

COURSE APPROVAL ROUTING CHECK LIST

091033

1. Course Number: ACM
PSM 661
2. Course Title: Survival Analysis
(no more than 70 characters)

1st Bulletin 11/5/09
2nd Bulletin 11/19/09

Title Abbreviation: Survival Analysis
For use in Master Schedule (no more than 19 characters)

3. Action: New Course Revision IF Designation WAC

Requested Designation(s): _____

Course Proposal/Revision Check List

This checklist will help departments avoid some of the most common mistakes made on course proposals. Your use of the checklist will allow the College Senate Curriculum Committee to focus its review on more substantive issues and expedite the approval process.

- Proposal format conforms to the Directory of Policy Statements, Section IV:02.00 (2002).
- Proposal has been proofread for spelling, punctuation, grammar, style and gender-neutral language.
- If the course is a new course, reasons for the additions are included; if the course is a revision of an existing course, reasons for revision and a copy of the old course are included as well as the IF Narrative when appropriate.
- Catalog description follows the guidelines in the Curriculum Handbook, Appendix C.
- Student learning outcomes are coherent with course content and assessment.
- Outcomes are referenced with course content.
- All resource entries are alphabetized and conform to a specific style manual.
- Cross listed courses have been checked with all chairs and deans included in development of the course.

DEPARTMENT ACTION

W. S. Scales _____ Date 10/16/09
Chair, Department Curriculum Committee

4. **Approved** with confirmation that all necessary laboratories, studios, resources, facilities and personnel for support of this course are available.
- David C. Wick _____ Department MATH Date 10/16/09
Signature of Department Chairperson

(OVER)

Faculty (Check one) SNSS School of Natural and Social Sciences
 SOE School of Education
 SAH School of Arts and Humanities
 SOP School of Professions

DEAN'S ACTION

Approved with confirmation that all necessary laboratories, studios, resources, facilities and qualified faculty for support of this course are available.

10/26/09 _____
Date Signature of Dean (both Dean's if cross-listing)

COURSE PACKET INCLUDES:

- Electronic proposal form
- Attached electronic document with explanations of contingencies as stipulated at Dean's level
- One hard copy of proposal with attached contingencies and routing sheet with all appropriate signatures (copy of routing sheet in packet sent to Academic Affairs)
- For all revisions, one hard copy of current course should be submitted (e-copy is preferable when available)

COLLEGE SENATE ACTION

1. **Received**, logged and electronic packet and hard copies forwarded to the College Senate Office. Program title to be published in the *College Bulletin*.

10/27/09 _____ 091033
Date Signature of College Senate Office Log Number

2. Action for Intellectual Foundations' Designation

_____ Recommend approval _____
Signature of Assistant Dean, Intellectual Foundations

_____ Recommend disapproval _____
Signature of Assistant Dean, Intellectual Foundations

3. Action of the College Senate Curriculum Committee

Recommend approval and forward to College Senate
11/17/2009 _____
Date Signature of Chair, College Senate Curriculum Committee

_____ Recommend disapproval and return to Department _____
Date Signature of Chair, College Senate Curriculum Committee

ACTION OF THE OFFICE OF ACADEMIC AFFAIRS

Approved and forwarded to President _____ 11/19/09
Signature Date

_____ Disapproved and returned to Department _____
Signature Date

Prefix, Number and Name of Course: PSM 661 Survival Analysis

Credit Hours: 1

In Class Instructional Hours: 1 **Labs:** 0 **Studio:** 0 **Field Work:** 0

Catalogue Description:

Prerequisite: PSM 640 or instructor permission

Survival and hazard functions, life tables, Kaplan-Meier survival analysis, Cox regression proportional hazards model and Cox regression with time-dependent variables; comparison with logistic regression approaches.

Reasons for addition:

To create a one-semester-hour module for the graduate Professional Applied and Computational Mathematics program where students will formulate and solve real life problems in various settings using an analytic approach called survival analysis: a collection of statistical procedures for data analysis in which the outcome variable of interest is *time until an event occurs*.

Student Learning Outcomes: Students will	Course Content References:	Assessment:
1. discriminate the type of analytic problems addressed by survival analysis.	I-V	Individual homework assignments, group work, examinations and computer projects.
2. examine data and apply the Life Table Method of analysis or the Kaplan-Meier survival analysis as appropriate.	II-III	Individual homework assignments, group work, examinations and computer projects.
3. use the Cox Regression Proportional Hazards Model and the model with time-dependent variables.	IV-V	Individual homework assignments, group work, examinations and computer projects.
4. use appropriate statistical software to analyze real world problems	I-V	Individual homework assignments, group work, and computer projects.
Course Content:		
I. Introduction to survival analysis <ul style="list-style-type: none"> A. Censored data B. Survival and hazard functions C. Goals of survival analysis 		

II. Life tables

- A. Assumptions needed to use the life table
- B. Lost to follow-up
- C. Plotting and comparing survival functions

III. Kaplan-Meier survival analysis

- A. Kaplan-Meier estimators
- B. Comparing survival distributions - log-rank test

IV. Cox regression - proportional hazards (PH) model

- A. Maximum likelihood estimation of the Cox PH model
- B. Evaluating the PH assumption
- C. Graphical displays - examination of residuals
- D. The stratified Cox procedure
- E. The no-interaction assumption and how to test it

V. Cox regression - Time-Dependent variables

Resources

Scholarship:

Balakrishnan, N., and Rao, C. R., *Advances in Survival Analysis*, Elsevier North-Holland, 2004.

Cox, D. R., and Oakes, D., *Analysis of Survival Data*, Chapman and Hall, 1984.

Elandt-Johnson, R. C., and Johnson, N. L., *Survival Models and Data Analysis*, Wiley, 1980.

Hosmer, D. W., Lemeshow, S., and May, S., *Applied Survival Analysis: Regression Modelling of Time-to-Event Data*, 2nd ed., Wiley Interscience, 2008.

Kalbfleisch, J. D., and Prentice, R. L., *The Statistical Analysis of Failure-Time Data*, Wiley, 1980.

Kleinbaum, D. G., *Survival Analysis: A Self-Learning Text*, 2nd ed., Springer Science, 2005.

Le, C.T., *Applied Survival Analysis*, Wiley, 1997.

Lee, E. T., and Wang, J. W., *Statistical Methods for Survival Data Analysis*, 3rd ed., Wiley, 2003.

Machin, D., Cheung, Y. B., and Parmar, M. K. B., *Survival Analysis: A Practical Approach*, 2nd ed., Wiley, 2006.

Ruppert, G., *Survival Analysis*, Wiley, 1981.

Periodicals:

Annals of Applied Statistics

Annals of Mathematical Statistics

Annals of Statistics

Biometrics

Biometrika

Communications in Statistics

Demography

International Statistical Review

Journal of the American Statistical Association

Journal of Applied Statistics

Journal of Applied Statistical Science

Journal of Statistical Computation and Simulation

Journal of the Royal Statistical Society

Life-time Data Analysis

Scandinavian Journal of Statistics

Statistics in Medicine

Statistical Methods in Medical Research

Technometrics

The American Statistician

Electronic and/or Audiovisual Resources:

MedCalc Software, "Kaplan-Meier Survival Curves," www.medcalc.be/manual/kaplan-meier.php.

NCSS, "PASS Survival Analysis," www.ncss.com/passsurv.html.

OriginLab, "Script: Survival Analysis," wiki.originlab.com/~originla/wiki/index.php?title=Script:Survival_Analysis.