LF262-15 Neurobiology

20/21

Department
Life Sciences
Level
Undergraduate Level 2
Module leader
Yuriy Pankratov
Credit value
15
Module duration
5 weeks
Assessment
Multiple
Study location
University of Warwick main campus, Coventry

Description

Introductory description

The aim of this module is to introduce students to one of the fundamental processes that underpin modern biomedical science: immunology. It builds on the materila delivered in BS127 Agents of infectious disease and provides the preliminary understadning for the final year module BS317 Advanced Immunlogy. Together with companion modules dealing with specific pathogens, the module considers many disease processes and their mitigation.

Module aims

The module aims to give an overview of the field of Neurobiology. It includes an introduction to the physiology of the nervous system, and reflects the expertise of the Department with a more detailed analysis of the cell and molecular biology underlying our present understanding of the way in which the nervous system develops and functions. The module stands on its own as one bridging the gap between Molecular Biology and the functioning of whole organisms.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Lectures 1-5
Neuronal Development, Cell biology and Disease
The aim of this part of the module is to provide an understanding of basic principles of organization of a nervous system and development of the nervous system. It will also give us an opportunity to discuss some diseases.
Neuronal cell biology: specialities of neuronal cell biology – axonal transport, localised translational control of mRNA, inter-cellular mRNA exchange by nanotubes, myelination. Diseases caused by defects in these systems.
Axon guidance: the identification of the factors involved in wiring a nervous system , including axonal growth cone structure, attraction and repulsion, pioneer and follower neurons.
Synaptic refinement and activity dependence: the Chemospecificity hypothesis, the role of activity in synaptic refinement and its molecular basis.
Development of the CNS: the link between genes and function of neuronal cells with particular focus to the development of nervous system

Lectures 6-10
Fundamentals of Neurophysiology
These lectures will explore fundamental principles of signal transmission in the nervous system, including electrical signalling in the neurons and the role of various neurotransmitters and their receptors in the information processing in the brain. The brief overview of the most important neuro physiological experimental techniques will be given. Lecture topics include:
Basic electrophysiology: role for ion channels in the signalling in neurons other cells and techniques which are used to study them: patch-clamp, current clamp, voltage clamp, fluorescent imaging.Synaptic transmission and neurotransmitter receptors - basic classes of neurotransmitters
An appreciation of our knowledge at the cellular and molecular level of highly complex interactive processes
An understanding of how a reductionist approach can yield valuable insight into events affecting the whole organism and their receptors; release and turnover of neurotransmitters and their modes of action.
Integration in the CNS - how neural networks process information.

Lectures 11-15
Functional Properties of Neuronal Networks
The final part of the module aims to provide an understanding of the functional properties of neuronal circuits and explore the role of neuronal networks in physiological processes including respiration, sleep and memory. The lectures will cover the following topics:
Central Pattern Generators;
Neural Circuits;
Respiration;
Sleep;
Plasticity/modulation.

Learning outcomes

By the end of the module, students should be able to:

- Level 5 understanding of the structure and functioning of the Central Nervous system

- Level 5 understanding of how neural networks process information and the techniques used to study such processes.
- Level 5 understanding of the development and formation of the CNS at a molecular level
- Level 5 understanding of the role of the nervous system in other physiological functions in the organism

Indicative reading list

Bear et al Neuroscience – Exploring the Brain 2001
Delcomyn H Foundations of Neurobiology 1998

Students are directed to the current literature for an up-to-date appreciation of developments in this area

Subject specific skills

Understand the structure and functioning of the Central Nervous system.
Understand how neural networks process information and the techniques used to study such processes.
Understand the development and formation of the CNS at a molecular level.
Understand the role of the nervous system in other physiological functions in the organism.

Transferable skills

Self directed learning
Adult learning
Critical appraisal of source material

Study

Study time

Type	Required
Lectures	15 sessions of 1 hour (7%)
Practical classes	1 session of 1 hour (0%)
Other activity	10 hours (4%)
Private study	124 hours (55%)
Assessment	75 hours (33%)
Total	225 hours

Private study description

Self directed learning and revision for final exam

Other activity description

Authentic assessment, based on a common problem or dataset researchers would deal with on a regular basis in the academic environment. This is in-line with both AQSC and RSB requirements on assessments

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group D

	Weighting	Study time	Eligible for self-certification
In Module Assessment	30%	30 hours	Yes (extension)
Authentic assessment, based on a common problem or dataset researchers would deal with on a regular basis in the academic environment. This is in-line with both AQSC and RSB requirements on assessments			
Online Examination	70%	45 hours	No
45 min SAQ Exam paper / 45 min Essay paper			

- Online examination: No Answerbook required

Assessment group R

	Weighting	Study time	Eligible for self-certification
In-person Examination - Resit	100%		No
45 min SAQ Exam paper / 45 min Essay paper			

- Answerbook Green (8 page)

Feedback on assessment

Final examination feedback is given to returning students as generalised feedback on what constituted a good essay; common mistakes/misconceptions and good practise are identified and shared.\r\n\r\n

Past exam papers for LF262

Availability

Courses

This module is Optional for:

- Year 2 of UBSA-C700 Undergraduate Biochemistry
- ULFA-C1A2 Undergraduate Biochemistry (MBio)
  - Year 2 of C1A2 Biochemistry
  - Year 2 of C700 Biochemistry
- Year 2 of ULFA-C702 Undergraduate Biochemistry (with Placement Year)
- Year 2 of ULFA-C1A6 Undergraduate Biochemistry with Industrial Placement (MBio)
- Year 2 of UBSA-3 Undergraduate Biological Sciences
- Year 2 of ULFA-C1A1 Undergraduate Biological Sciences (MBio)
- Year 2 of ULFA-C113 Undergraduate Biological Sciences (with Placement Year)
- Year 2 of ULFA-C1A5 Undergraduate Biological Sciences with Industrial Placement (MBio)
- Year 2 of UBSA-C1B9 Undergraduate Biomedical Science
- ULFA-C1A3 Undergraduate Biomedical Science (MBio)
  - Year 2 of C1A3 Biomedical Science
  - Year 2 of C1B9 Biomedical Science
- Year 2 of ULFA-C1A7 Undergraduate Biomedical Science with Industrial Placement (MBio)
- Year 2 of ULFA-CB18 Undergraduate Biomedical Science with Placement Year