

BS129-18 Physiology, Neurobiology and Metabolism

21/22

Department

Life Sciences

Level

Undergraduate Level 1

Module leader

Katrine Wallis

Credit value

18

Module duration

10 weeks

Assessment

20% coursework, 80% exam

Study location

University of Warwick main campus, Coventry

Description

Introductory description

Metabolism is the key to understanding how the human body obtains its energy with which to carry out all its essential functions. The generation of energy is the key step in metabolism and this part of the module focuses on where energy can be generated and the metabolic pathways used in energy generation. Equally important is an understanding of how essential components are built in the human body through anabolic reactions.

Physiology is the study of how the human body works and can be determined at the sub-cellular to whole organism level. In order to remain healthy, many physiological variables must be maintained within narrow limits. These variables include body temperature, blood pressure, blood glucose, and oxygen and carbon dioxide levels in the blood. The ability of the body to maintain the constancy of such variables is called homeostasis and understanding how this is achieved is a central goal of physiology. This module provides a framework for understanding homeostasis by covering the major organ systems of the body. The final lecture integrates the knowledge from individual organ systems to understand how the whole body maintains homeostasis in environmental extremes.

[Module web page](#)

Module aims

The module builds on knowledge obtained at A-level and provides a foundation in physiology and metabolism. In the physiology part of the module the aim is to provide an understanding of how parts of the body functions and how these parts work together in the whole organism. The focus will be on the nervous system, the cardio vascular and respiratory system as well as special senses. This information is then integrated to understand the physiological basis of adaptation to environmental conditions such as altitude, depth, cold and heat.

The metabolism part of the module will cover how enzymes function, metabolic pathways and bioenergetics. All key components of first year teaching on all degrees taught in life sciences. Signal transduction is essential in regulation of both metabolism and physiological responses and will hence also be covered in this module.

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.

Introduction to enzymes: What enzymes are and how they work, measuring how fast they work, enzyme inhibition as the basis of some drugs, and the value of enzymes in biotechnology.

Metabolism: Energy and its uses in biological systems. The organisation of metabolism into catabolic and anabolic pathways. Specific basic pathways such as glycolysis, citric acid cycle, pentose phosphate pathway, oxidative phosphorylation and photosynthesis.

Integration of Metabolism using glucose homeostasis as an example.

Signalling: Principles; cell surface receptors that are kinases, focusing on growth and insulin signalling; cell surface receptors associated with kinases, focussing on leptin and EPO signalling; GPCRs, focussing on sight and adrenaline responses; intracellular receptors, focussing on NO and oestrogen signalling; techniques and problems.

Neurobiology: Nervous system structure and function, neurons and glia, resting potential, action potential, synaptic transmission, sensory and motor systems, the autonomic nervous system, muscle contraction.

Cardiovascular system: The heart as a pump; properties and physiological regulation of the systemic circulation; introduction to the pulmonary circulation; response to blood loss, response to exercise

Respiration: Anatomy and physiology (including mechanics of respiration, gaseous exchange, nervous control of breathing).

Special senses: Physiology of vision and hearing

Integrated Physiology: Combining material from physiology and metabolism lectures to understand adaptation to extreme conditions such as altitude, depth, hot and cold.

Learning outcomes

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

- At the end of this module the students should have acquired a thorough understanding of the basics of metabolism and signal transduction as well as the physiology of the cardiovascular and respiratory system, the nervous system and special senses and how these work together and adapt to environmental conditions.

Indicative reading list

1. Illustrative Bibliography

Berg, Tymoczko and Stryer. Biochemistry 8th edition 2015

Vanders Human Physiology: The mechanism of body function 14th edition (McGraw Hill).

G Pocock & CH Richards Human Physiology: The Basis of Medicine. 5th Edition. OUP 2017

Berne & Levy Principles of Physiology 5th edition 2006

Associated reading

Life at the Extremes. Frances Ashcroft Flamingo 2000

Subject specific skills

At the end of this part of the module students should have acquired:

- a) A thorough foundation of basic knowledge of energy generation, anabolism and metabolism.
- b) Knowledge of the major metabolic pathways and their regulation.
- c) Knowledge of the principles of cell signalling: signals, receptors, second messenger, main signal transduction pathways.
- d) An understanding of neurobiology, the cardiovascular system, respiratory system and special senses.
- e) Some appreciation of how this knowledge can be applied to understand how whole organisms adapt to extreme conditions.

Transferable skills

1. Critical appraisal of source material
 2. Self directed learning
 3. Adult learning
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Study

Study time

Type	Required
Lectures	38 sessions of 1 hour (21%)
Tutorials	6 sessions of 1 hour (3%)
Private study	136 hours (76%)
Total	180 hours

Private study description

Independent learning, self directed learning and revision for exams.

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 D1

	Weighting	Study time	Eligible for self-certification
Assessment component			
Invigilated in-module tests	10%		No
Invigilated in-module MCQ based exam			
Reassessment component is the same			
Assessment component			
Invigilated in-module tests	10%		No
Reassessment component is the same			
Assessment component			
Online Examination	80%		No

MCQ based exam

- Online examination: No Answerbook required

Reassessment component is the same

Feedback on assessment

Instant feedback on in-module tests will be provided by Moodle - scores will be given immediately the test has ended.

[Past exam papers for BS129](#)

Availability

Courses

This module is Core for:

- Year 1 of UBSA-C700 Undergraduate Biochemistry
- ULFA-C1A2 Undergraduate Biochemistry (MBio)
 - Year 1 of C1A2 Biochemistry
 - Year 1 of C700 Biochemistry
- Year 1 of ULFA-C702 Undergraduate Biochemistry (with Placement Year)
- Year 1 of ULFA-C1A6 Undergraduate Biochemistry with Industrial Placement (MBio)
- Year 1 of UBSA-3 Undergraduate Biological Sciences
- Year 1 of ULFA-C1A1 Undergraduate Biological Sciences (MBio)
- Year 1 of ULFA-C113 Undergraduate Biological Sciences (with Placement Year)
- Year 1 of ULFA-C1A5 Undergraduate Biological Sciences with Industrial Placement (MBio)
- Year 1 of UBSA-C1B9 Undergraduate Biomedical Science
- ULFA-C1A3 Undergraduate Biomedical Science (MBio)
 - Year 1 of C1A3 Biomedical Science
 - Year 1 of C1B9 Biomedical Science
- Year 1 of ULFA-C1A7 Undergraduate Biomedical Science with Industrial Placement (MBio)
- Year 1 of ULFA-CB18 Undergraduate Biomedical Science with Placement Year
- Year 1 of ULFA-B140 Undergraduate Neuroscience (BSc)
- Year 1 of ULFA-B142 Undergraduate Neuroscience (MBio)
- Year 1 of ULFA-B143 Undergraduate Neuroscience (with Industrial Placement) (MBio)
- Year 1 of ULFA-B141 Undergraduate Neuroscience (with Placement Year) (BSc)