Tamkang University Academic Year 104, 1st Semester Course Syllabus

Course Title	SURVIVAL ANALYSIS	Instructor	CHEN SHUN-YI
Course Class	TSMCB3A DEPARTMENT OF MATHEMATICS (SECTION OF DATA SCIENCE AND MATHEMATICAL STATISTICS), 3A	Details	◆ Selective ◆ 1st Semester ◆ 3 Credits

Departmental Aim of Education

Ⅰ. To teach knowledge in mathematics.

Ⅱ. To train teaching professionals in mathematics.

Ⅲ. To develop independent and creative thinking.

Ⅳ. To establish ability to present oneself.

Ⅴ. To promote cooperative working spirit.

Ⅵ. To prepare self learning ability in multiple areas.

Departmental core competences

A. To learn the fundamentals of mathematics.

B. To develop independent and logical thinking ability.

C. To learn basics of probability and statistic.

D. To use the aid of computer in solving mathematical and statistical problems.

E. To obtain the ability to collect and analyze data.

F. To establish ability to pursue knowledge in advanced mathematics.

Course Introduction	This course provides a comprehensive introduction of commonly used methods for analyzing survival data. It deals with statistical methods for analyzing data derived from laboratory studies of animals, clinical and epidemiologic studies, and other appropriate applications. We will introduce definitions and interpretations of survival functions, methods for estimating and comparing these functions, and approaches to the identification of prognostic factors that are related to survival. Parametric survival model, recurrent event and competing risks survival analysis will be discussed.

The Relevance among Teaching Objectives, Objective Levels and Departmental core competences

I.Objective Levels (select applicable ones) :

(i) Cognitive Domain : C1-Remembering, C2-Understanding, C3-Applying, C4-Analyzing, C5-Evaluating, C6-Creating

(ii) Psychomotor Domain : P1-Imitation, P2-Mechanism, P3-Independent Operation, P4-Linked Operation, P5-Automation, P6-Origination

(iii) Affective Domain : A1-Receiving, A2-Responding, A3-Valuing, A4-Organizing, A5-Charaterizing, A6-Implementing

II.The Relevance among Teaching Objectives, Objective Levels and Departmental core competences :

(i) Determine the objective level(s) in any one of the three learning domains (cognitive, psychomotor, and affective) corresponding to the teaching objective. Each objective should correspond to the objective level(s) of ONLY ONE of the three domains.

(ii) If more than one objective levels are applicable for each learning domain, select the highest one only. (For example, if the objective levels for Cognitive Domain include C3,C5,and C6, select C6 only and fill it in the boxes below. The same rule applies to Psychomotor Domain and Affective Domain.)

(iii) Determine the Departmental core competences that correspond to each teaching objective. Each objective may correspond to one or more Departmental core competences at a time. (For example, if one objective corresponds to three Departmental core competences: A,AD, and BEF, list all of the three in the box.)

No.	Teaching Objectives	Relevance	
		Objective Levels	Departmental core competences
1	Students will be able to acquire the ability of the statistical concepts and techniques of survival analysis in related problems.	C4	CE

Teaching Objectives, Teaching Methods and Assessment

No.	Teaching Objectives	Teaching Methods	Assessment
1	Students will be able to acquire the ability of the statistical concepts and techniques of survival analysis in related problems.	Lecture, Discussion, Appreciation, Problem solving	Written test, Report, Participation

This course has been designed to cultivate the following essential qualities in TKU students	
Essential Qualities of TKU Students	Description
◆ A global perspective	Helping students develop a broader perspective from which to understand international affairs and global development.
◆ Information literacy	Becoming adept at using information technology and learning the proper way to process information.
◇ A vision for the future	Understanding self-growth, social change, and technological development so as to gain the skills necessary to bring about one's future vision.
◇ Moral integrity	Learning how to interact with others, practicing empathy and caring for others, and constructing moral principles with which to solve ethical problems.
◆ Independent thinking	Encouraging students to keenly observe and seek out the source of their problems, and to think logically and critically.
◇ A cheerful attitude and healthy lifestyle	Raising an awareness of the fine balance between one's body and soul and the environment; helping students live a meaningful life.
◆ A spirit of teamwork and dedication	Improving one's ability to communicate and cooperate so as to integrate resources, collaborate with others, and solve problems.
◇ A sense of aesthetic appreciation	Equipping students with the ability to sense and appreciate aesthetic beauty, to express themselves clearly, and to enjoy the creative process.

Course Schedule

Week	Date	Subject/Topics	Note
1	104/09/14 ~ 104/09/20	Introduction of Survival analysis	
2	104/09/21 ~ 104/09/27	Censored data	
3	104/09/28 ~ 104/10/04	Survival function and hazard function	
4	104/10/05 ~ 104/10/11	Data layout for understanding analysis	
5	104/10/12 ~ 104/10/18	Kaplan-Meier curve	
6	104/10/19 ~ 104/10/25	General features of Kaplan-Meier curve	
7	104/10/26 ~ 104/11/01	Log-rank test	
8	104/11/02 ~ 104/11/08	Alternatives to the Log-rank test	
9	104/11/09 ~ 104/11/15	The Cox proportional hazards model	
10	104/11/16 ~ 104/11/22	Midterm Exam Week	
11	104/11/23 ~ 104/11/29	Partial likelihood	
12	104/11/30 ~ 104/12/06	ML estimation of the Cox PH model	

13	104/12/07 ~ 104/12/13	Hazard ratio	
14	104/12/14 ~ 104/12/20	Checking the PH assumption	
15	104/12/21 ~ 104/12/27	Observed versus expected plot	
16	104/12/28 ~ 105/01/03	Goodness of fit test	
17	105/01/04 ~ 105/01/10	Time-dependent covariate approach	
18	105/01/11 ~ 105/01/17	Final Exam Week	

Requirement	1. Students will be required to present in class on the topics they are assigned to study. 2. Evaluation and grading criteria for the course: regular attendance; steady participation in class discussions; active in group-assignment participation.
Teaching Facility	Computer, Projector
Textbook(s)	Survival Analysis, A Self-Learning Text, 2nd ed., Kleinbaum & Klein (2005), Springer
Reference(s)	Survival Analysis: Techniques for censored and truncated data, Klein & Moeschberger (2003), Springer
Number of Assignment(s)	(Filled in by assignment instructor only)
Grading Policy	◆ Attendance： 40.0 % ◆ Mark of Usual：20.0 % ◆ Midterm Exam： % ◆ Final Exam： % ◆ Other〈Reports/Presentation〉：40.0 %
Note	This syllabus may be uploaded at the website of Course Syllabus Management System at http://info.ais.tku.edu.tw/csp or through the link of Course Syllabus Upload posted on the home page of TKU Office of Academic Affairs at http://www.acad.tku.edu.tw/CS/main.php . **※ Unauthorized photocopying is illegal. Using original textbooks is advised. It is a crime to improperly photocopy others' publications.**