



Redesigning EMOS-labelled master's programmes

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EMOS Network Meetings

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New Challenges and Opportunities in a New Era

- ▶ The job market for statisticians is in a state of change.
- ▶ We can note that knowledge and experience in programming, especially in R and Python, and database management are increasingly emphasized.
- ▶ New concepts such as "Data Science" have become popular and gained greater importance in the statistician's professional role.
- ▶ Data Science is a somewhat vague concept that largely includes knowledge and skills that are traditionally part of an education in statistics, but also methods and techniques that to some extent have their origins in data science.

Indicators for Changes: The Case of Örebro

- ▶ The number of students was going down.
- ▶ Alumni survey:
 - ▶ Based on their professional experience, wanted more focus on programming and databases in education.
 - ▶ The value of the internship course and other connections to working life when looking for a job, e.g. the writing of an essay in collaboration with an external partner was also highlighted.
- ▶ Network meetings: National and International.

Actions: The Case of Örebro

- ▶ A comprehensive update was performed to give the students a stronger connection to a changing labour market and thereby increasing the programme's attractiveness.
- ▶ A guiding thought during the work on the new programme has been that it should still provide the competencies that statisticians are traditionally expected to have while adding new competencies, including in what is popularly known as Data Science, from a statistical perspective.
- ▶ Methods such as machine learning will therefore be more marked by their roots in the subject of statistics than what is typically done within a "Data Science" programme with a greater focus on "explainability".
- ▶ An important aspect in the revision of the programme has been to keep the EMOS label and satisfy the EMOS learning outcomes.

Actions: EMOS Requirements

- ▶ The revised programme is set up to provide the students with the skills needed to address the challenges arising from the changing landscape of official statistics, the increased use of "alternative" data sources, dissemination, and communication skills emphasized by the ESSC.
- ▶ This is, in particular, manifested in the new courses Data Visualisation, Programming for Statisticians, Databases and Machine Learning for Data Science.
- ▶ In addition, many of the existing courses have been revised to bring in new material and provide the students with the required skill sets.

Actions: Programme Name and Local Objectives

▶ **New Name:**

”**Master’s Programme in Statistics - Statistical Modelling and Data Science**”

▶ **New Local Objectives:**

On completion of the programme, the student shall

- ▶ be confident in the statistician’s professional role and responsibility,
- ▶ demonstrate in-depth knowledge and advanced skills in statistical methods and their application,
- ▶ demonstrate an ability to independently identify appropriate approaches and analysis methods and, when required, develop and adapt these to new situations,
- ▶ demonstrate an ability to give reasons for and explain the choice of analysis method, as well as demonstrate insights into the significance of data quality for the choice of analysis methods, and
- ▶ demonstrate an ability to manage and organise large and complex datasets, including the illustration of data.

Programme Layout

- ▶ **One and two-year master's degree:**
The programme of study is two years long and leads to a master's (2 years) degree but there is also an option to exit after one year with a master's (1 year) degree.
- ▶ To make room for new content and at the same time clarify the programme's content, a large part of the courses in the new programme has a scope of 5 credits instead of 7.5 credits in the old programme.
- ▶ Although course names (and credit scores) remain, courses are new or revised and content adjusted to better align with the new goals of the programme.
- ▶ EMOS track is optional for students.

Programme Layout

▶ Semester 1

- ▶ Mathematics (5 ECTS credits, revised)
- ▶ Data Visualisation (5 ECTS credits, new)
- ▶ Programming for Statisticians (5 ECTS credits, new)
- ▶ Probability theory (5 ECTS credits, replaces 7.5 credit course in probability and inference)
- ▶ Databases (5 ECTS credits, new)
- ▶ Inference Theory (5 ECTS credits, replaces 7.5 credit course in probability and inference)

▶ Semester 2

- ▶ Computational Statistics (7.5 ECTS credits, revised)
- ▶ Econometrics (7.5 ECTS credits, revised)
- ▶ Thesis I (15 ECTS credits)

Programme Layout

▶ Semester 3

- ▶ Bayesian Statistics (5 ECTS credits, revised)
- ▶ Sampling Theory (5 ECTS credits, revised)
- ▶ Machine Learning for Data Science (5 ECTS credits, new)
- ▶ 15 ECTS credits of elective courses from
 - ▶ **Sample Survey Methodology** (5 ECTS credits, revised, required for EMOS diploma)
 - ▶ **Production of Official Statistics** (5 ECTS credits, revised, required for EMOS diploma)
 - ▶ Causal Inference (5 ECTS credits, revised)
 - ▶ Time Series Analysis (5 ECTS credits, revised)
 - ▶ Courses in other subjects offered by the university

▶ Semester 4

- ▶ **Work placement for Statisticians** (15 ECTS credits, placement at SCB or similar required for EMOS diploma)
- ▶ **Thesis II** (15 ECTS credits, topic relevant for official statistics required for EMOS diploma)