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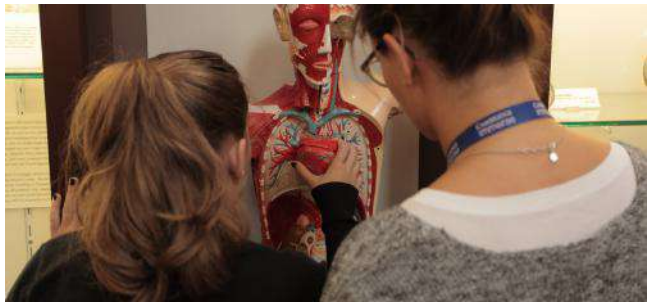

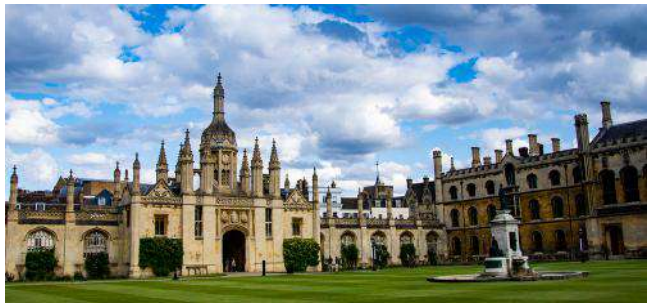

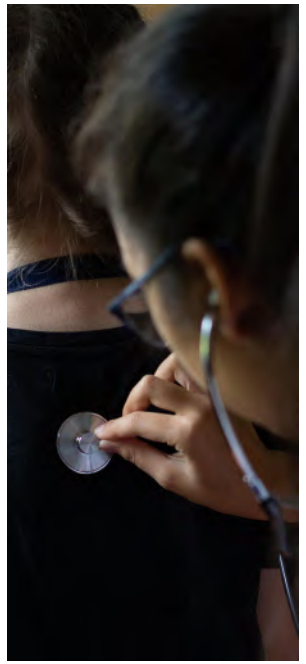

Medicine

SYLLABUS OVERVIEW
13-15 YEARS OLDS

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About Immerse

Immerse Education is an award-winning academic summer school provider offering programmes for 13-15 year olds in Cambridge University colleges.

The aim of these introductory programmes is to provide participants with academically challenging content in a classroom environment based on the university style of learning. Through 40 hours of academic sessions, the programmes also offer young students unique and valuable insights into what it would be like to study their chosen subject at an advanced level.

This Syllabus Overview provides a summary of the topics and subject areas that participants can encounter during their studies with Immerse. It has been carefully created by our expert tutors who are current members of world-leading universities, and who have experience in teaching undergraduate students.

Academic Sessions

The academic sessions at Immerse are arranged into modules to enable participants to explore a broad range of topics over the course of two weeks. The modules included in this syllabus overview are indicative but not prescriptive.

Tutors are encouraged to include their own specialisms and also focus on any particular areas of interest expressed by participants within the class. They may choose to provide further detail on a specific topic, or they may include new material and information that builds on the knowledge already developed during the programme.

Personal Project

Each programme includes an element of individual work, generally termed the 'Personal Project'. This can take many forms but is commonly an essay or presentation delivered on the final day of the programme. Participants will receive feedback on this work which may also be mentioned in the participant evaluation which is provided in writing by the tutor once the programmes have ended.

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Preparatory work

Some tutors may ask participants to complete some preparatory work, such as reading or a series of exercises in advance of the programme. Participants are strongly encouraged to complete this work since it will be included in the opening sessions of the programme. Any preparatory tasks will be provided in advance of the programme directly to the participant.

Academic Difficulty

As all of our programmes are designed to provide a unique introduction to advanced material, the syllabus will be academically challenging at times.

This is something to be excited about and all of our tutors will encourage and support participants throughout the programme. Immerse Education aims to develop every participant regardless of ability, and our tutors will adapt their teaching to individual needs.

Aim of the Medicine Programme

Medicine is a fascinating, multidisciplinary subject that offers a dizzying array of career options to those who choose to pursue the subject at a higher level. Medics require a broad range of skills, both academic and interpersonal skills. They must be able to retain large volumes of complex information and remain motivated to continuously update their scientific understanding. They must also be highly analytical in the face of obscure problems and work both independently and in teams to overcome high-pressure challenges. Finally, they must also be able to communicate with their patients, colleagues, and members of the public with empathy and in terms that are accessible to all. The aim of the Immerse Education Medicine programme is to introduce participants to the foundations of this subject and highlight the pathways that are available to those would like to pursue medicine further in the future. Participants will get to grips with a variety of topics as they explore both the theory and practice of medicine.

Introduction to Medical Research and Statistics

Information is everywhere within the technology age, but the quality and reliability of this information varies greatly. Future doctors and medical researchers need to be able to critically assess the data they are presented with by refusing to accept data at face value and by being aware that statistics can be presented in a misleading way. We will discuss the different stages of medical research (from bench to bedside), learn how to properly frame a research question (including the use of the PICO model), and consider the role of research ethics, relating to the Hippocratic Oath and the Declaration of Helsinki.

Introduction to Cardiovascular Medicine

As life progressed from simple unicellular organisms to larger, multicellular organisms, specialised transport systems had to develop for the efficient exchange of materials between the environment and our cells. In humans, these specialised transport systems refer to our circulatory system, made up of the heart and the blood vessels. We will explore the different mechanisms involved in the exchange of materials, the structure of the circulatory system, the anatomy of the heart (both in theory and in practice), its development in utero, and consider what happens when these processes go wrong. Finally, we will use our knowledge to diagnose a clinical problem.

Introduction to Respiratory Medicine

Gas exchange refers to the diffusion of oxygen from the external environment into the cells and the diffusion of carbon dioxide from the cells into the external environment. This vital process relies on the structures of the respiratory system, the mechanisms of ventilation, and the special adaptations of cells and tissues that maximize exchange. Oxygen is needed by the cells for aerobic respiration, which produces ATP – the energy currency of the body. We will explore why we need to breathe, how we breathe and how our bodies adapt our breathing in response to exercise.

Introduction to Immunology and Pharmacology

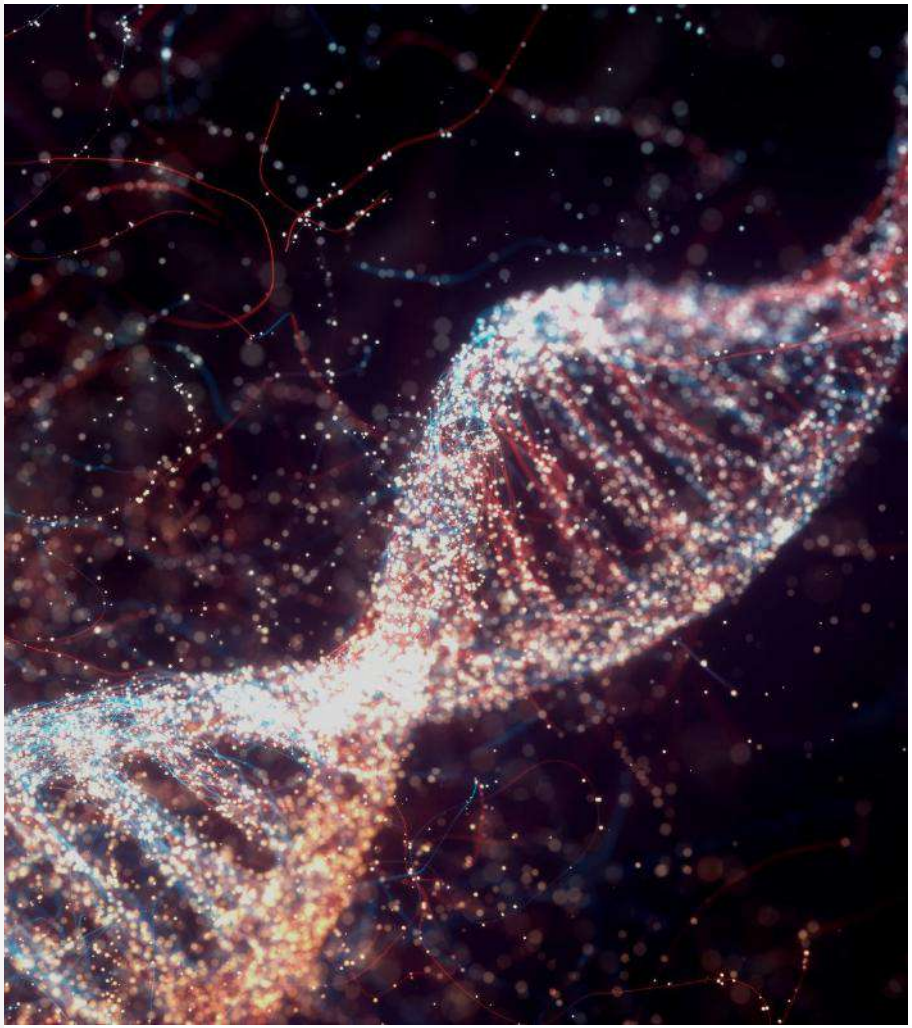
Pathogens are disease-causing organisms. Our skin acts as a physical barrier aiming to prevent the entry of pathogens, our stomach has hydrochloric acid to destroy microorganisms within the food we eat, and if the pathogen still manages to access the body, we have our immune system to fight against the invaders. Medicines such as antibiotics have been developed over the years to help our immune systems in the fight against certain pathogens (in this case bacteria). We will explore how our immune system defends against pathogen invasion and infection, as well as discuss how we can tackle this race against time with the rise of antibiotic resistance.

Introduction to Endocrinology and Renal Medicine

Homeostasis refers to the maintenance of a constant internal environment despite changes in the external environment. Mechanisms such as negative feedback and anticipatory signals are paramount in homeostasis, and several organs and hormones are involved in this critical process of maintaining a steady-state. These include the kidneys, which are responsible for the production of urine in order to control the composition and volume of body fluids, and the pancreas which is involved in the control of our blood sugar content. We will consider the chemical messengers involved in communicating these signals in the body, the importance of homeostasis and what happens when it goes wrong.

Introduction to Neurology

The central nervous system acts as the medium through which we experience our sensory environment and enables us to coordinate actions to interact with that environment. This capability is dependent on the specific morphology and functional properties of our individual neurones, their connections and ability to adapt through learning. We will consider the survival advantage of the rapid unconscious withdrawal reflex, the importance of our 'fight-or-flight' and 'rest-and-digest' autonomic responses, and how we perceive and interact with the world. Finally, we will consider the consequences of neuronal death or dysfunction in CNS diseases and we will learn how to perform a neurological examination to assess for specific symptoms and signs.



Introduction to Genetics and Inheritance

In order for life to continue to exist, organisms must carry genetic information that can be replicated and passed down to their offspring. Surprisingly, DNA is a simple molecule chemically when considering its function of determining the characteristics of life forms. We will explore the structure and function of DNA, delve into the world of genetics including Mendelian genetics and the chromosomal basis of inheritance, and gain an understanding of epigenetics. Finally, we will consider genetic medicine in the era of genome sequencing, which encompasses areas such as gene therapy, personalised medicine, and predictive medicine.

Introduction to Oncology

Our genetic composition determines our sensitivity to many environmental factors that contribute to the development of disease. In this topic, we will focus on how this relates to the development of cancer, which is characterised by uncontrolled cell proliferation and the capacity of cells to metastasise to other sites in the body. At the most detailed biochemical level, no two cancers are identical – but most share certain characteristic features known as the ‘hallmarks of cancer’. The accumulation of multiple mutations in somatic cells over time are thought to remove an elaborate set of controls that are important in regulating cell division.

Gastroenterology

The processes of life in all living organisms are dependent on amino acids, sugars, nucleotides, and their polymeric forms. Our diet is an important source of these fundamental building blocks, and our alimentary canal is where the processes of digestion and absorption of food molecules takes place. Our digestive system therefore provides an interface with the external environment, not only acting as a pathway for the entry of useful food substances such as glucose, but also as a vulnerability to the advantage of gastrointestinal pathogens. Throughout these digestive processes, enzymes act as catalysts by speeding up the rate of reactions, sometimes by a factor of millions.

The Future of Medicine

In the last few decades, we have seen the rapid development of technology. When we combine this with scientific developments such as genome sequencing, induced pluripotent stem cells, exploitation of the bacterial CRISPR/Cas9 system, we are skyrocketed to the forefront of modern medicine. Biotechnology and genetic engineering potentially offer targeted solutions to treating hereditary diseases such as haemophilia and cystic fibrosis. These tools in the right hands and minds can change the world for the better. However, without the proper consideration of research and medical ethics in how we use these technologies, the consequences could be devastating.

Personal Project

Throughout the fortnight, participants will be working on their own personal project. Having been provided with a brief, participants should research and prepare a presentation for their peers. This will build upon aspects of the theory that they have learnt over the course of the programme and is also an opportunity to showcase the practical skills they have developed. The presentation is followed by questions from the audience and wider class discussion of particular points of interest. The tutor may also include feedback about the presentation in the written evaluation which is sent to participants after the programme has ended.

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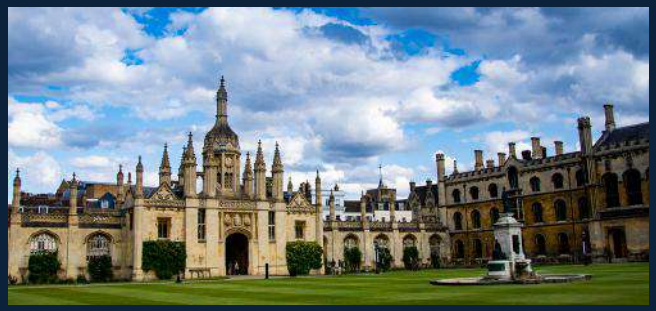


OUR AWARDS AND ACCREDITATIONS

THE QUEEN'S AWARDS FOR ENTERPRISE 2018

BAC ACCREDITED

COBIS SUPPORTING MEMBER | COUNCIL OF BRITISH INTERNATIONAL SCHOOLS

RoSPA Member

BETA British Educational Travel Association