Semesterplan for KA 1. semester NEURO

2025 Kandidatuddannelsen i Psykologi

Semesterbeskrivelse for uddannelser ved Aalborg Universitet

Oplysninger om semesteret
Studienævn: Studienævn for Psykologi
Studieordning for kandidatuddannelsen i psykologi 2025:
https://studieordninger.aau.dk/2025/53/5890

Semesterets organisering og forløb
1. semester udgøres af fire obligatoriske moduler:

- Videregående anvendt psykologi I, VAP I (15 ECTS-points)
- Den psykologiske profession (5 ECTS-point)
- Psykologisk testning (5 ECTS-point)
- Valgmoduler 1. semester kandidat (vælg 1 modul)

Se "Vigtige datoer" på moodle for information om afleveringsfrister, eksamener mv.

Fra 1. til 3. semester har den studerende mulighed for at indgå i et såkaldt struktureret kandidatforløb (professionsprogram og spor på underprogram), jf. modulbeskrivelse for professionsprogrammerne, Videregående Anvendt Psykologi I (VAP I), s. 4 *ff*. Det indebærer specielt tilrettelagte kursusforløb med tilhørende pensa til modulet "Videregående anvendt psykologi I" (VAP I). Udover det valgte professionsprogram skal den studerende på 7.semester samtidig følge fællesforløbene "Den psykologiske profession" og "Psykologisk testning" samt følge et valgmodul.

Det er en betingelse for at påbegynde det Psykologiske praktiske forløb på kandidatuddannelsens 2. semester, at prøverne på 1. semester er bestået.

Semesterkoordinator og sekretariatsdækning

Ankerlærer:
Rasmus Birk rbirk@ikp.aau.dk

Sekretariatsdækning
Skemalægger: Birgitte Skovsgaard, bsk@ikp.aau.dk
Eksamen: Christina Gertsen, chge@ikp.aau.dk
Rekvisitionsbudget: Lis Kragh, lis@ikp.aau.dk
Evaluering: Birgitte Skovsgaard, bsk@ikp.aau.dk
Uddannelseskoordinator/Studienævnssekretær: Andrea Dosenrode, ad@ikp.aau.dk

Neuropsychology and neuroscience (NEURO) programmet

Modultitel engelsk: Neuropsychology and neuroscience

ECTS: 15

Placering:
1. Semester (Kandidatuddannelsen i Psykologi)

Modulansvarlig:
Thomas Alrik Sørensen, alrik@ikp.aau.dk

Vejledere/Seminarholdere/Undervisere:
Thomas Alrik Sørensen, alrik@ikp.aau.dk
Christian Gerlach, christiang@ikp.aau.dk
Aurore Zelazny, aurore@ikp.aau.dk
Daniel Barratt, db.msc@cbs.dk
Torben Moos, tmoos@hst.aau.dk
Ove Wiborg, ow@hst.aau.dk
Vibeke Delêtre, vichr@regionsjaelland.dk

Type og sprog:
English/Danish

Mål:
The goal of the course is to introduce the students to basic neuroscience (VAP I) which is a precursor for the clinical neuroscience and neuropsychology course (VAP II) on the eighth's semester. (Se læringsmål for VAP I i studieordningen.)

The student will through the moduler aquire:

Knowledge of:
- human cognition and function of the healthy mind based on the latest international research in both neuropsychology and cognitive neuroscience
- methods used in neuropsychology and cognitive neuroscience
- assessment of cognitive function and its limitations
- how the mind can be affected by disease or injury to the brain, and the rehabilitation perspectives
- the relation between neuropsychological theory and the applied challenges of patients

Abillity to:
- critically evaluate neuropsychological and neuroscience literature and methods
- apply neuropsychological and neuroscience methods to investigate relevant problems in the field

- to communicate research-based knowledge on neuropsychology and neuroscience in a reflective manner
- to understand and communicate neuropsychology to both professional, cross-disciplinary, and to non-experts.

Competance to:

- individually identify neuropsychological problems and setup a plan for dealing with these
- connect and relate neuropsychology with general psychology and other fields
- assess own qualifications in neuropsychology and how to maintain and enhance these

Fagindhold og sammenhæng med øvrige moduler/semestre:
The module consists of a range of lectures ranging from anatomy and methodology to the functions of the human mind. Building on knowledge from courses like statistics, quantitative methodology, biological psychology, cognitive psychology, developmental psychology from the BA the students will be provided a foundation for the more clinical eights semester course in neuropsychology. Also, the research seminars provide the student an insight into ongoing projects for early-stage researchers in neuroscience and neuropsychology, to help provide tips and tools for research project management which the students can use both during their eighth's semester internship, and especially during the ninth semester TPV project.

Omfang og forventninger:
The aim of this course is to provide the students a thorough introduction to cognitive neuroscience, its foundation, as well as the different methods used. This will be the foundation of students who wish to progress further within cognitive science, neuroscience, or the clinical domain as a neuropsychologist. The course will also provide the background information needed, on both the more clinically applied 8th semester course in addition to the broader project-oriented classes on the 9th semester. The course consists of 16 lectures (2 x 45 min) on cognitive neuroscience including 4 research seminars (2 x 45 min), and a syllabus of 1424 pages of supporting literature.

Aktivitet	*Timer*
16 forelæsninger à 2 timer	*32*
Evalueringer	*1*
4 seminargange à 2 timer	*8*
Læsning og forberedelse inklusive udarbejdelse af synopsis	*370*
Eksamen	*1*

NB: lektioner tælles som timer.

Antal forelæsninger: 16

Antal forelæsningshold: 1

Antal seminargange: 4

Antal seminarhold: 1

Deltagere:
Students enrolled in the neuro program in the fall semester.

Deltagerforudsætninger
Bachelor degree in psychology

Modulaktiviteter (kursusgange med videre)

Forelæsninger:

Aktivitet	Tidsslot	Titel	Underviser/ Seminarholder
1.lecture	2x 45 min	Introduction to the neuropsychology program	Thomas Alrik Sørensen
2. lecture	2x 45 min	Introduction to the laboratory and experimental methods	Thomas Alrik Sørensen
3. lecture	2x45 min	Methods in cognitive neuroscience: imaging and neurophysiology	Thomas Alrik Sørensen
4. lecture	2x45 min	Methods in cognitive neuroscience: animal models	Ove Wiborg
5. lecture	2x45 min	Basic brain anatomy for neuropsychologists I	Torben Moos
6. lecture	2x45 min	Basic brain anatomy for neuropsychologists II	Torben Moos
7. lecture	2x45 min	Basic neurotransmission	TBD
8. lecture	2x45 min	Development and neuroplasticity	Christian Gerlach
9. lecture	2x45 min	Memory I – the bottleneck of perception	Thomas Alrik Sørensen
10. lecture	2x45 min	Attention	Thomas Alrik Sørensen
11. lecture	2x45 min	Perception	Thomas Alrik Sørensen
12. lecture	2x45 min	Memory II – the diversity of memory systems	Thomas Alrik Sørensen
13. lecture	2x45 min	Language	Christian Gerlach
14. lecture	2x45 min	Emotion and cognition	Daniel Barratt
15. lecture	2x45 min	Problem-solving, decision-making, and cognitive control	Thomas Alrik Sørensen
16. lecture	2x45 min	Consciousness – The relation between brain and mind	Thomas Alrik Sørensen

Seminarer:

Aktivitet	Tidsslot	Titel	Underviser/ Seminarholder
1.seminar	2x45 min	Percpectives on neuropsychology I	Thomas Alrik Sørensen
2.seminar	2x45 min	Percpectives on neuropsychology II	TBD
3. seminar	2x45 min	Percpectives on neuropsychology III	Vibeke Christensen
4. seminar	2x45 min	Percpectives on neuropsychology IV	Aurore Zelazny

Eksamen

En intern mundtlig prøve i Videregående anvendt psykologi I (VAP I) på baggrund af synopsis. Prøven er individuel. Den studerende afprøves i det valgte kursus. Prøven er en synopsis prøve. En synopsis er en kort, fokuseret akademisk tekst, der opridser en problemstilling og en analyse af den som forberedelse til en efterfølgende faglig drøftelse. Ved den mundtlige eksamen holder den/de studerende et oplæg i maksimalt 5 minutter. Den efterfølgende diskussion tager udgangspunkt i det skriftlige arbejde. Eksaminator inddrager også pensummateriale, som ikke har været berørt i synopsis. Synopsis udarbejdes i relation til pensum.

Tilladte hjælpemidler: Med visse hjælpemidler:

- Projektrapporten (synopsis)
- De studerendes noter.

Der må ikke anvendes generativ AI (fx ChatGPT) i forbindelse med eksamen.
Pensumramme: 1500 sider obligatorisk litteratur inden for den valgte disciplin.
Synopsis med sidetal: 1-3 sider og normeret prøvetid på 30 minutter.
Bedømmelsesform: Ved bedømmelsen gives der karakter efter 7-trinsskalaen.
Der gives karakter på grundlag af den samlede præstation.
Prøvens omfang: 15 ECTS.

Forelæsningsmanchet/Pensum:

1. Lecture: Introduction to the neuropsychology program

2x45 min v/ Thomas Alrik Sørensen

This presentation will provide the students with a general introduction to the course, the teachers and the curriculum, as well as discuss the expectations for the specialization in neuropsychology at Aalborg university.

Required reading:
Not Applicable (NA)

Recommended reading:
NA

2. Lecture: Introduction to the laboratory

2x45 min v/ Thomas Alrik Sørensen

In the second lecture we will introduce the lab and how to work in the lab, which will be a voluntary option for students on the 7th semester. In addition, this introduction is part of the requirements for students working in the lab during the internship or with their TPV projects on the 9th semester. Also, depending on time the laboratory introduction may be extended into collaborators lab spaces working with translational science and imaging.

Required reading:
NA

Recommended reading:
NA

3. Lecture: Methods in cognitive neuroscience: imaging and neurophysiology

2x45 min v/ Thomas Alrik Sørensen

This lecture will introduce basic methodological aspects of designing and conducting an experiment with healthy subjects and in different groups of patients. Moreover, the module will provide the students with a basic understanding of the recent brain mapping and neuroimaging techniques (e.g. EEG, MEG, PET, MRI, TMS) used in both clinical and experimental neuropsychology for assessing sensory and cognitive processing.

Required reading:

- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*. 7th edition. Sinauer Associates. Chapters 2 and 3.
- Gazzaninga, M. S., Ivry, R. B., Mangun, G. R. (2009). *Cognitive Neuroscience: The Biology of the Mind* (3rd Ed.) WW Norton & Company: New York. Chapter 4: Methods of Cognitive Neuroscience. 110-163. **[54 s.]**
- Gevins, A. (1998). The future of electroencephalography in assessing neurocognitive functioning. *Electroencephalography and Clinical Neurophysiology, 106*, 165-172. **[8. s.]**
- King, M., Shahshahani, L., Ivry, R. B., & Diedrichsen, J. (2023). A task-general connectivity model reveals variation in convergence of cortical inputs to functional regions of the cerebellum. *Elife*, 12, e81511. **[16 s.]**
- Lerch, J. P., Van Der Kouwe, A. J., Raznahan, A., Paus, T., Johansen-Berg, H., Miller, K. L., ... & Sotiropoulos, S. N. (2017). Studying neuroanatomy using MRI. *Nature Neuroscience*, 20(3), 314-326. **[22 s.]**
- Yuste, R. (2015). From the neuron doctrine to neural networks. *Nature Reviews Neuroscience*, 16(8), 487-497. **[10 s.]**

Recommended reading:

- Cowey, A. (2008): TMS and visual awareness, in E. Wasserman et al (Eds): *The Oxford Handbook of Transcranial Stimulation*, Oxford University Press. 411-431. **[20 s.]**

4. Lecture: Methods in cognitive neuroscience: animal models

2x45 min v/ Ove Wiborg

This lecture will introduce basic methodological aspects of designing and conducting an experiment using animal models. Providing an introduction for the benefits as well as challenges in animal models in both clinical and experimental neuropsychology. Examples on different types of research can span neurological and psychiatric research questions as well as how animal models contribute to basic research.

Required reading:

- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*. 7th edition. Sinauer Associates. Chapter 3 (only a little on optogenetics).
- Gazzaninga, M. S., Ivry, R. B., & Mangun, G. R. (2009). *Cognitive Neuroscience: The Biology of the Mind* (3rd Ed.) WW Norton & Company: New York. Chapter 4: Methods of Cognitive Neuroscience. 110-163. **[54 s.]**
- Mogensen, J. (2021). Animal models in neuroscience. In: Hau, J. & Schapiro, S. (Eds.) *Handbook of Laboratory Animal Science, Fourth Edition, Volume II. Animal Models*. Boca Raton, FL: CRC Press LLC**.**Chapter 23. **[14 s.]**
- Yuste, R. (2015). From the neuron doctrine to neural networks. *Nature Reviews Neuroscience*, 16(8), 487-497. **[10 s.]**

Recommended reading:

NA

5. Lecture: Basic brain anatomy for neuropsychologists I

2x45 min v/ Torben Moos

Knowing basic neuroanatomy is vital for a neuropsychologist working at a hospital, both in relation to understand patient ailments and in communicating with the medical colleagues. This lecture is the first of two which will provide the students with an overview of the most important anatomy.

Required reading:

- Branco, T., & Staras, K. (2009). The probability of neurotransmitter release: variability and feedback control at single synapses. *Nature Reviews Neuroscience*, 10(5), 373-383. **[11 s.]**
- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*. 7th edition. Sinauer Associates. Chapter 2.

- Di Ieva, A. (2011). *Brain anatomy - from a clinical and neurosurgical perspective: a clinically oriented manual of neuroanatomy*. Macquarie University. **[47 s.]**
- Lerch, J. P., Van Der Kouwe, A. J., Raznahan, A., Paus, T., Johansen-Berg, H., Miller, K. L., ... & Sotiropoulos, S. N. (2017). Studying neuroanatomy using MRI. *Nature Neuroscience*, 20(3), 314-326. **[22 s.]**
- Paulson, O. B., Schousboe, A., & Hultborn, H. (2023). The history of Danish neuroscience. *European Journal of Neuroscience*, 58(4), 2893-2960. **[49 s.]**
- Stenberg, D. (2007). Neuroanatomy and neurochemistry of sleep. *Cellular and Molecular Life Sciences*, 64, 1187-1204. **[19 s.]**
- Yuste, R. (2015). From the neuron doctrine to neural networks. *Nature Reviews Neuroscience*, 16(8), 487-497. **[10 s.]**

Recommended reading:
NA

6. Lecture: Basic brain anatomy for neuropsychologists II

2x45 min v/ Torben Moos

This lecture is the second part of the overview lectures in anatomy for neuropsychologists, which provide a foundational knowledge of the structures that facilitates cognitive function and behavior.

Required reading:
- Branco, T., & Staras, K. (2009). The probability of neurotransmitter release: variability and feedback control at single synapses. *Nature Reviews Neuroscience*, 10(5), 373-383. **[11 s.]**
- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*. 7th edition. Sinauer Associates. Chapter 2.
- Di Ieva, A. (2011). *Brain anatomy - from a clinical and neurosurgical perspective: a clinically oriented manual of neuroanatomy*. Macquarie University. **[47 s.]**
- Lerch, J. P., Van Der Kouwe, A. J., Raznahan, A., Paus, T., Johansen-Berg, H., Miller, K. L., ... & Sotiropoulos, S. N. (2017). Studying neuroanatomy using MRI. *Nature Neuroscience*, 20(3), 314-326. **[22 s.]**
- Paulson, O. B., Schousboe, A., & Hultborn, H. (2023). The history of Danish neuroscience. *European Journal of Neuroscience*, 58(4), 2893-2960. **[49 s.]**
- Stenberg, D. (2007). Neuroanatomy and neurochemistry of sleep. *Cellular and Molecular Life Sciences*, 64, 1187-1204. **[19 s.]**
- Yuste, R. (2015). From the neuron doctrine to neural networks. *Nature Reviews Neuroscience*, 16(8), 487-497. **[10 s.]**

Recommended reading:
NA

7. Lecture: Basic neurotransmission

2x45 min v/ TBD

Similar to a basic understanding of neuroanatomy, neurotransmission has an important functional role in the human brain. The lecture explores different transmitter systems and their functional role in human cognition.

Required reading:

- Branco, T., & Staras, K. (2009). The probability of neurotransmitter release: variability and feedback control at single synapses. *Nature Reviews Neuroscience*, 10(5), 373-383. **[11 s.]**
- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*. 7th edition. Sinauer Associates. Chapter 4.
- Özçete, Ö. D., Banerjee, A., & Kaeser, P. S. (2024). Mechanisms of neuromodulatory volume transmission. *Molecular Psychiatry*, 1-14. **[15 s.]**
- Spitzer, N. C. (2012). Activity-dependent neurotransmitter respecification. *Nature Reviews Neuroscience*, 13(2), 94-106. **[17 s.]**
- Stenberg, D. (2007). Neuroanatomy and neurochemistry of sleep. *Cellular and Molecular Life Sciences*, 64, 1187-1204. **[19 s.]**
- Yuste, R. (2015). From the neuron doctrine to neural networks. *Nature Reviews Neuroscience*, 16(8), 487-497. **[10 s.]**

Recommended reading:
NA

8. Lecture: Development and neuroplasticity

2x45 min v/ Christian Gerlach

The lecture covers brain development and plasticity, which are key terms for later lectures on developmental disorders and rehabilitation. Topics will have a special focus on issues related to the developmental and adult neuroplasticity – under normal and pathological circumstances.

Required reading:

- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*. 7th edition. Sinauer Associates. Chapter 7.
- Faust, T. E., Gunner, G., & Schafer, D. P. (2021). Mechanisms governing activity-dependent synaptic pruning in the developing mammalian CNS. *Nature Reviews Neuroscience*, 22(11), 657-673. **[21 s.]**
- King, M. (2023). The big role of the 'little brain': exploring the developing cerebellum and its role in cognition. *Current Opinion in Behavioral Sciences*, 54, 101301. **[6 s.]**
- Mogensen, J. (2012). Reorganization of Elementary Functions (REF) after brain injury: Implications for the therapeutic interventions and prognosis of brain injured patients suffering cognitive impairments. In: Schäfer, A. J., & Müller, J. (Eds.) *Brain Damage: Causes, Management and Prognosis* (1-40). Hauppauge, NY: Nova Science Publishers, Inc. **[40 s.]**

- Yuste, R. (2015). From the neuron doctrine to neural networks. *Nature Reviews Neuroscience*, 16(8), 487-497. **[10 s.]**

Recommended reading:
NA

9. Lecture: Memory I – the bottleneck of perception
2x45 min v/ Thomas Alrik Sørensen

Following the lectures on methodology and the neural foundation of the cognitive system, the ninth lecture is the first lecture to focus on the function of the brain. A key cognitive function is memory – and especially short-term memory seems to act as a gateway for information made available for the observer. Attention, short-term memory, and visual perception are typically held to be fairly stable, and crucial elements of human cognition; however, a number of recent studies seem to reveal that these elements are in fact modulated by a number of factors. This lecture broadly introduces how memory, attention, and visual perception interlink, as well as how these components can be modulated by expertise, arousal, and by observer expectation.

Required reading:
- Alvarez, G. A., & Cavanagh, P. (2004). The capacity of visual short-term memory is set both by visual information load and by number of objects. *Psychological Science, 15*(2), 106-111. **[6 s.]**
- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*. 7th edition. Sinauer Associates. Chapter 17.
- Dall, J. O., Wang, Y., Cai, X., Chan, R. C. K., & Sørensen, T. A. (2021). Visual Short-Term Memory and Attention: An Investigation of Familiarity and Stroke Count in Chinese Characters. *Journal of Experimental Psychology: Learning, Memory and Cognition*, 47(2), 282-294. **[15 s.]**
- Luck, S. J., & Vogel, E. K. (1997). The capacity of visual working memory for features and conjunctions. *Nature, 390*, 279–281. **[3. s.]**
- Sørensen, T. A., & Kyllingsbæk, S. (2012). Short-term storage capacity for visual objects depends on expertise. *Acta Psychologica, 140*(2), 158-163. **[6 s.]**

Recommended reading:
- Dall, J. O., Watanabe, K., & Sørensen, T. A. (2016). Category Specific Knowledge Modulate Capacity Limitations of Visual Short-Term Memory. In 2016 8th *International Conference on Knowledge and Smart Technology (KST)* (pp. 275-280). IEEE. **[6 s.]**
- Dall, J. O., & Sørensen, T. A. (2018). Hukommelse II: Ekspertise og korttidshukommelses begrænsninger. *Psykologi Information: Medlemsinformation for Psykologilærer-foreningen*, 18-25. **[8 s.]**
- Sørensen, T. A. (2018). Hukommelse I: Arbejds- og Korttidshukommelse. *Psykologi Information: Medlemsinformation for Psykologilærerforeningen*, 12-17. **[6 s.]**

- Sørensen, T. A. (2022). Hukommelsen – en multifacetteret hjerneproces. *Hjernen og hukommelsen*, 6-16 (Kap. 1), HjerneForum. **[11 s.]**
- Sørensen, T. A. & Brogaard, B. (2022). Hukommelse og ekspertise. *Hjernen og hukommelsen*, 54-69 (Kap. 5), HjerneForum. **[16 s.]**

10. Lecture: Attention

2x45 min v/ Thomas Alrik Sørensen

This lecture will continue from the last and delve into the specific selection mechanism of attention. The key role for attention is to prioritise information in the cognitive system to ensure that the most relevant environmental information is selected and retained in working memory. In this lecture we will take a modelling approach to investigate the mechanisms of attention and how these may be modulated by various factores. This lecture broadly introduces how memory, attention, and visual perception interlink, as well as how these components can be modulated by expertise, arousal, and by observer expectation.

Required reading:

- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*. 7th edition. Sinauer Associates. Chapter 18.
- Bundesen, C. (1990). A Theory of Visual Attention. *Psychological Review*, 97(4), 523-547. **[25 s.]**
- Bundesen, C., Habekost, T., & Kyllingsbæk, S. (2005). A neural theory of visual attention: bridging cognition and neurophysiology. *Psychological Review*, 112(2), 291-328. **[42 s.]**
- Sørensen, T. A., Vangkilde, S., & Bundesen, C. (2015). Components of attention modulated by temporal expectation. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 41*(1), 178-193. **[16 s.]**

Recommended reading:

- Sørensen, T. A., & Barratt, D. (2014). Is threat the only modulator of attentional selectivity? Redefining the Easterbrook hypothesis. *Frontiers in Psychology, 5*, 1020.

11. Lecture: Perception

2x45 min v/ Thomas Alrik Sørensen

Often it is assumed that we all experience the world in a similar fashion, however, in rare instances it is possible to see that this assumption is false. One such instance is in synaesthesia, which can be described as a perceptual variation in the normal population; this can be in the form that certain weekdays or letters have an added colour sensation. This lecture will present synaesthesia and also relate more broadly to variations in perception between different observers.

Required reading:

- Ásgeirsson, A.G., Nordfang, M. & Sørensen, T.A. (2015). Components of Attention in Grapheme-Color Synesthesia: A Modeling Approach, *PLoS ONE, 10*(8), pp. 1–19. **[20 s.]**
- Bottini, G., Paulesu, E., Gandola, M., & Invernizzi, P. (2010). Functional neuroanatomy of spatial perception, spatial processes and attention. In Jennifer Gurd, Udo Kischka, & John Marshall (Eds), *Oxford Handbook of Clinical Neuropsychology*. 2nd edition. Oxford University Press. **[27 s.]**
- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*. 7th edition. Sinauer Associates. Chapter 10.
- Manassi, M., Murai, Y., & Whitney, D. (2023). Serial dependence in visual perception: A meta-analysis and review. *Journal of Vision*, 23(8), 18. **[17 s.]**
- Witthoft, N., & Winawer, J. (2006). Synesthetic colors determined by having colored refrigerator magnets in childhood. *Cortex, 42*(2), 175-183. **[9 s.]**

Recommended reading:

- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*. 7th edition. Sinauer Associates. Chapter 8-9.
- Brogaard, B., & Sørensen, T. A. (2019). Den visuelle oplevelse af kunst. In *Den Kunstneriske Hjerne* (pp. 78-94). HjerneForum. **[17 s.]**
- Mannix, T. K., & Sørensen, T. A. (2021). Colours and Category learning– Implications for Grapheme-Colour Synaesthesia. In *Sálubót: Afmælisrit til heiðurs Jörgen L. Pind*. Kristiánsson, Á., Sigurdardottir, H. M. & Arnason, K. (red.). University of Iceland Press, s. 221-230. **[10 s.]**
- Mannix, T., & Sørensen, T. A. (2022). Face-Processing Differences Present in Grapheme-Color Synesthetes. *Cognitive Science*, 46(4), e13130.
- Sørensen, T. A., & Ásgeirsson, Á. G. (2013). Sanseoplevelser i Hjernen-Synæstesi. *Psykologisk Set, 30* (89), 23-29. **[7 s.]**
- Sørensen, T. A., & Overgaard, M. S. (2018, January). Prosopagnosia or Prosopdysgnosia: Facing up to a change of concepts. In 2018 10th *International Conference on Knowledge and Smart Technology (KST)* (pp. 260-263). IEEE. **[4 s.]**
- Sørensen, T. A. (2019). Kunst, synæstesi og individuelle forskelle i perception. In *Den Kunstneriske Hjerne*, 66-77. HjerneForum. **[12 s.]**
- Sørensen, T. A. (2019). Synaesthesia–Atypical Sensory Experiences. In *Sense Me* (pp. 142-151). Trapholt. **[10 s.]**
- Zelazny, A., & Sørensen, T. A. (2022). Synesthesia-are all Mondays blue? *Frontiers for Young Minds*.

12. Lecture: Memory II – the diversity of memory systems

2x45 min v/ Thomas Alrik Sørensen

Traditionally long-term memory is divided into two different subtypes (declarative vs non-declarative) each consisting of a number of functionally different specialized sub-systems. Despite convincing evidence from the patient literature, whether or not memories can be declared may be a problematic approach where only organisms with a language can have declarative memories. However, most would probably

agree that animals without language still process episodic memories albeit the representations may differ from human processing. This lecture will present different types of long-term memory, the problems with the traditional account and how we perhaps could think about long-term memory in a more coherent manner.

Required reading:

- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience.* 7th edition. Sinauer Associates. Chapter 17.
- Dew, I. T., & Cabeza, R. (2011). The porous boundaries between explicit and implicit memory: behavioral and neural evidence. *Annals of the New York Academy of Sciences*, 1224(1), 174-190. **[17 s.]**
- Henke, K. (2010). A model for memory systems based on processing modes rather than consciousness. *Nature Reviews Neuroscience, 11*(7), 523-532. **[9 s.]**
- Markowitsch, H. J. & Piefke, M. (2010). The Functional Anatomy of Learning and Memory. In Jennifer Gurd, Udo Kischka, & John Marshall (Eds), *Oxford Handbook of Clinical Neuropsychology*. 2nd edition. Oxford University Press. **[16 s.]**

Recommended reading:

- Sørensen, T. A. (2019). Hukommelse III: Langtidshukommelsessystemer. *Psykologi Information: Medlemsinformation for Psykologilærerforeningen*, 6-11.
- Sørensen, T. A. (2022). Hukommelsen – en multifacetteret hjerneproces. *Hjernen og hukommelsen*, 6-16 (Kap. 1), HjerneForum.
- Sørensen, T. A. & Brogaard, B. (2022). Hukommelse og ekspertise. *Hjernen og hukommelsen*, 54-69 (Kap. 5), HjerneForum.

13. Lecture: Language

2x45 min v/ Christian Gerlach

Language is one of the most vital and useful functions available to us. It is also highly susceptible to experimental testing, and as such a wealth of information exists regarding its biological and functional positions in the brain. This lecture will give a general introduction to neurolinguistics by discussing the primary brain mechanisms involved in the production, comprehension and acquisition of language via neuroscientific investigations.

Required reading:

- Bartels, C., & Wallesch, C.-W. (2010). Functional neuroanatomy of language disorders. In Jennifer Gurd, Udo Kischka, & John Marshall (Eds), *Oxford Handbook of Clinical Neuropsychology*. 2nd edition. Oxford University Press. **[11 s.]**
- Boutonnet, B., Dering, B., Viñas-Guasch, N., & Thierry, G. (2013). Seeing objects through the language glass. *Journal of Cognitive Neuroscience*, 25(10), 1702-1710. **[8 s.]**

- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*. 7th edition. Sinauer Associates. Chapter 19.
- Holcomb, P. J. (1993). Semantic priming and stimulus degradation: Implications for the role of the N400 in language processing. *Psychophysiology, 30*(1), 47-61. **[16 s.]**
- Kuhl, P. K. (2004). Early language acquisition: cracking the speech code. *Nature reviews neuroscience*, 5(11), 831-843 **[10 s.]**
- Kuhl, P. K. (2010). Brain mechanisms in early language acquisition. *Neuron, 67*(5), 713-727. **[14 s.]**
- van Petten, C., & Luka, B. J. (2012). Prediction during language comprehension: Benefits, costs, and ERP components. *International Journal of Psychophysiology*, 83(2), 176-190. **[24 s.]**

Recommended reading:
NA

14. Lecture: Emotion and cognition
2x45 min v/ Daniel Barratt

This lecture will examine the interplay between emotion and cognition. We will have a brief review of the neural underpinnings of emotion and discuss current opposing theories about how these two functions interact.

Required reading:
- Craig, A. D. (2009). How do you feel—now? The anterior insula and human awareness. *Nature Reviews Neuroscience*, 10(1), 59-70. **[16 s.]**
- Lazarus, R. S. (1982). Thoughts on the relations between emotion and cognition. *American Psychologist*, 37(9), 1019-1024. **[9 s]**
- Pessoa, L. (2008). On the relationship between emotion and cognition. *Nature Reviews Neuroscience, 9*(2), 148-158. **[11 s.]**

Recommended reading:
- Eysenck, M. W., & Keane, M. T. (2015). *Cognitive psychology: A student's handbook*. (7th ed.) Taylor & Francis, Chapter 15.

15. Lecture: Problem-solving, decision-making, and cognitive control
2x45 min v/ Thomas Alrik Sørensen

In the second to last lecture, we explore several related topics on human problem-solving, decision making and cognitive control. Jointly these can be grouped as executive processes which increase environmental adaptability.

Required reading:
- Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical*

Neuroscience. 7th edition. Sinauer Associates. Chapter 18 (very little towards the end of the chapter).

- Fellows, L. K. (2004). The Cognitive Neuroscience of Human Decision Making: A Review and Conceptual Framework. *Behavioral and Cognitive Neuroscience Reviews, 3*(3), 159–172. **[14 s.]**
- Kahneman, D., & Tversky, A. (2013). Choices, values, and frames. In *Handbook of the Fundamentals of Financial Decision Making*: Part I (pp. 269-278). **[10 s.]**

Recommended reading:

- Chen, R., Li, D. P., Turel, O., Sørensen, T. A., Bechara, A., Li, Y., & He, Q. (2018). Decision making deficits in relation to food cues influence obesity: a triadic neural model of problematic eating. *Frontiers in Psychiatry*, 9.
- Eysenck, M. W., & Keane, M. T. (2015). *Cognitive psychology: A student's handbook*. Psychology Press. Chapters 12 & 13 (pp 503-588).**[86 s.]**
- Liu, X., Liu, T., Shangguan, F., Sørensen, T. A., Liu, Q., & Shi, J. (2018). Neurodevelopment of conflict adaptation: Evidence from event-related potentials. *Developmental Psychology, 54*(7), 1347-1362. **[16 s.]**
- Peng-Li, D., Sørensen, T. A., Li, Y., & He, Q. (2020). Systematically lower structural brain connectivity in individuals with elevated food addiction symptoms. *Appetite*, 155, 104850.

16. Lecture: Consciousness – The relation between brain and mind

2x45 min v/ Thomas Alrik Sørensen

The classical mind-body problem has in recent years become one of the most central areas of investigation in cognitive neuroscience. This development has included a re-statement of the problem as a more specific consciousness-brain problem, making it more open to empirical investigation. The topic is perfect to illustrate the “meeting” of issues in philosophy of mind and science and experimental methodology. It opens up several questions of intuitive interest to most people, such as “do we have free will?” and “how can subjective experiences exist in a physical universe?”.

Required reading:

- Block, N. (1995). On a confusion about a function of consciousness, *Behavioral & Brain Sciences, 18*(2), 227–247. **[21 s.]**
- Chalmers, D (2000). What is a neural correlate of consciousness? In: T. Metzinger (ed): *Neural Correlates of Consciousness*, MIT Press.
- Libet, B., Gleason, C. A., Wright, E. W., & Pearl, D. K. (1983). Time of conscious intention to act in relation to onset of cerebral activity (readiness-potential). The unconscious initiation of a freely voluntary act. *Brain, 106*(3), 623-642. **[20 s.]**
- Naci, L., & Owen, A. M. (2013). Making every word count for nonresponsive patients. *JAMA neurology*, 70(10), 1235-1241. **[7 s.]**
- Owen, A. M., Coleman, M. R., Boly, M., Davis, M. H., Laureys, S., & Pickard, J. D. (2006). Detecting awareness in the vegetative state. *Science, 313*(5792), 1402-1402. **[1 s.]**

Recommended reading:

- Brogaard, B., & Sørensen, T. A. (2023). Kliniske aspekter i forbindelse med forstyrret bevidsthedsindhold. I R. S. Rasmussen, & T. A. Sørensen (red.), *Hjernen og Psyken*, HjerneForum, 166-192.Chalmers, D (2000). What is a neural correlate of consciousness? In: T. Metzinger (ed): *Neural Correlates of Consciousness*, MIT Press. **[27 s.]**
- Miskowiak, K., & Sørensen, T. A. (2004). Bevidsthed i Videnskaben. *Psykologisk Set, 21*(53), 3-10. **[8 s.]**
- Sørensen, T. A., & Brogaard, B. (2023). Kliniske aspekter ved forstyrret bevidsthedsniveau. I R. S. Rasmussen, & T. A. Sørensen (red.), *Hjernen og Psyken*, HjerneForum, 148-165. **[18 s.]**

Seminar
In a number of research seminars, the students are offered an insight in some of the ongoing research projects conducted by different people at CCN – typically at either ph.d. or post doc level. As these presentations are on current research, they will also have different emphasis on various stages of the research projects; some are just beginning whereas others have several parts that have been wrapped up. This also provides the students with a glimpse into the mechanisms and project management of a research project.

1. Seminar
2x45 min v/ Thomas Alrik Sørensen

Thomas Alrik Sørensen is an associate professor at the department and the head and PI of CCN. In this seminar he will talk about the various stages from student to researcher, and some of the lessons learned working on various projects.

Required reading:
NA

Recommended reading:
NA

2. Seminar
2x45 min v/ TBD

TBD.

Required reading:
NA

Recommended reading:
NA

3. Seminar
2x45 min v/ Vibeke Delêtre

Vibeke Delêtre is a neuropsychologist worked at the Filidelfia clinic since 2021 where she finished her education at the AAU neuroprogramme, and recently changed to a new job at the hospital in Region Sjælland. During her studies she worked with animal models of Alzheimer's disease in the Wiborg lab and is now doing clinical work with patients.

Required reading:
NA

Recommended reading:
NA

4. Seminar
2x45 min v/ Aurore Zelazny

Aurore Zelazny completed her double ph.d. at CCN in 2024 investigating the boundaries between synaesthesia and multisensory perception in a Sino-Danish Center funded project entitled "The effect of semantics on perception – an investigation of synaesthesia, multisensory perception, and the experience of food".

Required reading:
NA

Recommended reading:
NA

Course literature:

Alvarez, G. A., & Cavanagh, P. (2004). The capacity of visual short-term memory is set both by visual information load and by number of objects. *Psychological Science, 15*(2), 106-111. **[5 s.]**

Ásgeirsson, A. G., Nordfang, M. & Sørensen, T. A. (2015). Components of Attention in Grapheme-Color Synesthesia: A Modeling Approach, *PLoS ONE, 10*(8), pp. 1–19. **[12 s.]**

Bartels, C., & Wallesch, C.-W. (2010). Functional neuroanatomy of language disorders. In Jennifer Gurd, Udo Kischka, & John Marshall (Eds), *Oxford Handbook of Clinical Neuropsychology*. 2nd edition. Oxford University Press. **[11 s.]**

Branco, T., & Staras, K. (2009). The probability of neurotransmitter release: variability and feedback control at single synapses. *Nature Reviews Neuroscience*, 10(5), 373-383. **[11 s.]**

Block, N. (1995). On a confusion about a function of consciousness. *Behavioral & Brain Sciences*, 18 (2), pp. 227–247. **[34 s.]**

Bottini, G., Paulesu, E., Gandola, M., & Invernizzi, P. (2010). Functional neuroanatomy of spatial perception, spatial processes and attention. In Jennifer Gurd, Udo Kischka, & John Marshall (Eds), *Oxford Handbook of Clinical Neuropsychology*. 2nd edition. Oxford University Press. **[27 s.]**

Boutonnet, B., Dering, B., Viñas-Guasch, N., & Thierry, G. (2013). Seeing objects through the language glass. *Journal of Cognitive Neuroscience*, 25(10), 1702-1710. **[8 s.]**

Breedlove, S. M., Watson, N. V., & Rosenzweig, M. R. (2013). *Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience*. 7th edition. Sinauer Associates. **[600 s.]**

Bundesen, C. (1990). A Theory of Visual Attention. *Psychological Review*, 97(4), 523-547. **[26 s.]**

Bundesen, C., Habekost, T., & Kyllingsbæk, S. (2005). A neural theory of visual attention: bridging cognition and neurophysiology. *Psychological Review*, 112(2), 291-328. **[42 s.]**

Chalmers, D. (2000). What is a neural correlate of consciousness? In: T. Metzinger (ed): *Neural Correlates of Consciousness,* MIT Press, 17-40. **[23 s.]**

Craig, A. D. (2009). How do you feel—now? The anterior insula and human awareness. *Nature Reviews Neuroscience*, 10(1), 59-70. **[16 s.]**

Dall, J. O., Wang, Y., Cai, X., Chan, R. C. K., & Sørensen, T. A. (2021). Visual Short-Term Memory and Attention: An Investigation of Familiarity and Stroke Count in Chinese Characters. *Journal of Experimental Psychology: Learning, Memory and Cognition*, 47(2), 282-294. **[15 s.]**

Dew, I. T., & Cabeza, R. (2011). The porous boundaries between explicit and implicit memory: behavioral and neural evidence. *Annals of the New York Academy of Sciences*, 1224(1), 174-190. **[17 s.]**

Di Ieva, A. (2011). *Brain anatomy - from a clinical and neurosurgical perspective: a clinically oriented manual of neuroanatomy*. Macquarie University. **[47 s.]**

Fuster, J. M. (2010). Functional neuroanatomy of executive process. In Jennifer Gurd, Udo Kischka, & John Marshall (Eds), *Oxford Handbook of Clinical Neuropsychology*. 2nd edition. Oxford University Press. **[14 s.]**

Gazzaninga, M. S., Ivry, R. B., & Mangun, G. R. (2009). *Cognitive Neuroscience: The Biology of the Mind* (*3rd Ed.*) WW Norton & Company: New York. Chapter IV: Methods of Cognitive Neuroscience. pp. 96-146. **[50 s.]**

Gevins, A. (1998). The future of electroencephalography in assessing neurocognitive functioning. *Electroencephalography and Clinical Neurophysiology 106: 165-172.* **[8 s.]**

Henke, K. (2010). A model for memory systems based on processing modes rather than consciousness. *Nature Reviews Neuroscience, 11*(7), 523-532. **[16 s.]**

Holcomb, P. J. (1993). Semantic priming and stimulus degradation: Implications for the role of the N400 in language processing. *Psychophysiology, 30*(1), 47-61. **[14 s.]**

Faust, T. E., Gunner, G., & Schafer, D. P. (2021). Mechanisms governing activity-dependent synaptic pruning in the developing mammalian CNS. *Nature Reviews Neuroscience*, 22(11), 657-673. **[21 s.]**

Fellows, L. K. (2004). The Cognitive Neuroscience of Human Decision Making: A Review and Conceptual Framework. *Behavioral and Cognitive Neuroscience Reviews, 3*(3), 159–172. **[16 s.]**

Kahneman, D., & Tversky, A. (2013). Choices, values, and frames. In *Handbook of the Fundamentals of Financial Decision Making*: Part I (pp. 269-278). **[12 s.]**

King, M. (2023). The big role of the 'little brain': exploring the developing cerebellum and its role in cognition. *Current Opinion in Behavioral Sciences*, 54, 101301. **[6 s.]**

King, M., Shahshahani, L., Ivry, R. B., & Diedrichsen, J. (2023). A task-general connectivity model reveals variation in convergence of cortical inputs to functional regions of the cerebellum. *Elife*, 12, e81511. **[16 s.]**

Kuhl, P. K. (2004). Early language acquisition: cracking the speech code. *Nature Reviews Neuroscience*, 5(11), 831-843 [14 s.]

Kuhl, P. K. (2010). Brain mechanisms in early language acquisition. *Neuron*, 67(5), 713-727 **[15 s.]**

Lazarus, R. S. (1982). Thoughts on the relations between emotion and cognition. *American Psychologist*, 37(9), 1019-1024. **[9 s.]**

Lerch, J. P., Van Der Kouwe, A. J., Raznahan, A., Paus, T., Johansen-Berg, H., Miller, K. L., ... & Sotiropoulos, S. N. (2017). Studying neuroanatomy using MRI. *Nature Neuroscience*, 20(3), 314-326. **[22 s.]**

Libet, B. Gleason, C. A., Wright, E. W., & Pearl, D. K. (1983). Time of conscious intention to act in relation to onset of cerebral activity (readiness-potential), *Brain, 106,* 623-642. **[19 s.]**

Luck, S. J., & Vogel, E. K. (1997). The capacity of visual working memory for features and conjunctions. *Nature, 390*, 279–281. **[3 s.]**

Manassi, M., Murai, Y., & Whitney, D. (2023). Serial dependence in visual perception: A meta-analysis and review. *Journal of Vision*, 23(8), 18. **[17 s.]**

Markowitsch, H. J. & Piefke, M. (2010). The Functional Anatomy of Learning and Memory. In Jennifer Gurd, Udo Kischka, & John Marshall (Eds), *Oxford Handbook of Clinical Neuropsychology*. 2nd edition. Oxford University Press. **[16 s.]**

Mogensen, J. (2021). Animal models in neuroscience. In: Hau, J. & Schapiro, S. (Eds.) *Handbook of Laboratory Animal Science, Fourth Edition, Volume II. Animal Models*. Boca Raton, FL: CRC Press LLC**.**Chapter 23. **[14 s.]**

Mogensen, J. (2012). Reorganization of Elementary Functions (REF) after brain injury: Implications for the therapeutic interventions and prognosis of brain injured patients suffering cognitive impairments. In: Schäfer, A. J., & Müller, J. (Eds.) *Brain Damage: Causes, Management and Prognosis* (1-40). Hauppauge, NY: Nova Science Publishers, Inc. **[26 s.]**

Naci, L., & Owen, A. M. (2013). Making every word count for nonresponsive patients. *JAMA neurology*, 70(10), 1235-1241. **[7 s.]**

Özçete, Ö. D., Banerjee, A., & Kaeser, P. S. (2024). Mechanisms of neuromodulatory volume transmission. *Molecular Psychiatry*, 1-14. **[15 s.]**

Owen, A. M., Coleman, M. R., Boly, M., Davis, M. H., Laureys, S., & Pickard, J. D. (2006). Detecting awareness in the vegetative state. *Science*, 313(5792), 1402-1402. **[1 s.]**

Paulson, O. B., Schousboe, A., & Hultborn, H. (2023). The history of Danish neuroscience. *European Journal of Neuroscience*, 58(4), 2893-2960. **[49 s.]**

Pessoa, L. (2008). On the relationship between emotion and cognition. *Nature Reviews Neuroscience, 9*(2), 148-158. **[16 s.]**

Spitzer, N. C. (2012). Activity-dependent neurotransmitter respecification. *Nature Reviews Neuroscience*, 13(2), 94-106. **[17 s.]**

Stenberg, D. (2007). Neuroanatomy and neurochemistry of sleep. *Cellular and Molecular Life Sciences*, 64, 1187-1204. **[19 s.]**

Sørensen, T. A., & Kyllingsbæk, S. (2012). Short-term storage capacity for visual objects depends on expertise. *Acta Psychologica, 140*(2), 158-163. **[7 s.]**

Sørensen, T. A., Vangkilde, S., & Bundesen, C. (2015). Components of attention modulated by temporal expectation. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 41*(1), 178-193. **[21 s.]**

van Petten, C., & Luka, B. J. (2012). Prediction during language comprehension: Benefits, costs, and ERP components. *International Journal of Psychophysiology*, 83(2), 176-190. **[24 s.]**

Witthoft, N., & Winawer, J. (2006). Synesthetic colors determined by having colored refrigerator magnets in childhood. *Cortex, 42*(2), 175-183. **[12 s.]**

Yuste, R. (2015). From the neuron doctrine to neural networks. *Nature Reviews Neuroscience*, 16(8), 487-497. **[14 s.]**

Total pages: 1424.