inf963 - Foundations of STS Eng.: Cognitive Processes

Module label: Foundations of STS Eng.: Cognitive Processes
Module code: inf963
Credit points: 6.0 KP
Workload: 180 h
Used in course of study: Master's Programme Engineering of Socio-Technical Systems > Fundamentals/Foundations
Contact person: Martin Georg Fränzle

Entry requirements
Skills to be acquired in this module

The module aims to provide an overview of theories of cognitive processes.

Part 1 will be a lecture on neurocognition. Students will first acquire a general understanding of the brain mechanisms of different cognitive functions and the methods used to study these functions:

- Brain and cognition, methods of cognitive neuroscience
- Attention, learning and memory
- Emotional and social behavior
- Language, executive functions

Part 2 will be a lecture on neurophysiology. Students will acquire specific knowledge about neurophysiology and neuroanatomy, learn the fundamental concepts of multi-channel EEG analysis, and acquire hands-on skills in using EEGLAB, an open-source software toolbox for advanced EEG analysis.

Competencies:
Understanding of basic concepts of biomedical signal processing; using EEG analysis tools interactively and independently; understanding the complete chain of EEG analysis steps, from data import to the illustration of results; ability to use open source tools for EEG analysis; application of theoretical knowledge to practical problems of physiology.

Part 3 will be a seminar on cognitive engineering. Students will be introduced to methods, tools, and techniques (MTTs) to evaluate and predict human performance in small use cases in different domains (Aviation, Air Traffic Control, Automotive, Maritime, or Healthcare). Each student is expected to study and apply the MTT based on material and software provided and present and discuss the modelling approach and the results achieved with the other participants and experts in the seminar.

Professional competences:
- Neuropsychological / neurophysiological knowledge

Methodological competences:
- Interdisciplinary knowledge & thinking

Social competences:
- Written and oral presentation and discussion of scientific and technical results with others

Self-competences:
- Reading, understanding, summarizing and critically evaluating scientific texts/literature

Module contents
Part 1 neurocognition:
Part 2 neurophysiology:

Part 3 cognitive engineering:
Paternò, F (2000). Model-Based Design and Evaluation of Interactive Applications
Wickens & Hollands (2012). Engineering Psychology & Human Performance

Reader’s advisory

Links

Language of instruction English
Duration (semesters) 1 Semester
Module frequency Once a year
Module capacity unlimited
Reference text The module will be offered in winter terms and should be completed within one semester. Both parts will run in parallel
Modullevel BC (Basiscurriculum / Base curriculum)
Modulart Pflicht o. Wahlpflicht / compulsory or optional
Lern-/Lehrform / Type of program V+S
Vorkenntnisse / Previous knowledge

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>At the End of the lecture periods</td>
<td>Written exam. A bonus system will be employed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2.00</td>
<td>WiSe</td>
<td>28 h</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>2.00</td>
<td>WiSe</td>
<td>28 h</td>
</tr>
</tbody>
</table>

Total time of attendance for the module 56 h