

BS204-12 Neurobiology

20/21

Department

Life Sciences

Level

Undergraduate Level 2

Module leader

Yuriy Pankratov

Credit value

12

Module duration

5 weeks

Assessment

100% exam

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 material delivered in BS127 Agents of infectious disease and provides the preliminary understanding for the final year module BS317 Advanced Immunology. Together with companion modules dealing with specific pathogens, the module considers many disease processes and their mitigation.

[Module web page](#)

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:

- 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.

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 (12%) |
| Practical classes | 1 session of 1 hour (1%) |
| Private study | 104 hours (87%) |
| Total | 120 hours |

Private study description

Self directed learning and revision for final exam

Costs

No further costs have been identified for this module.

Assessment

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

Assessment group B1

| | Weighting | Study time | Eligible for self-certification |
|---|-----------|------------|---------------------------------|
| Assessment component | | | |
| Online Examination | 100% | | No |
| 100% 1.5 hour exam, students will have to answer 2 out of 3 essay questions which cover different parts of the module | | | |

- Online examination: No Answerbook required

Reassessment component is the same

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.

[Past exam papers for BS204](#)

Availability

Courses

This module is Optional for:

- UBSA-C700 Undergraduate Biochemistry
 - Year 2 of C700 Biochemistry
 - Year 2 of C700 Biochemistry
- ULFA-C1A2 Undergraduate Biochemistry (MBio)
 - Year 2 of C1A2 Biochemistry
 - Year 2 of C700 Biochemistry

- Year 2 of UBSA-C701 Undergraduate Biochemistry (with Intercalated Year)
- Year 2 of ULFA-C1A6 Undergraduate Biochemistry with Industrial Placement (MBio)