

Full Time MSc Neuroscience Programme 2014-2015
Titles for Essay A1
Submission Deadline: 20 October 2014, at 15.00pm

A1.1 Neuroanatomy and neuropathology

1. The human brain is usually described as being divided into a number of different regions on the basis of functional roles. Discuss brain divisions according to their functions using examples from disease.
2. Explain the regulation of oligodendrocyte differentiation from their precursors, and discuss the roles of some of the key growth factors in this process.
3. Discuss the current understanding of the neural pathways associated with pain perception.
4. How does stereology overcome sampling bias and why is this important for studying the diseased brain?
5. Discuss the evidence that ATP is a 'gliotransmitter'.
6. Explain the functional specifications that make neurons different from somatic cells.

A1.2 Cell Biology

7. Discuss the role cell adhesions play in neurodegenerative disorders?
8. Compare and contrast how the permeability transition pore and Bcl-2 family members activate caspases and how these pathways could be targeted in neurodegeneration?
9. How does the Bcl2 family of proteins (Bcl2, BH123, and BH3) regulate cytochrome c release from the mitochondrion?

A1.3 Neurotransmission

10. Discuss the evidence that genetic variation in receptors plays a role in epilepsy.
11. Discuss the evidence that variation in nicotinic acetylcholine receptor subunit genes plays a role in epilepsy.
12. Explain the mechanisms by which synaptic transmission occurs and discuss the effect of excitatory and inhibitory inputs on the target neuron.
13. Explain the mechanisms that underlie the conduction of an action potential along myelinated and non-myelinated fibres, including the prevention of bidirectional conduction.
14. Discuss how cloning and sequencing of receptor genes has contributed to our understanding of their function.
15. Discuss the sources and removal processes that determine extracellular glutamate concentrations during normal neurotransmission and during pathological states?

A1.4 Cell signalling

16. Describe 3 different classes of GPCR that have distinct signalling pathways and discuss.
17. Explain and discuss the neurotrophic hypothesis.
18. Do signalling pathways act in isolation? Illustrate your answer with detailed examples.