APPLICATION FOR NEW COURSE

1. Submitted by the College of Arts and Sciences Date: 10/04/01

Department/Division offering course: Statistics

2. Proposed designation and Bulletin description of this course:

(a) Prefix and Number: STA 662  (b) Title: Resampling and Related Methods  
   (subt. req.)
   *NOTE: If the title is longer than 24 characters (including spaces), write
   a sensible title (not exceeding 24 characters) for use in transcripts: Resampling Methods

(c) Lecture/Discussion hours per week 3
(d) Laboratory hours per week 0

(e) Studio hours per week 0
(f) Credits: 3

(g) Course description: Theory and application of the bootstrap, jackknife and other resampling methods

(h) Prerequisites (if any): STA 601, STA 603

(i) May be repeated to a maximum of 4

4. To be cross-listed as:
   Prefix & No.  Signature, Chairman, cross-listing department

5. Effective Date: Fall, 2002  (semester and year)

6. Course to be offered:  (a) Fall  ☑  (b) Spring  ☐  (c) Summer  ☐

7. Will the course be offered each year?  (a) Yes  ☑  (b) No  ☐
   (Explain if not annually):

8. Why is this course needed: Resampling techniques are important tools in both statistical inference and applications. This course has been successfully taught for several years

9. (a) By whom will the course be taught? Mai Zhou

(b) Are facilities for teaching the course now available?  (a) Yes  ☑  (b) No  ☐
   If not, what plans have been made for providing them?
10. What enrollment may be reasonably anticipated? **5-10**

11. Will this course serve students in the Department primarily? (a) Yes ☒ (b) No ☐

Will it be of service to a significant number of students outside the Department? (a) Yes ☐ (b) No ☒

If so, explain: ____________________________________________________________________________

Will the course serve as a University Studies Program course? (a) Yes ☐ (b) No ☒

If yes, under what Area?

12. Check the category most applicable to this course:

___ traditional; offered in corresponding departments elsewhere;

___ ☒ relatively new, now being widely established

___ not yet to be found in many (or any) other universities

13. Is this course part of a proposed new program? (a) Yes ☒ (b) No ☐

If yes, which? **Elective for the Statistics/Probability and Biostatistics tracts within the Statistics Ph. D.**

14. Will adding this course change the degree requirements in one or more programs?* (a) Yes ☐ (b) No ☒

If yes, explain the change(s) below: _____________________________________________________________________

15. Attach a list of the major teaching objectives of the proposed course, outline and/or reference list to be used.

16. If the course is a 100-200 level course, please submit evidence (e.g., correspondence) that the Community College System has been consulted.

17. Within the Department, who should be contacted for further information about the proposed course?

Name/e-mail: **Arnold J. Stromberg, DGS** Phone Extension: **7-6903**

*NOTE: Approval of this course will constitute approval of the program change unless other program modifications are proposed.*
APPLICATION FOR NEW COURSE

Signatures of Approval:

Christine L. Wood
Department Chair

Philip Adams
Dean of the College

03/22/02

Air Date: 09/2002

Date

MAR 28 2002

Date of Notice to the Faculty

*Undergraduate Council

*University Studies

*Graduate Council

*Academic Council for the Medical Center

*Senate Council

If applicable, as provided by the Rules of the University Senate

ACTION OTHER THAN APPROVAL:

Date of Notice to Univ. Senate

Rev 11/98
Course Description for STA662

Resampling and Related Methods


Teaching Objectives:
Students are expected to (1) know when to use various resampling methods, (2) know (and be able to articulate) the strengths and weaknesses of various resampling methods, and (3) be able to use statistics software to carry out the relevant computation.

Course Content: This course will explain, among other things:

- What is the bootstrap method? What can it do? What is the difference between bootstrapping and Monte Carlo simulation? What is the fundamental justification of the bootstrap? How is the bootstrap implemented?
- Parametric and nonparametric bootstraps, definition of the empirical distribution, sampling methods for empirical distributions.
- Bootstrap estimation of probabilities and variances. Bootstrap bias correction and confidence intervals.
- What are the main strengths of the bootstrap, and when should bootstrapping be preferred? Error analysis in the bootstrap. Speed of convergence. Some basic theoretical results of the bootstrap method will be studied along with necessary tools. We prove that the bootstrap can produce a more accurate confidence interval than would otherwise based on the usual normal approximation (central limit theorem).
- Some further applications of the bootstrap: bootstrap tests, adjusted p-values, and bootstrap regression models.
- Examples where the bootstrap fails.
- The relationship between the bootstrap, jackknifing, and other re-sampling methods, including related applications.
- Application of the bootstrap to censored data.
- The empirical likelihood ratio method, including computation and applications to confidence intervals and testing. We will discuss the accuracy of these methods.

Nature of Assignments and Grading Criteria:

Weekly Homework – 25%
2 Midterms – 25% each.
Final – 25%

Grading Scale:
90-100 – A
80-90 – B
70-80 – C
Below 70 – E
At his or her discretion, the instructor may use a curve.
INVESTIGATOR REPORT

INVESTIGATING BODY

Area A. Shelley Steiner
(Area, Area Chair)

COURSE, MAJOR or DEGREE

STA 662
(department or college)

DATE FOR COUNCIL REVIEW

4/9/02

CATEGORY

NEW

CHANGE

DROP

INSTRUCTIONS: This completed form will accompany the course application to the Graduate/Undergraduate Council(s) in order to avoid needless repetition of investigation. The following questions are included as an outline only. Be as specific and as brief as possible. If the investigation was routine, please indicate this. The term "course" is used to indicate one course, a series of courses or a program, whichever is in order. Return the form to Phil Harling, Associate Dean, 231 Patterson Office Tower for forwarding to the Council(s). ATTACH SUPPLEMENT IF NEEDED.

1. List any modifications made in the course proposal as submitted originally and why.

None

2. If no modifications were made, review considerations that arose during the investigation and the resolutions.

3. List contacts with program units on the proposal and the considerations discussed therein.

Dr. Wood & Area A Committee

4. Additional information as needed.

None

5. A&S Area A, Natural & Mathematical Sciences Curriculum Committee Recommendation:

APPROVE

6. A&S Council Recommendation:

APPROVE

7. A&S Council Investigator, Dr. Shelley Steiner

Date: 4-9-02

File: InvestigatorRpt