neu410 - Auditory Neuroscience

Module label: Auditory Neuroscience
Module code: neu410
Credit points: 15.0 KP
Workload: 450 h
Used in course of study: Maste's Programme Neuroscience > Research Modules

Contact person:
- Christine Köppl
- Georg Martin Klump
- Jannis Hildebrandt

Entry requirements:
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
Introduction to independent, experimental research in auditory sensory physiology. May serve as preparation for a Master thesis.

Upon successful completion of this course, students:
• have profound knowledge on auditory sensory processing, including cochlear transduction mechanisms, central auditory processing and auditory psychophysics
• have basic knowledge of the large range of techniques used in auditory research
• are able to read and critically report to others on an original research paper in auditory neuroscience
• have in-depth knowledge on a specific research question in auditory neuroscience
• are able to discuss current hypotheses and controversies regarding their research question
• are able to perform experiments addressing their research topic and can describe the principles and the pros and cons of the experimental technique used
• are able to critically evaluate and discuss experimental results

Module contents:
One week introductory block course "Fundamentals of Auditory Physiology", comprised of a lecture series and matching seminar that emphasizes discussion.
Topics:
- Hair cells: structure, transduction mechanism, receptor potential, synaptic transmission
- Basilar papilla / cochlea: structure, micromechanics, amplification; otoacoustic emissions
- Auditory nerve: phase locking, rate coding. Excitation patterns
- Ascending auditory pathways: wiring, principles of excitation/inhibition, examples of cellular/molecular specialisations
- Sound localisation in birds and mammals
- Central auditory processing: imaging techniques, auditory streams, cortex, primates
- Relation between psychophysics and neurophysiology

The introductory course is followed by 6 weeks of small-group laboratory-based projects, participating in the supervisor's ongoing research. This includes experimental work, data analysis, literature study, participation in the group seminar and in a poster presentation of concurrent Research Modules.

There are three options for the lab projects:
Option 1: Cochlea and auditory brainstem (Köppl)
Option 2: Auditory cortex (Hildebrandt)
Option 3: Central auditory mechanisms (Klump)

Reader's advisory:
About 20 selected original papers (selection varies).

Links:

Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: jährlich
Module capacity: unlimited
Reference text:
Introductory block course will be held in the first week of winter term, lab component is flexible and subject to individual arrangement. Participation in a joint poster presentation of concurrent research modules is required to pass the module.

Module level: MM (Mastermodul)
Modulart: Wahlpflicht
### Vorkenntnisse / Previous knowledge

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<th>Examination</th>
<th>Time of examination</th>
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<tr>
<td>Final exam of module</td>
<td>within 2 months after completion of</td>
<td>Internship report</td>
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<td>experimental work</td>
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<td>Seminar</td>
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Total time of attendance for the module: 140 h