

BIOCHEMISTRY - A CONCEPTUAL OVERVIEW - 2024/5

Module code: BMS1041

Module Overview

In this module students will be taken on a learning journey through protein structure and function, and enzymes to emphasize their importance in the biochemical processes that occur in living cells. Students will explore the contributions of lipid molecules and sugars to cellular ATP production, and will be introduced to the important role that the tricarboxylic acid (TCA) and electron transport systems have in production of ATP. Students will undertake enzyme-based practical to develop and enhance concepts taught within the module.

Module provider

School of Biosciences

Module Leader

KIESSLING Silke (Biosciences)

Number of Credits: 15

ECTS Credits: 7.5

Framework: FHEQ Level 4

Module cap (Maximum number of students): N/A

Overall student workload

Independent Learning Hours: 56

Lecture Hours: 40

Laboratory Hours: 4

Guided Learning: 10

Captured Content: 40

Module Availability

Semester 2

Prerequisites / Co-requisites

BMS1049 OR BMS1054

Module content

- Proteins and enzymes
- Carbohydrates and glycolysis Lipids and oxidation
- TCA cycle
- Electron transport and ATP synthesis

Assessment pattern

Assessment type	Unit of assessment	Weighting
Practical based assessment	Practical Report	40
Examination	Closed-book invigilated MCQ Examination - 60 minutes	60

Alternative Assessment

Data analysis

Assessment Strategy

The assessment strategy is designed to provide students with the opportunity to demonstrate a deep understanding of the fundamental principles around molecular biochemistry and cellular energy generation. Thus, the Summative Assessment for this module consists of:

- A synoptic practical report [40% weighting].
- A multiple-choice and multiple-answer exam [60% weighting].

Formative feedback & advice will be provided through:

- In-class questions and discussions (lectures, practicals, workshops)
- In-class polls, e.g. PollEveryWhere & Kahoot
- Assessments brief
- Worksheets linked to laboratory practicals
- SurreyLearn tests

- One-to-one advice opportunities

Summative feedback will be provided on the students’ practical report submission.

Module aims

- Provide a breadth of understanding of the levels of protein structure, and how amino acids influence the three-dimensional folding of protein molecules; enzyme kinetics and reaction mechanisms.
- Provide a breadth of understanding of the structure and function of lipid molecules, their synthesis and utilization.
- Provide a breadth of understanding of the use of glucose in glycolysis and the importance of this process in the generation of cellular energy.
- Provide a breadth of understanding of the essential role of the tricarboxylic acid (TCA) cycle in maximizing the yield of cellular energy from biological fuels.
- Provide breadth of understanding of the process of electron transport and its importance in synthesizing ATP through the mitochondrial electron transport chain.
- Develop confidence and competence with practical and analytical skills in key biochemical methods.

Learning outcomes

		Attributes Developed
001	Describe protein structure and it is related to protein function	KC
002	Define and discuss enzymes, enzyme kinetics and mechanisms to enhance enzyme-catalyzed reactions	KC
003	Discuss the importance of carbohydrates and their metabolism	KC
004	Discuss the synthesis, breakdown and metabolic roles of lipids.	KC
005	Discuss the central role of the TCA cycle within cellular metabolism and its importance in energy (ATP) generation	KC
006	Discuss the role of Electron Transport Chain (ETC) and ATP Synthase in ATP generation.	KC
007	Undertake and discuss experiments to determine Km, Vmax, and inhibition characteristics	KCPT
008	Generate a laboratory report that demonstrates data analysis skills and critical understanding of relevant topics	KCPT
009	Demonstrate independent learning and relevant further reading to further develop scientific and critical thinking skills	KPT

Attributes Developed

C - Cognitive/analytical

K - Subject knowledge

T - Transferable skills

P - Professional/Practical skills

Methods of Teaching / Learning

The learning and teaching strategy is designed to:

- Enhance and develop the students understanding of biochemical compounds and reactions, and their importance in homeostasis.
- To further develop students' critical thinking, data analysis, writing and communication skills.

The learning and teaching methods include:

- Lectures
- Practicals
- Workshops

Indicated Lecture Hours (which may also include seminars, tutorials, workshops and other contact time) are approximate and may include in-class tests where one or more of these are an assessment on the module. In-class tests are scheduled/organised separately to taught content and will be published on to student personal timetables, where they apply to taken modules, as soon as they are finalised by central administration. This will usually be after the initial publication of the teaching timetable for the relevant semester.

Reading list

<https://readinglists.surrey.ac.uk>

Upon accessing the reading list, please search for the module using the module code: **BMS1041**

Other information

Resourcefulness & Resilience: Students will be provided with guidance, both direct (wellbeing & resilience workshop) and indirect (further workshops & tutorials), to further develop their resilience and reflective skills (Learning Outcomes 8 & 9).

Sustainability: This pillar may be addressed indirectly in workshop discussions. Lectures will discuss sustainable energy sources such as biofuels and the production of useful products from waste (Learning Outcome 3).

Digital capabilities: Students will enhance their digital and literacy skills throughout the module, in particular through data analysis and demonstration of critical thinking in their reports as well as the final exam (Learning Outcome 8).

Employability: Students will indirectly gain employability skills through the development of their data analysis, critical thinking, literacy and communication skills, which will be further developed at levels 5 & 6 (Learning Outcomes 8 & 9).

Programmes this module appears in

Programme	Semester	Classification	Qualifying conditions
Biochemistry BSc (Hons).	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Biochemistry MSci (Hons).	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Biological Sciences (Animal Biology and Ecology) BSc (Hons).	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Biological Sciences (Cellular and Molecular Sciences) BSc (Hons).	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Biological Sciences (Infection and Immunity) BSc (Hons).	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Biological Sciences BSc (Hons).	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Biomedical Science BSc (Hons).	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Biomedical Science MSci (Hons).	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Microbiology BSc (Hons).	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Veterinary Biosciences BSc (Hons).	2	Compulsory	A weighted aggregate mark of 40% is required to pass the module

Please note that the information detailed within this record is accurate at the time of publishing and may be subject to change. This record contains information for the most up to date version of the programme / module for the 2024/5 academic year.