PSYC 3204 – Behavioural Neuroscience

Unit of Study Code: PSYC3204

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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 20 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:

- Classwork 35%
  comprised of a tutorial quiz (week 7, 6/9 to 10/9) - 15%
- Class presentation - 10%
- Class participation - 10%

- Final Exam 65%
  multiple choice questions and short answers

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

This unit carries on from the Neuroscience component of PSYC 2111. It is concerned with neural processes as studied in non-human animals, providing more specialised coverage in the areas of psychopharmacology, molecular neuroscience, the neural bases of motivation and emotion, and the neurobiology of learning and memory. Specific topics include: basic actions of drugs in the brain; the specific mechanisms of action of therapeutic drugs such as antidepressants, anxiolytics, and anti-psychotic drugs; the effects of recreational drugs such as ecstasy and opiates; and the use of gene knockout mice to study brain and behaviour; neurobiology of social emotions and social behaviour; the neural bases of perception and action; balance and vestibular function; synaptic plasticity and associative learning; pathophysiology of degenerative brain diseases; and animal models of psychiatric disease.

In the first few weeks of the course, tutorials consist of demonstrations covering basic neuroanatomy, histology and neuropharmacology. In the latter part of the course, tutorials involve groups of students giving oral 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: electrophysiological recording, brain lesions, histology and immohistochemistry; behavioural measures; and computational analysis.
- Knowledge of psychopharmacology - for example the psychopharmacology of depression and the psychopharmacology of drugs of abuse.
- Understanding of the neurobiology of emotions and social behaviour.
- Understanding of basic mechanisms of plasticity in the nervous system and how they relate to learning.
- Understanding of cognitive neuroscience as studied in non-human primates; relating recent neuronal activity to behaviour and psychological function.
- Knowledge of neuropathology of degenerative neurological conditions and selected models of psychiatric disease.
- Experience in critically evaluating a journal publication in behavioural neuroscience.
- Experience in oral presentation of piece of neuroscience research.

Tutorials

Up to week 6 of semester, tutorials will consist of demonstrations and practicals on such topics as sheep brain dissection, histology, immunohistochemistry, stereotaxic surgery, and animal models. These practicals, while not at all “gory”, are not recommended for people who have a strong ethical objection to animal experimentation. The material covered in these tutorials will then be assessed by a class quiz in week 7. In weeks 8-12, tutorials will involve oral presentations by groups of students in which they discuss a recent paper in the neuroscience field.

Class presentations

In the first tutorial (week 2) you will be required to form groups of 3-4 people. A topic will be allocated (at random - literally by drawing the topic out of a hat) to each group and you will be required to make an oral presentation on that topic later in the semester. You will work with others in your team to prepare this presentation. You will also be responsible for preparing a handout in association with each presentation for the rest of the tutorial. Your presentation will last around 20 minutes and you must be ready to encourage and handle questions about the material.

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PROVISIONAL SYLLABUS

Associate Professor Iain McGregor will give lectures on the following topics:
- Revision of basic neuroanatomy, neurophysiology and neurochemistry
- The origins and history of psychopharmacology.
- Depression - neural basis, animal models, prevalence and drug treatments. The role of neurogenesis in recovery from depression.
- MDMA ("Ecstasy") and Methamphetamine ("Speed") - use, abuse, possible neurotoxic effects and adverse functional effects.
- Cannabis and cannabinoids - Effects of cannabis on the brain and long-term effects on health. Addictive effects. Functions of anandamide and 2-AG.
- Alcohol - effects on the brain and behaviour. Anti-craving medications for the treatment of alcoholism.
- Defensive behavior: rodent models of anxiety. Neural substrates and learning mechanisms involved in fear and defense.

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.
- Degenerative disorders – Alzheimers, Parkinsons, CJD.

Professor Ian Curthoys will give lectures on the following:
- Sensorimotor integration in behavioural neuroscience.
- Clinical implications of work in behavioural neuroscience:
  How understanding the neuroanatomical and physiological basis of a sensory system is used to understand normal function and function after unilateral loss.
- The vestibular system as an example.
- The role of the vestibular system in stabilizing the visual world. The effect of unilateral vestibular disease and loss.
- Plasticity of the vestibulo-ocular reflex. Vestibular compensation.
- Clinical implications.
  Vertigo, vection and motion-sickness.

TEXT

This will be supplemented by references to many recent papers in the areas.
Copies of these papers should be available from Special Reserve.