

Approval Form

Proposal Title: Structural Program of Experiments I 1702-371

Sponsor(s) 2 Chemical Dept.: Mathematics Ext. 4514
F. M. ...

Check one: Course Specialization Concentration Minor Achievement Certificate
 Certification Program Major Program Minor Change (please name deletion or credit/title/catalog change)

Undergraduate Graduate 3 Credit Hours

| | | |
|--|---|---|
| <p>Step 1 (Department)</p> <p><input checked="" type="checkbox"/> Approved <u>4/5/91</u> Date</p> <p><input type="checkbox"/> Not Approved</p> <p><u>W. ...</u> Dept. CC Chairperson</p> <p><input type="checkbox"/> Reviewed _____ Date</p> <p><u>Gary ...</u> Dept. Chairperson</p> | <p>Step 2 (Receipt)</p> <p><input checked="" type="checkbox"/> SCC# <u>90-91-42</u></p> <p>Proposal Received <u>2-8-91</u> Date</p> <p><u>Donna Duthaway</u> SCC Chairperson</p> | <p>Step 3 (School CC)</p> <p>Reviewed <u>3/14/91</u> <u>10/4/91</u> <u>update</u></p> <p><input checked="" type="checkbox"/> Approved <input type="checkbox"/> Not Approved</p> <p>Comments: Suggestions made in March were incorporated.</p> <p><u>Ronald J. ...</u> School Cur. Comm. Chairperson</p> |
|--|---|---|

Step 4 (Academic Dean) **Comments:**

Recommend
 Not Recommend
 Conditionally Recommend (see comments)

Reviewed _____
Date

Signature, Dean of School

Step 5 (SCC)

Open Hearing 10/23/91 Approved by Senate Curriculum Committee 10/23/92
Date Date

Returned to sponsor(s) for the following reasons: Field - letter sent to Chair
need to change implementation date

Step 6 (Senate)

Presented to Senate 10/23/92
Date

Approved Not Approved

Notification to Executive Vice-President/Provost _____
Date

Signature, SCC Chairperson

Step 7 (Executive V.P./Provost)

Received _____

Date

If no, reasons are as follows:

Approved Yes No

Student credit hours _____

Faculty load hours _____

Equalized credit hours _____

Official copy and approval sheet filed _____

Date

Signature, Executive Vice-President/Provost

Registrar

Approved course description received 23 Feb 93

Date

Hegis Taxonomy and Course Number assigned 1702-371

B. J. Kelley

Signature, Registrar

23 Feb 93

Date

Notification forwarded:

- Senate Curriculum Committee Chairperson
- Department Chairperson(s)
- Academic Dean(s)
- Registrar
- Sponsor(s)

Glassboro State College
Department of Mathematics
Course Proposal
Statistical Design of Experiments I

I. Details

- a) Course Title: Statistical Design of Experiments I
- b) Sponsors: Dr. Zenaida Otero Keil and the Department of Mathematics
- c) Credit Hours: 3 s.h.
- d) Course Level: Junior, Senior
- e) Curricular effect: Requirement for proposed Statistics Concentration
- f) Prerequisites: Statistics I and II or Statistical Research Methods is Psychology I and II
- g) Suggested Time Implementation: Fall 1993
- h) Resources: Faculty are available to teach the course, available equipment is satisfactory and library resources are adequate.

II. Rationale:

Statistical design of experiments has gained significant recognition in the last decade. As experimentation and data collection have become more costly and regulated, the statistical design of experiments has offered a means to get the maximum information for the minimum number of experimental trials.

Statistical design of experiments will be the major avenue for the design of experimental programs in the future. Corporations are hiring new employees to develop internal expertise in the area of statistical experiment design along with their statistics groups. The proposed course will allow Glassboro to offer education in state of the art analysis theories and techniques.

The proposed course would be a required course for the Statistics Concentration in the Department of Mathematics. This course will give students the necessary background to develop experimental designs in any subject area of experimentation. This background will give Glassboro students an important advantage in the market place. Students interested in actuary science will also benefit. Much of what will be presented in the Statistical Design of Experiments course is relevant for actuarial applications. The proposed course is the first semester of a two semester sequence. It will give students the necessary basic background to take the second semester. The second semester, Statistical Experimental Design II, will cover optimization techniques and more complex designs for constrained and complex systems.

Students from many other departments may use the course to supplement their education. Even without completion of the requirements for the Statistics Concentration, students in Psychology, Sociology, the Physical and Biological Sciences, and Business can benefit from the course. The techniques and theory presented in the proposed course are relevant to a wide range of subject areas and are now frequently used to develop and analyze experiments in all of the disciplines mentioned above.

3. Essence of the Course

a) Objectives in Relation to Student Outcome

Students will

- o gain an understanding of the theoretical and practical aspects of the statistical design of experiments and see its relevance in a wide range of applications
- o gain a strong foundation for the basics of statistical experimental design
- o work on problems of various degrees of complexity
- o use the computer to develop experimental designs and perform analyses of the designs
- o be prepared to use statistics and experimental design techniques in industrial applications

b) Topical outline

I. Fundamentals of Statistical Design of Experiments and Analysis of Experimental Data

This section will cover the basic principles governing experimental design techniques. Principles of statistics as they relate to experimental design will also be covered.

- a) rationale for statistical design
- b) statistics background for experimental design
- c) development of designs
- d) orthogonality criteria
- f) comparisons of a one-factor-at-a-time approach with statistical designs
- g) distributions
- h) analysis of variance
- i) matrix analysis and operations

II. Methods of Statistical Experiment Design

This section will cover specific experimental design techniques. The basics of each technique will be covered and applications will be discussed in detail. Appropriate application of experimental design techniques will be detailed

- a) block and incomplete balanced block designs
- b) factorial designs
- c) response surfaces
- d) mixture designs

III. Analysis of Data from Statistical Experiment Designs

This section will cover the analysis of data from experimental design techniques discussed above. The emphasis will be on analysis techniques and a comparison of how experimental design makes data analysis simpler and leads to better predictions.

- a) model building
- b) analysis of variance and covariance
- c) interblock variance
- d) regression analysis

- c) Evaluation and grading procedure for students: Homework and exams will be used to evaluate student progress as well as projects. Students will be expected to understand the basic principles and apply all discussed experimental design techniques. Projects will involve the use of all of the experimental design techniques. Thus, students will be evaluated on their knowledge of all of the techniques presented in the course.
- d) Course Evaluations: Student evaluations will be used to evaluate the course along with review by the Mathematics Department Curriculum Committee.

4. Consultants:

Karen Rappaport, Statistics Group
Supervisor, Hoechst Celanese

Kim Kearns Hockman, Statistician,
E.I. duPont de Nemours and Company

Charles Schultz, Chairperson
Physical Sciences

Harold W. Lucius, Dean
School of Business

Eleanor Gaer, Chairperson
Psychology Department

John Myers, Chairperson
Sociology Department

Ben Hitchner, Chairperson
Economics Department

Catalog Description


Statistical Design of Experiments (Prerequisite: Statistics I and II or Statistical Research Methods in Psychology I and II)

Students will gain an understanding of the major theoretical and practical concepts in the statistical design of experiments. The relevance of statistical experimental design to all experimentation will be presented in a highly applied manner. Students will be exposed to a variety of applications from a wide range of subject areas. Students will learn how to use the statistical design of experiments to obtain the maximum information with a minimum number of experimental trials for any type of experimentation or data collection. Examples from business, social and physical sciences and engineering will be used to illustrate concepts.



November 26, 1990

To: Dr. Zenaida Otero Keil
Associate Professor
Dept. of Mathematics

From: John P. Myers 
Sociology

Re: Proposal for Statistics Concentration

Thank you for sharing the proposal for the Statistics Concentration. Dr. Pearl Bartelt, Dr. Ted Tannenbaum and I discussed your proposal. We believe that such a concentration as you propose would be of benefit to Glassboro students. However, we believe that the Sociological Methods and Statistics course should be included as an elective. As far as we know, this is the only course which combines various research designs with quantitative methods. The result of this is that students become aware of the relationship between abstract ideas and concrete applications. Students learn how to raise research questions, develop ways to measure appropriate variables, construct data collection techniques, and gain skills in preparing, organizing, and analyzing empirical data.

I hope that our comments have been helpful. Please let me know if we can provide further input.

JPM/m
cc: P. Bartelt
T. Tannenbaum



November 14, 1990

To: Dr. Keil
From: Dr. Peter Kressler *Peter Kressler*
Re: Statistics Concentration
Statistical Design of Experiments
Advanced Statistical Design of Experiments

We received the proposals for a Statistics Concentration and the two new mathematics course proposals.

We support fully these proposals. Indeed, we anticipate that some of our majors will take advantage of this course of study.

We request, however, that Elementary Statistics and Economic Statistics be included as an option in the requirements for the concentration as well as in the prerequisites for the two proposed new mathematics courses. This will enable our majors to participate in this worth while concentration.