

Module Description

Predictive Modelling

General Information

Number of ECTS Credits

3

Abbreviation

FTP_PredMod

Version

21.11.2015

Responsible of module

Mirko Birbaumer, HSLU

Language

	Lausanne	Bern	Zürich
Instruction	<input type="checkbox"/> E <input type="checkbox"/> F	<input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/> F	<input type="checkbox"/> D <input checked="" type="checkbox"/> E
Documentation	<input type="checkbox"/> E <input type="checkbox"/> F	<input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/> F	<input type="checkbox"/> D <input checked="" type="checkbox"/> E
Examination	<input type="checkbox"/> E <input type="checkbox"/> F	<input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/> F	<input type="checkbox"/> D <input checked="" type="checkbox"/> E

Module category

- Fundamental theoretical principles - FTP
- Technical/scientific specialization module - TSM
- Context module - CM

Lessons

- 2 lecture periods and 1 tutorial period per week

Brief course description of module objectives and content

This course will provide an introductory review of the basic concepts of probability and statistics to understand probability distributions and to produce rigorous statistical analysis including estimation, hypothesis testing, and confidence intervals. Students will be introduced to the basic concepts of predictive modelling which by definition is the analysis of current and historical facts to make predictions about future events. Students will learn several techniques that account for many business and engineering applications of predictive modelling. These include regression techniques, time series models, and classification methods. Applicability and limitations of these methods will be illustrated in the light of data sets and analyses using the statistical software R.

Learning objectives and acquired competencies

Students are able to analyze data by means of regression analysis. They are familiar with important statistical forecasting methods and are able to calculate, evaluate and interpret predictions. They are able to choose an appropriate statistical method for a regression, classification or time series problem. They are able to evaluate and compare statistical models.

Contents of module with emphasis on teaching content

Fundamental concepts of probability and statistics (repetition of basic courses) : concept of random variable, important probability distributions, parameter estimation, hypothesis testing, and confidence intervals.

Regression analysis : Simple linear regression with parameter estimation, graphical model validation, transformation of variables, confidence and prediction intervals for parameters. Multiple linear regression with parameter estimation, statistical tests and confidence intervals for parameters, and variable selection.

Classification : Concepts of classification, logistic regression, CART, random forests and model evaluation by cross-validation.

Time series analysis : STL decomposition, MA with parameter estimation, confidence and prediction bands, AR models with parameter estimation, confidence and prediction bands, autocorrelation, and model selection.

Teaching and learning methods

Lecture and practical work on computer with the statistics software R.

Prerequisites, previous knowledge, entrance competencies

Basic knowledge of statistics on the level of an introductory stochastics course. Linear algebra: matrix-vector calculations.

Literature

Lecture notes will be available in addition to recommended book chapters.

Assessment**Certification requirements for final examinations (conditions for attestation)**

No.

Written module examination

Duration of exam : 120 minutes

Permissible aids: Open book and statistical software R on examination laptop.