PSYC 3204 – Behavioural Neuroscience

Unit of Study Code: PSYC3204

Coordinator: Associate Professor Iain McGregor
Office: Room 244 Top South Badham
Phone: 9351 3571
E-mail: iain@psych.usyd.edu.au

Other Teaching Staff:

Dr Diana Caine
Office: Room 159 Transient Building
Phone: 9351 4518
E-mail: dianac@psych.usyd.edu.au

Dr Lea Williams
Office: Room 507 Griffith Taylor
Phone: 9351 5750
E-mail: lea@psych.usyd.edu.au

Dr Justin Harris
Office: Room 507 Griffith Taylor Room 479 Brennan
Phone: 9351 5750 9351 2864
E-mail: justinh@psych.usyd.edu.au

Format of Unit:
2 x 1 hour lectures/week x 13 weeks
1 x 1 hour tutorial/week x 12 weeks
Tutorial sizes: maximum of 15 students per group

Credit Point Value:
4 Credit Points

Qualifying:
8 credit points of Intermediate Psychology including PSYC 2111

Assessment:
The marks will be allocated as follows:
• Exam (multiple choice) 65%
• Classwork 35%

Classwork will be comprised of:
• Tutorial quiz (week 13) 25%
28 October to 31 October (week 13)
• Poster presentation 10%
all through the semester

Evaluation of teaching and learning:
Date: week 13
Type: standard CTL evaluation
Unit of study general description:

This unit of study carries on the from the Neuroscience component of PSYCH 2111, providing some more specialised coverage in the areas of psychopharmacology, molecular neuroscience, human brain imaging, cognitive neuroscience and cognitive neuropsychology. Topics to be covered include: Psychopharmacology (basic actions of drugs on the brain, mechanism of action of antidepressants, antipsychotic and anxiolytic drugs, effects of recreational drugs (cannabis, MDMA, alcohol, opiates) on brain, behaviour and cognition); Molecular Neuroscience (effects of drugs on gene expression, the use of knockout mice and antisense techniques); Neurobiology of learning and memory (the synaptic and neuroanatomical basis of associative learning and memory retrieval); Models of the human brain (theories of how the brain functions as a complex system); Brain Imaging Technologies (findings in psychiatry and neurology, what we can learn about the fundamentals of brain function from brain imaging); Cognitive Neuroscience (neural basis of cognitive abnormalities in schizophrenia and other disorders). And Cognitive Neuropsychology (explores how models of normal cognitive function can be derived from focal cognitive deficits in neurological patients).

In the first few weeks of the course, tutorials consist of demonstrations covering basic neuroanatomy, histology and psychopharmacology. In the latter part of the course, tutorials involve groups of students giving poster presentations of recent "hot" papers in the neuroscience field.

Teaching outcomes:

- Knowledge of fundamental functional neurophysiology including neuronal and synaptic transmission.
- Knowledge of the methods in behavioural neuroscience; recording, lesions, histology and immunohistochemistry; behavioural measures.
- Knowledge of psychopharmacology - for example the psychopharmacology of depression and the psychopharmacology of drugs of abuse such as MDMA and cannabis.
- Knowledge of cognitive neuroscience; relating recent functional imaging results to behaviour and psychological function.
- Knowledge of neuropsychology - understanding brain structure and function from the cognitive sequelae of focal neurodegenerative diseases.

Tutorials
For the first six weeks, tutorials will consist of demonstrations and practicals on such topics as sheep brain dissection, histology, immunohistochemistry, single cell recording and animal models. These practicals, while not at all "gory", are not recommended for people who have a strong ethical objection to animal experimentation. In weeks 8-12, tutorials will involve poster presentations by groups of students in which they discuss a recent paper in the neuroscience field. The final tutorial (in week 13) will involve a quiz on all tutorial material.

Poster presentations
In the first tutorial (week 2) you will be required to form groups of 3 people. A poster topic will be allocated (at random - literally by drawing the topic out of a hat) to each group and you will be required to present a poster on that topic later in the semester. You will work with others in your team to prepare this poster. You will also be responsible for preparing a handout in association with each poster for the rest of the tutorial. Your poster presentation will last around 20 minutes and you must be ready to encourage and handle questions about the material.
PROVISIONAL SYLLABUS

Associate Professor Iain McGregor will give lectures on the following topics:

- Revision of basic neuroanatomy, neurophysiology and neurochemistry
- Molecular neuroscience - the new revolution in neuroscience.
- The origins and history of psychopharmacology.
- Depression - neural basis, animal models, prevalence and drug treatments.
- MDMA ("Ecstasy") - who takes it, what it does. Does it have neurotoxic effects in humans?
- Cannabis - effects on the brain. Is it addictive? Is it a gateway drug? Does it cause schizophrenia?
- Alcohol - effects on the brain and behaviour. Anti-craving medications for treatment of alcoholism.

Dr Justin Harris will give lectures on the following:

- Mechanisms of synaptic plasticity and their contribution to associative learning;
- Brain structures specialised for specific learning and memory processes;
- How the brain represents space;
- Movement and action.

Dr Lea Williams will give lectures on the following:

- Brain dynamics and understanding the brain as a complex system.
- Brain Imaging Technologies in neuroscience; techniques for investigating 'where' brain activity occurs - eg PET, MRI, SPECT and functional MRI.
- Brain Imaging Technologies; techniques for investigating 'when' brain activity occurs - Psychophysiological techniques such as EEG, event-related potentials.
- Cognitive neuroscience models of brain function: Are there ways to integrate different models of human brain function?
- Application of brain models and evidence from brain imaging techniques to understanding clinical disorders, such as schizophrenia, ADHD, parkinsons disease and phobias.

Dr Diana Caine will give lectures on the following:

- Alzheimer's disease, the temporal lobes and episodic memory
- Frontotemporal dementia, the language circuit and semantic memory
- Frontotemporal dementia, the frontal lobes, personality and behaviour
- Corticobasal degeneration, the parietal lobes and praxis

TEXT

Carlson, N.R. (2002) Foundations of Physiological Psychology, 5th Edition. Boston. Allyn and Bacon. This will be supplemented by references to many recent papers in the areas. Copies of these papers should be available from Special Reserve.

Supplementary Text