



BIOCHEMICAL
SOCIETY

Studying Biochemistry at Undergraduate Level



INTRODUCTION

Biochemistry is an exciting and rapidly developing subject, which is at the forefront of breakthroughs in areas as diverse as drug discovery, forensic science, gene editing and developing sustainable sources of energy.

Undergraduate level biochemistry is taught in different ways at different universities: some will have specific departments of biochemistry, while others may deliver the subject via experts in their departments of biology and chemistry. Some courses may also be quite specific in the topics they teach, while others will be more flexible and some may also provide opportunities for you to spend a year working in industry.

This booklet provides an overview of a typical biochemistry degree course. It sets out both the types of things you should expect to learn as well as the skills and attitudes which graduates of a biochemistry degree programme should be able to demonstrate.

Some courses will not cover every one of these items and will introduce other, equally interesting areas.

For more information on where your degree in biochemistry can take you, visit bit.ly/StudyBiochem

For more details on specific degree courses and entry requirements, make sure you visit the relevant university's website.

For a list of degree courses accredited by the Royal Society of Biology, visit www.rsb.org.uk/education/accreditation



TYPICAL COURSE CONTENT

Biomolecular structure and function

The structure of biological molecules such as protein, DNA or RNA is crucial to how they work. By the end of a biochemistry degree, you should be able to:

- Demonstrate an understanding of the structure and function of biological molecules;
- Appreciate that life processes can be explained in biochemical terms;
- Know the aspects of chemistry that are relevant to biological systems;
- Understand the relationship between genotype and phenotype.

Metabolism and bioenergetics

The complex range of chemical reactions taking place in living cells defines an organism's metabolism. By the end of a biochemistry degree you should be able to:

- Understand fundamental metabolic principles;
- Understand metabolic regulation and control;
- Understand genetic and metabolic control of pathways;
- Explain the chemistry of biological processes such as bioenergetics and metabolism;
- Understand how disturbances in metabolism can lead to disease;
- Appreciate how cells harness and deploy metabolic energy.

The molecular cell

Cell and molecular biology are closely related and often overlapping fields, so a strong understanding of cell biology is an important part of a biochemistry degree. Once you have completed your degree in biochemistry you should be able to:

- Demonstrate an understanding of the structure and function of prokaryotic and eukaryotic cells;
- Explain the regulation of gene expression;
- Explain the molecular basis and role of organelles;
- Understand the molecular basis of signalling between cells;
- Understand how cells grow, divide and die;
- Appreciate biomolecular diversity in living systems.

Practical biochemistry

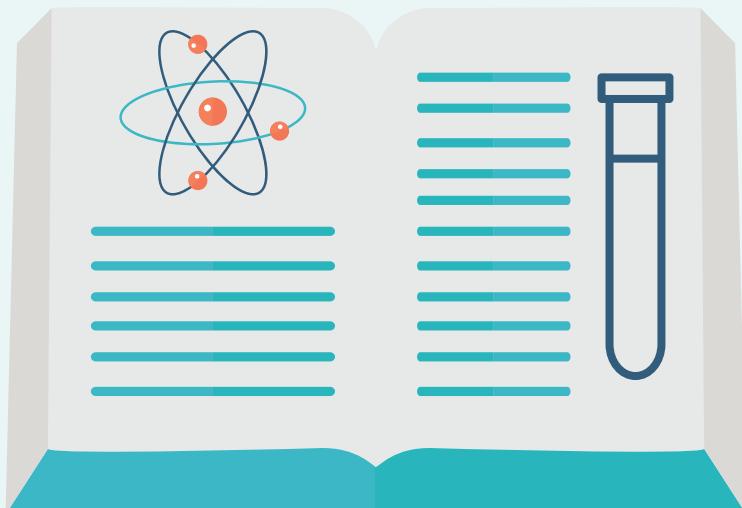
Biochemistry is a practical subject. Having successfully completed an undergraduate degree in biochemistry, you should be able to:

- Understand the theory, and have practical experience of, a broad range of biochemical techniques;
- Understand the principles and approach to experimental design;
- Be able to design, execute and analyse properly controlled experiments;
- Apply laboratory-orientated numerical calculations;
- Be capable in skills of data visualization, analysis and interpretation;
- Have an appreciation of advanced methods in biochemical analysis.

Biochemists in society

Biochemistry links to many other areas of biological science, from microbiology to pharmacology, genetics and physiology. It is a rapidly advancing field, with new technologies including synthetic biology and gene editing. Many of these developments can provide both benefits and challenges for society. By the end of a biochemistry degree, you should:

- Have an appreciation of ethics and ethical conduct;
- Appreciate that biochemistry impacts society and can create social, ethical and environmental challenges;
- Be aware of the various career paths and opportunities open to you through a biochemistry degree;
- Understand that biochemistry links to other disciplines, often in multidisciplinary environments.



SKILLS

As part of a Biochemistry degree you should have the opportunity to develop your skills in a number of areas, including experimental skills, data handling and analysis and scientific working practices. By the end of your degree, you should be able to:

Experimental skills

- Formulate a scientific hypothesis;
- Implement principles of good experimental planning and design;
- Identify the most appropriate statistical approaches to data analyses;
- Make appropriate decisions about methodology when designing a study;
- Be precise and accurate in the laboratory;
- Conduct experiments following principles of good laboratory practice;
- Be able to use quantitative methods to collect, process and present data.

Data handling & analysis

- Be comfortable with core numerical skills and techniques appropriate to the analysis of biochemical data;
- Identify and use information from appropriate and reliable sources;
- Integrate information from a range of sources and critically evaluate it;
- Identify software tools appropriate to the data analysis challenge;
- Apply and interpret the results of data analyses;
- Accurately record and reference source material;
- Analyse and interrogate information from large-scale data resources;
- Synthesise novel conclusions from experimental findings or literature searches in the context of other research in the field.

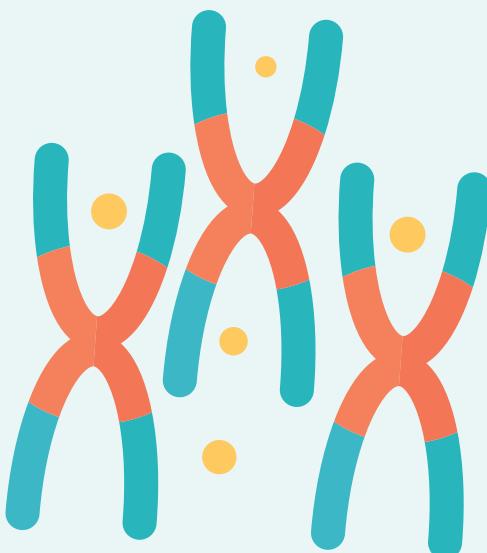
Working practices

- Keep up-to-date with the relevant literature and developments in biochemistry, including being able to analyse the literature and write critically;
- Perform research efficiently and thoroughly through good planning and management;
- Organise and accurately record information e.g. in a laboratory book;
- Work independently, understanding when to ask for help from appropriate people;
- Work constructively in small groups or teams;
- Communicate effectively to scientific and non-scientific audiences (including written and oral forms);
- Be able to give constructive feedback to colleagues and peers on their work;
- Work safely and appropriately with and around hazards such as chemicals and radiation, being mindful of other laboratory users.

ATTITUDES

In common with many other degree programmes, a biochemistry degree should enable you to demonstrate a number of attributes which will help to prepare you for your future career, including:

- A concern for detail and quality;
- Curiosity and openness when interpreting data;
- A flexible and adaptable approach to working;
- A willingness to accept a challenge;
- A resilient attitude in the face of failure or unexpected outcomes and the ability to learn from mistakes;
- The ability to work to the highest principles of scientific integrity, following ethical working practices;
- The ability to be creative and innovative;
- The ability to maintain effective working relationships and collaborations;
- The ability to work to fixed deadlines and manage pressure;
- A willingness to engage with developments across science;
- The ability to identify employment opportunities and independently pursue personal career goals;
- The confidence and ability to apply their skills in a real world setting;
- The skills for lifelong learning, e.g. independence, time management, organisation and planning, initiative, knowledge transfer;
- An appreciation of the societal relevance and impact of biochemistry;
- An appreciation of the value of public engagement and outreach;
- The ability to self-assess performance;
- An understanding of how to evaluate risk.



The document has been based on an original version developed by the British Pharmacological Society, together with criteria developed by the Biochemical Society for the Royal Society of Biology's Accreditation scheme.

The latest, current version of this document is available here: bit.ly/StudyBiochem



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