Universitat Autònoma de Barcelona

2022/2023

Survival Analysis

Code: 104867
ECTS Credits: 6

Degree	Type	Year	Semester
2503852 Applied Statistics	OB	2	2

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Prerequisites

It is necessary to have knowledge of:

- Descriptive statistics
- Probability
- Statistical inference

In addition, it's recomended to be studying or have completed the subject Linear Models 1, and to have basic knowledge of SAS.

Objectives and Contextualisation

In this subject, the basic concepts for the analysis of time to event will be introduced: censor indicator, Kaplan-Meier estimator and introduction to parametric and semi-parametric models for survival data.

Competences

- Critically and rigorously assess one's own work as well as that of others.
- Make efficient use of the literature and digital resources to obtain information.
- Select and apply the most suitable procedures for statistical modelling and analysis of complex data.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
- Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
- Use quality criteria to critically assess the work done.

- Work cooperatively in a multidisciplinary context, respecting the roles of the different members of the team.

Learning Outcomes

1. Critically assess the work done on the basis of quality criteria.
2. Identify the statistical assumptions associated with each advanced procedure.
3. Identify, use and interpret the criteria for evaluating compliance with the requisites for applying each advanced procedure.
4. Make effective use of references and electronic resources to obtain information.
5. Reappraise one's own ideas and those of others through rigorous, critical reflection.
6. Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
7. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
8. Students must be capable of communicating information, ideas, problems and solutions to both specialised and non-specialised audiences.
9. Students must develop the necessary learning skills to undertake further training with a high degree of autonomy.
10. Work cooperatively in a multidisciplinary context, accepting and respecting the roles of the different team members.

Content

OBservation: At the moment of publishing this information, the subject does not have an assigned professor, hence, the contents and/or grading details might change.

I. Basic concepts

- Survival function

- Risk function

- Mean residual life

- Incomplete data: censor indicator

II. Non- parametric inference for right censoring data

- Estimators of the survival function

- Estimator of the mean and median survival times

- Comparison of survival curves

III. Introduction of parametric models for survival times

- Distributions of non-negatives random variables

- Accelerated failure time model. Definition, properties and goodness of fit

IV. Introduction of Cox model (Proportional-Hazards Model)

- Cox regression model

- Partial likelihood function

- Interpretations and properties of estimators

Methodology

Indepedendent learning:

- Learning basic concepts
- Practice activities with SAS
- Problems solutions

**The proposed teaching methodology may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.*

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Problem resolution	14	0.56	5, 2, 3, 9, 6, 7, 4
Theory	21	0.84	2, 3, 7, 4
Type: Supervised			
Practices	20	0.8	5, 1, 2, 7, 10
Type: Autonomous			
Complete each practice	30	1.2	7
More concepts	30	1.2	7
Problems solutions	10	0.4	5, 1, 10, 4

Assessment

For the practices evaluation, a hackaton will be carried out. In this session, a database will be analyzed, a code (with the software proposed) with the solution of the problem and a report that includes the methodologies used, technical details and interpretation of the results.

**Student's assessment may experience some modifications depending on the restrictions to face-to-face activities enforced by health authorities.*

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Final Exam	40%	3	0.12	2, 3, 8, 6, 7
Hackathon	30%	20	0.8	5, 1, 10, 4

Midterm exam	30%	2	0.08	2, 9, 8, 6, 7

Bibliography

Allison, P. (2010). Survival Analysis Using the SAS System: A Practical Guide, 2nd Edition. Cary: SAS Institute Inc, cop.

Collett, D. (2015). Modelling Survival Data in Medical Research, 3rd Edition. Chapman & Hall.

Hosmer, D., Lemeshow, S. and May, S. (2008). Applied Survival Analysis: Regression Modeling of Time-to-Event Data, 2nd Edition. Wiley.

Klein, J. and Moeschberger, M. (2003). Survival Analysis: Techniques for Censored and Truncated Data, 2nd Editon. Springer.

Kleinbaum, D. (2012). Survival Analysis: A Self-Learning Text, 3rd Edition. Springer Science.

Software

The practices will be carried out with software SAS.