Lifetime Data Analysis

Course title - Intitulé du cours	Lifetime Data Analysis
Level / Semester - Niveau /semestre	M2 / S1
School - Composante	TSE
Teacher - Enseignant responsable	Eve LECONTE
Lecture Hours - Volume Horaire CM	21
TA Hours - Volume horaire TD	0
TP Hours - Volume horaire TP	0
Course Language - Langue du cours	English
TA and/or TP Language - Langue des TD et/ou TP	

Teaching staff contacts

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Students may ask questions during the class, after the class, by email or they also can ask for an appointment by sending an email.

Course's Objectives

Objective: to be able to recognize a situation where censored data appear and to be able to analyze such data by implementing an appropriate modeling.

More precisely: to be able

- to estimate the survival function (Kaplan-Meier estimator) and the cumulated hazard function,

- to assess the univariate influence of a categorical variable on the duration to an event (Kaplan-Meier curves and logrank tests),

- to fit a multivariate parametric or semi-parametric regression model (Cox model) and to comment the output (estimation and tests),

- to check the validity of the proportional hazards assumption in a Cox model.

All the sessions take place in a computer room as a preponderant part is given to the learning of the dedicated software (R and SAS). The course is illustrated by data examples in different fields: medicine, economics, marketing,...

Prerequisites

Inferential statistics: hypothesis testing, maximum likelihood estimation and tests (Wald, score and likelihood ratio tests).

Practical information about the sessions

Laptops or tablets are accepted.

Students have sometimes short homework to do.

Late arrivals are accepted with a good reason.

Grading system

A final exam with a short theoretical part without documents and a longer part to analyse real data with computer software (R or SAS) with all the documents and files allowed.

Bibliography/references

Hill C., Com-Nougué C., Kramar C., Moreau T., O'Quigley J., Senoussi R. and Chastang C. (1990), Analyse statistique des données de survie, Flammarion.

Klein J. P. and Moeschberger M. L. (1997), Survival Analysis - Techniques for censored and truncated data, Springer.

Allison P. D. (1995), Survival analysis using the SAS system. A practical guide. SAS Institute Inc.

Session planning

Course outline:

- Survival distributions: specific functions and the most used distributions for survival data

- Censored data: censoring and truncation, right censoring

- Non parametric estimation of the survival function and the cumulative hazard function: Kaplan - Meier and Nelson - Aalen estimators

- Comparison of two or more survival distributions: weighted logrank tests

- Parametric regression models: proportional hazards models and accelerated failure time models

- The semi-parametric Cox model: modeling, partial likelihood, estimation and tests of the parameters, estimation of the baseline cumulative hazard, validation and extensions.

Distance learning – Enseignement à distance :

In case of closure of the University, there will be for this course: - Interactive virtual classrooms (with Zoom) with R tutorials - MCQ tests and other exercises and assignements (TP with R) - Forum on Moodle