# psy280 - Transcranial Brain Stimulation

<table>
<thead>
<tr>
<th>Module label</th>
<th>Transcranial Brain Stimulation</th>
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<tr>
<td>Module code</td>
<td>psy280</td>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
<tr>
<td>Used in course of study</td>
<td>Master's Programme Neurocognitive Psychology &gt; Master module</td>
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<td>Contact person</td>
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**Module responsibility**

- Christoph Siegfried Herrmann

**Entry requirements**

Enrolment in Master’s programme Neurocognitive Psychology.

**Skills to be acquired in this module**

**Goals of module:**

Students will gain theoretical and practical knowledge on various non-invasive brain stimulation techniques.

**Competencies:**

++ Neuropsychological / neurophysiological knowledge  
++ experimental methods  
+ statistics & scientific programming  
+ scientific literature  
+ ethics / good scientific practice / professional behaviour

**Module contents**

In this module, we will introduce the theoretical concepts, neurophysiological underpinnings and neurocognitive as well as clinical applications of various non-invasive brain stimulation techniques such as transcranial magnetic stimulation (TMS), transcranial direct current stimulation (tDCS), transcranial alternating current stimulation (tACS), and transcranial random noise stimulation (tRNS). A focus will be tACS, because it is especially suited to modulate brain oscillations which have been shown to correlate with cognitive processes.

**Part 1: Introduction to transcranial brain stimulation (lecture)**

- Historical overview of brain stimulation  
- Different techniques (TMS, tDCS, tACS, tRNS)  
- Physiological mechanisms (entrainment, after-effects etc.)  
- The use of transcranial brain stimulation in cognitive neuroscience - Experimental parameters (intensity, electrode montage, etc.)  
- Pros and cons of TMS vs. tACS  
- Technical aspects (artefact correction, modelling current flow, etc.)  
- Safety issues  
- Ethical considerations of brain stimulation

**Part 2: Effects of tACS on physiology and cognition (seminar)**

- Physiology of tACS (on-line and after-effects)  
- Modulating cognitive functions (e.g. memory, attention, and perception)  
- Clinical applications of tACS  
- Hands-on experience in the lab

**Reader's advisory**


**Links**

- Language of instruction: English  
- Duration (semesters): 1 Semester  
- Module frequency: The module will be offered every summer term.  
- Module capacity: 10  
- Reference text: We strongly recommend to take either psy170, psy270, psy275, psy280, or psy220 to gain methodological competencies (EEG, fMRI, TBS, HCI) that are needed for most practical projects and Master's thesis!  
- Modullevel: MM (Mastermodul / Master module)  
- Modulart: Wahlpflicht / Elective
### Lern-/Lehrform / Type of program
Part 1: lecture; Part 2: seminar

### Vorkenntnisse / Previous knowledge

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
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<tr>
<td>Final exam of module</td>
<td>during summer term</td>
<td>Oral presentation in the seminar.</td>
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<th>Course type</th>
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<th>SWS</th>
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<tbody>
<tr>
<td>Lecture</td>
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<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
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<tr>
<td>Seminar</td>
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<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
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**Total time of attendance for the module**: 56 h