UNIVERSITY OF KENTUCKY
APPLICATION FOR NEW COURSE

1. Submitted by College of Medicine ___________________________ Date February 26, 2002

Department/Division offering course School of Public Health ___________________________

2. Proposed designation and Bulletin description of this course

   a. Prefix and Number SPH 632
   b. Title* Mixed Models in Public Health
      *NOTE: If the title is longer than 24 characters (including spaces), write
      A sensible title (not exceeding 24 characters) for use on transcripts Mixed Models
   c. Lecture/Discussion hours per week 2
   d. Laboratory hours per week 2
   e. Studio hours per week 0
   f. Credits 3
   g. Course description
      Students will learn statistical techniques for analyzing those longitudinal studies in public health that involve repeated
      measures and random effects. This course will cover multilevel regression models, Poisson regression models, logistic
      Models with random effects, crossover experiments, and nonlinear pharmacokinetic models.
   h. Prerequisites (if any)
      SPH 630 or STA 580 or equivalent
   i. May be repeated to a maximum of N/A (if applicable)

4. To be cross-listed as

         Prefix and Number ___________________________ Signature, Chairman, cross-listing department

5. Effective Date Fall 2003 (semester and year)

6. Course to be offered ☑ Fall ☑ Spring ☐ Summer

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

8. Why is this course needed?

   This is one of four selective courses in the Biostatistics track of the MPH degree program. Students must complete three of
   the selectives. This selective concerns mixed models which are now the accepted method for analyzing responses from
   longitudinal studies in public health.

9. a. By whom will the course be taught? Richard Kryscio, Ziyad Mahfoud

   b. Are facilities for teaching the course now available?
      If not, what plans have been made for providing them?
      ☑ Yes ☐ No
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10. What enrollment may be reasonably anticipated? 25

11. Will this course serve students in the Department primarily?
   □ Yes □ No

   Will it be of service to a significant number of students outside the Department?
   □ Yes □ No

   Although primarily serving SPH students, some students in Medicine, Pharmacy, Agriculture, and Statistics might enroll in this course.

   Will the course serve as a University Studies Program course?
   □ Yes □ 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?
   If yes, which?
   □ Yes ☒ No

14. Will adding this course change the degree requirements in one or more programs?*
   If yes, explain the change(s) below

   This course is needed to meet the existing requirements of the Biostatistics track of the MPH degree program.

15. Attach a list of the major teaching objectives of the proposed course and 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 Richard J. Kryscio Phone Extension 7-4064

*NOTE: Approval of this course will constitute approval of the program change unless other program modifications are proposed.
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Signatures of Approval:

____________________________  ______________________________
Department Chair                 Date

____________________________  ______________________________
Dean of the College              Date

____________________________  ______________________________
*Undergraduate Council           Date

____________________________  ______________________________
*University Studies              Date

____________________________  ______________________________
*Graduate Council                Date

____________________________  ______________________________
*Academic Council for the Medical Center Date

____________________________  ______________________________
*Senate Council (Chair)          Date of Notice to University Senate

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

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ACTION OTHER THAN APPROVAL

Rev 11/98
Proposed Course: SPH 632 Mixed Models in Public Health

Prerequisite: SPH 630 or STA 570 or equivalent

Course Description:
Students will learn statistical techniques for analyzing those longitudinal studies in public health that involve repeated measures and random effects. This course will cover multilevel regression models, Poisson regression models, logistic models with random effects, crossover experiments, and nonlinear pharmacokinetic models.

Major Teaching Objectives:

1. Students will learn the basic components of statistical mixed models including fixed effects, random effects and their interactions with particular attention to models for repeated measures experiments and models for longitudinal data analysis.

2. Students will learn current mixed models for dependent variables with normal distributions, and other distributions from the exponential family including the binomial (logit), poisson, gamma, and ordered categorical.

3. Students will learn how random effects impact meta analysis studies and multicenter clinical trials.

4. Students will learn the role of mixed models in the following experiments frequently encountered in the medical sciences pharmacokinetic experiments and crossover trials.

5. Students will become familiar with statistical software to mixed models including Procedures Mixed, Gamma, Glimmix in the SAS system, and WinNumMix.

Course Topics:

1. Overview of Mixed Models and Applications
   Assessing patient effects in a medical experiment
   Using random effects
   Estimation (prediction) of random effects
   Baseline covariates

2. Normal Mixed Models
   Model fitting
   Bayesian approach
   Practical applications and interpretations
   Negative variance components

3. Generalized Linear Mixed Models
   Definitive: specifying random effects and link functions
   Examples of applications in medicine
   Binary and Poisson data

4. Mixed Models for Categorical Data
   Ordinal logistic and mixed models
   Unordered categorical data
   Practical applications

5. Multicenter Clinical Trials and Meta Analysis
   Center and center by treatment interactions
   Meta analysis using random effects
   Practical applications

6. Repeated Measures Data
   Covariance pattern models for normal data
   Covariance pattern models for count data
   Random coefficient models
   Sample size estimation
7. Crossover Trials
   - Advantages of mixed models in crossover experiments
   - Two period, two treatment designs
   - Higher order Designs
   - Binary and categorized responses

8. Nonlinear Mixed Models Applications
   - Pharmacokinetic (PK) models
   - Pharmacodynamic (PD) models
   - Selecting PK/PD links
   - Specifying mixed effects, error structures, and model parameters

References:


* denotes likely text

Course Grading Criteria:
Grades will be based on two exams (midterm and final) and a lab grade, all equally weighted. Weekly
lab assignments will emphasize computations, and use of technical software for this purpose. The
midterm exam will cover concepts and interpretation for the items listed under topics 1-4 above, while
the final exam will do the same for the items listed under topics 5-8.

Course Instructors:
Richard Kryscio, Ziyad Mahfoud