

SCICOGN101, Introduction to Cognitive Science
Fall 2019 – Course Schedule

Course Schedule (subject to minor changes):

Wk	Class	Topics handled in class	Preparation/Assignments (A)
1	Class 1a Monday 26/08	Course instructions Get to know each other History of cognitive neuroscience	Read Chapter 1: page 3-14 (Until: <i>The instruments...</i>) Preparation: what do you expect from this course? What do you hope to learn?
	Class 1b Thursday 29/08	The mind-body problem Overview of the course Introduction to neural signalling	Read Chapter 2: page 23-33 (Until: <i>Synaptic transmission..</i>) Preparation: what is the mind-body problem and what is your view on it? A1: Chapter overview In groups: overview of subjects handled in each chapter, short presentation (max. 5 min) of each group See Assignments file on Moodle
2	Class 2a Monday 02/09	Neural signalling Synaptic transmission Action potentials	Read: Chapter 2: page 33-39 (Until: <i>2.3 Overview..</i>) Watch: YouTube <i>Crash Course on The Nervous System</i> part 1, 2 and 3 Preparation: do you understand neural signalling? Bring questions to class if anything is unclear
	Class 2b Thursday 05/09	Neural signalling	Read: Chapter 2: page 39-45 (Until: <i>2.4 A guided tour..</i>)

		Anatomy of the brain (introduction)	<p>and: from http://thebrain.mcgill.ca read “From the simple to the complex”, click on “<u>Anatomy</u> by Level of Organisation”. (Function is also interesting/useful to read, if you want to)</p> <p>From the upper right panel, read ‘Molecular’ and ‘Neurological’, (Upper left panel: read Beginner, Intermediate and Advanced)</p>
3	Class 3a Monday 09/09	<p>Basics of neuroanatomy</p> <p>In-class quiz of brain anatomy and anatomical topography</p> <p>Presentation 1: Anatomy</p>	<p>Read: Chapter 2: page 45-63 (Until: <i>2.7 Development..</i>)</p> <p>Preparation: familiarize yourself with anatomical topographical terms (Box 2.1, page 43) and the four brain lobes (Figure 2.36, page 53)</p> <p>A2: Anatomy Quiz</p> <p>In-class assignment on anatomy</p>
	Class 3b Thursday 12/09	<p>Neuroanatomy repetition</p> <p>Techniques 1</p>	<p>Read: Chapter 3: page 73-93 (Until <i>3.4 Structural...</i>)</p> <p>Preparation: familiarize yourself with several forms of brain damage and deterioration (Table 3.1) and the following techniques: DBS, optogenetics and TMS</p>
4	Class 4a Monday 16/09	Techniques 2	<p>Read: Chapter 3: pp 93-104 (Until: <i>The Marriage...</i>)</p> <p>Preparation: familiarize yourself with the following techniques: CT/CAT, MRI,</p>

			DTI, single-cell recording, EcoG, EEG (ERP) and MEG A3: ZAPS Stroop test , perform the task at home before class, discussion on the task held in class
	Class 4b Thursday 19/09	Techniques 3 Converging methods Mind reading: is it possible?	Read: Chapter 3: 104-121 Preparation: familiarize yourself with the following techniques: PET, fMRI and the terms voxel and BOLD. Think about future prospects of mind reading for class discussion.
5	Class 5a Monday 23/09	Hemispheric specialisation, lateralization Presentation 2: Lateralization	Read: Ch 4: pp 125-156 (Until: 4.5 Evidence...) Preparation: make sure you understand the function of the corpus callosum and are familiar with split brain patients and methods to test their cognitive functions.
	Class 5b Thursday 26/09	Perception 1: Introduction to the senses The somatosensory system Plasticity	Read: Chapter 5: page 169-173 (Until: 5.2 Olfaction) and 181-190: 5.4 Somatosensation until 5.6 Vision
6	Class 6a Monday 30/09	In-class assignment: Critical analysis of a scientific paper	Read: article (plasticity) posted on Moodle, find strengths and weaknesses and <i>Guide to critical analysis of a scientific paper</i> (on Moodle)

			A4: Article summary, due Sunday at 8 pm, <u>bring paper copy to class!</u>
	Class 6b Thursday 03/10	Perception 2: Vision	Read: Chapter 5 page 190-200 <i>5.6 Vision</i>
7	Class 7a Monday 07/10	Perception 3: Vision: deficits Multimodal processing Presentation 3: Synesthesia	Read: Chapter 5 page 200-210, <i>5.7 From Sensation... until 5.9 Perceptual...</i> Preparation: familiarize yourself with the following terms: sensation, perception, achromatopsia, akinetopsia, area V4 and MT (V5) and synesthesia
	Class 7b Thursday 10/10	Perception 4: Audition	Read: <i>The hearing brain</i> (on Moodle) and page 184-190, <i>5.5 Audition</i> Deadline critical analysis, due Wednesday at 8 pm
FALL BREAK 14 OCTOBER – 20 OCTOBER			
8	Class 8a Monday 21/10	Revision and repetition	Prepare for exam, repetition in-class, Q and A session (voluntary)
	Class 8b Thursday 24/10	Midterm exam	See Midterm SLO's on Moodle

Midterm to Endterm (second half of the course):

Wk	Class	Topics handled in class	Preparation/Assignments (A)
9	Class 9 Monday 28/10	Object recognition 1	Read: Chapter 6: page 223-248 (Until: 6.4 <i>Specificity...</i>) Preparation: make sure you understand the terms object constancy, the what and where pathway, visual agnosia, optic ataxia, the area LOC and ventral OTC and the fNIRS technique.
	Thursday 31/10	MODERATION DAY	NO CLASS
10	Class 10a Monday 04/11	Object recognition 2 Presentation 4: Face and object recognition	Read: Chapter 6: page 248-271 Preparation: familiarize yourself with the brain areas STS, FFA and PPA and know their functions. Know the sub-types of visual agnosia (6.5) and prosopagnosia (6.6).
	Class 10b Thursday 07/11	Action 1	Read: Chapter 8: page 325-359 (Until: 8.7 <i>Movement...</i>) not: Central representation of movement plans and Hierarchical representation of action sequences (page 337-339). Preparation: know what the basal ganglia and cerebellum and their functions are. Understand population vectors and be able to explain what these are (study Figure 8.14, 8.15 and 8.16). Understand mirror neurons.

11	Class 11a Monday 11/11	Action 2 In-class discussion on the 10.000 hour rule	Read: Chapter 8 page 359-375 Preparation: make sure you understand and can explain Figure 8.32 and 8.34. Prepare for the class discussion on the 10.000 hour rule.
	Class 11b Thursday 14/11	Memory types Working Memory	Read: Chapter 9: page 379-396 (Until: 9.4 <i>The Medial Temporal...</i>) and from http://thebrain.mcgill.ca how memory works, <u>short</u> term memory, neurological level of organization (beginner, intermediate and advanced) Preparation: familiarize yourself with the different types of memory, see Table 9.1 and Figure 9.2 and 9.4. A5: ZAPS Memory, due Sunday 8 pm
12	Class 12a Monday 18/11	Long term memory 1 Long term memory types	Read: Chapter 9: pp 396-416 (Until: 9.6 <i>Memory...</i>) and from http://thebrain.mcgill.ca how memory works, <u>long</u> term memory, neurological level of organization (beginner, intermediate and advanced)

	Class 12b Thursday 21/11	Long term memory 2 Presentation 5: Memory	Read: Chapter 9: page 416-423 Preparation: rehearse all material we have handled on memory so far.
13	Class 13a Monday 25/11	Emotion 1	Read: Chapter 10: page 427-454 (Until: <i>10.7 Interactions...</i>) not: <i>10.4 Theories of emotion generation</i> A6: ZAPS Emotion Deadline resubmission critical analysis Friday 22/11 at 8 pm
	Class 13b Thursday 28/11	Emotion 2 Presentation 6: Emotion	Read: Chapter 10: page 454-471 Preparation: rehearse all material handled on emotion.
14	Class 14a Monday 02/12	Development 1	Read: Chapter 2: page 63-69 <i>2.7: Development...</i> and from Moodle: Development Page 669 – end
	Class 14b Thursday 05/12	Development 2 Presentation 7: Development	Rehearse all material for Endterm Exam
15	Class 15a Monday 09/12	Repetition of all chapters Q&A session	Prepare for exam, repetition Q and A session (voluntary) Resubmit Assignments (maximum 2) Sunday December 4th by midnight.
	Class 15b Thursday 12/12	Endterm Exam	Good luck! Mind the quizzes on Moodle

Student learning outcomes

More detailed objectives (to be used when studying for the exam) will be put on Moodle.

Instructor will (GIO's)	Student is able to do (SLO'S)	
Explain what cognitive science entails and how it evolved	Describe how the field has evolved and why it is a combination of various disciplines	Period 1 Week 1
Provide feedback on student presentations	Present scientific data, in a well-informed, clear and interactive manner	Week 3-14
Discuss and practice with students the reading and analysis of scientific articles, including their strengths, weaknesses and implications	Critically analyze scientific literature within the discipline	Week 2-14
Introduce basic concepts concerning the electrical and chemical processes involved in neurotransmission	Understand the basics that underlie neuronal communication	Period 2 (Week 2/3)
Introduce the most relevant methods used in Cognitive science, giving various examples of their application in research Provide articles dealing with these techniques and discuss with the students their limitations and possibilities	Understand the basics of these methods, Describe the possibilities as well as the limitations of the various techniques, with emphasis on functional MRI	Period 3 (week 3-4)
Explain to and discuss with students key issues of perception on a behavioural, cellular and systems basis, with emphasis on visual perception, including object and face recognition	Describe the main concepts of visual perception Describe symptoms off these deficits, underlying neuronal substrates and possible way to diagnose these deficits	Period 4 (week 5-6)

Explain and discuss with students some of perceptual deficits encountered in the clinic		
Explain and discuss and differentiate between simple and complex motor behaviours Explain and discuss the role of various cortical and subcortical areas in motor processing.	Describe how specific behavioural goals are accomplished, include the role of the primary motor cortex and premotor areas Describe the modulatory role of the basal ganglia and cerebellum	Period 5 Week 7-8
Explain to and discuss with students the processes underlying learning and memory on a behavioural, cellular and system basis Explain and discuss with students the characteristics of declarative memory, nondeclarative memory and working memory	Describe what happens during memory storage and retrieval. Describe these characteristics, the neuronal structures involved in these different types of memory and their functioning. Describe studies in which each of these memory types is examined	Period 6 Week 9-10
Define emotions Explain and discuss some of the psychological models for emotion Explain and discuss the neural basis of emotions Explain and discuss the emotional influences on various cognitive functions	Describe what emotions are Explain the basic characteristics of these models Describe the role of a number of brain structures in emotion Explain the influences of emotion on learning/memory and decision making	Period 7 Week 11-12
Explain and discuss changes in brain structure and function during development that lead to changing cognitive abilities	Describe three changing structures in the brain, describe the consequences for behaviour	Period 8 Week 13-14

<p>Explain that different brain regions mature at different age and how this affects cognitive behaviour</p> <p>The role of nurture vs. nature in the development of brain and behaviour</p> <p>Describe some behavioural methods to study cognition in infants</p>	<p>Point out two areas that mature late and two areas that mature early and how this affects behaviour</p> <p>Describe the influences of nature and nurture, give one example of each</p> <p>Describe at least 2 of these methods</p>	
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