Engineering Tripos Part IIA, 3G3: Introduction to Neuroscience, 2017-18

Module Leader

Dr G Hennequin [1]

Lecturers

Dr G Hennequin, Dr M Lengyel, Dr T O’Leary

Lab Leader

Dr G Hennequin [1]

Timing and Structure

Lent term. 16 lectures.

Aims

The aims of the course are to:

- Introduce students to how the brain processes sensory information, controls our actions, learns through experience and lays down memories.
- Elucidate the computational and engineering principals of brain function.

Objectives

As specific objectives, by the end of the course students should be able to:

- Have a basic grasp of neuroscience that can act as foundation for further study.
- Understand the basic principles of sensory processing, decision making, learning and memory and how engineering concepts can be applied to them.

Content

Perception and action (6L) (Dr G Hennequin)

- Neurons and synapses
- Perception as Bayesian inference
- Decision making

Hearing (2L) (Dr R Turner)

- Auditory processing
- Cochlear implants

Learning and memory (8L) (Dr M Lengyel)

- The cellular basis of learning and memory
Animal learning
Memory

Coursework
Simulation of different types of neural coding of natural images. Laboratory report and/or Full Technical Report.

Efficient coding in visual cortex

Learning objectives:

Practical information:

- Sessions will take place in [Location], during week(s) [xxx].
- This activity [involves/doesn't involve] preliminary work ([estimated duration]).

Full Technical Report:

Students [will/won't] have the option to submit a Full Technical Report.

Booklists
Please see the Booklist for Part IIA Courses [2] for references to this module.

Examination Guidelines
Please refer to Form & conduct of the examinations [3].

UK-SPEC
The UK Standard for Professional Engineering Competence (UK-SPEC) [4] describes the requirements that have to be met in order to become a Chartered Engineer, and gives examples of ways of doing this.

UK-SPEC is published by the Engineering Council on behalf of the UK engineering profession. The standard has been developed, and is regularly updated, by panels representing professional engineering institutions, employers and engineering educators. Of particular relevance here is the 'Accreditation of Higher Education Programmes’ (AHEP) document [5] which sets out the standard for degree accreditation.

The Output Standards Matrices [6] indicate where each of the Output Criteria as specified in the AHEP 3rd edition document is addressed within the Engineering and Manufacturing Engineering Triposes.

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