

S.87-75

SIMON FRASER UNIVERSITY

MEMORANDUM

TO: Senate

FROM: J.W.G. Ivany,
Chair, SCAP

SUBJECT: Graduate Curriculum
Changes - Math & Statistics
Reference: SCAP 87-46

DATE: Nov.19, 1987

Action undertaken by the Senate Committee on Academic Planning/Senate Graduate Studies Committee gives rise to the following motion:

MOTION: "That Senate approve and recommend approval to the Board of Governors, as set forth in S.87-75 the following new course:

STAT 602 Generalized Linear and Non-linear
Modeling"

New Graduate Course Proposal Form

CALENDAR INFORMATION:

Department: Mathematics and Statistics Course Number: Stat 602

Title: Generalized Linear and Nonlinear Modeling

Description: A methods-oriented unified approach to a broad array of non-linear regression modelling methods including classical regression, logistic regression, probit analysis, dilution assay, frequency count analysis, ordinal-type responses, and survival data. A project will be assigned related to students' field of study.

Credit Hours: 3 Vector: 602-3 Prerequisite(s) if any: Stat 302 or Stat 330 or permission of instructor. Open only to graduate students in departments other than Mathematics and Statistics.

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 6 When will the course first be offered: 1988 - III.

How often will the course be offered: Once per year.

JUSTIFICATION:

Double listing with Stat 402. Available only to Graduate Students in Departments other than Mathematics and Statistics.

RESOURCES:

Which Faculty member will normally teach the course: Eaves, Lockhart, Routledge, Stephens, Swartz, Weldon
 What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

- Appended: a) Outline of the Course (Course Description for Stat 402)
 b) An indication of the competence of the Faculty member to give the course.
 c) Library resources Reserve copies of reference materials (see course description Stat 402).

Approved: Departmental Graduate Studies Committee: G. Bojedziew Date: 2 Oct. 87
 Faculty Graduate Studies Committee: G. Bojedziew Date: 2 Oct. 87
 Faculty: [Signature] Date: 13 Oct 87
 Senate Graduate Studies Committee: _____ Date: _____
 Senate: _____ Date: _____

STATISTICS 602

Generalized Linear and Nonlinear Modelling

NOTE: This course extends the concepts, methods and approach of STAT 302-3 to cover a wide variety of common types of outcome data. It employs a modern unified approach to a broad array of nonlinear regression problems.

1. Brief review of fundamental background.
2. Overview: Empty model, link function, simple examples of structuring a mean value vector with link function and design matrix, and of structuring variance with a variance function; iterated reweighted least squares estimation.
3. Examples from exponential - type likelihood models: Normal, including classical linear regression and other links; Poisson, including log-linear regression; Binomial, including logit, probit, and dilution assay. Examples allowing overdispersion.
4. Other examples.
5. Inference: The variance-covariance matrix of the estimated regression vector and confidence intervals for linear predictors, fitted values, other relevant estimated quantities; comparative evaluation of models, deviance, Pearson statistic, residuals.
6. Logistic Regression.
7. Contingency tables and log-linear models.
8. Ordinal-type outcome: Proportional odds model, proportional hazards model.
9. Experimental design: Randomized block, factorial designs, latin squares.
10. In addition to the STAT 402 outline, STAT 406 students will be expected to analyse a data set from work in their own area of application.

Primary References

An Introduction to Statistical Modelling
Dobson
Chapman & Hall, 1983.

Other References: Sections 1 through 6 of:

The GLIM System, Release 3, Manual
Baker & Nelder
Numerical Algorithms Group, 1978.

Nonlinear Regression Modeling - A Unified Practical Approach
Ratkowsky
Marcel Dekker, 1983

SIMON FRASER UNIVERSITY

MEMORANDUM

To: Dr. John Webster, Dean of Science

From: Dr. George Bojadziev,
FSGSC

Subject: STAT 602 Course proposal

Date: 2 October 1987

The following course proposal for STATistics 602 has been approved by the Faculty of Science Graduate Studies Committee. Please include this item in the agenda for the next Faculty of Science meeting.

Rationale for STAT 602
(available only to graduate students
in departments other than Mathematics & Statistics)

Many graduate students engaged in quantitative research need the practice and mechanical skills for analysing a wide variety of common types of data which are beyond traditional classical regression and anova packages. STAT 602 will provide this. While these skills are considered to be at the advanced undergraduate/beginning graduate level within the discipline of Statistics, they should properly be credited at the graduate level for workers in applications fields. It will require that the student already have some experience and practical general sense of data frequency distributions, of experimental design, and of classical regression/anova. However no further mathematical background will be needed. The lecture components of STAT 602 and STAT 402 will be the same. Registration in STAT 602 will be restricted to graduate students in departments other than Mathematics & Statistics. They will be required to complete a substantial project analysing a data set in their own field of interest.