LUND UNIVERSITY
Faculty of Science

SYLLABUS

Date	Reg. Nr.
2017-XX-XX	U 2017/XXX

Syllabus for the course Applied Scientific Data Handling, NAKE014

Swedish title: Tillämpad vetenskaplig hantering av data

The course syllabus was confirmed by the Faculty board for graduate studies XX Month 2017. The course is in the third cycle and amounts to 4 credits.
The course syllabus is formally approved in Swedish. This is a translation.

Learning outcomes
This course develops the basic skills for applied scientific data treatment with focus on the chemical and life science. The course contains theoretical as well as applied parts to enable the students to perform data analysis in their respective subject with a widely used and freely available computing language (python). On completion of the course, participants shall be able to:

Knowledge and understanding

- Formulate and test hypotheses with standard methods like t-test and ANOVA

Skills and abilities

- Create a wide variety of plots for visualization of data and in publication quality.
- Calculate and describe statistical correlations in datasets and evaluate their significance with standard models
- Describe a dataset with principle component analysis, model functions and models with optimised sets of parameters
- Import and export data from text files and communicate with instrument interfaces for automated data collection.

Course content
The course is focused on the practical skills necessary to analyse data in chemical sciences. Each topic will be introduced with a short theoretical background followed by a practical tutorial introducing the key concepts and methods on tutorial data and finally on the student's own dataset. The course deals with the following concepts
- Introduction to Python and data handling
- Importing, cleaning and plotting of data
- Statistical description and evaluation of data and data correlations, including hypothesis testing and ANOVA.
- Creation of advanced graphs in publication quality
- Introduction into singular component analysis (SVD, PCA,..), model formulations and optimisation routines
- Introduction into communication with instruments

Teaching
The course consists of seminars, practical exercises and hand-in written assignments.

Assessment
Assessment is based on written assignments and on a written report on a data analysis based on the student's own data set.

Grading scale
Possible grades are Pass and Fail. To pass the course, the student must pass the written assignments and pass the written data analysis report.

Language of instruction
English.

Entry requirements
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Additional information
As the focus is on the practical analysis of a data set, the students are encouraged to use a dataset from their respective subjects during the course. In this way the individual needs will be met as far as possible.