UNIVERSITY OF SKÖVDE

COURSE SYLLABUS

Predictive modelling, Post-graduate level

7.5 credits

Course code: IT0947F
Version number: 2.1
Valid from: 1 July 2024
Ratified by: Curriculum Committee for Third-cycle Studies
Date of ratification: 11 March 2024

1. General information about the course

The course is provided by the University of Skövde and is named Predictive modelling, Post-graduate level (Prediktiv modellering, Forskarnivå). It comprises 7.5 credits .

The course is a part of the third-cycle subject area of Informatics.

2. Entry requirements

The prerequisites for this course are general entry requirements for third-cycle courses and study programmes, i.e. a second-cycle qualification or satisfied requirements for courses comprising at least 240 credits of which at least 60 credits were awarded in the second cycle (or the equivalent).

In order to fulfil the specific entry requirements, the applicant must have completed course requirements of at least 60 credits, including an independent project of at least 15 credits at the second cycle, within the subject Informatics, applicable areas of a similar kind or other fields assessed as directly relevant for thesis work in the subject Informatics.

An additional requirement is proof of skills in English equivalent of studies at upper secondary level in Sweden, known as the Swedish course English 6. This is normally demonstrated by means of an internationally recognized language test, e.g. IELTS or TOEFL or the equivalent.

3. Course content

Predictions are central to any decision making, yet often in generating predictions we do not consider the special nature of the problem. There are both methodological and modelling implications when we switch from a descriptive to a predictive context. This course is designed to provide a thorough understanding of these differences, introduce the principal modelling families, and the intricacies of predictive experimental design. We will also discuss in depth the notions of uncertainty, predictability and causality, to better understand what they imply for our modelling, and the implicit limitations for our analysis. Ultimately, predictive modelling is not done for the sake of generating predictions, but rather to support users and decision makers. This will be a pillar of this course, making it relevant to students who have wider interests and research topics than predictive modelling.

More specifically, we will focus on time series modelling: data analysis and exploration for predictive modelling, design of experiments in a predictive setting, extrapolative forecasting models, causal forecasting models, model specification and evaluation, and model selection and combination.

The aim of the course is to be agnostic in the model families, taking advantage of all artificial intelligence, machine learning and statistics. Specifics will be updated periodically to reflect the state of

the art in the literature and the research at the University. Finally, a thorough understanding of predictive modelling will contribute to furthering the student's mastery of the scientific method, having access to a substantial toolbox to validate models, and data driven insights. The ultimate test of a theory is its ability to make predictions.

4. Objectives

After completed course the student should be able to:

- demonstrate a good understanding of predictive model building principles,
- solve real decision making and predictive problems using different families of models,
- design and carry out valid experiments in a predictive setting,
- quantify prediction and modelling uncertainties and map how these connect to supporting users, and
- understand the limits of predictability and causality and how to estimate them.

5. Examination

The course is graded G (Pass) or U (Fail).

To receive the grade Pass on the course, all examination parts have to be graded Pass.

The examinations of the course consist of the following modes of assessment:

- **Written assignment**
  7.5 credits, grades: G/U

Doctoral students with a permanent disability who have been approved for directed educational support may be offered adapted or alternative modes of assessment.

6. Types of instruction and language of instruction

The form of teaching comprises of lectures, self-study material, and group discussions.

The teaching is conducted in English.

7. Course literature and other educational materials

Hyndman, R.J. & Athanasopoulos, G. (2021). *Forecasting: Principles and practice* (3rd ed.). Melbourne, Australia: Otexts. ISBN 9780987507136.

Ord, K., Fildes, R. & Kourentzes, N. (2017). *Principles of business forecasting* (2nd. ed.). Wessex Publishing. ISBN 9780999064917.

Research articles according to teacher's instructions on the page of the course on the learning platform.

8. Doctoral student influence

Doctoral student influence in the course is ensured by means of course evaluation. The students are informed about the results of the evaluation and potential measures that have been taken or are planned, based on the course evaluation.

9. Additional information

Further information about the course, as well as national and local governing documents for higher education, is available on the website of the University of Skövde.