*St John's College, Cambridge*

# GUIDE TO THE NATURAL SCIENCES TRIPOS

**PLEASE KEEP THIS DOCUMENT FOR REFERENCE IN SUBSEQUENT YEARS OF YOUR COURSE**

August 2015

# THE NATURAL SCIENCES TRIPOS

Courses in Natural Sciences are designed to cover a normal period of three or four academic years with an honours (= Tripos) examination at the end of each. Candidates must be classed in three honours examinations to obtain an honours B.A. degree. Successful completion of the four-year course leads to the award of the M.Sci. degree in addition to the B.A. The Cambridge Tripos system allows great flexibility in the courses leading to a degree, so that it is possible for students who read Natural Sciences during their first one or two years to complete their degrees by means of a Tripos in another subject; for example, Chemical Engineering, Electrical and Information Sciences, Engineering or Law, although this may require four years study in total.

In this document you will find on the next two pages a list of the subjects in the Tripos and some examples of routes through the Tripos. Please remember that these are examples, not instructions. In the remainder of the document you will find outlines of the courses in the various subjects included in the Natural Sciences Tripos and some information about other Triposes frequently associated with a part or parts of the Natural Sciences Tripos.

Lectures and, where relevant, associated practical work and/or examples classes are organised on a University basis. Supervisions, i.e. teaching in small groups (typically just two or three pupils per group), are organised by the College.

Please note that courses evolve from year to year. Nevertheless, you should find this document helpful throughout your course, especially when choosing subjects for subsequent years *so do keep it where you can find it!* Your Tutor or Director of Studies will be able to advise on the current full regulations applying to your courses. Do not hesitate to seek further information whenever necessary and please remember that your Tutor or Director of Studies probably knows more about the course than a fellow undergraduate!

Up to date information is available from www.cam.ac.uk/cambuniv/natscitripos/. The webpages of individual departments also contain useful information and a list of these is on the back cover of the booklet. Finally the web pages of individual courses provide the most recent information on each of the courses in the Natural Sciences Tripos at http://www.cam.ac.uk/cambuniv/natscitripos/links.html.

We hope that you will find your chosen courses to be both interesting and stimulating.

---

***Important***

***Four-year courses and transfers to other Triposes***

If you think that you *may* wish to take one of the four-year courses in the Natural Sciences Tripos or to change to a Tripos in another subject involving a fourth year please inform your Tutor on arrival in College. By indicating your interest in a four-year course at this stage you are not committing yourself but it will be helpful for your Tutor to know of the possibility as background to discussions with you, for example about financial arrangements. If you wish to change to a Tripos that does not involve a fourth year you should also consult your Tutor as soon as possible.

**The Natural Sciences Tripos [NST] Course Structure**

**First Year = NST Part IA**

Students take *any three* experimental sciences and *one* mathematical subject.

*Experimental Sciences:*

Biology of Cells
Chemistry
Computer Science
Evolution and Behaviour
Earth Sciences
Materials Science
Physics
Physiology of Organisms

*Mathematical Subjects:*

*Mathematics* (essential for physical scientists)

*Mathematical Biology*
(for biologists who took A level Maths)

*Elementary Mathematics for Biologists*
(for biologists who did **not** take A level Maths)

**Second Year = NST Part IB**

Students take *three* subjects[1].

Animal Biology
Biochemistry & Molecular Biology
Cell and Developmental Biology
Chemistry A
Chemistry B
Ecology
Experimental Psychology
Geological Sciences A
Geological Sciences B
History & Philosophy of Science
Mathematics
Materials Science
Neurobiology
Pathology
Pharmacology
Physics A
Physics B
Physiology
Plant & Microbial Sciences

([1] There are some restrictions on combinations for timetabling reasons, e.g. Pathology and Physics may not be combined.)

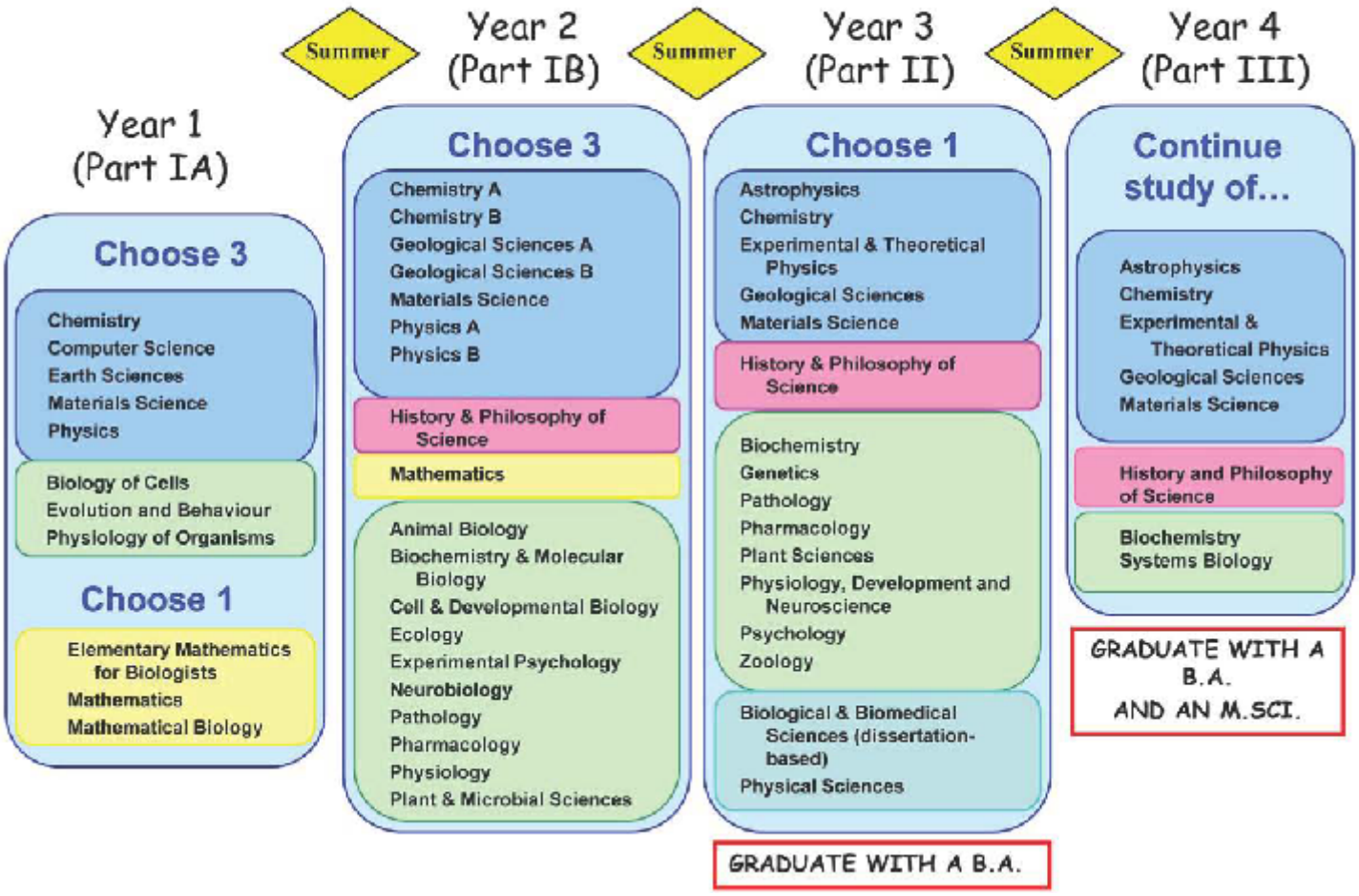
**Third (= NST Part II) and Fourth (= NST Part III) Years**
**Part II ⇒ B.A. Parts II + III ⇒ B.A., M.Sci.**

Students take *one* subject[2]

[3]Astrophysics
[3]Biochemistry
[3]Chemistry
3[3]Experimental & Theoretical Physics
Genetics
[3]Geological Sciences
History & Philosophy of Science
[3]Materials Science
Neuroscience
Pathology
Pharmacology
Physiology, Development & Neuroscience
Physiology & Psychology
Plant Sciences
Psychology
[4]Systems Biology
Zoology

([2] There are some restrictions on entry, depending on laboratory space available and second year subjects taken. [3]A three-year course and a four-year course are available. [4]Part III only.)

# Natural Sciences Tripos: Course Structure



***N.B.*** *** **Calculators, lab coats and safety glasses** *** ***N.B.***

Most equipment and materials for practical classes will be provided free of charge: there are, however, some items which you may need to purchase and you will be advised of these in the appropriate course documentation.

All students reading subjects from the Natural Sciences Tripos are likely to need to buy a University-approved **calculator** and a **lab coat**.

- Lab coats can be purchased from the Part IA laboratory in the Department of Chemistry on Lensfield Road (08:30–16:30 on Tuesday 6th October) or Biopath Stores on the Downing Site (11:00-17:00 on Tuesday 6th October and 10:00–13:00 on Wednesday 7th October). They cost about £10 - payment by cash or cheque only.
- Safety glasses are a requirement for certain practical classes and it is recommended that you purchase your own pair. Safety glasses will be available for sale at the same time as lab coats at a cost of about £3. If you are taking Chemistry you should purchase your glasses from the Department of Chemistry.
- For Natural Sciences Tripos examinations Parts IA, IB, II and III, you will be permitted to use only the standard University calculator CASIO fx 115 (any version), CASIO fx 570 (any version) or CASIO fx 991 (any version). Each such calculator must be marked in the approved fashion.

Standard University calculators, **CASIO fx 991ES**, marked in the approved fashion, will be on sale at the beginning of Full Michaelmas Term 2015 as follows:

- Department of Chemistry, Part IA laboratory preparation room

You are strongly advised to purchase a calculator at the beginning of Full Michaelmas Term from one of the centres named above.

Students already possessing a CASIO fx 115 (any version), CASIO fx 570 (any version) or CASIO fx 991 (any version) will be able to have it marked appropriately, at no cost, at the above centre.

[* N.B. Some of these models are no longer available; they remain on the list because some candidates may have obtained them in the past. This information is correct at the time of writing but is subject to change].

Please note that the above is based on last year's information. Please visit the Natural Sciences website for any possible changes:

http://www.cam.ac.uk/about/natscitripos/students/first.html

---

**Cambridge Terms**

You will find it helpful to learn the names used in Cambridge for the teaching terms.

| | |
|---|---|
| *Michaelmas Term* | October - December |
| *Lent Term* | January - March |
| *Easter Term* | April - June |

---

## Examination Results

In Part IA of the Tripos the *honours classes* are First, Second and Third. In all other Parts the Second Class is divided into Upper = II(i) and Lower = II(ii). The result gained each year is based on performance in the examinations and other work (e.g. practicals) assessed that year. The results from each year are not aggregated to give an overall Class at the end of three (or four) years. The exception to this rule is Chemistry Part III, where the final mark is a combination of the results in the final *two* years.

In all Parts of the Tripos a proportion of the credit is assigned for *practical / project work*, either on a basis of continuous assessment during the year or on an end-of-year practical examination, or both. The proportions and procedures vary from subject to subject and from one Part of the Tripos to another. For further information consult the Directors of Studies in the specific subjects.

In Part IA the maximum marks allocated to each subject are:

| | |
|---|---|
| Each experimental subject | 100 |
| Mathematics | 75 |
| Mathematical Biology | 75 |
| Elementary Mathematics for Biologists | 50 |

Candidates are classed on the basis of their aggregate of three experimental subjects and one mathematics subject, account being taken of whether that subject carries a maximum of 75 or 50 marks.

In Part IB each subject counts equally.

In the final examinations at the end of the undergraduate course over half of the candidates in the Natural Sciences Tripos usually achieve at least a II(i), the minimum standard required to qualify for the funding provided on a competitive basis by Research Councils to eligible students accepted to study for research degrees - see the *Postgraduate Studies* section of this document.

**FIRST YEAR**

Students are required to offer *three* of the following experimental subjects for Part IA of the Tripos:

| | | |
|---|---|---|
| Biology of Cells | Evolution and Behaviour | Physics |
| Chemistry | Earth Sciences | Physiology of Organisms |
| Computer Science | Materials Science | |

Each of these subjects entails three one-hour lectures, an average of from three to five hours practical work and one one-hour supervision per week. For information about the link between A-level (or equivalent) background and Part IA subjects, please see p.8.

Students are required to offer *in addition*, Mathematics, Mathematical Biology or Elementary Mathematics for Biologists. Each of these courses includes an appropriate introduction to computing techniques and applications. The mathematics courses consist of three lectures and one supervision per week plus some practical computing.

***Biology of Cells*** - http://www.bio.cam.ac.uk/undergraduate/courses/cells
This is a combined course presented by the Departments of Zoology, Biochemistry, Genetics and Plant Sciences. It deals with biological systems at the molecular and cellular level, with special emphasis on the molecular biology that has greatly extended knowledge of such systems in recent years. Among the important topics covered are: the structure and functioning of cellular membranes, proteins and nucleic acids (DNA and RNA), how nucleic acids encode genetic information at the molecular level, how that information is inherited and expressed as proteins, and the spatial and temporal control of gene expression during the development of multicellular organisms. There are some lectures on genetic engineering to help you understand the experimental techniques.

The course has been designed so that it is not dependent on knowledge of A-level Biology and so is completely accessible to students who have not studied biology at school. It should in any case be taken by those students who intend to study a biological subject in future years.

***Chemistry*** - http://www.ch.cam.ac.uk/teaching/course-guides
In this course we begin to explore the complex and subtle relationship between the structure of a molecule and its chemical properties; an understanding of this relationship is central to making sense of the physical and biological worlds. The ideas and concepts introduced in the course are relevant to all areas of molecular science, from biochemistry to materials science, and also form a foundation for more advanced study in chemistry in subsequent years. The course emphasises the underlying concepts in chemistry and how these can be used to rationalise and understand the behaviour of chemical systems and molecular interactions.

The course begins by looking at how chemists use spectroscopy to determine the shape and structures of molecules, and then goes on to consider how modern theories of chemical bonding give us an understanding of why molecules adopt the shapes and structures they do. We will also look at how these theories point to the type of chemical reactivity that a particular molecule will have. The consequences of these shapes and electronic structures are then explored in a number of ways. We will consider how the molecules react and how mechanistic ideas can be used to rationalise and predict the outcome of a chemical reaction. The way in which a qualitative study of the rates of chemical reactions sheds light on mechanisms will be discussed, and the way in which chemical equilibrium can be understood in a quantitative way will be introduced and illustrated. The course closes by drawing together all of these concepts and using them to make sense of the widely different chemistry shown by some key non-metallic and metallic elements.

Practical work (one five-hour session per fortnight) is synchronised with the lecture courses and includes both preparative chemistry and experiments needing quantitative measurement and interpretation of data. Such work is continuously assessed and contributes up to 20% of the final mark.

***Computer Science*** - http://www.cl.cam.ac.uk/teaching

Computer science is becoming as essential to science as mathematics. Whole disciplines, ranging from particle physics to genomics, are now dependent on efficient and effective use of computers for the analysis of data. This first year option is an opportunity for natural scientists to take one of the two first year courses from the Computer Science Tripos. We cover the foundations of computer science, including programming in two languages (ML and Java), an introduction to the discrete mathematical structures that underpin computing, the design and analysis of software, and a thorough grounding in computer algorithms including examples of real-world scientific problems. There is extensive practical programming work. Students who wish to continue with computer science in the second year must switch to the Computer Science Tripos at the end of their first year and do some work over the summer to catch up on material that they have missed. There is no computer science in later years of the Natural Sciences Tripos.

***Earth Sciences*** - http://www.esc.cam.ac.uk/teaching/earth-sciences-course/part-ia

The course introduces earth science (geology, geophysics, geochemistry). The principles of physics, chemistry, and biology are applied to the past and present behaviour of the earth deduced from study of rocks, earthquakes, fossils, etc., so that the best preparation at school is in two or more of these three basic subjects. Previous knowledge of geology is not expected; though prior field experience would be an asset. The course covers the nature and properties of the earth, particularly of the mantle and the crust; the theory of plate tectonics, past climate changes and its driving forces, biological, physical and chemical methods of geology as they apply to a broad scale picture of a segment of the earth and, in outline, to other terrestrial planets. The aims of practical and field work are principally the identification and interpretation of rocks, of geological maps of large areas, and the use of fossils to understand the history of the Earth. A one week field course is held in Arran in the Easter vacation.

*Those who are planning to read Part II Geological Sciences in their third year are expected to attend a ten day mapping course in Sedbergh in the last part of the long vacation following Part IA. A shorter mapping course is available in Skye immediately following Part IB for those who do not decide to read Part II Geological Sciences until some point in their second year.*

***Evolution and Behaviour -*** http://www.zoo.cam.ac.uk/undergraduates/NST1A-evolution-and-behaviour

This course draws on a very wide area of knowledge and is designed to provide a fairly detailed introduction to the principles and processes of evolution, and also to allow, for the first time, Natural Science Tripos students to learn something about behaviour, psychology and the evolution of humans. The course starts with an overview of the conceptual basis for our understanding of evolution – the principles of natural selection and genetic drift that underlie all of biology. This includes an introduction to evolutionary genetics, and leads to a broad understanding of the genetic basis for evolutionary change and comparative developmental biology. Much of the remainder of the Michaelmas and Lent terms is taken up with an empirical overview of evolution, starting with the origins of life, followed by a comprehensive examination of the evolution of plants and subsequently animals. This provides an introduction to their range of diversity and explains how this arose by the processes of evolutionary adaptation. Throughout there is an emphasis on recent advances in our understanding from whole genome sequence and developmental genetics, as well as more traditional approaches. The Easter term is largely devoted to an introduction to the science of behaviour and psychology, as well as a short section on primate and hominid evolution.

An understanding of evolutionary principles underlies all of biology. This course therefore provides a basis for any undergraduate planning a biologically orientated Tripos. The course provides an explicit foundation for Animal Biology, Plant Sciences, Ecology and as well as Experimental Psychology, subsequent to the first year

***Materials Science*** - http://www.msm.cam.ac.uk/teaching/partIA.php
Part IA Materials Science gives an essential framework for the understanding of the behaviour of solids. By building on the basics of solid state Physics and Chemistry the course explores how the properties of solid materials are determined by their structure. Students intending to specialise in other Physical Science subjects in later years, including Physics, Chemistry and Earth Sciences, will find Part IA Materials Science to be an ideal preparation.

An understanding of materials - functional, biomedical, structural, geological, - is essential to answering questions such as "How can we produce better computer memories?", "Why do so many hip implants work loose?", "How were diamonds formed in the Earth and can we mimic the process in the laboratory?". By bringing together theoretical and practical aspects of the basic sciences, the subject lays the necessary interdisciplinary foundations to underpin efforts to work out the history of the Earth, to provide new opportunities in all branches of engineering, and to improve many individuals' quality of life. Although the course emphasises basic sciences, an additional strength is the introduction of the "engineering dimension". The underlying theme is the relationship between the properties of a material and its structure - at length-scales from individual atoms to millimetres and more. Simple crystal structures and the significant defects found in them lead to explanations of important physical and mechanical properties. Changes in structure that occur as a result of changes in temperature, pressure or composition, including changes that arise during use, are then studied experimentally and theoretically. Applications of these concepts and techniques are demonstrated in two challenging and rapidly developing areas: functional materials used in devices and biomaterials. The practicals throughout the year are designed to develop and clarify concepts introduced during the lectures. Instead of an end-of-year practical examination, four of the practicals during the year include assessed exercises. If you have access to the web, you can find out more at: http://www.msm.cam.ac.uk/Teaching/.

Courses in Materials Science continue into the second, third and fourth years of the Natural Sciences Tripos and build on the subject material taught in Part IA. As Materials Science is a very interdisciplinary subject, the wide variety of subjects that are studied at Part IA proves very useful. It is expected that students specialising in Materials Science at IB, Part II and Part III will have studied Materials Science and either Physics or Chemistry (but not necessarily both) at Part IA.

***Physics*** - http://www.phy.cam.ac.uk/students/teaching
The first year course in Physics assumes knowledge of Physics to A level standard. It is designed to provide a good grounding in the subject for those who will later specialise in other subjects as well as those aiming towards Part II and Part III in Experimental and Theoretical Physics. Individual lecture courses cover: Principles of Relativity, Mechanics and Fields; Electromagnetism, Oscillations and Waves; Quantum Physics and the Physics of Large Systems.

Practical work (one four hour session per fortnight) involving general laboratory work and electronics, is an essential part of the course and includes a component of continuous assessment.

***Physiology of Organisms*** - http://www.pdn.cam.ac.uk/teaching/index.shtml
Physiology is the study of how living organisms work. In this unifying new course you will look at the different functional solutions developed by bacteria, fungi, plants and animals to the problems of survival in the many different environments on the planet.

The first part of the course centres on the physiology of animal systems. It begins with an overview of physiological ideas and problems, focusing on water, the properties of the cell membrane and the factors that contribute to the stability of the internal environment. You will then consider detection of environmental change by animals, particularly the role of sense organs and the hormonal and nervous systems. How muscles work will then be explored. Then comes details of the circulation and control of body fluids in animals followed by respiratory gas handling in animals. The topics of osmoregulation, nutrient acquisition and homeostatic control in animals are then explained.

The second part of the course focuses on the physiology of plants and microbes. You will be introduced to the fundamentals of plant physiology, including transport of water and nutrients, followed by the roles of

plant growth substances and adaptations of plants in a changing climate. Key concepts in the physiology of microbial growth and their interactions with plants are then described.

In the third term you will investigate more "higher level" physiological functions, considering issues such as temperature regulation, energy balance and food intake. Then adaptations to extreme conditions and the physiological problems of development and reproduction will be discussed. Finally, motivation and stress will be covered, including the physiological bases of processes such as hunger and thirst.

Physiology of Organisms is a core biological course, and the Departments of Physiology, Plant Sciences, Zoology and Experimental Psychology are all involved in its teaching. The course will provide a wider context for the material provided in the Biology of Cells course, and gives a contemporary understanding of how integrated organisms function. It also underpins the broader issues covered in the Evolution and Behaviour course. It provides a highly recommended introduction to all IB biological courses, as well as providing general interest to anyone curious to know how complex biological "machines" work.

---

***Mathematics***

If you took A-level (or equivalent) in Mathematics you should have received a *Mathematics Workbook* with this document. If you did not do so, please contact your Tutor straight away. If you are planning to take the subject *Mathematics*, make sure that you have a good shot at the problems it contains before the beginning of term but do not worry if you find some of them difficult.

The lectures at this stage are designed to cover those parts of mathematics that are of immediate use to students reading Natural Sciences. These are two alternative courses, course A and course B.

Course A provides a thorough grounding in methods of mathematical science and contains everything prerequisite for the mathematical content of all physical-science courses in Part IB of the Natural Sciences Tripos, including specifically Mathematics, Physics A and Physics B. Course B contains additional material for those students who find mathematics rewarding in its own right, and it proceeds at a significantly faster pace. Both courses draw on examples from the physical sciences but provide a general mathematical framework by which quantitative ideas can be transferred across disciplines.

Students are strongly encouraged to take Course A unless they have a thorough understanding of material in Further Mathematics A-level. As a guide, such students might be expected to have scored in the region of 95%in at least two of the modules FP1, FP2, FP3. Some topics that look similar in the Schedules may be lectured quite differently in terms of style and depth. Both courses lead to the same examination and qualification. Mathematics is a skill that requires firm foundations: it is a better preparation for future courses in NST to gain a first-class result having pursued Course A than to gain a second-class result following Course B.

Each course consists of 60 lectures over three terms which include such topics as complex numbers, vector algebra, matrices and determinants, convergence of series, differential and integral calculus, partial differentiation, multiple integrals, ordinary differential equations and an introduction to Partial Differential equations and Fourier series.

There are two courses in Mathematics for Biologists. The more advanced of these, *Quantitative Biology* is suited to the requirements of those who have taken Mathematics at A-level and yet intend to concentrate their efforts in the field of biological science at University. The second is *Elementary Mathematics for Biologists*, pitched at a substantially more elementary level; among the topics dealt with are: elementary calculus; complex numbers; an introduction to partial derivatives and multiple integrals; the elementary theory of differential equations. In addition, some 30% of the course is devoted to data handling techniques and statistics, concentrating on the statistical techniques most needed in experimental scientific work.

**Some Illustrative Examples of A-level Routes into the Natural Sciences Tripos**

This table indicates, for each subject in Part IA, the subjects which are commonly taken at A-level (or equivalent) by prospective Natural Scientists. These are shown in two categories. It is very important to realise that the information is illustrative. It is *not* essential to have taken subjects from the '*Also helpful*' column in order to take a particular Part IA subject but, if you have, you are likely to find it easier getting to grips with the subject at the beginning of the course. With ability and determination all sorts of gaps can be plugged but, with good planning, many potentially serious gaps can be avoided!

This table should be read in conjunction with the table showing routes through the Tripos to particular final year specialities. That table will help you to identify sensible combinations of three experimental subjects in Part IA that leave open the options for later years that attract you. The possible combinations of Part IA subjects can then be assessed against the A level subjects shown in this table.

Chemistry is not straightforward for anyone who has not learnt some calculus but a full A-level in Mathematics, whilst very useful, is not essential.

** Even if no specifically '*Strongly recommended*' subject is shown, it is important to realise that the first year courses in Natural Sciences assume a general understanding of scientific method and terminology equivalent to that gained from a minimum of two scientific subjects (or one scientific and one mathematical subject) at A-level, or other comparable examination, and that a background in an immediately relevant subject can be expected to make the initial stages of the Tripos a bit easier.

| **Part IA Subject** | **A-level Subjects** | |
|---|---|---|
| | *Strongly recommended* | *Also helpful* |
| *Biology of Cells* | Chemistry | Biology (but *not* essential) |
| *Chemistry* | Chemistry | Mathematics |
| *Computer Science* | Mathematics (essential); Further Mathematics; A Physical Science | Electronics; English; Modern or Classical Language; Social Science |
| *Earth Sciences* | ** | Physics *or* Chemistry |
| *Evolution and Behaviour* | Biology | Biology |
| *Materials Science* | Physics *or* Chemistry<br>Mathematics | Chemistry *or* Physics *or* Biology |
| *Physics* | Mathematics<br>Further Mathematics | Physics |
| *Physiology of Organisms* | ** | Biology (but not essential) |
| *Mathematics* | Mathematics | |
| *Mathematical Biology* | Mathematics | |
| *Elementary Maths for Biologists* | [GCSE Mathematics] | |

## SECOND YEAR

In Part IB of the Tripos students are required to read three subjects. Directors of Studies should be consulted by students when a choice of Part IB subjects is being made. Only one subject may be chosen from any one of the following groups.

| | |
|---|---|
| (i) | Ecology; Geological Sciences B; Physics B |
| (ii) | Biochemistry and Molecular Biology; Geological Sciences A |
| (iii) | Animal Biology; Mathematics; Pharmacology |
| (iv) | Pathology, Physics A |
| (v) | Chemistry B; Physiology |
| (vi) | Materials Science; Cell and Developmental Biology |
| (vii) | Experimental Psychology; Plant and Microbial Sciences |
| (viii) | Chemistry A; Neurobiology |
| (ix) | History and Philosophy of Science |

***Animal Biology*** **-** http://www.zoo.cam.ac.uk/undergraduates/NST-IB-Animal-Biology
This course follows the Part IA courses in Biology of Cells, Evolution and Behaviour and Physiology. Many students will have read two of these in Part IA; but some come across from the physical side, having read only Biology of Cells or Evolution and Behaviour in Part IA. The overall aim of the course is to demonstrate the extraordinary diversity of ways in which the behaviour, physiology and development of animals are adjusted by evolutionary processes to result in adaptation to environment.

The Michaelmas Term begins with Behaviour and Ecology, which considers how different behaviour patterns will be favoured by natural selection under different ecological conditions. Life history strategies, foraging behaviour, habitat selection and mate choice are some of the topics covered. This is followed by Brains and Behaviour, which explores the ways in which brains are organised for the control of behaviour. Particular emphasis is placed on the ways in which nervous systems function in the detection and discrimination of signals in the environment, during learning and memory and in the generation of various patterns and movement. In the Lent Term the first set of lectures seeks to explain the success of those most abundant land animals, the insects. Topics covered include endocrine systems, cuticle and moulting, insect-plant relations and the evolution of insect societies. There then follow lectures on Vertebrate Biology, showing how the integration of developmental and evolutionary studies can enhance the understanding of adaptation. In the Easter Term lectures on Evolutionary Principles review the fundamental theories underlying evolutionary biology, and consider the methods available to interpret, understand and predict the pattern and process of evolution.

Practical work consists of experimental procedures, observation of specimens, behavioural experiments, dissections, films and talks as appropriate to the course.

***Biochemistry and Molecular Biology*** - http://www.bioc.cam.ac.uk/teaching/second-year/bmb
This course deals with the biochemistry and molecular biology of animals, plants and micro-organisms. The topics covered include the control of prokaryotic and eukaryotic gene expression, control of the cell cycle, oncogenes and cancer, genetic engineering, proteins and protein engineering, transmembrane signalling, bioenergetics, the control of metabolism, the molecular aspects of differentiation, intracellular protein traffic and the biogenesis of organelles.

The course can be taken by undergraduates with backgrounds in the physical or biological sciences: suitable Part IA subjects include Biology of Cells, Chemistry, Physics, Materials Science, Physiology and Evolution and Behaviour. Biology of Cells and Chemistry are particularly helpful and students with no knowledge of biology or chemistry should consult their Director of Studies about suitable background reading.

***Cell and Developmental Biology*** - http://www.bio.cam.ac.uk/undergraduate/courses/cdb/overview
This course deals with the cell biology of animals, plants and micro-organisms. The topics covered include the molecular biology of the cell nucleus, the organisation of genes and genomes, molecular genetics of micro-organisms and organelles, the organisation of the cytoplasm, intracellular communication, nucleo-cytoplasmic interactions and cell differentiation.

The course can be taken by undergraduates with a background in the biological sciences: suitable Part IA subjects are Biology of Cells, Physiology and Evolution and Behaviour. Biology of Cells is particularly useful and students with no knowledge of Biology should consult their Director of Studies about suitable background reading to be undertaken before starting the course.

***Chemistry*** - http://www.ch.cam.ac.uk/teaching/course-guides
A wide range of options is available. It is possible to take either Chemistry *A* (covering physical and theoretical chemistry) or Chemistry *B* (organic and inorganic chemistry) or both Chemistry *A* and Chemistry *B* ('double subject' Chemistry). Those who are contemplating taking Part II Chemistry should normally take double subject Chemistry. It is possible, though more difficult, for a single subject candidate to read Part II Chemistry: this entails some course work and some directed reading during the Long Vacation following the Part IB Tripos examination. The single subject courses are intended for those who may take a Part II in a subject where a chemical background in either physical or the more biological aspects of chemistry would be valuable.

***Ecology*** - http://www.plantsci.cam.ac.uk/teaching/ecology
This course deals with all aspects of the relations of organisms with the physical environment and with other organisms. The lecture courses cover Global Patterns (Marine and Terrestrial), Ecology of Communities (Freshwater and Terrestrial). Evolutionary Ecology (Social Behaviour and Population Structures, Predators and Prey, Population Ecology), Insect-Plant Interactions and Wildlife Management for Conservation. The course begins with a 2-week field course starting in late June held at Juniper Hall (near Dorking in Surrey) which introduces students to key techniques vital to fieldwork that are subsequently used for project work. Students intending to read Ecology are encouraged to read Evolution and Behaviour in the first year. Those who do not should consult their Director of Studies about suitable background reading.

***Experimental Psychology*** - http://www.library.psychol.cam.ac.uk/part-ib-teach-res
This course comprises an introduction to all areas of psychology from an experimental perspective. The topics covered by lectures and practical classes are: sensory processes, perception, learning, memory, language and thought, human performance, intelligence testing, child development, psychopathology, physiological psychology, animal behaviour, statistical methods. Practical work is assessed during the year; there is no practical examination at the end of the year. It is useful, although not essential, to have some previous knowledge of biology such as would be gained by taking Evolution and Behaviour, Physiology, or both, in Part IA. Mathematics in Part IA is also a useful preparation.

***Geological Sciences A*** - http://www.esc.cam.ac.uk/teaching/general-information
The course assumes prior knowledge of 1A Earth Sciences. It concentrates on the surface environments of the Earth. – the atmosphere, hydrosphere and biosphere – together with their geological products. It encompasses the fields of sedimentology, palaeobiology and oceanography. This course also covers tectonics and scales from lithosperic plates down to hand specimens, emphasizing the processes that form and deform sedimentary basins. Sediments and their component minerals are studied with emphasis on environments of deposition and diagenesis. In palaeobiology the evolution and palaeoecology of selected groups of vertebrates and invertebrates are studied. The geophysics of the ocean floor is studied in terms of the evolution of sedimentary basins, using seismic stratigraphy, borehole data and palaeothermometry. The course is a combination of theory and practical material, including maps. A ten-day field course in Dorset and Cornwall is held in the Easter vacation.

For most candidates wishing to proceed to Part II Geological Sciences it is advisable also to read Part IB Geological Sciences B. Those of a biological inclination may prefer to read such subjects as Ecology and/or

Animal Biology. Note that the present regulations permit Part IB Physics B to be combined with Geological Sciences A but not Geological Sciences B.

***Geological Sciences B*** - http://www.esc.cam.ac.uk/teaching
This course assumes prior knowledge of Part IA Earth Sciences. The course starts with a review of mineralogy, the theory of optics, crystallography and diffraction, with reference to common igneous minerals. This is followed by a review of igneous petrology and petrogenesis, focusing in particular on the processes that govern the formation and evolution of melts and the tectonic settings of magmatism. Igneous phase diagrams and geochemical tracers are introduced as tools to understanding igneous processes. Metamorphic minerals and rocks are discussed next, with an emphasis on the use of phase diagrams, textural relationships and bulk compositions as aids to understanding the mineralogical development of metamorphic rocks from different tectonic environments. The principles of the course are then illustrated using case studies from the Himalayas and the north-western United States. For details of the field course and the Part II options, please see the section on Geological Sciences A.

***History and Philosophy of Science*** - http://www.hps.cam.ac.uk/studying/undergraduate/partib.html
This course offers a wide-ranging overview of the nature of science and its place in society. It explores the historical, philosophical and social dimensions of the sciences, the ways in which the sciences are shaped by other aspects of social and economic life, and the role of scientists in public debate. Examples are drawn from many different disciplines, over a period extending from ancient civilisations to the present day: from early astronomy, alchemy and natural philosophy, to the atomic bomb and the discovery of DNA. We examine questions about how theories are tested and change, and about the nature of causation, laws and scientific explanation. The course also considers whether science provides and increasingly accurate account of a largely unobservable world.

***Materials Science*** - http://www.msm.cam.ac.uk/teaching/partIB.php
Polymers, metals, ceramics and composites are all essential in underpinning modern technological developments. The optimisation of materials selection and performance is becoming increasingly important in determining the competitive edge of products in all types of manufacturing industry. In the Part IA Materials course an understanding has been developed of the basic concepts underlying the properties of materials. In Part IB these ideas are developed further to provide a deeper understanding of why materials behave as they do and provide indicators for ways of optimising material performance, through control of composition, processing and hence, microstructure. The course highlights the versatility of metallic properties and considers diffusion, solidification and solid-state phenomena in the development of metallic microstructures. The relationships between the molecular architecture of polymers (and other soft materials such as liquid crystal), the organisation and conformation of the molecular chains, their behaviour and the production of plastics artefacts are also explored. The scientific principles underlying the electrical and magnetic properties of materials are discussed together with the issues involved in designing and producing materials for applications, such as in electric motors, integrated circuits and compact disks. However, in presenting the idealised properties, it is also important to remember that almost all materials in service, metallic and non-metallic, are degraded by chemical reaction with their environment and this phenomenon, corrosion, often limits the useful lifetime of components. In considering the deformation of materials we ask “why are some materials capable of plastic flow while others are not?” and “how do material properties and structures influence the energetics of cracking?”.

The aim of this course if to develop understanding of the scientific principles involved in the design of materials and to relate its properties to their microstructure at scales ranging from a millimetre to a fraction of a nanometre. The course follows on from Materials and Mineral Sciences in Part IA and combines well with other subjects in Part IB such as Physics A, Physics B, Advanced Physics, Chemistry A, Chemistry B, Mathematics or Geological Sciences B.

***Mathematics*** - http://www.maths.cam.ac.uk/mathematics/undergradcourses.html
This course is designed mainly for students intending to study Experimental & Theoretical Physics in Parts II and III of the Tripos but it is also useful to others, e.g. chemists wishing to specialise in physical or theoretical parts of their subject. The following topics are included: introduction to group theory; more

advanced matrix theory; Cartesian tensors; more advanced theory of differential equations (including solution in power series and expansions in characteristic functions); Fourier transforms; calculus of variations; functions of a complex variable and contour integration. There is also a course on numerical analysis taught through a set of assessed computational exercises related to material elsewhere in the course.

***Neurobiology*** - http://www.bio.cam.ac.uk/undergraduate/courses/neurobiology
This course covers seven main areas in Neurobiology: Cellular, Molecular, Developmental, Sensory, Motor, Regulatory and Cognitive. A feature of the course will be to demonstrate the inter-relations between these different areas. For example, Molecular, Developmental and Cellular/electrical events ultimately underlie Sensory and Cognitive behaviour. Much of the material, including that to be presented in the lab classes which accompany the course, will lend itself to a quantitative approach, so the course should be of interest not only to biological scientists, but also to physical scientists interested in studying brain function who have had relatively little prior experience of biology. Lectures will cover the following topics:

Electrical and chemical properties of neurons, Development of cellular diversity in the CNS, Transduction in sensory systems, Sensory pathways, Sensory integration, Motor systems, Sensorimotor integration, Development of neural connections, Modification of synaptic efficacy, Learning and memory, Motivation and emotion, Higher functions of the CNS.

The Neurobiology course, as well as being a fascinating area of study in its own right, is well suited to accompany other biological Part IB courses, including Animal Biology, Biochemistry and Molecular Biology, Experimental Psychology, Cell and Developmental Biology, Pathology, Pharmacology and Physiology. For physical scientists who find themselves - as many do - getting interested in the exciting field of neuroscience, it can also provide an attractive option.

***Pathology*** - http://www.path.cam.ac.uk/undergraduate/second_year
This course provides an introduction to pathology, covering the main topics in cellular pathology, immunology, microbiology and parasitism. The lectures are supplemented by a comprehensive practical course. Pathology is a compulsory subject for those reading for medical and veterinary medical degrees and as such provides the necessary groundwork for the applied pathology subsequently studied in the clinical curriculum.

However, Natural Scientists are also encouraged. They attend the same lectures as the medical and veterinary students in the Michaelmas and Lent Terms, but have a separate short course on genetic pathology, with emphasis on molecular mechanisms, in the Easter Term.

The website gives course aims, lecture synopsis and appropriate reading lists: (http://www.path.cam.ac.uk/undergraduate/second_year)

***Pharmacology*** - http://www.phar.cam.ac.uk/undergrads/nst
The course deals with the principles of drug action at the cellular, subcellular and molecular levels. Emphasis is given not only to the importance of the chemical structure of drug molecules and their interaction with receptors, ion channels, and the signal transduction process, but to the molecular biology/structure of the receptors themselves. Drug design and pharmacokinetic disposition are also considered in relation to the chemotherapy of invading organisms, toxicology, and the pharmacological actions of drugs on the major integrated systems of the body including the cardiovascular and renal systems and, of key importance, the neural networks of the central nervous system. The practical course incorporates a mini-project and is designed to give as wide an experience as possible of pharmacological methods and to illustrate experimentally material covered in the lecture course.

This subject is therefore particularly suitable for those with a Part IA background in Biology of Cells, *or* Physiology, *or* Chemistry.

***Physics*** - http://www.phy.cam.ac.uk/students/teaching/current-courses/Ib_overview
The second year course provides two subjects in Part IB: Physics A and Physics B. Students may study either Physics A or Physics B as a single subject in Part IB of the NST or offer both subjects together. It is expected that students who wish to proceed to Part II ETP or Astrophysics will study both courses.

Physics A is a self-contained course dealing with waves and quantum matter. The material covers the central aspects of physical phenomena such as waves and quantum phenomena (treated both from the wave equation and using operator methods). In addition the course includes an introduction to the wave properties of quantum condensed matter. There is an integrated practical class, which is supported by lectures on Experimental Methods. The course is designed to be appropriate for scientists with a wide-range of career destinations. The mathematical level of the course is set by the syllabus for Part IA Mathematics and any additional material, such as Fourier methods, will be taught within the body of the course.

The Physics B course runs in parallel with Physics A and offers material that requires a more sophisticated mathematical approach while covering more specialised topics that lead naturally to Part II/III Physics and other quantitative subjects. The syllabus includes substantial courses in Electromagnetism and Classical Dynamics and Fluids, together with a course on Thermal & Statistical Physics. The Mathematical Methods course is designed to meet the needs of students not doing Part IB Mathematics. The practical class extends the teaching offered in the Part IB Physics A course.

.

***Physiology*** - http://www.pdn.cam.ac.uk/teaching/1b-physiology.shtml
Physiology is the study of how organisms work. This course is concerned with the functions and dynamic interactions of the various organs and systems that make up a living organism, with particular reference to vertebrates - especially mammals including man. The course begins in the first term by considering the individual organ systems and their role in homeostasis: the heart and circulatory system, the respiratory system, the renal/body fluid system, and the digestive system. The second term assembles these principles to consider the integrated control of more complex physiological processes, dealing first with reproductive physiology, and then moving on to investigate the limits to human performance during exercise. Finally, in the third term the course concludes by examining the physiological mechanisms which permit life in extreme environments.

Experimental work is of two kinds. In the experimental laboratory, using newly-developed computer-based equipment, students study the function of living muscle, heart, lungs etc., using themselves as subjects when that is possible. In histology, students examine tissue using light- and electron-microscopy in order to understand the structural and cellular basis of the functions that are being considered. Both kinds of practical are being continually updated to make the best use of modern video and IT techniques, making them both instructive and enjoyable.

The Physiology course, as well as being interesting in its own right, is well suited to accompany several other Part IB courses, including Biochemistry and Molecular Biology, Experimental Psychology, Cell and Developmental Biology, Neurobiology, Pathology, and Pharmacology.

***Plant and Microbial Sciences*** - http://www.plantsci.cam.ac.uk/teaching/pms
This subject continues the study, begun in the Part IA courses on Biology of Cells, Physiology of Organisms and Evolution and Behaviour, of plants and micro-organisms, their structures, physiology, biochemistry, genetics and ecology; there is no overlap with the Part IB subject *Ecology*. Centred on the Department of Plant Sciences, this course provides a treatment of plant sciences that integrates the molecular, cellular and ecological approaches of the subject. Topics covered include photosynthesis, water nutrients, interactions with other organisms, development evolution and conservation. Lectures are complemented by an integrated practical course that includes visits to local biotechnology companies and an optional field course to Portugal.

This course can be taken by students with a background in Biology of Cells and/or Physiology of Organisms and/or Evolution and Behaviour, and goes well with a wide range of IB courses, such as Cell and Developmental Biology, Animal Biology and Ecology. It provides an essential background for Part II Plant Sciences, as well as a good scientific basis for Part II Biochemistry, Genetics or Ecology.

## THIRD YEAR

At this stage there is a choice between preparation for a single subject Part II or to study the broader Part II Biological and Biomedical Sciences or Part II Physical Sciences. In some subjects lack of laboratory space makes it necessary to select only those students who have done relatively well at Part IB level. There are no such restrictions on entry to Part II Biological and Biomedical Sciences or Part II Physical Sciences.

The regulations permit these examinations to be taken at the end of either the third or fourth year of residence so that in exceptional, very rare cases where previous achievement is sufficient to merit permission to reside for a fourth year, both may be taken.

## PART II

Third year students take *one* of the following:

| | |
|---|---|
| *Astrophysics | Pathology |
| *Biochemistry | Pharmacology |
| *Chemistry | *Experimental & Theoretical Physics |
| Genetics | Physiology, Development & Neuroscience |
| *Geological Sciences | Physiology & Psychology |
| History & Philosophy of Science | Plant Sciences |
| *Materials Science | Psychology |
| Neuroscience | Zoology |

***Astrophysics*** - http://www.ast.cam.ac.uk/students/current.undergraduates/part.ii.astrophysics
The Institute of Astronomy offers two Astrophysics courses at Part II level for students who have successfully completed Physics A and B or Physics A and Mathematics, in Part IB of the Natural Sciences Tripos, or have taken Part IB of the Mathematics Tripos. The Option A course is intended for those wishing to complete their degree after three years, and aims to provide a theoretical understanding of the scientific reasoning that underlies modern astronomy and astrophysics. It is not in itself a preparation for research in this area. The Option B course has a limited entry and is designed for those intending to go on to take Part III Astrophysics in their final year. Those interested in the possibility of a research career in astronomy and astrophysics should take either Part II (B) and Part III Astrophysics or Part II (B) and Part III Experimental and Theoretical Physics. For purely theoretical research in this area, Part III of the Mathematical Tripos provides a further option.

***Biochemistry*** - http://www.bioc.cam.ac.uk/teaching/third-year
This is an advanced course in cell and molecular biology in its wider aspects. It includes instruction in related subjects such as physical chemistry, physical organic chemistry, microbiology, morphogenesis and elementary genetics, in order to provide some of the necessary background.

An essential preparation is Biochemistry and Molecular Biology and/or Cell and Developmental Biology in Part IB of the Natural Sciences Tripos or Molecules in Medical Sciences (MIMS) in Part IA of the Medical and Veterinary Sciences Tripos. Probably the best additional subjects for the natural scientist are Chemistry B in Part IB and a biological subject in either Part IA or IB. However, those with leanings towards Physics or Mathematics can read this subject with advantage.

Please see (http://www.bioc.cam.ac.uk/teaching/third-year) for details of the current Part II and Part III courses.

Many of those who have read Part II Biochemistry proceed to post-graduate study in University departments (in Cambridge and elsewhere) or research institutions. There is a whole range of openings, from hospitals to industry where there is a growing interest in biotechnology. Medical students take the

course, either for general interest or because they hope to return to Biochemistry after obtaining their medical qualifications.

***Chemistry*** - http://www.ch.cam.ac.uk/teaching/third-and-fourth-year-courses-chemistry
Part IIA is the third and final year of a course leading to graduation with the usual B.A. degree. Part IIB is the third year of the four-year course leading to the M.Sci. degree (as well as the B.A.). Both courses consist of a package of lectures and continuously assessed work, and both have end-of-year examinations. Students are asked to indicate at the start of the Part II year which option they wish to take. However, it is (at present) possible to change options (and examination entries) almost up to the end of the Lent Term.

In the Michaelmas Term there are four 12 lecture *Core* courses designed to be of relevance to all chemists, regardless of the area in which they may wish to specialise. These courses cover Inorganic, Organic, Physical and Theoretical chemistry and they are compulsory for all students who have taken Chemistry *A* and *B* in Part 1B. There is a special course for students who have not taken Chemistry *A*. Student then have a choice of three out of six *Foundation* courses. These courses aim to present fundamental principles which are important to further study in particular areas. For the remainder of the Lent Term and for approximately the first two weeks of the Easter Term, students have a choice of advanced and specialised courses which are designed as a preparation the advanced research-based topics that will be studied in Part III.

The continuously assessed work consists of compulsory *Core Practical* occupying the first ten weeks of the course and a combination of various options including a *Language Course* (French, German, Chinese, Japanese or Spanish), *Computer Programming*, *Mathematical Methods*, and *Advanced Practical*.

Further details of the Chemistry course can be found in the 'teaching' area of the departmental website: http://www.ch.cam.ac.uk/teaching

The three-year course should be ideal for those planning to embark on a career not directly related to Chemistry; for example, accountancy, management, production, law, etc. The four-year course is intended more for those who wish to practice as professional chemists.

***Genetics*** - http://www.gen.cam.ac.uk/undergraduate/nst2-genetics-overview
This course is broad in scope covering topics such as: the genetic systems of a variety of organisms (including man); cytology; statistics applied to genetics; molecular genetics; the general regulation of cellular differentiation and development; and population and ecological genetics - particular emphasis being placed on the last two topics in this list. Research projects are carried out during the year.

Opportunities for those who have taken the Part II course include plant, animal and micro-organism breeding, and those who plan to teach will find the course of value. Departmental facilities are available in a wide range of topics for students wishing to do postgraduate research. Openings for those who go on to a higher degree are readily obtained, now that the impact of genetics on biology in general is being felt.

***Geological Sciences*** - http://www.esc.cam.ac.uk/teaching/general-information
All candidates are expected to have read Geological Sciences A or B. The Department strongly advise attendance on a ten-day field mapping course normally held in Sedbergh in September at the end of Part IA on a shorter course in Skye following Part IB.

Part IIA (three-year) and Part IIB (four-year) candidates must submit a project for examination based principally on independent field work of at least four weeks duration in the Long Vacation preceding Part IIA/B. Mineral scientists submit a project for examination based on independent laboratory work conducted in Cambridge in that Long Vacation. A one-week tectonics field course is held in Greece in the Christmas vacation for all Part IIA/B candidates.

In the Michaelmas Term all candidates select two from a list of four options. Part IIA and Part IIB diverge in the Lent Term. Which options to take, and whether to take Part IIA or Part IIB is best discussed with your Director of Studies.

Graduates in Geological Sciences are employed by the oil and natural gas industries, environmental services, water supply companies, geological surveys, mining companies and higher education. The spread of observational, numerate and literate skills developed by geological scientists also finds favour with a wide range of employers in management and finance.

***History and Philosophy of Science*** - http://www.hps.cam.ac.uk/studying/undergraduate/partii.html
The aim of the course is to give insight into the historical development of the sciences, technology and medicine, and into their philosophical structure and sociological dynamics. It thus provides essential resources for understanding some of the most significant institutions in the world today.

There are two options for students taking HPS Part II. Option A students select three papers from nine on offer, and write a dissertation of up to 12,000 words; Option B students select nine papers. Both options also write two primary source essays. Students should discuss potential dissertation topics and preliminary reading with the Director of Studies in History and Philosophy of Science, preferably before leaving Cambridge for the Long Vacation at the end of the second year. All Part II students are required to write two essays (up to 3,000 words) on primary sources discussed in weekly seminars during Michaelmas Term.

The nine subject-based papers on offer allow students to emphasize either the historical or philosophical side, or to focus primarily on medical issues. There are four papers ranging from science in ancient civilisations to that of the twentieth century, and two on History of Medicine, extending from the healing traditions of the ancient world to modern biomedical science. Three papers in Philosophy of Science examine conceptual problems in the physical, biological and psychological sciences, while the paper on Ethics and Politics of Science, Medicine and Technology draws on approaches from sociology and anthropology. The Director of Studies can advise on the choice of papers, and recommend preliminary reading. While History and Philosophy of Science in Part IB is a valuable preparation, it is by no means essential, and each year a substantial number of students on the Part II course have not studied the subject before. It is also possible to transfer to the course from History, Philosophy, Mathematics and other Triposes.

The course takes a broad perspective on the sciences, and encourages critical thought, historical sensitivity, depth of argument and clarity of presentation. Graduates are well placed for employment and are particularly suited to positions where the skills typically developed in the arts Triposes must be combined with a knowledge of science.

A list of papers on offer at Part II are below:

- Early Medicine
- Science in Transition: Renaissance to Enlightenment
- Science, Industry and Empire
- Modern Medicine and Biomedical Sciences
- Metaphysics, Epistemology and the Sciences
- Ethics and Politics of Science, Technology and Medicine
- History and Philosophy of the Physical Sciences
- Human and Behavioural Sciences
- Topics in the History of Twentieth Century Science

***Materials Science*** - http://www.msm.cam.ac.uk/teaching/partII.php
The aim of Materials Science is to utilise the discoveries and understanding provided by the basic sciences in order to develop materials with new, improved properties and to ensure that materials used in existing applications operate efficiently and safely. Throughout the subject, the same fundamental questions must be asked. How is the material made up? Is it chemically uniform? How are the different constituents joined together? How do its properties relate to its structure? Can these properties be developed reliably by control of the details of processing? Can improvements be made and, if so, how? How can pieces of the same or different materials be joined together without deleterious changes in their properties? To help answer such questions it is necessary to understand not only the scientific principles involved in the make up of a material but also the various techniques used to study the material's microstructure.

The Part II course builds on the foundations laid in Materials Science in Part IA and Part IB. There are around 20 courses with a series of related practicals that take place during the Michaelmas Term. To support the lectures, much of the teaching is through examples classes and project work (including a design project, a materials project and a literature review). In addition to the central curriculum other (transferable-skills) options are available such as computing, management and a selection of modern languages. Students can opt to complete an Honours BA degree after three years, or a BA and Masters after four years by proceeding into Part III. The principal goal is to ensure a thorough first-degree education in the subject for high calibre students wishing to pursue a professional career, either in Materials Science or another numerate discipline. In designing the course, the criteria have been considered that guarantee exemption from some of the steps towards Chartered Engineer registration and, to this end, students work in industry or undertake a summer project before taking Part II and additionally, if desired, undertake another summer project before starting Part III.

There are openings for materials scientists in many parts of the world. Those planning to enter the profession normally take Part II and proceed to the fourth year course (Part III).

***Neuroscience -*** http://www.natsci.tripos.cam.ac.uk/subject-information/part2/neurosci
This is an inter-Departmental course which aims to provide a multi-disciplinary and integrated approach to Neuroscience. Students take four of the following five modules: Development, Degeneration and Regeneration; Cellular and Molecular Neurobiology; Control of Action; Sensory Systems; Learning, Memory and Cognition. In addition to lectures there are some series of seminars and technical workshops associated with each module. All students also undertake a research project in one of the research groups in the contributing Departments during the Lent Term.

***Pathology*** - http://www.path.cam.ac.uk/undergraduate/third_year
This course is made up of advanced lectures on selected topics given by members of the Departmental staff who are engaged in various aspects of research within the broad field of pathology. The course is now divided into four equal-sized options; Cellular and Genetic Pathology, Immunology, Microbial and Parasitic Disease, and Virology. Each option consists of a course of three lectures per week plus a small number of supporting practicals and discussions, and everyone is required to read two options (whilst every effort is made to allow students the options of their choice this cannot always be achieved).

Students are also expected to undertake original research under the direction of a supervisor who is already engaged in research in that field. The results of the project are then written up in the form of a short dissertation which is taken into consideration by the examiners when deciding the overall class of the candidate. The very small number who are unable to submit a project report may alternatively write a critical review of a selected topic.

The Part II Pathology course welcomes both medical or veterinary students, and Natural Scientists, for whom there is an increasing number of good career opportunities. The website (http://www.path.cam.ac.uk/undergraduate/third_year) gives details of course aims, as well as an outline of individual options.

***Pharmacology*** - http://www.phar.cam.ac.uk/undergrads/bbs
This course is broad in scope extending from basic molecular mechanisms to the action of drugs on cellular function and whole organisms, up to and including man. The underlying aim of the course is to achieve an understanding of the various mechanisms by which drugs control cellular activity, this being an integral part of the strategy essential for future drug design.

Topics covered range from the molecular biology of excitatory and inhibitory receptors, intracellular messengers, ion channels and the molecular targets of antibacterial agents, to the scientific basis of the use of drugs to suppress the immune response or to treat hypertension or neurosis. The course does not have formal options and the timetable has been deliberately arranged so that it is technically possible to attend all lectures. This course structure allows a wide diversity of interest and considerable personal choice in the selection of topics for intensive study. Practical work is at an advanced level and includes a research project undertaken within the Department.

There are good career opportunities on an international scale for those reading Pharmacology since many pharmaceutical companies in this country and abroad maintain extensive departments actively engaged in pharmacological research and drug discovery.

***Experimental and Theoretical Physics-*** http://www.phy.cam.ac.uk/students/teaching/current-courses/II_overview
There are two courses in Part II, one for students who intend to continue to Part III and one for those who plan to leave after completing Part II. The two courses start off together but diverge during the year.

The Part II course is demanding but fulfilling. It is essential preparation for Part III. Many of the core subjects are treated at a high level and the objective is to reach a level of sophistication at which students can begin to appreciate physics at the research level. The options within Part II range from experimentally biased options to those which have a strong emphasis on theory and mathematical physics. Various intermediate combinations are possible. In the Lent and Easter Terms several courses are given surveying the wide field of subjects which nowadays fall within the remit of Experimental and Theoretical Physics.

In Part II the differences between the three-year and four-year courses become apparent in the Lent Term, at the beginning of which a definitive choice has to be made. Those who intend to complete their degrees with Part II take special courses in the Lent Term to provide them with experience and skills which will be valuable in whatever areas they wish to follow after their degrees.

***Physiology, Development and Neuroscience*** - http://www.pdn.cam.ac.uk/teaching/part2/index.shtml
The Departments of Physiology and Anatomy merged in 2006 to form the Department of Physiology, Development and Neuroscience. The Department offers a Part II course comprising 14 modules, which fit into themes of development and reproductive biology, integrative physiology, and neuroscience. All students take 4 modules, which may be within or may span the themes and are taken as part of one of two options. In Option A, the modules are combined with a two-term research project. In Option B, the modules are combined with at least two practicals in Michaelmas Term, a one-term research project in Lent Term, and an extended essay. The practicals are designed not only to give experience of the advanced techniques used in the investigation of particular aspects of physiology, development or neuroscience, but also to introduce some of the topics later undertaken as research projects.

Whilst some of those who take Part II Physiology, Development and Neuroscience intend to go into clinical medicine or veterinary studies, Natural Scientists who do well in Part II take up research directly in areas ranging from environmental physiology to developmental biology: a medical or veterinary qualification is not required. Others go on to careers in teaching, publishing and management.

***Physiology with Psychology*** - http://www.library.psychol.cam.ac.uk/partiiresources/part-ii
Those who are primarily interested in psychology but who also have some interest in other aspects of neurobiology may wish to take this joint course, which consists partly of neurobiological material from Part II Physiology, Development and Neuroscience and partly of material from Part II Psychology. Subject to timetabling constraints, students may choose whichever parts of each course most interest them: this often includes the sensory aspects of the two courses. Those taking the joint course can choose between a Psychology or Physiology project.

***Plant Sciences*** - http://www.plantsci.cam.ac.uk/teaching/plants
The modern study of plants is treated comprehensively at an advanced level with lectures and practical work in plant physiology, including molecular biology, biochemistry and biophysics; in mycology and plant pathology including bacterial diseases; in systematics and the principles of classification of the major genetics and experimental taxonomy, in ecology. Students choose four 24 lecture module from a collection of modules that includes interdepartmental courses on Ecology, and also undertake a research project.

There are extensive facilities in the department for training in research in all the above aspects of the study of plants. Many openings exist for good plant scientists notably in plant biotechnology, but also in agriculture, horticulture, and the forestry industry, and other fields at home and abroad. Persons with degrees in plant sciences who have been trained in physics, chemistry and mathematics up to and beyond 'A' level are highly welcome.

***Psychology*** - http://www.library.psychol.cam.ac.uk/partiiresources/part-ii
The course covers most areas of psychology with an emphasis on experimental psychology and rather little social psychology. The topics covered by lectures are: cognition, emotion, motivation, sensory processes, perception, learning, memory, language and thought, human performance and judgement, intelligence testing, child development, psychopathology, psychoanalysis, physiological psychology including neuropsychology (the study of the effects of brain damage), animal behaviour, statistical methods.

The examination comprises four papers each sampling the whole range of topics, plus some further topics from the Social and Political Sciences Tripos. It is set on the assumption that a student will have covered about half the lecture material in depth. The student is free to choose what that half comprises, so there is considerable freedom to specialise within the course. A dissertation may also be submitted, and the student is then classed on the best four out of the four papers plus the dissertation. As practical work during the year each student (or pair of students) does an original research project. The project report is submitted to the examiners.

To complete the course in one year, it is essential to have some background in Psychology. This is usually Experimental Psychology in Part IB but the Psychology course in Medical and Veterinary Sciences Part IB, or Empirical Psychology in the Philosophy Tripos are also possible. Physiology in Part IA, IB or both, Evolution and Behaviour and Mathematics in Part IA and Animal Biology in Part IB are advantageous although not essential. Students are sometimes admitted without any previous background in psychology, but they are required to take two years. The number of places on the course is limited, and in the last few years at least a good II(2) in IB has been necessary to obtain entrance.

About half the students on the course proceed to further work in Psychology. This includes research and teaching in university, government or other establishments; work in Clinical, Educational or Occupational Psychology, for which further postgraduate training is required; and in industrial and business management, particularly on the personnel or work study sides. The course is also taken by many medical students either out of general interest or with a view to specialising in psychiatry or neurology.

***Zoology -*** http://www.zoo.cam.ac.uk/undergraduates/NST-II-Zoology
Zoology is the study of Animal Biology in all its aspects, from cells to populations and from neurones to behaviour. Part II Zoology reflects this diversity; it is made up of seven 24-lecture modules in the Michaelmas Term and seven modules in the Lent Term. Each student selects at least two modules in each term. The Easter Term is largely set aside for reading and revision, but there is a special series of six review lectures on Human Biology that are not directly examined. Specific modules include an extremely wide range of topics including Vertebrate Evolution, Aquatic Ecology, Behaviour, Cell Dynamics and Communication, Conservation Biology, Behavioural Ecology, Genetics, Development and Animal Evolution and Development Biology. Zoology therefore offers and excellent choice for those primarily interested in cellular and developmental biology, as well as being an obvious option for those interested in the behaviour, ecology and evolution of animals. It is perhaps the only Part II course in the Tripos which allows students to combine cellular, evolutionary and whole-organism approaches to biological research.

***Biological and Biomedical Sciences*** - http://www.biology.cam.ac.uk/undergrads/nst/bbs
Third-year Natural Scientists may not wish to specialise in a single subject. This option allows students to maintain a breadth of study by combining elements from the different biological subjects. A written dissertation replaces the practical laboratory-based research project. This route is suited to those who wish to pursue career paths outside scientific research. It's also suited to Medicine and Veterinary Medicine students who don't wish to take a single science subject at Part II.

***Physical Sciences*** - http://www.natsci.tripos.cam.ac.uk/students/third/physicalsciences
This course allows students to continue their studies in a chosen discipline and either retain or pick up another subject. Students essentially take half of one of the Part II subjects in Physical Sciences (Chemistry, Geological Sciences, Materials Science or Physics) alongside a second subject.

## FOURTH YEAR - PART III

At present the subjects in Part III of the Natural Sciences Tripos are:

| |
|---|
| Astrophysics |
| Biochemistry |
| Chemistry |
| Experimental & Theoretical Physics |
| Geological Sciences |
| History and Philosophy of Science |
| Materials Science |
| Systems Biology |

As far as University Regulations are concerned you do not have to choose between the three-year and the four-year courses in these subjects until you have completed the second year. However there is an academic hurdle at the end of the *third* year; those wishing to take a fourth-year Natural Sciences course must obtain at least a 2i in the Pt II Tripos. For fuller details consult the Directors of Studies in the subjects that interest you.

Successful completion of the four-year course leads to the award of the M.Sci. degree in addition to the traditional B.A. degree, for which a three-year course is sufficient.

If you think that you *may* wish to take one of the four-year courses in the Natural Sciences Tripos please inform your Tutor on arrival in College. By indicating your interest in a four-year course at this stage you are not committing yourself but it will be helpful for your Tutor to know of the possibility as background to discussions with you, for example about financial arrangements.

***Astrophysics -*** http://www.ast.cam.ac.uk/students/undergrad/part_iii
This course is intended primarily for those wishing to pursue a research career in astronomy or astrophysics.

***Biochemistry*** - http://www.bioc.cam.ac.uk/teaching/fourth-year
Details of the Part III course as well as a booklet describing the course are available from the Director of Studies.

***Chemistry*** - http://www.ch.cam.ac.uk/teaching/course-guides
The course consists of a range of optional courses and a research project. Typically eight to ten lecture courses are offered in both Michaelmas and Lent Terms; students have to answer questions on *three* courses per Term in the Tripos. Students are free to select the required number of lecture courses in accordance with their own specialised interests and there is clearly a wide range of options spanning everything from protein folding to theoretical methods. There is also a wide choice in topics for research project. Practical work for this is undertaken in Michaelmas and the first part of Lent Terms. It is then assessed by means of a written thesis and a brief oral examination.

***Geological Sciences*** - http://www.esc.cam.ac.uk/teaching/earth-sciences-course/part-iii
An important part (40%) of Part III Geological Sciences is an independent research project in the Michaelmas Term. This can be based on field, laboratory or library work. There are in addition a range of lecture and practical courses; details can be found in the Course Synopsis to be found in the Part III booklet on the departmental website. A field trip takes place in the Easter vacation.

***Experimental & Theoretical Physics -*** http://www.phy.cam.ac.uk/students/teaching/current-courses/III_overview
The course consists entirely of optional courses but there are minimum requirements in the Michaelmas and Lent Terms. In the Michaelmas Term there will be up to six major options and students are examined in three of these. These courses cover major areas of current interest and importance and in each of them physics is presented as a connected discipline which uses all the material of the first three years to take

each topic close to the frontiers of current research. In the Lent Term there will be a much wider range of minor options and candidates are examined in three out of about sixteen of them.

In addition to the major and minor options there is a course in general physics which runs throughout the year and in which there is a written paper at the end of the Easter Term. All students undertake some form of major project work during the year which involves about four weeks work spread over a four or five month period.

Part III provides a thorough training for a research career in a wide range of disciplines inside and outside physics both in the academic and industrial sectors.

***History and Philosophy of Science*** - http://www.hps.cam.ac.uk/studying/undergraduate/partiii.html
The course encourages students to explore a range of different topics, balancing them so that they are both relevant to their interests and also span the subject of History, Philosophy and Sociology of Science, Technology and Medicine. All students must undertake a Critical Literature Review and a Research Essay (both 5000 words), two essays (2,500 words each) on selected readings, and a dissertation of no more than 15,000 words. Each essay and the dissertation will be separately supervised by senior members and associates of the Department. Details of the criteria for admission are available at http://www.hps.cam.ac.uk/studying/undergraduate/partiii.html or from the Director of Studies in HPS.

***Materials Science -*** http://www.msm.cam.ac.uk/teaching/partIII.php
A significant component of the Part III course is an individual *Research Project* carried out in one of the research groups in the Department during the Michaelmas and Lent Terms. The research project is assessed by means of a thesis and an oral presentation. Part III students attend a core lecture course on important experimental techniques and about ten lecture courses, chosen from over 15, covering a wide range of advanced topics in the subject. They also take a Language, Management or computing course, choosing either to continue with what they did in Part II or to complement it by switching between language and management. There are no "set" practicals.

Successful completion of the course provides an accredited qualification towards chartered engineer (C. Eng.) status.

***Systems Biology*** - http://www.sysbiol.cam.ac.uk/Part%20III
Genome sequencing has provided us with inventories of the working parts of living organisms, and much effort is going into exploring the functions of each of these parts. Systems Biology is all about discovering how the parts interact to make a working organism. Since there are thousands of different cellular components, the way such interaction networks behave, and how that behaviour is controlled, is a complex business.

This means that we need computer models to describe the networks and predict their performance. For this reason, Systems biology is an area that requires the interaction of biologists, chemists, computer scientists, engineers, mathematicians, and physicists. Therefore, this subject is accessible to students that have specialised in any area of the Natural Sciences, as well as to those from Engineering and Mathematics.

It comprises lectures, computer-based practicals, seminars and discussion sessions. An important component is the research project, where you'll work alongside leading scientists in this field.

## OTHER TRIPOSES

Particulars are given here of the other Triposes most frequently combined with a Part or Parts of the Natural Sciences Tripos. Most follow on after one or two years of Natural Sciences but Computer Science Part IA (50%) may be taken before Natural Sciences Part IB.

***Chemical Engineering*** - http://www.ceb.cam.ac.uk/undergraduates
Chemical Engineers are concerned with the design, construction and operation of industrial processes in which physical or chemical changes of matter take place. These processes may involve chemical and biochemical reactions, changes of physical state, mixing and separation of materials. Traditionally these activities have been in the oil, gas and petrochemicals sector, but now Chemical Engineers find employment in a variety of industries, including food processing, brewing and water treatment; they are increasingly involved in pollution monitoring and control. Many graduates also continue to careers in research and development, or move into the management of chemical plant and industries.

Candidates for the Chemical Engineering Tripos must have successfully completed Part IA in Engineering, Natural Sciences (having included Chemistry and either Mathematics or Mathematical Biology amongst their subjects) or Computer Science (having included Chemistry amongst their subjects).

The Chemical Engineering course extends over three years. Although it is possible to leave after two years of Chemical Engineering (with the B.A. degree) it is expected that almost all chemical engineering students will take all three years, allowing them to learn about some specialist areas and to develop a greater overall understanding of the subject. Successful completion of the four years (Part IA in a suitable Tripos plus three years of Chemical Engineering) leads to the awards of the B.A. and M.Eng. degrees. The M.Eng is fully accredited by the Institution of Chemical Engineers and, after suitable industrial experience, graduates may become 'Corporate Members' of the Institution and 'Chartered Engineers'.

The Department encourages students to spend some time in industry during the long vacations and, through its many industrial contacts, is active an helping to arrange placements in the vacations following the second and third years at university.

***Computer Science Tripos*** - http://www.cl.cam.ac.uk/admissions/undergraduate/
Computer Science is the study of information and computation. It asks questions about the nature of information and the operations which can be performed on it. The Cambridge course roams widely across the field of computing. It considers information acquisition, handling, retrieval and presentation. It looks at the design of machines on which these operations can be performed, the facilities required by these machines, and the myriad uses to which they can be put. It investigates the mathematical underpinnings of the whole edifice and the practical problems faced in getting the machines to do what you want them to.

The Cambridge course provides balanced coverage of the various aspects of Computer Science. It provides opportunities for hands-on practical experience of both advanced hardware and software, while providing a thorough coverage of theory. Graduates emerge with an understanding of principles that will outlast today's technology.

In the first year Computer Science students take four papers. Two of the four are foundation computer-science papers. The other two depend on which option you choose to take. These additional papers are taken from either the Mathematical Tripos, Natural Sciences Tripos or Politics, Psychology and Sociology Tripos. It is also possible to take Computer Science as an option in the first year of the Natural Sciences Tripos or Politics, Psychology and Sociology Tripos.

Full details of the course, including the options for the first year, can be found at:
http://www.cl.cam.ac.uk/admissions/undergraduate/

***Education Studies Tripos*** - http://www.educ.cam.ac.uk/courses/undergradstudy/tripos/
Part I (two years) enables undergraduates to combine either biological or physical subjects from the Natural Sciences Tripos with study of two Education papers. At Part IA, these cover the disciplines of philosophy, psychology, sociology and history of education, and a paper on Language, Literacy and

Education. At Part IB these cover the disciplines and a paper on Education, Modernity and Globalisation. From the Natural Sciences Tripos only selected biological or physical subjects may be combined with Education.

Part II (one year) allows a choice. Students may specialise wholly in Education or continue with a combination of Education papers and their chosen biological or physical subject.

The Education Tripos is particularly suitable for people who wish to undertake research in Education or a career in teaching, educational administration, publishing media or personnel work. For those who decide on a career in teaching, a further year on a Postgraduate Certificate of education (PGCE) course would be necessary (see below in Postgraduate Studies).

***Engineering Tripos Part IIA (third year) and Part IIB (fourth year) and Manufacturing Engineering -*** http://teaching.eng.cam.ac.uk/
These courses are intended mainly for those who are aiming to make their careers in some section of the Engineering profession. The courses in Engineering and in Electrical and Information Sciences involve two years of study after Part IB. The usual approach to either is by Parts IA and IB of the Engineering Tripos but an alternative route is via physical sciences in the Natural Sciences Tripos Parts IA and IB. This is particularly suitable for undergraduates reading Natural Sciences who decide to enter the Engineering profession. Such an undergraduate would take appropriate papers in the third year followed by a stronger specialisation in the fourth year, choosing eight modules from about 65 available within the combined Engineering and Electrical & Information Sciences Triposes as well as undertaking a major project, which accounts for half of the fourth year credit. The pattern of options chosen determines whether the student is a candidate for the Engineering Tripos or for EIST.

A candidate for these examinations must have had approved industrial experience. A Natural Scientist would normally gain this during the Long Vacation following the second year.

***Management Studies Tripos*** - http://www.jbs.cam.ac.uk/programmes/programmes-for-members-of-the-university-of-cambridge/undergraduate/
Some Natural Scientists aiming for a career in management take this course in their third or fourth year. Further details are available through the Director of Studies in this subject in College.

***Medical and Veterinary Sciences Tripos -*** www.med.cam.ac.uk *or* www.vet.cam.ac.uk
Transfer to the Medical and Veterinary Sciences Tripos after Part IA or Part IB of the Natural Sciences Tripos is no longer available because of the formal requirements for medical and veterinary education, and because there is a strict quota of places. Anyone thinking about turning to a medical or veterinary career should consult the Director of Studies as soon as possible.

***Mathematical Tripos Part IA***

This course, which is normally taken in the first year, includes basic courses in Algebra and Geometry, Differential Equations, Numbers and Sets, Vector Calculus, Dynamics, and Probability, together with optional courses on Linear Algebra, Numerical Analysis, Geometry, Complex Methods, Special Relativity and Electromagnetism.

Students with a particularly strong background in mathematics who intend to take Experimental & Theoretical Physics in Parts II and III of the Natural Sciences Tripos sometimes take Part IA of the Mathematical Tripos in their first year and then transfer to Part IB of the Natural Sciences Tripos to read Advanced Physics and Mathematics. For them the "Mathematics with Physics" option, in which about a sixth of the standard Mathematics courses are replaced by lecture courses in Physics supported by practical work, is particularly relevant. It is essential for such students to make clear their intentions when discussing the choice of options with the Director of Studies.

***Mathematical Tripos Part IB***

Further details are available from the Director of Studies in Mathematics.

A transfer from Part IB Mathematics to Part II Physics at the end of the second year is within the regulations, but very difficult in practice.

Students reading Physics in the Natural Sciences Tripos are sometimes encouraged to attend certain lecture courses given for Part IB of the Mathematical Tripos; the same applies to some of the courses given in the more specialised Mathematical Tripos Part II.

***Mathematical Tripos Part III***

In the past some of the best theoretical physicists from the Natural Sciences Tripos, rather than going straight on to begin research, have spent a year reading for Part III of the Mathematical Tripos. This consists of a large number of highly specialised courses covering more or less the whole range of mathematics and mathematical physics, of which any candidate will take about six. It is also possible to gain examination credit equivalent to that of one course by the submission of an essay. Part III provides an excellent background for the most mathematically sophisticated developments in theoretical physics. Some students taking Part III Experimental & Theoretical Physics who are especially strong mathematically are able to offer selected topics from courses in Part III of the Mathematical Tripos in the examination for Part III of the Natural Sciences Tripos.

## POSTGRADUATE STUDIES

***Research Degrees***

Many of those who obtain a Class I or Class II(i) result in the final examination in the Natural Sciences Tripos (Part II or Part III, as applicable) become *Graduate Students* working for the M.Phil., M.Sc., or Ph.D. degrees in Cambridge or elsewhere. The requirements for these are the presentation of a dissertation incorporating an account of original research and the passing of an oral examination. In the sciences, the M.Phil. is designed primarily for students who intend to stay for only one year, who are of the necessary calibre and who wish to obtain a Cambridge degree. At least two years of research are required for the M.Sc. degree and three years for the Ph.D. Departments which organise courses for a *Certificate of Postgraduate Study* (C.P.G.S.) normally require candidates for higher research degrees to take these courses during their first year of research.

For eligible students, most funding of research degrees is provided, on a competitive basis, by Research Councils or by Government Departments, medical charities and industrial companies with a direct interest in the research. It is not provided by Local Education Authorities. The national arrangements for postgraduate research in the sciences may have been changed by the Government by the time students starting the Natural Sciences Tripos in October 2013 complete their first degree. Those interested in the possibility of going on to a research degree in Cambridge or elsewhere should consult their Tutor or Director of Studies early in their final year of undergraduate studies.

***Courses for the M.Phil.***

Established courses leading after one year to the qualification of M.Phil. are available in a wide range of subjects currently including *Advanced Computer Science, Biological Anthropology, Biological Science*, *Chemistry, Computer Speech and Language Processing, Control Engineering and Operational Research, History and Philosophy of Science*, *Materials Modelling, Microelectronic Engineering and Semiconductor Physics, Physics*, *Polar Studies*, *Quantitative Modelling of Industrial Processes* and *Quaternary Science*. Further details are given in the current issue of *The Cambridge University Guide to Courses*.

***Postgraduate Certificate in Education (P.G.C.E.)***

The P.G.C.E. course is intended for graduates with an honours degree who wish to go into school-teaching.

There are three major elements of this course:

1. Core studies
2. Subject studies
3. Professional placement

The course is taught mainly in seminar groups or on Placement in schools; there are few lectures. Topics from the Core Studies part of the course include: curricular issues; classroom teaching and learning; assessment, recording and reporting; personal, social and health education; special educational needs; values education. Subject Studies are related to particular subjects in secondary schools or programmes of work in primary schools. Professional Placement is under supervision in schools during the Lent Term and the latter part of the Easter Term. Two-thirds (24 weeks) of the PGCE Secondary Course is undertaken in schools, including initial school experience, school-based Core and Subject Studies and Professional Placements.

Candidates are assessed in practical teaching ability in school and by submitted dissertations and essays.

**USEFUL WEB SITES**

| | |
|---|---|
| Natural Sciences Tripos | www.cam.ac.uk/cambuniv/natscitripos |
| Faculty of Biology | www.biology.cam.ac.uk |
| Faculty of Earth Sciences and Geography | www.esg.cam.ac.uk |
| Faculty of Mathematics | www.maths.cam.ac.uk |
| Faculty of Physics and Chemistry | www.ast.cam.ac.uk/physchemfaculty |
| School of the Biological Sciences | www.bio.cam.ac.uk |
| School of the Physical Sciences | www.physsci.cam.ac.uk |
| School of Technology | www.tech.cam.ac.uk |
| School of Humanities and Social Sciences | www.cshss.cam.ac.uk |
| Department of Anatomy | www.pdn.cam.ac.uk |
| Department of Applied Mathematics and Theoretical Physics | www.damtp.cam.ac.uk |
| Institute of Astronomy | www.ast.cam.ac.uk |
| Department of Biochemistry | www.bioc.cam.ac.uk |
| Department of Chemical Engineering and Biotechnology | www.ceb.cam.ac.uk |
| Department of Chemistry | www.ch.cam.ac.uk |
| Computer Laboratory | www.cl.cam.ac.uk |
| Department of Earth Sciences | www.esc.cam.ac.uk |
| Department of Experimental Psychology | www.psychol.cam.ac.uk |
| Department of Genetics | www.gen.cam.ac.uk |
| Department of History and Philosophy of Science | www.hps.cam.ac.uk |
| Department of Materials Science and Metallurgy | www.msm.cam.ac.uk |
| Department of Pathology | www.path.cam.ac.uk |
| Department of Pharmacology | www.phar.cam.ac.uk |
| Department of Physics | www.phy.cam.ac.uk |
| Department of Physiology, Development and Neuroscience | www.pdn.cam.ac.uk |
| Department of Plant Sciences | www.plantsci.cam.ac.uk |
| Department of Zoology | www.zoo.cam.ac.uk |