Full Time MSc Neuroscience Programme 2016-2017

Titles for Essay A2

Submission Deadline: Monday 19th of December 2016, at 15.00pm

A2.1 Neurogenetics

1. Is there a genetic component to human personality and are there any convincing genetic findings linking specific genes to personality traits?

2. What are genome wide association studies (GWAS)? Describe and discuss the factors that contribute to the success of these studies.

3. Studies have identified mutations in gene X as being linked to a neurological disorder that affects both the motor and cognitive systems. Following preliminary cellular work, you now wish to investigate the effect of this mutation in vivo. You have access to labs that work with Drosophila, zebrafish and mice. Discuss which of these species you might use to establish your transgenic animals, with reference to the benefits and drawbacks of each model system.

A2.2 Developmental Neurobiology

4. Why are mutations in both the VLDLR and the ApoER2 genes required to generate a 'reeler' phenotype?

5. In the invertebrate ventral nerve cord you find a combination of repulsive and attractive cues to guide axons at the midline. Discuss why multiple activities are required, their regulation during the process of axon midline crossing and the axon pathway consequences in deletion mutant animals for these factors.

6. Outline how tritiated thymidine or BrdU labelling can be used to label dividing cells. Discuss three features of corticogenesis that have been revealed by this technique.

A2.3 Neuronal Plasticity

7. Describe one artificial neural network in detail and asses its plausibility as a model of neuronal processes and its potential to contribute to neuroscience research.
8. Discuss the role of CaMKII autophosphorylation in long-term potentiation.

A2.4 Neuroimmunology

9. Discuss the evidence from genetic and transgenic animal studies suggesting that microglia play a key role in the progression of Alzheimer's disease.

10. How can infection lead to autoimmune disease that affects the CNS? Illustrate your essay with examples of diseases where this mechanism is thought to occur.