



UNIVERSITY
OF SKÖVDE

TRANSLATION FROM SWEDISH

COURSE SYLLABUS

Probabilistisk modellering, Forskarnivå Probabilistic Modeling, Post-graduate level 7.5 credits

Course Code: IT0949F

The Course Syllabus applies from: Jul 1, 2023

Date of Approval: Mar 20, 2023

Version Number: 1.1

Third-cycle Subject Area: Informatics

Academic Level: Post-graduate level

1 Name, Scope and Level of the Course

The course is given by the University of Skövde and is named Probabilistic Modeling, Post-graduate level. It comprises 7.5 credits and is on Post-graduate level.

2 Objectives

After completed course the doctoral student should be able to:

- demonstrate the use of tools for probabilistic programming;
- analyze and judge training results of a probabilistic model;
- demonstrate use of methods for evaluation of fit for a given probabilistic model with respect to certain data set;
- critically reflect regarding different models and their fit to data; and
- argue for different choices within the modeling process for both design choices with respect to probabilistic model but also approach within the modeling process.

3 Course Content

The course cover the area probabilistic modeling from the perspective that is present within the areas artificial intelligence, machine learning and data science where the goal often is to extract knowledge or use models for decision making or prediction. The course will in general be based on Bayesian theory since this is the commonly used base for probabilistic modeling within

these areas.

The course starts with a positioning of the area within a context and introducing central terms and tools for probabilistic programming. Programming for efficient handling of data as well as for building models, so called probabilistic programming, will be covered. Furthermore, important probabilistic terms will be highlighted and illustrated. Terms and concepts, such as prior, likelihood and posterior, within Bayesian theory will be introduced at different level of details in several of the lectures.

Great emphasis within the course will be put on intuitive understanding of terms and concepts since these are required in order to understand consequences of different design choices for a model and its relation to data. Different types of training algorithms and its consequence when it comes to resulting model will be covered as well as a range of models of different complexity.

The course follows a structure where complexity when it comes to methods and terms within the area increases with the progression of the course. Hence, the first assignment aims at securing that a certain level within methods and terms has been achieved. The following assignment as well as the project work aims at applying and further develop this level.

4 Forms of Teaching

The teaching comprises lectures, project work, presentations and exercises.

The teaching is conducted in English.

5 Examination

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

Registration of examination results:

Name of examination	Credits	Grading
Assignment 1	1.5 hp/credits	U/G
Assignment 2	2 hp/credits	U/G
Project report	4 hp/credits	U/G

To obtain a final passing grade of the course, each part of the examination must have been approved.

6 Admission Requirements

The admission requirements of the 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 Specified Entry Requirements the applicant must have completed academic courses of at least 60 credits, including independent thesis writing of at least 15 credits at advanced level, within the field Informatics, applicable areas of a similar kind or other fields which are directly judged as relevant for the Licentiate or PhD thesis.

A further 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.

7 Third-cycle Subject Area

The course forms a part of the third-cycle subject area of Informatics at the University of Skövde.

8 Approval of Course and Course Syllabus

This course was established by the Education Committee for Third-cycle Studies in Informatics Sep 26, 2022. This course syllabus was ratified by the Education Committee for Third-cycle Studies Mar 20, 2023. It is valid from Jul 1, 2023 and replaces the course syllabus ratified Sep 26, 2022.

9 Overlapping with Another Course

This course cannot constitute a part of a degree also containing a course, the content of which is totally or partly equivalent to the content of this course.

10 Additional Information

Further information will be available on the university's website before the course is provided.

National and local regulations for higher education are available on the university's website.

During and after the course there will be a follow-up evaluation concerning the learning outcomes. The main objective of the follow-up is to contribute to improving the course. The doctoral students' experience and points of view constitute one part of the scrutiny and are obtained through written group course evaluation/discussions. The doctoral students are to be informed about the outcome of these as well as possible decisions concerning steps to be taken.

11 Course Literature and Other Educational Materials

Scientific publications and other specified material according to the teacher.