

## C8306 Psychobiology

20 credits

Dr. Marc Obonsawin (GH 662) m.c.obonsawin@strath.ac.uk  
Dr. Kellyanne Findlay (GH 581) Kellyanne.findlay@strath.ac.uk

### **Aims**

This core class is required for the Graduate Basis for Chartered Membership by the British Psychological Society (BPS). The purpose of this class is to provide the opportunity for students to learn the basic principles of brain function, and to encourage students to address the implications of this understanding for their own view of how behaviour is generated. Prior knowledge of Psychology is required, specifically those issues covered in the First and Second Year classes. Although a prior knowledge of biology is helpful, no prior knowledge of biology is required, as the essential required elements will be covered in the class, either through lecture or through student led reading.

The Teaching and Learning activities for this class consists of directed reading, formal lectures, informal online student discussions and a laboratory practical. Most of the learning will come as a result of the directed reading of the required texts. The required reading will be the entire book ***Making up the Mind*** and selected pages from ***Biological Psychology*** (Breedlove SM and Watson NV). The aim of the formal lectures and the laboratory practical will be to clarify difficult concepts in the reading material, to bring the most important issues into focus and to provide additional detail on selected points. Students will also be directed to additional textbooks of varying degrees of complexity and detail. Throughout the course, particular emphasis will be placed on the insights into behaviour (both normal and abnormal) that are gained by an understanding of brain function and development.

### **Content**

1. Why study the brain?
  - i. The brain is the organ of behaviour
  - ii. Basic neuroanatomy
2. Electrophysiology and psychopharmacology
  - i. Cells in biological systems
  - ii. Neurons as cells
  - iii. How information is transmitted from one end of the neuron to another
  - iv. How information is transmitted from one neuron to another
  - v. The roles of temporal and spatial summation
3. Research methods in neuroscience
  - i. Single-cell and unit recordings
  - ii. Scalp recordings of electrical activity: the EEG and event-related potentials.
  - iii. Structural imaging
  - iv. Functional imaging
4. The visual system
  - i. The function of the eye
  - ii. Perception of form:
    - a. Visual fields of the ganglion cells
    - b. Visual fields of the cells of the lateral geniculate nucleus of the thalamus
    - c. Visual fields of the cells of the primary visual cortex
    - d. The role of other cortical areas in the perception of form
  - iii. Perception of colour: roles of the retina, and the blob sections of the cerebral cortex
  - iv. Perception of motion: from the retina to extrastriate areas of the cerebral cortex
6. The motor system
  - i. The nature of muscle and muscle function
  - ii. The role of the spinal cord in the control of muscle function
  - iii. The role of the cerebral cortex in modulating spinal cord function
  - iv. The roles of the basal ganglia and the cerebellum in modulating cortical and spinal control of muscle
  - v. The roles of the pre-motor cortical areas in the planning of actions.

### ***Learning outcomes***

An important aim of this course is to facilitate a cognitive shift in the way the students think about psychological problems. On completing the course, students should be familiar with the arguments supporting the hypothesis that the brain is the organ of behaviour and of psychological function, and should be aware of the implications of this hypothesis for hypotheses on the generation of behaviour. Students should be able to defend their own viewpoint on this issue by making use of evidence, parsimony and persuasive argument.

#### ***Cognitive skills***

- i. the ability to put intuitively-held beliefs about the causes of behaviour in perspective and to consider the implications of the empirical results in neuroscience and psychology for beliefs about the causes of behaviour
- ii. the ability to reconsider their own hypotheses in the light of new evidence or in the light of a more persuasive argument.
- iii. the ability to evaluate new evidence

#### ***Knowledge and understanding***

- i. to promote an understanding of the basic principles of brain function.
- ii. to raise awareness of the relationship between behaviour, psychological states and brain function.

#### ***Practical skills***

- i. beginner's level skill in physiological instrumentation
- ii. beginner's level skill in recording electroencephalographic measures

### ***Employability***

Psychobiology C8306 provides students with skills that will be useful beyond the undergraduate context: the ability to re-evaluate intuitively-held beliefs in the light of new evidence, the ability to discern the relevant detail from a large body of knowledge, the ability to take notes during a presentation,

### ***Place in course***

This class constitutes the third year component of the Biological Basis section of the teaching of Psychology for the purposes of BPS recognition of the degree. Whereas the relationship between the brain and behaviour was explored in the second year class ***C8201 Cognition & Neuropsychology***, ***C8306 Psychobiology*** provides an opportunity to learn about how the brain works, and how it carries out the processes underlying sensory perception and movement.

The class introduces information and concepts that will be directly useful in some fourth year classes. An understanding of brain structure, function and plasticity will be helpful in evaluating the usefulness of models of brain and mind discussed in the Honours option ***Artificial Intelligence***. An understanding of neuronal and neurotransmitter function would enhance your understanding of many topics covered in another Honours option ***Physiological Psychology***.

### ***Teaching, learning and methods of assessment***

It is expected that students will learn most of the material and concepts with the help of the recommended readings, additional readings found by the student, and the laboratory practicals provided by the course. The content of the lectures will supplement and guide the readings and the practicals.

The course is assessed by degree examination, a short essay, and in-class tests. The degree examination counts for 65% of the final mark, the short essay counts for 15% of the final mark, and the four in-class tests count toward 20% of the final mark (5% for each test). The degree examination is held in May/June, with an opportunity to resit in August.

The regulations of University of Strathclyde and of the School of Psychological Sciences and Health require that students attend lectures, seminars, tutorials, and practicals regularly and perform satisfactorily in the associated work. Students who fail to attend or who have not participated in class tests may be excluded from the degree examination. Any student with coursework outstanding at the time of the examination will receive a Fail for the examination performance and will not be able to obtain a pass at the resit examination unless the outstanding work completed to a satisfactory standard has been submitted.

### **Feedback**

Students will receive feedback on their performance in many forms and at various points during the semester. Students will receive individual marks on tests. After each test is marked, students will be provided with the answers to the questions and will be provided with generic comments on their performance on each test. Students will receive a mark and comments on their essay.

### **Teaching hours**

Two meetings per week - one two-hour session and one one-hour session.

### **Required reading**

Breedlove SM and Watson NV (2013) *Biological Psychology*, 7th edition, Sinauer Associates:Sunderland. This text is available for purchase from the bookshop, and is also available for borrowing in the Short Loan Collection in the library.

Frith, Chris (2007) *Making up the mind*. Blackwell Publishing. This text is available for purchase from the bookshop. It is also available for borrowing in the Short Loan Collection in the library, and is available as an e-book from the library.

### **Additional texts that you may find useful**

Banich MT (2004) *Cognitive Neuroscience and Neuropsychology*, Boston:Houghton Mifflin Co.

Bear MF, Connors BW and Paradiso MA (2007) *Neuroscience: Exploring the Brain*, Philadelphia:Lippincott.

Kolb B and Whishaw IQ (2006) *An Introduction to Brain and Behaviour*, 2nd edition, Worth Publishers:New York.

Kandel ER, Schwartz JH and Jessell TM (2000) *Principles of Neural Science*, 4th edition, New York:McGraw-Hill.

Pinel JPJ (2007) *Biopsychology*, Boston:Pearson Allyn and Bacon.

Squire LR, Berg D, Bloom F, du Lac S, and Ghosh A (2008) *Fundamental Neuroscience*, Boston:Academic Press