

Lifetime Data Analysis

Course title - Intitulé du cours	Lifetime Data Analysis
Level / Semester - Niveau /semestre	M2 / S1
School - Composante	Ecole d'Economie de Toulouse
Teacher - Enseignant responsable	LECONTE EVE
Other teacher(s) - Autre(s) enseignant(s)	
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Other teacher(s) - Autre(s) enseignant(s)	
Lecture Hours - Volume Horaire CM	21
TA Hours - Volume horaire TD	0
TP Hours - Volume horaire TP	0
Course Language - Langue du cours	Anglais
TA and/or TP Language - Langue des TD et/ou TP	Anglais

Teaching staff contacts - Coordonnées de l'équipe pédagogique :

Eve Leconte, eve.leconte@tse-fr.eu, office MF 219

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

Course's Objectives - Objectifs du cours :

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

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 model (Cox-model) and to comment the output (estimation and tests),
- to check the validity of the proportional hazards assumption.

All the sessions take place in a computer room and an important place is given to the learning of the dedicated software (R and SAS).

Prerequisites - Pré requis :

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

Practical information about the sessions - Modalités pratiques de gestion du cours :

Laptops or tablets are accepted.

Students have sometimes to do homework.

Late arrivals are accepted with a good reason.

Grading system - Modalités d'évaluation :

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 - Bibliographie/références :

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 - Planification des séances :

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: modelling, partial likelihood, estimation and tests of the parameters, estimation of the baseline cumulative hazard, validation and extensions.