

BIOCHEMISTRY - UNDERSTANDING THE CHEMISTRY OF LIFE - 2024/5

Module code: BMS1054

Module Overview

This module will introduce students to the fundamental biochemistry of life and will provide students with an understanding of the biological molecules, which will inform their studies throughout their degree programme. Students will experience a combination of taught lectures, guided seminars, workshops and practical classes to enhance their learning experience and provide them with the maximum opportunity for success and personal development.

Module provider

School of Biosciences

Module Leader

TRINDER Sarah (Biosciences)

Number of Credits: 15

ECTS Credits: 7.5

Framework: FHEQ Level 4

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

Overall student workload

Workshop Hours: 1

Independent Learning Hours: 35

Lecture Hours: 44

Tutorial Hours: 5

Laboratory Hours: 15

Guided Learning: 10

Captured Content: 40

Module Availability

Semester 1

Prerequisites / Co-requisites

None

Module content

Indicative content includes:

Essential Skills Laboratory skills - liquid handling (pipettes), spectrophotometry, protein assay, titration and, aspirin synthesis and assessment of purity.

Laboratory mathematics - but not limited to, concentration, dilution, moles and molarity, basic statistics, units in chemistry and biochemistry.

Writing skills - formative development of writing skills with a view to supporting the students in future modules such as but not limited to BMS1041.

Subject Knowledge - The chemistry of water and pH, the structures and functions of amino acid, lipids and hydrophobic molecules
Taught material for each of these groups of molecules will contain the relevant chemical concepts and may include: UV-Vis & fluorescence spectrometry. Water - the solvent of life, intra-molecular interactions. Bonding - electrons and molecules. Acids & bases - pH, buffers. Carbon - the basis of biological life. Reactivity of biological molecules - reaction kinetics & energy isomers isotopes.

Assessment pattern

Assessment type	Unit of assessment	Weighting
Coursework	COURSEWORK - PRACTICAL PROFORMA	40
Examination	MCQ invigilated exam - 1hr	60

Alternative Assessment

COURSEWORK PRACTICAL PROFORMA Students will be provided data to complete the necessary evaluative elements of practical classes to enable completion of the coursework practical proforma.

Assessment Strategy

The assessment strategy is designed to provide students with the opportunity to demonstrate:

A confidence in expressing how the chemical nature of a molecule influences the biological behaviour. To express confidence in laboratory mathematics and statistics.

Thus, the summative assessment for this module consists of:

- Coursework - practical pro-forma consisting of elements from all practical classes within the module. 40% of module weighting. Addresses learning outcomes 1-5.

- Multiple choice question (MCQ) exam – A multiple-choice and multi-answer exam from all components of the module. 60% of module weighting. Addresses learning outcomes 1-8.

Formative assessment:

- Regular use of Kahoot/Poll Everywhere to assess student understanding of the material. Face to face contact with staff during practicals, workshops and lectures to provide verbal feedback.
- MCQ quizzes on SurreyLearn and via Learning Science (including maths and statistics).
- Use of discussion board to both pose questions to students and answer student questions.
- Access to practical simulations are provided for students to become familiar with practical equipment and concepts.

Feedback

Feedback to the students will be provided instantly after online MCQ formative assessments, during workshops and practical session in the form of verbal feedback, and during lecture classes where the class can receive feedback on formative work. Additionally, the use of Kahoot/Poll Everywhere gives instant feedback with explanations as to why the other options were incorrect. This enables students to be able to pick up on any misunderstanding.

Summative feedback will be provided on the students' practical submission, although this will not come until the end of the module for logistical reasons.

Module aims

- Enhance and develop practical laboratory skills and provide students the confidence to undertake practical work in future modules for example but not limited to BMS1041, BMS2035, BMS2043 & BMS3052
- Provide a solid knowledge base from which the students can describe and explain the properties of biological molecules and identify their roles within a functioning organism.

Learning outcomes

		Attributes Developed
001	Laboratory skills: To identify and competently use basic laboratory equipment in Chemistry & Biochemistry and to do so with sufficient accuracy that they generate repeatable and consistent laboratory data.	CKPT
002	Laboratory skills: To use essential calculations within the laboratory during experiments and to evaluate and analyse chemical and biochemical experimental data from the laboratory.	CKPT
003	Amino acids: To identify the chemical characteristics of the amino acids and to use this information to explain the four levels of structure within proteins.	CK
004	Lipids: To identify different types of structural and energy storage lipid molecules and apply the chemical behaviour of the each to explain the functions of the lipid.	CK
005	Water: To identify the role of the chemistry of water in determining the pH of a physiological system and hence the biological function of all biological molecules.	CK
006	Chemistry: To evaluate the impact of electron structure and atomic properties on the formation and physical properties of organic molecules.	CK
007	Chemistry: To explain the energy flow in a chemical reaction with reference to thermodynamic principles and concepts.	CK
008	Biodiversity: To evaluate the impact of biochemistry on biodiversity.	KCPT

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:

Develop a confident understanding of the molecular basis of biology; encourage proactive, interactive, and enthusiastic learning; develop and enhance confidence in students' practical skills; develop and enhance skills within numeracy and written communication.

The learning and teaching methods include: lectures, laboratories, tutorials, small group workshops, guided reading and pre-recorded video bites. Students are encouraged to be active participants in all taught sessions, thus enabling them to develop informed, engaged and confident learning attitudes. Furthermore, students are encourage to bring questions and observations from the pre-lecture materials to their contact time.

This module is designed for students to be able to access and become confident with key biochemical concepts which will be built on in a large number of modules throughout their degree but there are key and direct links to BMS1041, BMS2035, BMS2043 and BMS3052.

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: **BMS1054**

Other information

Resourcefulness and resilience:

Students are required to complete practicals and generate data. This does not always go to plan, students are encouraged and assessed on their ability to reflect on their laboratory practices. Online lab simulations are provided throughout the module for students to become familiar with equipment & methodology. Students are required to undertake self-directed study and guided learning, therefore students need to plan their own time. Furthermore, formative quizzes and lab simulations allow the students to assess their learning and consider any gaps.

Sustainable practices:

Students consider and apply sustainable practices (where appropriate) in the laboratory. Such as safe routes of disposal, can pipette tips be re-used without compromising the experiment.

Digital capabilities:

Students are given training on how to use GraphPad Prism in order to appropriately present and analyse their data. The use of the discussion boards is actively encouraged. Students are provided with lab simulations and smart maths worksheets.

Employability:

Practicals introduce students to general "wet lab" skills including pipetting as well as common calculations encountered in the lab. They interpret their data and receive training in statistical analysis. Applications of theory are explored e.g. how chemical kinetics determine drug half-lives.

Programmes this module appears in

Programme	Semester	Classification	Qualifying conditions
Biochemistry BSc (Hons)	1	Compulsory	A weighted aggregate mark of 40% is required to pass the module
Biochemistry MSci (Hons)	1	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.