

Hi freshers!

Ade and Maisie here – your subject reps. I (Ade) am a second year Chemical Engineer and did Material Sciences, Chemistry, Earth Science and Maths A in first year. I (Maisie) am a third year Natural Scientist (or NatSci as you will become known).

Congratulations on making your offers and welcome to Sidney Sussex! For most year groups here, NatSci is the most popular course, so there will be plenty of Sidney freshers in your lectures. There are usually around 20 NatScis in a year at Sidney, with an even split between Bio and Phys. You will also be part of a college family with one or more NatSci college parents, and they will support you by answering any burning questions you have.

We're not going to sugar-coat it, as you may have already heard, first year NatSci is a challenge and a half! You have 12 hour-long lectures a week, spread across Monday to Saturday mornings, and 4 supervisions a week, which are really useful chances to go over bits of the lectures you didn't understand, and you will have work set for each one. They are in groups of 2-4, and they are really there for your own benefit. Experimental sciences also have lab sessions. This may sound like a lot, but NatSci can be a very rewarding course and many of the modules are fascinating.

Shortly after you arrive you will have a chat with your tutor and DoS (Director of Studies, who looks after your academics) about which modules you should take. You will have a choice of 4 modules which are broken up into 3 experimental science blocks and 1 mathematics block. Have a think about what modules you want to take but don't worry if you're not certain right now! Your opinions might change after arriving and it is worth mentioning that in the first couple of weeks you can switch modules with relative ease, so if you start an option and find out that it isn't for you then you need not worry.

In freshers' week we will organise a subject meal being held straight after the garden party so you can get to know all the other freshers on your course. There will also be a tour of the departments so you can get your bearings and find your way around Cambridge.

The modules:

### **Cells Biology:**

The Cells Biology course explores molecular biology in detail, focusing mainly on the processes that occur within cells and the role of genes in the body, often relating these to disease. The first term covers the components of cells, and processes within them, including respiration and photosynthesis. You will also study macromolecules, membranes and various chemical pathways. The second term focuses more on genes, from the discovery of genes to their expression and the consequences of things going wrong. Lecture series also cover cancer, cell division and viruses. The final term focuses on cell signalling and development. Cells Biology labs are weekly from 11am to around 5pm, although you may finish earlier than this depending on how well you work (and how long your lunch break is!) Cells Biology labs are not assessed although you will often hand in reports for your demonstrators to mark, and your practical skills will be assessed in a practical exam at the end of the year. This course provides a good foundation for various Part IB subjects including Biochemistry and Molecular Biology, Biology of Disease and Cell and Developmental Biology.

If you have any more questions regarding the Cells Biology course feel free to email me at [mjp210@cam.ac.uk](mailto:mjp210@cam.ac.uk)

## **Chemistry:**

The Chemistry course is split into the sections: Shapes and Structures of Molecules, Organic Chemistry, Thermodynamics, Kinetics, and Chemistry of the Elements (3 lecture a wee). In supervision you discuss questions that were on the problem sheet during the week. There is also a practical every fortnight which runs from 11-5 but almost always finishes early. The labs are assessed but only through short reports that you complete within the lab with help from a demonstrator. If you want to do any reading before the course I would recommend 'Why Chemical Reactions Happen' by Peter Wothers and James Keeler (both are lecturers for the course). This is by no means essential but might help you with the first part of the course.

If you have any questions about the chemistry course please feel free to email me at

[aro26@cam.ac.uk](mailto:aro26@cam.ac.uk)

## **Earth Sciences:**

Earth Sciences is indeed full of rocks, but also much more! It will bring you up mountains, under oceans, across shores, deep into the mantle, back to eons past, from the macro to the micro and even beyond the Earth. You'll get to marvel at the complex climate system, massive tectonic processes, and be engaged by stories told by fossils and crystals. This is a truly interdisciplinary subject, involving physics, chemistry, biology, materials sciences and maths! The field trip to the Isle of Arran, Scotland, in the Easter break is certainly a selling point. Besides a great deal of adventure, you'll finally get your eye into wild rocks after studying caged ones in the lab. You'll see much of what you've learnt fit together.

For supervisions which last for an hour every week, you could be set essays, analysis of rock samples, calculation questions or map exercises depending on your supervisor. There are also lab sessions taking place thrice a week, each lasting an hour. Helpful demonstrators, who are PhD students, will be there to answer your queries! You'll learn to read geological maps, see samples of rocks and fossils mentioned in lectures, look at them under the microscope, and more, which will be useful for understanding course content. For exams, you'll have a practical paper and a written paper (essays oops).

For any questions about the Earth Sciences course, email me at [aro26@cam.ac.uk](mailto:aro26@cam.ac.uk)

## **Materials Sciences:**

Materials Sciences will be a discipline most of you will not have studied before and as such no specific knowledge of it is required. It combines elements of maths, physics, chemistry and engineering and is a study of how properties of a material arise from its structure. It is split into 7 courses: Atomic Structure of Materials, Materials for Devices, Diffraction, Microstructure, Mechanical Behaviour of Materials, Biomaterials, and Materials under Extreme Conditions. The first three courses are studied in the first term, the next two are studied in the second term, and the last two are studied in your final term.

Alongside lectures, you will be getting a 3-hour long practical every week from 2-5pm where you will apply practical knowledge get a more hands-on experience of the topics learned in lectures. These

practicals will end early most of the time and alongside them will be an online questionnaire that you will need to do before the practical each week. Both the practicals and the questionnaires will count towards your overall mark for the module. In the second term, you will carry out a project in these labs and will need to write up a report over the Easter holidays that will also count towards your overall mark. For supervision work, you will be set a problem sheet to finish every week.

For any further questions, please email me at [aro26@cam.ac.uk](mailto:aro26@cam.ac.uk)

### **Physiology:**

The Physiology course focuses on the biological systems of animals, plants and microbes. The first term will cover some of major systems in animals, including the respiratory, osmoregulatory, digestive and cardiovascular systems, as well as looking at muscles. The second term will cover plants and microbes, including plant diseases. The third term will cover animal sensory systems and body scaling. Physiology practicals occur fortnightly in the first term and weekly in the second, and include worm and rat dissections, as well as many experiments where you yourself will be the subject, such as experiments involving blood pressure, ECGs and spirometry. Practical are from 2-5 pm, with a debrief from 12-1pm discussing the results of the previous week's practical. This course provides an excellent foundation for various Part IB courses, including Physiology IB, Neurobiology and Pharmacology.

If you have any more questions about Physiology feel free to email me at [mjp210@cam.ac.uk](mailto:mjp210@cam.ac.uk)

### **Mathematics:**

This course is mandatory for anyone wanting to do Physics, and for good reason. There is a lot of overlap between the maths you will do in physics and the maths you will do in this course. Also, for those wanting to do Chemistry, this course is recommended (but not needed!).

Maths is split into two routes: A and B, which are lectured separately. The B course covers more topics beyond the A course, however both routes sit the same exam at the end of the year. The exam gives you a choice of several questions with the opportunity to ignore certain ones that you do not want to take. This means that students who study the A course will have less of a choice as to which questions they want to tackle in the exam compared to those studying the B course. It is worth noting that the A course does not contain the easiest topics, rather the topics that will be most important if you wanted to take maths in your second year. I understand that this can be rather confusing and hopefully when you arrive in freshers' week, we and your tutors will be able to clear anything up. In general, the advice is to stick with the B course for as long as you feel you can because it will make the exam easier. You can swap between the routes with relative ease up until around halfway into your second term.

There will not be any practicals for this course, however during the first and second terms there are additional Scientific Computing sessions where you will be working with a program called MATLAB. These are assessed and will count towards your final mark for this module.

Prior reading is not required for this course. However, it may be useful to pick up a textbook as if you are stuck on a topic or do not understand the lecturer's steps it can help to look at the issue from another perspective or with different wording. One textbook that I have heard good things about is Mathematical Methods for Physicists and Engineers, however this isn't the cheapest so I would

recommend getting a second-hand copy if possible. Again, no textbooks are required for the course and many students do not own any.

For any further questions, please email me at [aro26@cam.ac.uk](mailto:aro26@cam.ac.uk)

### **Mathematical Biology:**

The Mathematical Biology course (MB) aims to utilise mathematical tools and models to help analyse biological processes or experimental data. In the first term, statistical techniques and basic probability is explored in a biological context along with the study of matrices and linear models. The second term focuses on the use of differential equations and graphical methods to model biological systems, finishing with the analysis of nucleotide and protein sequence data in the third term. The practicals consist of roughly an hour each week of computer-based exercises on R Studio. Problem sheets are typically set by supervisors each week. There will be two sets of coursework set (one in each term) to be completed over each Christmas/Easter break, based on the practicals and lectures throughout the term.

This course is compulsory, unless an alternative mathematical course is taken. However, maths A and B are probably less relevant to the biological options of the Natural Sciences course. An A Level standard of maths is assumed, with knowledge of Further Maths proving useful but not essential. There is no specific preparation particularly recommended for this course and textbooks are not essential, however there are several provided in the various university libraries that may be of use throughout the course.

For more information regarding any aspect of the course, please email [mjp210@cam.ac.uk](mailto:mjp210@cam.ac.uk)

### **Physics:**

The physics course is split into 5 courses: Dynamics, Oscillating Systems, Waves and Quantum Waves, Rotational Mechanics and Special Relativity, and Gravitational and Electromagnetic Fields. Some of these topics you will be familiar with from A level (even then may still be taught in a new way) and some will be brand new. The first two courses will be studied in the first term (Dynamics is mostly A level content but approached in a more mathematically robust way), the next two will be studied in the second term and the last course will be studied in your final term.

You will also have lab sessions/practicals every other week which are 4 hours long, often people feel pushed for time during them so rarely finish early. They are designed to enhance your understanding of the lectures and equip you with experimental skills. Over Christmas and Easter holidays you will be set a lab report to write on an experiment that you will have done in one of these practicals. Both the practicals and lab reports will count towards your overall mark in this module. For supervision work, you will be set a certain number of questions from a problem sheet each week.

For any further questions, please email me at [jp861@cam.ac.uk](mailto:jp861@cam.ac.uk)

### **Evolution:**

The Evolution course explores the evolution of plants and animals as well as animal behaviour. In your first term, you will learn about the general theory of evolution, early evolutionary events, the

origins of species, and the evolutionary history of plants (genuinely more interesting than it sounds). In your second term, you will look at adaptive radiations, the evolution of animal diversity, and animal psychology and behaviour. Your final term will be spent looking at primate and human evolution.

Lab sessions/practicals will run every other week, some of which will be marked and will go towards your overall mark for the module. For supervision work, you will most likely get an essay every other week, with other work including reading and research. The exam is a series of 30-minute essays and as such the essays you will be set in supervisions will not take you too long to complete, so don't worry if you haven't done an essay in years (I hadn't before arriving either). A lot of people take Evolution as a filler subject but end up continuing with Evolution in later years, so keep an open mind

While A-Level biology provides a useful foundation for some of the aspects of this course, it is by no means necessary and I and several others have managed without it.

For any further questions, please email me at [an597@cam.ac.uk](mailto:an597@cam.ac.uk)

On behalf of all of Sidney, we would like to congratulate you and welcome you to our college. Sidney is a really nice, friendly college and we're right next to Sainsbury's, so you picked well! We look forward to getting to know you all in the coming year. For now, enjoy the rest of your summer!

-Ade and Maisie

