:** _____
**Instruction Mode:** _____
**Attendance Type:** _____

**If different from regular units:**
**Academic Progress Units:** _____
**Financial Aid Progress Units:** _____

# PHYS 891: Cosmology

Professor Levon Pogosian
levon@sfu.ca

## Course Description:

Topics in Cosmology actively investigated today. The course includes a review of the current cosmological model and observations that support it. Theoretical issues associated with the remaining unsolved problems in Cosmology are discussed, as well as the type of observations that can test the existing ideas. The course assumes a basic knowledge of General Relativity.

## Recommended Textbook:

*Modern Cosmology*, S. Dodelson

## Course Details:

The aim of the course is to cover topics in cosmology that are actively investigated today, both from the theoretical and observational perspectives. The course will be largely self-contained, however, basic knowledge of General Relativity will be assumed.

The plan is to start with a brief review of the basic building blocks of the current cosmological model and various types of observations that support it. Then the focus will be on the unsolved problems in cosmology, such as dark matter and dark energy, the cosmological constant problem, inflationary model building, search for gravity waves, cosmic magnetic fields and others. In each case, we will examine the current state of the theoretical understanding of the problem as well as the kind of observations that are, or will be, available to test the theory.

## Grading:

Assignments: 60%
Personal Project and Paper: 40%

SFU

faculty of science

Statistics & Actuarial Science

contact information
Tim Swartz
Professor
T:(778) 782-4579
F:(778) 782-4368
tim@stat.sfu.ca

mailing address
Dept of Stats/Actsci
8888 University Drive
Burnaby, BC Canada
V5A 1S6

April 14, 2016

To: Peter Ruben
Faculty of Science Graduate Studies Committee
cc: Tom Loughin

Re: Course Proposals - STAT 641-2: Introduction to Statistical Computing and Exploratory Data Analysis - R and STAT 642-2: Introduction to Statistical Computing and Exploratory Data Analysis - SAS

We propose the introduction of two courses, STAT 641-2 and STAT 642-2 which are statistical programming courses in R and SAS, respectively. The courses are intended for graduate students outside of the Department of Statistics and Actuarial Science and will be cross listed with STAT 341-2 and STAT 342-2, respectively. STAT 341-2 and STAT 342-2 are courses intended for Statistics undergraduate majors.

This proposal is to be presented to the Faculty of Science Graduate Curriculum Committee for consideration of having the course added to the Calendar.

The courses were approved by the Department of Statistics and Actuarial Science at the January 15/16 Departmental meeting.

Tim Swartz
Graduate Chair, Stats/ActSci

SIMON FRASER UNIVERSITY
GRADUATE STUDIES & POSTDOCTORAL FELLOWS

# New Graduate Course Proposal

**Please save the form before filling it out to ensure that the information will be saved properly.**

| Course Subject (eg. PSYC) | Number (eg. 810) | Units (eg. 4) |
|---|---|---|
| STAT | 641 | 2 |

Course title (max 100 characters including spaces and punctuation)
Introduction to Statistical Computing and Exploratory Data Analysis - R

Short title (for enrollment/transcript - max 30 characters)
Intro to Stat Comp. Data An.-R

Course description for SFU Calendar *
Introduces the R statistical package in the context of statistical problems. Data management; reading, editing and storing statistical data; data exploration and representation; summarizing data with tables, graphs and other statistical tools; and data simulation. Students with credit for STAT 340 or STAT 341 may not take STAT 641 for further credit.

Rationale for introduction of this course
Graduate students across the university are becoming more involved with the analysis of data. This course provides them with an introduction to the statistical programming language R to assist in their research endevours.

| Effective term and year | Course delivery (eg 3 hrs/week for 13 weeks) |
|---|---|
| Spring 2017 | 2hrs/week for 13 weeks |
| **Frequency of offerings/year** | **Estimated enrollment/offering** |
| once per year | 10 |

Equivalent courses (These are previously approved courses that replicate the content of this course to such an extent that students should not receive credit for both courses.)
STAT 341

Prerequisite and/or Corequisite **
STAT 285 or STAT 302 or STAT 305 or equivalent. Open only to students in departments other than Statistics and Actuarial Science.

Criminal record check required? ☐ Yes ☑ No If yes, then add this requirement as a prerequisite.

Campus where course will be taught ☑ Burnaby ☐ Surrey ☐ Vancouver ☐ Great Northern Way ☐ Off campus

Course Components ☑ Lecture ☐ Seminar ☐ Lab ☐ Research ☐ Practicum ☐ Online ☐ _____

| | | |
|---|---|---|
| Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | | Capstone course? ☐ Yes ☑ No |
| Repeat for credit? *** ☐ Yes ☑ No | Total completions allowed? _____ | Repeat within a term? ☐ Yes ☑ No |
| Required course? ☐ Yes ☑ No | Final exam required? ☑ Yes ☐ No | Additional course fees? ☐ Yes ☑ No |

Combined with an undergrad course? ☑ Yes ☐ No If yes, identify which undergraduate course and what the additional course requirements are for graduate students:
STAT 341 — No additional course requirements for graduate students

* Course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description.
** If a course is only available to students in a particular program, that should be stated in the prerequisite.
*** This mainly applies to a Special Topics or Directed Readings course.

## 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 |
|---|
| Altman, Bingham, Campbell, Graham, Hu, Lockhart, T.Loughin, McNeney,Schwarz, Swartz,Tang,Thompson |
| Additional faculty members, space, and/or specialized equipment required in order to offer this course |

## CONTACT PERSON

| Department / School / Program | Contact name | Contact email |
|---|---|---|
| Statistics & Actuarial Science | Sadika Jungic | sjungic@sfu.ca |

## DEPARTMENTAL APPROVAL

**REMINDER:** New courses must be identified on a cover memo and confirmed as approved when submitted to FGSC/SGSC. Remember to also include the course outline.

Non-departmentalized faculties need not sign

| | | |
|---|---|---|
| Department Graduate Program Committee<br>Tim Swartz | Signature | Date<br>Apr 14/16 |
| Department Chair<br>Tom Loughin | Signature | Date<br>14 Apr 16 |

## LIBRARY REVIEW

**Library review done?** ☒ YES

Course form, outline, and reading list must be sent by FGSC to lib-courseassessment@sfu.ca for a review of library resources.

## OVERLAP CHECK

**Overlap check done?** ☒ YES ☐ N/A

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content. An overlap check is not required for some courses (ie. Special Topics, Capstone, etc.)

## FACULTY APPROVAL

This 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 Studies Committee (FGSC)<br>PETER RUBEN | Signature | Date<br>27 April 2016 |

## SENATE GRADUATE STUDIES COMMITTEE APPROVAL

| | | |
|---|---|---|
| Senate Graduate Studies Committee (SGSC)<br>Wade Parkhouse | Signature | Date<br>JUL 11 2016 |

**ADMINISTRATIVE SECTION (for DGS office only)**

**Course Attribute:** _____
**Course Attribute Value:** _____
**Instruction Mode:** _____
**Attendance Type:** _____

**If different from regular units:**
**Academic Progress Units:** _____
**Financial Aid Progress Units:** _____

# STAT 641-2
# Introduction to Statistical Computing and Exploratory Data Analysis - R

**Day Course**

**Instructor: Dr. Carl Schwarz**

**Prerequisite:**
STAT 285 or STAT 302 or STAT 305 or equivalent.

**Textbook Recommended:**
*SAS and R, Data Management, Statistical Analysis, and Graphics,* 2nd ed, by Ken Kleinman and Nicholas J. Horton, Publisher: CRC Press

**Calendar Description:**
Introduces the R statistical package. Data management; reading, editing and storing statistical data; data exploration and representation; summarizing data with tables, graphs and other statistical tools; and data simulation. Students with credit for STAT 340 or STAT 341 may not take STAT 641 for further credit.

**Outline:**

R component

1. What is the R programming environment
   - Downloading and installing
   - Basics of writing R functions
   - Basics of loops/if/while and other control-flow constructs
2. Data management in R
   - Reading and writing data: plain text files and spreadsheets, other file formats
   - Using R to query databases with SQL
   - Merging and re-shaping data
3. Data exploration and representation in R
   - Graphical displays. Customizing and extending these displays for your own research purposes.
   - Cross-tabulations and tests of association.
4. Data simulation and resampling in R
   a. Generating data from parametric distributions: uses in evaluating statistical procedures and in understanding classical large-sample results.
   b. Generating data by resampling: introduction to permutation, bootstrapping, cross-validation and their uses.

**Grading Scheme:**

Term Test – 50%
Final Exam – 50%

SPRING 2016 - STAT 341 D100

# INTRODUCTION TO STATISTICAL COMPUTING AND EXPLORATORY DATA ANALYSIS - R (2)

*Class Number: 2959 Delivery Method: In Person*

**COURSE TIMES + LOCATION:**

Tu, Th 8:30 AM – 10:20 AM
EDB 7618, Burnaby

**INSTRUCTOR:**

Carl Schwarz
cschwarz@sfu.ca
778-782-3376
Office: SC-K10559

**PREREQUISITES:**

STAT 285 or STAT 302 or STAT 305 or equivalent.

## Description

**CALENDAR DESCRIPTION:**

Introduces the R statistical package. Data management; reading, editing and storing statistical data; data exploration and representation; summarizing data with tables, graphs and other statistical tools; and data simulation. Students with credit for STAT 340 may not take STAT 341 for further credit.

**COURSE DETAILS:**

**Course Outline:**

R component

1. What is the R programming environment
   - Downloading and installing
   - Basics of writing R functions
   - Basics of loops/if/while and other control-flow constructs
2. Data management in R
   - Reading and writing data: plain text files and spreadsheets, other file formats
   - Using R to query databases with SQL
   - Merging and re-shaping data
3. Data exploration and representation in R
   - Graphical displays. Customizing and extending these displays for your own research purposes.
   - Cross-tabulations and tests of association.
4. Data simulation and resampling in R

   a. Generating data from parametric distributions: uses in evaluating statistical procedures and in understanding classical large-sample results.

   b. Generating data by resampling: introduction to permutation, bootstrapping, cross-validation and their uses.

## Grading

| | |
|---|---|
| Term Test | 50% |
| Final Exam | 50% |

**NOTES:**

***All grading is subject to change.***

## Materials

**RECOMMENDED READING:**

***Recommended Text:***

***SAS and R, Data Management, Statistical Analysis, and Graphics, 2nd ed,*** **by Ken Kleinman and Nicholas J. Horton, Publisher: CRC Press**

**DEPARTMENT UNDERGRADUATE NOTES:**

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

**Tutor Requests:**
Students looking for a Tutor should visit http://www.stat.sfu.ca/teaching/need-a-tutor-.html. We accept no responsibility for the consequences of any actions taken related to tutors.

**REGISTRAR NOTES:**

SFU's Academic Integrity web site http://students.sfu.ca/academicintegrity.html is filled with information on what is meant by academic dishonesty, where you can find resources to help with your studies and the consequences of cheating. Check out the site for more information and videos that help explain the issues in plain English.

Each student is responsible for his or her conduct as it affects the University community. Academic dishonesty, in whatever form, is ultimately destructive of the values of the University. Furthermore, it is unfair and discouraging to the majority of students who pursue their studies honestly. Scholarly integrity is required of all members of the University. http://www.sfu.ca/policies/gazette/student/s10-01.html

ACADEMIC INTEGRITY: YOUR WORK, YOUR SUCCESS

SIMON FRASER UNIVERSITY
GRADUATE STUDIES & POSTDOCTORAL FELLOWS

# New Graduate Course Proposal

**Please save the form before filling it out to ensure that the information will be saved properly.**

| Course Subject (eg. PSYC) | Number (eg. 810) | Units (eg. 4) |
|---|---|---|
| STAT | 642 | 2 |

Course title (max 100 characters including spaces and punctuation)
Introduction to Statistical Computing and Exploratory Data Analysis - SAS

Short title (for enrollment/transcript - max 30 characters)
Intro to Stat Comp. Data SAS

Course description for SFU Calendar *
Introduces the SAS statistical package. Data management; reading, editing and storing statistical data; data exploration and representation; summarizing data with tables, graphs and other statistical tools; and data simulation. Students with credit for STAT 340 or STAT 342 may not take STAT 642 for further credit.

Rationale for introduction of this course
Graduate students across the university are becoming more involved with the analysis of data. This course provides them with an introduction to the statistical programming language SAS to assist in their research endevours.

| Effective term and year | Course delivery (eg 3 hrs/week for 13 weeks) |
|---|---|
| Spring 2017 | 2hrs/week for 13 weeks |
| **Frequency of offerings/year** | **Estimated enrollment/offering** |
| once per year | 20 |

Equivalent courses (These are previously approved courses that replicate the content of this course to such an extent that students should not receive credit for both courses.)
STAT 342

Prerequisite and/or Corequisite **
STAT 285 or STAT 302 or STAT 305 or equivalent. Open only to students in departments other than Statistics and Actuarial Science.

Criminal record check required? ☐ Yes ☑ No If yes, then add this requirement as a prerequisite.

Campus where course will be taught ☑ Burnaby ☐ Surrey ☐ Vancouver ☐ Great Northern Way ☐ Off campus

Course Components ☑ Lecture ☐ Seminar ☐ Lab ☐ Research ☐ Practicum ☐ Online ☐ _____

| | | |
|---|---|---|
| Grading Basis ☑ Letter grades ☐ Satisfactory/Unsatisfactory ☐ In Progress/Complete | | Capstone course? ☐ Yes ☑ No |
| Repeat for credit? *** ☐ Yes ☑ No | Total completions allowed? _____ | Repeat within a term? ☐ Yes ☑ No |
| Required course? ☐ Yes ☑ No | Final exam required? ☐ Yes ☐ No | Additional course fees? ☐ Yes ☑ No |

Combined with an undergrad course? ☑ Yes ☐ No If yes, identify which undergraduate course and what the additional course requirements are for graduate students:
STAT 342 — No additional course requirements for graduate students

* Course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description.
** If a course is only available to students in a particular program, that should be stated in the prerequisite.
*** This mainly applies to a Special Topics or Directed Readings course.

## 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 |
|---|
| Bingham, M.Loughin, T.Loughin, Schwarz |
| Additional faculty members, space, and/or specialized equipment required in order to offer this course |
| |

## CONTACT PERSON

| Department / School / Program | Contact name | Contact email |
|---|---|---|
| Statistics & Actuarial Science | Sadika Jungic | sjungic@sfu.ca |

## DEPARTMENTAL APPROVAL

**REMINDER:** New courses must be identified on a cover memo and confirmed as approved when submitted to FGSC/SGSC. Remember to also include the course outline.

Non-departmentalized faculties need not sign

| | | |
|---|---|---|
| Department Graduate Program Committee<br>Tim Swartz | Signature | Date<br>Apr 14/16 |
| Department Chair<br>Tom Loughin | Signature | Date<br>14 Apr 16 |

## LIBRARY REVIEW

**Library review done?** ☒ YES

Course form, outline, and reading list must be sent by FGSC to lib-courseassessment@sfu.ca for a review of library resources.

## OVERLAP CHECK

**Overlap check done?** ☒ YES ☐ N/A

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content. An overlap check is not required for some courses (ie. Special Topics, Capstone, etc.)

## FACULTY APPROVAL

This 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 Studies Committee (FGSC)<br>Peter Ruben | Signature | Date<br>27 April 2016 |

## SENATE GRADUATE STUDIES COMMITTEE APPROVAL

| | | |
|---|---|---|
| Senate Graduate Studies Committee (SGSC)<br>Wade Parkhouse | Signature | Date<br>JUL 11 2016 |

**ADMINISTRATIVE SECTION (for DGS office only)**

**Course Attribute:** _____
**Course Attribute Value:** _____
**Instruction Mode:** _____
**Attendance Type:** _____

**If different from regular units:**
**Academic Progress Units:** _____
**Financial Aid Progress Units:** _____

# STAT 642-2
# Introduction to Statistical Computing and Exploratory Data Analysis - SAS

**Day Course**

**Instructor: Dr. Carl Schwarz**

**Prerequisite:**
STAT 285 or STAT 302 or STAT 305.

**Textbook Recommended:**
*SAS and R, Data Management, Statistical Analysis, and Graphics,* 2nd ed, by Ken Kleinman and Nicholas J. Horton, Publisher: CRC Press

**Calendar Description:**
Introduces the SAS statistical package. Data management; reading, editing and storing statistical data; data exploration and representation; summarizing data with tables, graphs and other statistical tools; and data simulation. Students with credit for STAT 340 or STAT 342 may not take STAT 642 for further credit.

**Outline:**

SAS component

1. What is SAS?
   - Downloading and installing
   - Overview of the system
2. Data management in SAS
   a. Data input and structures
      - DATA step
      - Reading specially formatted files
      - Date/time/character formats and manipulations
      - Derived variables
      - Exporting
   b. Data access: from database systems using query languages
   c. Merging and reshaping data
      - sorting/subsetting (set/if/where statements)/ merging/transposing
      - processing using DO LOOPS and SAS arrays
      - modify variable attributes
3. Data exploration and representation in SAS
   - basic procs (print, plot, tabulate, means, univariate, freq)
   - by statement and uses in analysis and simulation
   - output delivery system to extract information from analyses
4. Data simulation in SAS

**Grading Scheme:**

Term Test – 50%
Final Exam – 50%

SPRING 2016 - STAT 342 D100

# INTRODUCTION TO STATISTICAL COMPUTING AND EXPLORATORY DATA ANALYSIS - SAS (2)

*Class Number: 2963 Delivery Method: In Person*

**COURSE TIMES + LOCATION:**

Tu, Th 8:30 AM – 10:20 AM
EDB 7618, Burnaby

**INSTRUCTOR:**

Carl Schwarz
cschwarz@sfu.ca
778-782-3376
Office: SC-K10559

**PREREQUISITES:**

STAT 285 or STAT 302 or STAT 305.

## Description

**CALENDAR DESCRIPTION:**

Introduces the SAS statistical package. Data management; reading, editing and storing statistical data; data exploration and representation; summarizing data with tables, graphs and other statistical tools; and data simulation. Students with credit for STAT 340 may not take STAT 342 for further credit.

**COURSE DETAILS:**

**Course Outline:**

SAS component

1. What is SAS?
   - Downloading and installing
   - Overview of the system
2. Data management in SAS
   a. Data input and structures
      - DATA step
      - Reading specially formatted files
      - Date/time/character formats and manipulations
      - Derived variables
      - Exporting
   b. Data access: from database systems using query languages
   c. Merging and reshaping data
      - sorting/subsetting (set/if/where statements)/ merging/transposing
      - processing using DO LOOPS and SAS arrays
      - modify variable attributes
3. Data exploration and representation in SAS

- basic procs (print, plot, tabulate, means, univariate, freq)
- by statement and uses in analysis and simulation
- output delivery system to extract information from analyses

4. Data simulation in SAS

## Grading

| | |
|---|---|
| Term Test | 50% |
| Final Exam | 50% |

**NOTES:**

***All grading is subject to change.***

## Materials

**RECOMMENDED READING:**

**Recommended Text:**

***SAS and R, Data Management, Statistical Analysis, and Graphics, 2nd ed,*** **by Ken Kleinman and Nicholas J. Horton, Publisher: CRC Press**

**DEPARTMENT UNDERGRADUATE NOTES:**

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

**Tutor Requests:**
Students looking for a Tutor should visit http://www.stat.sfu.ca/teaching/need-a-tutor-.html. We accept no responsibility for the consequences of any actions taken related to tutors.

**REGISTRAR NOTES:**

SFU's Academic Integrity web site http://students.sfu.ca/academicintegrity.html is filled with information on what is meant by academic dishonesty, where you can find resources to help with your studies and the consequences of cheating. Check out the site for more information and videos that help explain the issues in plain English.

Each student is responsible for his or her conduct as it affects the University community. Academic dishonesty, in whatever form, is ultimately destructive of the values of the University. Furthermore, it is unfair and discouraging to the majority of students who pursue their studies honestly. Scholarly integrity is required of all members of the University. http://www.sfu.ca/policies/gazette/student/s10-01.html

ACADEMIC INTEGRITY: YOUR WORK, YOUR SUCCESS