

# Module PS3035

## Cognitive and Behavioural Neuroscience

2016/2017  
1<sup>st</sup> semester

Lecturer: Dr Ines Jentzsch (email: ij7; room 2.04)

DRAFT

### Timetable:

Date	Week	9-11am	2-5pm
Tuesdays		<b>Maths Lecture Theatre D</b>	Seminar Room, 1.00
13/09/16	1	Lecture	Practical
20/09/16	2	Lecture	Practical
27/09/16	3	Lecture	Practical
04/10/16	4	Lecture	Practical
11/10/16	5	Lecture	Practical
29/11/16		Revision for PS3035 and PS3037	

### Aims and Objectives:

This module aims to provide an understanding of psychological knowledge in several inter-related domains concerned with the biological bases of behaviour. Emphasis will be laid on basic experimental science from analysis of synaptic events, brain lesion studies, brain activity scans, and clinical studies. The relationship between cognitive, emotional, behavioural, neurological and physiological processes will be examined and how these processes might differ between individuals focussing on State and Trait Anxiety, Externalizing vs Internalizing Personalities, and Aging.

Teaching will be based on morning lectures and afternoon seminars/practicals in which class members will be expected to play an active part (e.g., group presentations followed by class discussion), based on reading and critical evaluation of original material. Emphasis will be placed on the development of the skill of critical evaluation of alternative methods and models and levels of explanations of behaviour, with a particular focus on current debates and critiques of psychology. Students will learn to construct a coherent argument or debate by demonstrating logical processing of (complex) information and deductive reasoning and test hypotheses, theories, methods and evidence within their proper research contexts.

### Intended Learning outcomes

#### *A) Knowledge & Understanding / Intellectual Skills:*

- (1) To understand the basic research techniques in neuroscience sufficiently to allow comprehension and appraisal of original research papers.
- (2) To realise limits in methods and theory through critical evaluation.
- (3) To formulate new studies to advance the field.
- (4) To realise how brain processing underpins normal and pathological mental symptoms.
- (5) To understand how individuals can differ in basic behavioural and physiological processes.

#### *B) Module Specific / Practical Skills; Transferable / Key Skills:*

- (1) Teamwork, (2) Effective communication via oral presentations (3) Practical skills of designing neuroscience experiments (4) Analysis of data arising from neuroscience experiments. (5) To think creatively and independently. (6) To handle complex bodies of information.

### Assessment:

100% *Exam* (1.5 hours).

The exam will involve short answer questions, with a choice of 5 out of 7 questions.

## **Lecture 1. Methods in Cognitive Neuroscience I**

Introduction; Lesion studies, TMS/tDCS, PET, fMRI

### Reading (Lecture 1 and 2):

Gazzaniga, Ivry, & Mangun (2014). *Cognitive Neuroscience: The biology of the mind*. 4<sup>th</sup> Edition (Chapters 1, 3, 12 and 14). Norton and Company: New York.

Churchland & Sejnowski (1988). *Science*, 242,741-745.

Gratton et al. (2003). *Psychophysiology*, 40, 487-491.

Rorden & Karnath (2004). *Nature Reviews Neuroscience*, 5(10), 813-819.

Coles & Rugg (1995). [www.cogsci.ucsd.edu/~coulson/cogs179/ColesRugg1995chpt1.pdf](http://www.cogsci.ucsd.edu/~coulson/cogs179/ColesRugg1995chpt1.pdf)

Savoy (2001). *Acta Psychologica*, 107, 9-42.

### Afternoon Practical:

Debate: Cognition versus Neuroscience; Paper Discussion: Churchland & Sejnowski, (1988). (see also *Lisman (2015) Neuron*, 86, 864-882; and *Hochstein (2016) Studies in History and Philosophy of Science*, 56, 135-144).

## **Lecture 2. Methods in Cognitive Neuroscience II**

EEG/ERP, MEG, Optical Imaging

### Afternoon Practical:

Paper Discussion: McCabe & Castel (2008) Seeing is believing. The effect of brain images on judgements of scientific reasoning. *Cognition*, 107, 343-352.

(see also *Weisberg (2008). Journal of Cognitive Neuroscience*, 20(3), 470-477)

## **Lecture 3. Voluntary control over mental processes: Historical debates and experimental paradigms**

Key Concepts (The control homunculus, modularity hypothesis); Conflict paradigms (S-R compatibility effect, Simon effect, Eriksen/Flanker effect, Stroop effect)

### Reading (Lecture 3 and 4):

Monsell (1996). Control of mental processes. In V. Bruce (Ed), (pp. 93-148). Psychology Press.

Botvinick et al. (2004). *TICS*, 8, 539-546.

Carter et al. (2007). *Cognitive, Affective, & Behavioural Neuroscience*, 7, 367-379.

Practical: Experimental Paradigms: Design and data collection

## **Lecture 4. Voluntary control over mental processes: Neuroscience**

Neuroanatomy of cognitive control; computational modelling

Ullsperger et al. (2014). *Physiology Reviews*, 94, 35-79.

Botvinick (2007). *Cognitive, Affective, & Behavioral Neuroscience*, 7(4), 356-366.

Gehring et al. (1993). *Psychological Science*, 4(6), 385-390.

MacDonald et al. (2000). *Science*, 288, 1835-1838.

Taylor et al. (2007). *The Neuroscientist*, 13,160-172.

Williams et al. (2004). *Nature Neuroscience*, 7(12), 1370-1375.

Practical: Experimental Paradigms: Data Analysis, interpretation and critique

## **Lecture 5. Voluntary control over mental processes: Individual Differences**

Individual variations affecting Cognitive Control: State and Trait Anxiety, Externalizing vs Internalizing Personalities, Aging, Depression

### Reading:

Gehring, W.J., Himle, J., & Nisenson, L.G. (2000). *Psychological Science*, 11, 1-6.

Hajcak (2012). *Current Directions in Psychological Science*, 21(2), 101-106

Mathalon et al. (2003). *Neurobiology of Aging*, 24, 675-685.

Olvet & Hajcak (2008). *Clinical Psychology Review*, 28, 1343-1354

Pellegrino et al. (2007). *Journal of Cognitive Neuroscience*, 19(2), 275-286.

Ullsperger et al (2006). *International Journal of Psychophysiology*, 59, 59-69.

Weinberg et al. (2015). *International Journal of Psychophysiology*, 98, 276-299

Practical: Paper discussion, Critique: Erickson et al. (2004). *Human Brain Mapping*, 21, 98-107.