

# LF209-18 Human and Animal Physiology

20/21

**Department**

Life Sciences

**Level**

Undergraduate Level 2

**Module leader**

Mark Wall

**Credit value**

18

**Module duration**

11 weeks

**Assessment**

100% exam

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

The overall aim of the module is to describe the haematological system (blood and the tissues and organs associated with it) and the cardiovascular system (CVS) in an integrated manner in order to give students a good understanding of the physiology, in health and disease, of these two linked systems. It will build on first year modules such as BS129 Physiology and Metabolism and will relate to second and final year modules such as BS211 Immunology, BS261 Pharmacology and BS347 Oncology. This year we have reduced the number of lectures that will be delivered and replaced these with a problem based learning ECG workshop which will contribute towards your overall module grade.

The aim of the module is to give students of Biomedical Sciences an all-round understanding of the physiology and pathophysiology of blood, circulation and nervous system. This module bridges the gap between Molecular Biology and the functioning of whole organisms.

[Module web page](#)

### Module aims

The lectures fall into three segments: Renal Structure and Function, Haematology – the study of blood (aka blood sciences) and the Cardiovascular System (CVS).

Students will learn about renal function (kidney structure and function), cardiovascular pathology (including conditions such as hypertension and myocardial infarction) and cardiovascular risk (links with lipids, lipid lowering drugs etc). These lectures build on BS129 Physiology and Metabolism.

In the Haematology lectures, students will learn the nature of blood – the cellular and non-cellular components, and how it is formed (haematopoiesis). Students will also gain an understanding of the various pathological conditions associated with blood, how they are recognised, the consequences, and how they are treated.

## **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.

### **Part A: Neurobiology**

#### **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 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.

## Part B: Blood and Circulation

Lecture 1 and 2: Kidney structure and function

Lecture 3: Cardiovascular Risk

Lecture 4: Blood cells, Plasma and Serum

Lecture 5: Haematopoiesis

Lecture 6: Blood transfusion

Lecture 7: Blood disorders

Lecture 8 - Hypertension (MW)

Lecture 9 - Angina

Lecture 10 - Heart Failure

Lecture 11 - Cardiac Arrhythmias

Lecture 12 - The Pharmacology of Anti-arrhythmic drugs

ECG workshop and self-directed learning

## Learning outcomes

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

- The biological principles of haematology including blood structure and homeostasis (including kidney)
- The biological basis of circulation, especially cardiac and vascular processes.
- The biological basis of neurological function, including development of the central nervous system at a cellular level.
- The functioning of these systems in both health and disease including the current treatment options for specific examples.

## Indicative reading list

Pocock G. and Richards. Human physiology : the basis of medicine, 3rd edn. (Oxford : Oxford University Press, 2006).

Hugh-Jones N. C., Wickramasinghe S. N. and Hatton C. Lecture notes on Haematology, 7th edn. (Blackwell, 2004).

Purves, D. et al. (Eds.) Neuroscience, 4th edn. (Sinauer, 2008)

## Subject specific skills

Explain the basics of haematology, including the role of kidney; formation, structure and function of blood cells

Understand the rationale for, and biology of, blood transfusion

Understand the biology of circulation through disease processes (hypertension, myocardial infarction, angina, cardiovascular disease, heart failure, arrhythmias)

Explain the current treatment options for example blood and circulatory diseases

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 role of the nervous system in other physiological functions in the organism.

Understand the development and formation of the CNS at a molecular level.

## **Transferable skills**

Adult learning, self-directed learning, team based learning and quantitative analysis of data.

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## **Study**

### **Study time**

<b>Type</b>	<b>Required</b>
Lectures	30 sessions of 1 hour (17%)
Practical classes	2 sessions of 1 hour (1%)
Private study	148 hours (82%)
Total	180 hours

### **Private study description**

148 hrs self-study and directed reading

### **Costs**

No further costs have been identified for this module.

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## **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

90%

No

This module is assessed in two ways: an examination consisting of a 1.5 hr 'short answers' paper in June (equally split between Blood&Circulation and Neurobiology)

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- Online examination: No Answerbook required

**Reassessment component is the same****Assessment component**

Online Examination

10%

No

The ECG workshop consists of 2 parts: firstly the students will measure their own ECGs and then secondly at home will do some analysis and carry out some self-directed learning. The self-directed learning will be assessed with an MCQ quiz.

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- Online examination: No Answerbook required

**Reassessment component is the same****Feedback on assessment**

Pastoral meetings with personal tutors

[Past exam papers for LF209](#)

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**Availability****Courses**

This module is Core for:

- UBSA-C1B9 Undergraduate Biomedical Science

- Year 2 of C1B9 Biomedical Science
- Year 2 of C1B9 Biomedical Science
- Year 2 of C1B9 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 UBSA-CB19 Undergraduate Biomedical Science with Intercalated Year