Biochemistry is an expanding area and graduates have no difficulty in finding employment at the end of their course. You may embark on a research career by studying for a higher degree and about half our students do so. Alternatives can be to enter industry, the health service, or the scientific civil service. However, the course also provides a broad intellectual training. You emerge with some familiarity with mathematical methods and quantitative reasoning, and a proper understanding of rigorous scientific method. These skills are of great value in jobs that are not necessarily directly related to biochemistry. Our students find posts in accountancy, social services, insurance, public administration, civil service, teaching and many other areas. The Careers Service offers helpful guidance.

Admissions

For more information on applying to Oxford, please visit www.admissions.ox.ac.uk.

Open Days

There’s no better way to find out what Oxford is really like than to visit us. Many colleges and departments welcome applications to attend their events throughout the year but our University open days remain the most popular time to visit. Explore colleges and departments and talk to their students and staff. For details, please see www.admissions.ox.ac.uk/opensdays.

What can I do after I finish my degree?

What qualifications will I need?

Typical offer for successful candidates: A-levels: A*AA including Chemistry and another science or Maths, with the A* in Maths, Physics, Chemistry or Biology (or a very closely related subject) Advanced Highers: AA/AAB IB: 39 including core points or any other equivalent.

Full details on the Departmental website.

Research in the Department

This course is about biological molecules and how they assemble to make living cells and organisms. It illustrates how modern techniques, and the information acquired, are fundamental for studying most branches of life sciences.

From it you will get some idea of the scope of biochemical research going on in Oxford that underpins the undergraduate course. It is by combining these two approaches that we bring you to laboratories, to the Department, to lecture theatre and to seminar rooms. This course is about making research and about research skills. To learn these skills, you will be organized into small groups to work on projects and to write reports. You will also work with other students and with tutors from the Department. You will be expected to study independently, and the resources available to you are extensive. All students are allocated a tutor to help you with their studies, and all students have the opportunity to work closely with research students and researchers.

The combination of teaching in the Department and independent study teaches you to take responsibility for the discipline of your study, and in the Department you will be taught in the same way as the graduate researchers. The combination of this approach with the intellectual and practical skills you will learn is one of the major strengths of the Oxford system.

Roles of the Department and Colleges

Oxford is a collegiate university, which means that all students are admitted by, and become members of, a college. The biochemistry courses in organized and largely taught by the Department. Lectures, classes, practicals, research projects and exams are all provided centrally. The undergraduate admission process is also centrally coordinated by the Department. This means that your choice of getting on offer is a place and the education that you receive after you have entered Oxford depends on the college you choose. Many students happily end up at a college different to the one they originally applied to!

Get in touch...

The Department’s website provides more information on the course, advice on applying, suggested reading as well as information about the department itself and its excellent and award-winning research. If you have any further questions regarding studying biochemistry at Oxford, please do email admissions@bioch.ox.ac.uk

Department of Biochemistry

South Parks Road

Oxford OX1 3QU

Telephone: +44 (0)1865 613277

www.bioch.ox.ac.uk

MBiochem BIOCHEMISTRY

www.bioch.ox.ac.uk

Biochemistry (C700)
How is the course structured?

The course takes four years and has an intake of about 100 students per year. It is divided into three sections:

**MOLECULAR BIOCHEMISTRY**

- Cell biology
- Biochemistry
- Molecular biology
- Genetics
- Developmental biology
- Evolution

**CELLULAR BIOCHEMISTRY**

- Chemical control of development
- Environmental sensing and many other areas.
- The powerful tools developed for biochemistry have been adopted by many other disciplines including medicine and evolutionary biology.

**MECHANISTIC BIOCHEMISTRY**

- How do cells do development?
- What are the principles of development?
- Why do cells kill themselves?
- What are the principles of the immune response?
- How is a nervous system put together?

**MOLECULAR PROCESSES IN THE CELL**

- How does cell signalling work?
- How are proteins processed?
- How do chemicals move across membranes?
- How do neurons convey information?

**PHYSICAL BIOCHEMISTRY**

- Thermodynamics
- Atomic & molecular models
- Graphical representations
- From DNA to proteins: the principles of protein structure?

**QUALITATIVE BIOCHEMISTRY**

- Differentiation & Growth
- Replication & Repair
- Transition States
- Catalysis

**INFORMATION TRANSFER**

- How does cell signalling work?
- How are proteins processed?
- How do chemicals move across membranes?
- How do neurons convey information?

**CELLULAR CHEMISTRY**

- What is the impact of DNA damage?
- How do cells respond to DNA damage?
- What are the mechanisms of DNA repair?
- How do cells sense DNA damage?

**THE CELL IN TIME AND SPACE**

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**PRELIMINARY EXAMINATIONS**

- Formal examinations are held in and around the Department. There are usually about 10 lectures a week in the first two years. Lectures in the first two years are mainly conducted in laboratories; others involve computer-based work. Examples of topics covered are atomic & molecular models, graphical representations, and its control. These are run throughout the course throughout the course.

**INFORMATION TRANSFER**

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- How are proteins processed?
- How do chemicals move across membranes?
- How do neurons convey information?

**CELLULAR CHEMISTRY**

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How is the course structured?

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1. FIRST YEAR
   - What is Biochemistry?
   - How is the course structured?

2. SECOND & THIRD YEAR
   - How is DNA packaged in the cell?
   - How do cells copy and maintain chromosomes?
   - How is chromatin accessed?
   - How are genes expressed?

3. FOURTH YEAR
   - How is the course structured?
   - How is the course structured?

Teaching at Oxford University

Lectures

There are usually about 10 lectures a week held in and around the Department. The lecture material defines the course, and forms the basis of our examinations. The course is kept under constant review by a Teaching Committee which contains representatives of the student body as well as members of the academic staff. In this way new developments in the subject, and requests from students for teaching in particular areas, can be incorporated into the course.

Practical Classes

These are run throughout the course in parallel with lectures. Some are lab based (i.e. practicals), which introduce you to the basic techniques used in research laboratories; others involve computer-based work (e.g. manipulation of databases and simulation of techniques in data handling and interpretation of experimental data). For the most part these aim to teach you new skills but in later years longer practicals allow you to develop complete projects more challenging than those in your earlier years, with the aim of preparing you for the more independent research you will carry out in your fourth year.

Tutorials

Tutors allow you to study individual topics in more depth and also to clarify lecture topics in small group discussions. Your college tutor will arrange at least one tutorial a week for you (normally with a partner). This may be with your personal tutor, or with other tutors to learn about their specialist area. For a tutorial, you are given a reading list in advance; this reading then forms the basis for discussion in which you are expected to show that you understand the topic in question and the experimental evidence that underpins it.

The Research project

Carried out in the fourth year and under the supervision of the group leader, you will be able to design your own experiments, and will learn to plan a research programme and present your results and ideas to your peers in the form of a research project and a research dissertation. At the end of the fourth year, you will be expected to write a dissertation which forms the basis of the research project. This dissertation will be assessed by your college tutor, your group leader, and one or more examiners from other departments. This dissertation is assessed as part of your degree.

Outreach

Our teaching and research are accessible to students and the general public. We are able to offer a range of outreach programs, including an internship scheme, summer school, and public lectures. We also run a regular series of public lectures on various aspects of biochemistry. These lectures are designed to take place monthly on a Saturday morning and are aimed at an audience of schoolchildren and their teachers. The lectures are given by members of the Department and are designed to be accessible to a general audience.

Department of Biochemistry

The Department was established over 90 years ago. Centred on a new award winning building, it houses over 45 independent research groups, each covering a wide range of disciplines which include genetics, computational biology, atomic structure determination, and glycoscience. The collective research aims are to arrive at a full understanding of the chemistry and biology of molecules, and cells, and to relate to the physiology and development of multicellular organisms. These research goals are facilitated by close links with other Departments in Oxford, including Chemistry, Biology, Physiology, Pathology, Pharmacology, Physics and Molecular Medicine. According to the 2014 Research Excellence Framework assessment, 93% of Oxford’s Biological Sciences research, of which we are part, was rated as internationally excellent or world leading in terms of significance, rigour and originality. Three Nobel Prize-winners (Hans Krebs, Rodney Porter and Paul Nurse) have been members of the Department.

What is Biochemistry?

Biochemistry, the study of life at the molecular level, continues to undergo rapid expansion and development. Powerful new techniques, for example in molecular genetics and structure determination, enable us to analyse biological phenomena in more and more precise molecular terms. Biochemistry gives us ever increasing insight into topics as various as the origins of life, the nature of disease and the development of organisms from a single cell to an assembly of specialised cells. As well as answering fundamental questions it has also led to commercial development and practical applications, for example in drugs, environmental sensing and many other areas. The powerful tools developed for biochemical studies have been adopted by many other disciplines including medicine and evolutionary biology.

Why study Biochemistry at Oxford?

Our 4-year integrated Masters course, taught both in the Department and College, gives a comprehensive introduction to the subject. The course is well-established and has been fine-tuned over many years. It is certified to provide biology compendium level 7 qualifications. There is a coherence and sense of community in the Department, as well as high quality interdisciplinary, research experience, that helps us provide a flexible, efficient and cutting-edge course.

Training in Biochemistry is valuable because it plays an important role in many areas, including health, the environment and agriculture. The level of employment for Biochemistry graduates is high – our graduates find places in a wide range of industries, in medical research, in agriculture, in education, and in patent law to name but a few.

“The Oxford Biochemistry course not only inspired me to go in to research but also gave me an excellent basis in terms of skills and knowledge required to take this career path. The course initially covers a range of topics, and then permits specialisation depending on your personal interests. Moreover, the Part II research project provides a first rate opportunity to experience a laboratory environment, to work with field leaders and to make a significant contribution to research at an early career stage. I highly recommend the course!”

Dr Louise Blain

I owe a lot to the Oxford Biochemistry course, which provided me with both an understanding of the fundamental processes behind biological phenomena and with an ingrained analytical approach to reasoning which has been invaluable in my current work for GSK Vaccines, one of the world’s largest pharmaceutical companies, which I joined immediately after finishing the course in 2010. I would thoroughly recommend the biochemistry course to anyone with an interest in the field”

Dr Rebecca Gillard

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Why study Biochemistry at Oxford?

Our 4-year integrated Masters course, taught both in the Department and College, gives a comprehensive introduction to the subject. The course is well-established and has been fine-tuned over many years. It is certified to provide biology compendium level 7 qualifications. There is a coherence and sense of community in the Department, as well as high quality interdisciplinary, research experience, that helps us provide a flexible, efficient and cutting-edge course.

Training in Biochemistry is valuable because it plays an important role in many areas, including health, the environment and agriculture. The level of employment for Biochemistry graduates is high – our graduates find places in a wide range of industries, in medical research, in agriculture, in education, and in patent law to name but a few.

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Dr Rebecca Gillard
How is the course structured?

The course takes four years and has an intake of over 100 students per year. It is divided into three sections:

- **Cellular Biochemistry**
  - Cell turnover and replication
  - Cell signaling and activation
  - Cell metabolism and nutrition

- **Bioorganic Biochemistry**
  - Organic chemistry of metabolic pathways
  - Organic chemistry of macromolecules
  - Organic chemistry of cell function

- **Physical Biochemistry**
  - Thermodynamics
  - Kinetics
  - Structural biology

**Research Project**

Carried out in the fourth year and under the guidance of a supervisor, this project is an opportunity to re-examine a particular area of the course. You will learn to plan a research programme, carry out experiments, and present your results and ideas to a panel of examiners. The experience gained and the extra maturity acquired during the fourth year are much valued by employers, and we strongly encourage independent and original work. Many of our graduates go on to work in industry, often leading to successful careers.

**Tutorials**

Tutorials allow you to study individual topics in more depth and to clarify lecture topics in small group discussions. Four college tutors will arrange at least one tutorial per week for you (normally with a partner). This may be with your personal tutor, or with other tutors to listen about their specialist areas. For a tutorial, you are given a reading list in advance; this reading forms the basis for discussion in which you will be expected to show that you understand the topic in question and the experimental evidence that underpins it.

The Research Project

Carried out in the fourth year under the supervision of the group leader, it will be able to design your own experiments, and you will learn to plan a research programme and present your results and ideas to a panel of examiners in the final year as a 10-minute presentation. For publication, you will be expected to show that you understand the topic in question and the experimental evidence that underpins it.
Courses in the Faculty of Biology are described elsewhere in this booklet. Biochemistry is one of the three subjects in the University’s course in Integrated Biomedical Sciences (IBS). The other courses are Molecular and Cell Biology (MCB) and Genetics (GEN). Biochemistry is also part of the three-year MSci course in Molecular Science (MOL).

Biochemistry is an expanding area and graduates have no difficulty in finding employment at the end of their course. You may embark on a research career by studying for a higher degree and about half our students do so. Alternatives can be to enter industry, the health service, or the scientific civil service. However, the course also provides a broad intellectual training. You emerge with some familiarity with mathematical methods and quantitative reasoning, and a proper understanding of rigorous scientific method. These skills are of great value in jobs that are not necessarily directly related to biochemistry.

The four-year course in Biochemistry is an integrated course that offers a broad-based education in the area of biochemistry. The course is designed to provide students with a strong foundation in the principles of biochemistry and to develop their ability to think critically and to solve problems.

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Biochemistry (C700)

Biochemistry is the scientific study of living systems. It is a fundamental science that underpins the life sciences, including medicine, biology, and bioengineering.

Research in the Department

The research conducted in the Department of Biochemistry is at the forefront of our understanding of the chemical processes that drive life.

The Department is home to over 80 research groups, each of which is led by a team of researchers working together on a specific area of biochemistry.

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Biochemistry is an expanding area and graduates have no difficulty in finding employment at the end of their course. You may embark on a research career by entering industry, the health service, teaching and many other areas. The Department provides a personal tutor who will examine your course and provide you with your progress. You will also be given some tutorials and other forms of assessment. They will provide a list of advice, and make use of your own extra help that you may need during your studies. The college also provides accommodation (for some or all of your course), meals and a wide range of social and sporting activities.

The combination of teaching in the Department and personal teaching and guidance is one of the major strengths of the Oxford system.

What qualifications will I need?

Typical offers for successful candidates are:

- A levels: AAA including Chemistry and another science or Maths, with the A* in Maths, Physics, Chemistry, or Biology (or a very closely related subject)
- Advanced Highers: AA/AAB
- IB: 35 including core points
- Or any other equivalent.

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IB: 35 including core points

Or any other equivalent.

Full details are on the Departmental website.

Maths to A-level or the equivalent is very helpful to students in completing the course and although not required for admission, may make an application more competitive. Biology beyond GCSE is helpful, (e.g. to A level). Scottish, Scottish High, Standard level in the IB can be helpful for students in completing the course, although it is not required for admission.

Biochemistry (C700)

This course is about biological molecules and how they assemble to make living cells and organisms. It illustrates how modern techniques, and the information acquired, are fundamental for studying most branches of life sciences.