

Full Time MSc Neuroscience Programme 2013 – 2014

Titles for Essay A1

Submission Deadline : 22 October 2013, at 15.00pm

A1.1 Neuroanatomy and neuropathology

1. Describe the major divisions of the human CNS and their functions, using clinical correlates to illustrate.
2. Describe the major types of intracortical connections and discuss their importance in cortical function.
3. Describe the regulation of oligodendrocyte differentiation from their precursors, including the roles of some of the key growth factors.
4. Describe the functional specifications that make neurons different to somatic cells.
5. What are the limitations of using human post mortem material to study neurodegeneration and why do we often use mice instead?

A1.2 Cell Biology

6. Describe the role of the ribosome as a molecular machine in the cell and how it can be the target of therapeutic strategies.
7. Explain the role of the hydrophobic effect in protein folding.
8. Compare and contrast how the permeability transition pore and Bcl-2 family members activate caspases and how these pathways could be targeted to combat neurodegeneration.

A1.3 Neurotransmission

9. Discuss the evidence that variation in receptor genes plays a role in epilepsy.
10. Explain how real-time measurement of neurochemical levels can be used to study neuronal function. In your answer consider (i) The factors that determine the concentration of a neurochemical in the extracellular fluid. (ii) The factors that limit the transport of different neurochemicals within the extracellular space to your measurement device. (iii) The type of in vivo measurement device chosen.
11. Describe the structure-function relationship of voltage gated- and ligand gated ion channels.

A1.4 Cell signalling

12. Explain the different types of secondary messengers associated with G-protein-coupled receptors and illustrate/describe their roles in signalling.
13. Describe the major mechanisms that cells use to transduce an extracellular signal into gene expression.
14. Describe the key functions of BDNF in the adult brain.