

**Part Time MSc Neuroscience Programme 2016-2018**  
**Titles for Essay A1**  
**Submission Deadline: 12 December 2016, at 15.00pm**

**A1.1 Neuroanatomy and neuropathology**

1. Discuss the structure and functional roles of the major association connections within the cerebral cortex.
2. Discuss the factors that regulate oligodendrocyte differentiation from their precursors.

**A1.2 Cell Biology**

3. Compare and contrast how the permeability transition pore and Bcl-2 family members activate caspases. What is the significance of these pathways in neurodegeneration?
4. Compare the LMTK protein family members with respect to their structure and function.
5. Describe and discuss the molecular mechanisms governing cell cycle control.

**A1.3 Neurotransmission**

6. Describe and discuss how an action potential - after it has been initiated - can be modulated during axonal conduction. Use specific examples.
7. Describe the measurement of extracellular dopamine in the brain using microdialysis and implanted carbon fiber electrodes. What are the advantages and problems of the two methods? Illustrate your answers with examples from the literature.
8. Compare and contrast the different classes of glutamate receptor.

**A1.4 Cell signalling**

9. How might a better understanding of cell signalling increase our knowledge of neurological diseases?
10. siRNAs have enormous potential as a therapy for diseases including those affecting the CNS. Describe and discuss strategies being developed to overcome the challenges of rapid degradation, poor cellular uptake and off-target effects if this approach is to succeed.