# neu250 - Computational Neuroscience - Statistical Learning

**Module label**
Computational Neuroscience - Statistical Learning

**Module code**neu250

**Credit points**
6.0 KP

**Workload**
180 h

**Used in course of study**
- Master's Programme Neuroscience > Background Modules

**Contact person**

**Module responsibility**
- Jutta Kretzberg

**Authorized examiners**
- Alle hier genannten

**Module counseling**
- Jochem Rieger
- Jörn Anemüller

**Entry requirements**
attendance in pre-meeting

**Skills to be acquired in this module**
- Neurosci. knowlg. Expt. methods Independent research + Scient. literature + Social skills
- Interdiscipl. knowlg. ++ Maths/Stats/Progr. + Data present./disc. + Scientific English Ethics
- Upon successful completion of this course, students have refined their programming skills (in Matlab) in order to efficiently analyze large-scale experimental data
- are able to implement a processing chain of prefiltering, statistical analysis and results visualization
- have acquired an understanding of the theoretical underpinnings of the most common statistical analysis methods
- have practised using existing toolbox functions for complex analysis tasks
- know how to implement new analysis algorithms in software from a given mathematical formulation
- can interpret analysis results in a neuroscientific context
- have applied these techniques to both single channel and multi-channel neurophysiological data

**Module contents**
data preprocessing, e.g., artifact detection and rejection, filtering, z-scoring, epoching
-data handling for high-volume data in matlab
-introduction to relevant analysis toolbox software
-theory of multi-dimensional statistical analysis approaches, such as multi-dimensional linear regression, principal component analysis, independent component analysis, logistic regression, gradient-based optimization
-practical implementation from mathematical formulation to software code, debugging and unit testing
-postprocessing and results visualization
-consolidation during hands-on computer-based exercises (in Matlab)
-introduction to selected specialized analysis approaches during the seminar

**Reader’s advisory**
More text books will be suggested prior to the course.
Scientific articles: Copies of scientific articles for the seminar will be provided prior to the course

**Links**

**Language of instruction**
English

**Duration (semesters)**
1 Semester

**Module frequency**
jährlich

**Module capacity**
18

**Reference text**
Course in the first half of the semester
Students without Matlab experience should take the optional Matlab course (1. week) of Computational Neuroscience - Introduction

**Modullevel**
MM (Mastermodul)

**Lern-/Lehrform / Type of program**
Wahlpflicht

**Vorkenntnisse / Previous knowledge**

**Module frequency**

**Examination**
Time of examination during the course
Type of examination Portfolio, consisting of daily short tests, programming exercises and short reports

**Course type**

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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<td>Lecture</td>
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<td>Exercises</td>
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Total time of attendance for the module