Curriculum of the Doctoral Programme of Cognitive Neuroscience 2020-2024

The degree consists of four study components (total of 40 ECTS) and the dissertation research. The student negotiates with the supervisors on the contents and extent (number of credits) of each component. In general, all studies must be at least advanced-level studies. An exception to this rule can be, for example, supplementing or updating methodological skills by first taking courses at the subject/intermediate level. The components include the following (Rector's decision 12 Dec 2016): 1) Discipline specific skills; 2) Research competence; 3) Communication skills; 4) Other competence to support the construction of professional expertise.

The completed parts of study components are valid for 10 years. Parts of study components, such as courses completed more than 10 years ago, can be accepted to form a part of the degree in exceptional cases. Following section 33 in the Degree Regulations of the University of Jyväskylä, previous studies or competences otherwise achieved may be recognized as forming a part of the doctoral degree. The recognition of prior learning must always be based on documented proof. The recognition is proposed by the student and the supervisors. The dean of the faculty approves/rejects the recognition.

The studies should be planned so that they support and enhance the student's previous competences and so that the ways of completing credits are diverse (generally, one component should not be accomplished only by, for example, taking exams, giving conference presentations or writing essays). When planning the studies, attention should be paid to the following: the total number of credits attained is 40, the studies support the research work, and it is feasible to complete them within the timetable of four years of full-time studies. Different courses, forming the curriculum for the CNS Doctoral Program are offered in different years by different units in JYU, including Centre for Interdisciplinary Brain Research together with Department of Psychology (from Faculty of Education and Psychology) and Faculty of Sport and Health Sciences, as well as the Methodology Centre for Human Sciences. It is recommended, that as doctoral students start their studies, they participate in an orientation event organized by the Faculty.

Components

1. CNSJ1200 Discipline specific skills (20 ECTS)

2. CNSJ1300 Research competence (10-13 ECTS)

3. CNSJ1400 Other competence to support the construction of professional expertise (5 ECTS)

4. CNSJ1500 Communication skills (2-5 ECTS)

5. CNSJ1100 Doctoral dissertation

1. CNSJ1200 Discipline specific skills

Credits: 20 ECTS

CNSJ1201 Cognitive neuroscience seminars (3 ECTS)

Responsible teacher: Piia Astikainen

This course is built on multidisciplinary methods seminars currently organized by CIBR collegium on cognitive neuroscience. The seminars include student, senior and visiting researcher presentations.

Learning objective: After the course, student is able to participate in scientific discussion, prepare presentations and present scientific findings to an academic audience. Student is able to constructively comment on other researchers' presentations. The student also learns about the current research and research methods in the fields of JYU brain research.

Content: Cognitive neuroscience seminars with topics related to experimental designs, analysis and interpretation of neuroscientific data. Theoretical understanding is built via discussions with senior researchers and other students. Students will present their own research plans and/or preliminary analyses and reports and receive feedback from the supervisors, senior researchers and other PhD students.

Mode of teaching: Active participation in the seminar series during at least one semester. The seminar includes presentations by senior researchers and PhD students, and supervised group discussions. Participation in 20 one-to-two hour seminars is equivalent of 3 ECTS.

Evaluation: Pass – fail.

CNSJ1202 Designing cognitive neuroscience research (5 ECTS)

Responsible teacher: Jarmo Hämäläinen

Learning objective: After completing the course, the student knows how to create experimental designs, how to plan, conduct and manage a cognitive neuroscience research project.

Content: Topics in the course cover both theoretical and practical issues related to conducting cognitive neuroscience research. These include planning the research and experimental designs; ethical issues and permission procedures related to brain research; data management and open science; laboratory practices.

Mode of teaching: Lectures, exercises, course literature, presentations.

Evaluation: Pass - fail.

CNSJ1203 Specialization topic in cognitive neuroscience research (4 ECTS)

Responsible teacher: Paavo Leppänen

Learning objective: The student acquires expert knowledge on the current themes, theories and research methods in the selected special field.

Content: The student and supervisor select together advanced level reading materials focusing on one of the special fields supporting student's empirical research for PhD thesis. Possible fields include but are not restricted to the following:

- Affective neuroscience
- Behavioral neuroscience
- Biological psychology
- Cognitive science
- Computational neuroscience
- Clinical neuroscience
- Developmental affective or cognitive neuroscience
- Educational neuroscience
- Music neuroscience
- Sport and movement neuroscience
- Sensorimotor neuroscience

Mode of teaching: Written examination on a book or article selection, essay, or literature review.

Evaluation: Pass - fail.

CNSJ1204 Analysis methods of cognitive neuroscience (4 ECTS)

Responsible teacher: Jan Kujala

Learning objectives: Students are able to conduct basic level analyses on selected brain research methods and gain knowledge of the most widely used advanced brain data analysis approaches.

Content: The course consists of lectures and assignments with the objective of learning

- of a variety of brain research methods and the related recorded signals
- how to conduct appropriate evaluation of the quality of the collected data
- the principles of and practical approaches for pre-processing the data
- to understand and to apply different ways to obtain quantitative measures from the recorded brain signals
- how to combine electrophysiological and anatomical brain imaging data in the analyses
- how to apply appropriate statistical analyses that take into account the nature of the brain imaging data in question
- an introduction to advanced brain data analyses, including time frequency, connectivity,
- to become familiar with independent component (ICA) analyses and machine learning approaches

Mode of teaching: Lectures, assignments (contact teaching, primarily independent work), reading material.

Evaluation: Pass - fail.

CNSJ1205 Current applications of cognitive neuroscience (4 ECTS)

Responsible teacher: Harri Piitulainen and Tiina Parviainen

Learning objectives: The student is familiar core application areas, as well as current trends in cognitive neuroscience

Content: The topics cover most recent applied research and current trends in cognitive neuroscience including topics of development, learning, learning difficulties, sensorimotor functions, sports, music, developmental and psychological disorders, and the current cognitive and affective neuroscience methods applied to these topics.

Mode of teaching: Lectures, seminars, workshops, learning diary, symposia and/or international conferences. The credits for each sub-unit depend on the extent of the mode of teaching, below examples of crediting different types of performance:

- Participation on lectures and exam 1-2 ECTS
- International conference with own paper presentation 2 ECTS, poster 1 ECTS
- National conference with own paper presentation, 1 ECTS
- Learning diaries (depending on the extent), 1 ECTS

Evaluation: Pass - fail.

2. CNSJ1300 Research competence

Credits: 10-13 ECTS

Competence aims:

- familiarity with methodology and the basic research methods used in educational science, psychology, and combining the data from these fields with cognitive neuroscience, have the ability to use some specific qualitative, quantitative, and in the doctoral programme historic or theoretical methods
- know the ethical guidelines of good scientific practice and be able to recognize and analyze ethical issues in different phases and areas of research (obligatory content, 3ECTS)
- understand the general premises of scientific theory (obligatory content, 3ECTS)
- understand the specific nature and development of educational science, psychology or cognitive neuroscience
- skills needed in running a research project; scientific publication
- open science (obligatory content, 1 ECTS)

Content: the studies typically consist of the obligatory studies of research ethics (3 ECTS), theory of science/philosophy of science (3 ECTS), and open science (1 ECTS) (e,g, LIBJ1011 Open Science Resource) as well as courses on qualitative, quantitative methods and/or mixed methods. Studies planned by the student her/himself and approved by the supervisor can be included.

Method of study: Courses (e.g. by Methodology Centre for Human Sciences/ IHME and CIBR), independent studying (essays, learning diaries, assignments), seminars, scientific journals, conference presentations and posters, scientific expert tasks, project work and supervision.

Assessment: pass - fail

Assessment criteria: To be agreed with the supervisors.

3. CNSJ1400 Other competence to support the construction of professional expertise

Credits: 5 ECTS

Competence aims:

- have the ability to act as an expert in the field of the doctoral dissertation in research-based development, teaching, and planning tasks in multiprofessional groups
- have the ability to participate in research-based pedagogical activities / possess pedagogical competence in higher education
- have the skills and capabilities needed in building a professional academic career (e.g. project management skills, managerial skills, interaction skills as well as skills related to information and communication technology)

Content: Pedagogical skills, leadership skills, entrepreneurial skills, skills related to quality assurance or development, knowledge of working life.

Method of study:

- Tasks as an expert: planning, teaching and developing tasks in departments and projects of the University
- Tasks serving the interests of society at large: significant development tasks in society and/or academic pedagogical studies in your field or study
- Courses, guest lectures, meetings developing your expertise in the field, approved as part of the studies by the supervisors.

Assessment: pass – fail

Assessment criteria: To be agreed with the supervisors.

Examples of study credits to be achieved:

- max. 3 ECTS credits /project: working as a project researcher or assistant in the field related to the topic of dissertation
- 0.5 - 1ECTS credits: participating in the planning of new research projects
- max. 2 ECTS credits: expert tasks related to the topic of the dissertation, such as teaching an advanced level method course (not including the teaching tasks of the position of doctoral

4. CNSJ1500 Communication skills

Credits: 2-5 ECTS

Competence aims: have the ability to communicate using English/ Finnish or at least one other language in spoken or written form in academic contexts

Content: Scientific writing and communicating, interactional skills, language skills and intercultural skills, media skills, performance skills.

Method of study: Scientific writing and courses related to that or oral scientific presentations.

Obligatory content: a minimum of 2 ECTS from a course or study module organized for example the Centre for Academic Multilingual Communication Movi.

Examples of study credits to be achieved:

- Oral presentation in an international conference, 2 ECTS
- Poster in an international conference, 1 ECTS
- Oral presentation in a national conference, 1 ECTS
- Tasks, such as learning diaries related to doctoral research, 1 ECTS
- Chairing/coordinating in international or national conference, 1 ECTS
- Scientific presentation to audiences other than the research group, 1 ECTS

Assessment: pass – fail

Assessment criteria: To be agreed with the supervisors

5. CNSJ1100 Doctoral dissertation

Competence aims: Upon completing the dissertation research, the student is capable of

- conducting independent, scientific research in the field of cognitive neuroscience
- evaluate scientific cognitive neuroscience research

Content: Carrying out scientific research guided by the supervisors. The research topic falls within the fields of research strength of the faculty's research strategy.

Assessment: fail – pass – pass with honours.

Assessment of the dissertation

According to the degree regulations, a grading numeric scale 0-5 or verbal scale "fail – pass – pass with honours" can be used in the assessment of a doctoral dissertation. The Faculty of Education and Psychology uses the following scale (accepted by the Faculty Council on 15 Dec 2016): fail – pass – pass with honours. Prior to assigning the overall grade the following criteria (rated by 1-5 points) are used in the assessment. The assessment must take into account the variation in the research orientations of doctoral dissertations and apply the criteria below accordingly.

1. Research topic, design, and setting of research questions
2. Theoretical framework and conceptual clarity
3. Methods and data
4. Results and responding to research questions
5. Conclusion and discussion of findings
6. Relevance of research and applicability of findings
7. Validity, reliability, credibility, transferability, confirmability of the study and ethical issues
8. Language and coherence of reporting
9. Independence as a researcher
10. Skills in defending one's choices and ability to engage in scientific discussion in public defense