

Medicine

The syllabus aims to enable students to:

- Provide, through well-designed studies of experimental and practical medical science. In particular, it should enable them to become confident and gain an informed interest in scientific matters
- Develop abilities and skills that are relevant to the study and practice of biological science and encourage effective communication using universal scientific conventions
- Develop attitudes relevant to medical science such as an aptitude for accuracy and precision, objectivity, integrity, initiative and inventiveness
- Stimulate learners and create a sustained interest in medical biology so that the study of the subject is enjoyable and satisfying

	Topics Covered	Course Outline
Week 1 Cell structures and living organisms	<ul style="list-style-type: none"> • Recognise cell structures and be able to outline their functions • Outline key structural features of typical prokaryotic cells as seen in a typical bacterium • Discover the key features of viruses as non-cellular structures (limited to protein coat and DNA/RNA) 	<p>The cell is the basic unit of all living organisms. The interrelationships between these cell structures show how cells function to transfer energy, produce biological molecules including proteins and exchange substances with their surroundings.</p> <p>Prokaryotic cells and eukaryotic cells share some features, but the differences between them illustrate the divide between these two cell types.</p>
Week 2 Enzymes	<ul style="list-style-type: none"> • Explain that enzymes are globular proteins that catalyse metabolic reactions • State that enzymes function inside cells (intracellular enzymes) and outside cells (extracellular enzymes) • Investigate the progress of an enzyme-catalysed reaction by measuring rates of formation of products (for example, using catalase) or rates of disappearance of substrate (using amylase) 	<p>Enzymes are essential for life to exist. Their mode of action and the factors that affect their activity are explored in this week.</p> <p>An enzyme is a biological catalyst that increases the rate of a reaction and remains unchanged when the reaction is complete. There are many opportunities in this section for students to gain experience of carrying out practical investigations and analysing and interpreting their results.</p> <p>Students will investigate and explain the effects of various factors on the rate of enzyme-catalysed reactions.</p>
Week 3 Nucleic acids and DNA replication	<ul style="list-style-type: none"> • Describe the structure of nucleotides, including the phosphorylated nucleotide ATP • Describe the structure of RNA and DNA and explain the importance of base pairing and the different hydrogen bonding between bases • Describe the semi-conservative replication of DNA during interphase 	<p>Nucleic acids have roles in the storage and retrieval of genetic information and in the use of this information to synthesise polypeptides. DNA is an extremely stable molecule that cells replicate with extreme accuracy. The genetic code is used by cells for assembling amino acids in correct sequences to make polypeptides.</p> <p>Understanding the structure of nucleic acids allows an understanding of their role in the storage of genetic information and how that information is used.</p>
Week 4 Exploring infectious diseases	<ul style="list-style-type: none"> • State the name and type of causative organism (pathogen) of each of the following diseases: cholera, malaria, tuberculosis (TB), HIV/AIDS, smallpox and measles • Explain how cholera, measles, malaria, TB and HIV/AIDS are transmitted • Discuss the factors that influence the global patterns of distribution of malaria, TB and HIV/AIDS and assess the importance of these diseases worldwide 	<p>While many infectious diseases have been successfully controlled in some parts of the world, many people worldwide are still at risk of these diseases.</p> <p>The infectious diseases studied throughout this week are caused by pathogens that are transmitted from one human host to another.</p> <p>Some, like Plasmodium that causes malaria, are transmitted by vectors; others are transmitted through water and food or during sexual activity. An understanding of the biology of the pathogen and its mode of transmission is essential if the disease is to be controlled and ultimately prevented.</p>

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Students will enjoy two full-day excursions per week. One will be a traditional 'fun' or cultural excursion, with all other students on the Young Professionals programme. The other weekly excursion is known as a study-in-action day, where students visit destinations relating to their chosen academic stream. The locations visited by Medicine students are:



WE ARE CURIOUS: QUESTION OF TASTE Week 1

This lab-based workshop turns theory into practice by using one of the most revolutionary biochemical technologies - the polymerase chain reaction (PCR) - to explore an unusual human trait.

Students will:

- Determine their own genotype in relation to the bitter-tasting chemical PTC (phenylthiocarbamide)
- Use DNA extraction, PCR techniques and gel electrophoresis
- Debate the social and ethical issues surrounding screening for genetic conditions



ROYAL INSTITUTION OF SCIENCE: FORENSICS WORKSHOP Week 3

In this Royal Institute Study-In-Action day, students experience what it would be like to work in a forensics lab by investigating a fictional crime scene scenario.

Students will:

- Evaluate the crime scene and suspect DNA samples using modern molecular biological techniques including restriction digests and gel electrophoresis
- Compare the bands formed on the gels to identify the criminal



THE OLD OPERATING THEATRE Week 2

The Young Medics experience how operations took place in the past, seeing how far modern medicine has come in the past 300 years.

Students will:

- Compare operations of today to what they were
- Learn old medical theories and techniques



BAYER: SCIENCE FOR A BETTER LIFE - ENZYMES WORKSHOP Week 4

Bayer is a multinational pharmaceutical and life sciences company and one of the largest pharmaceutical companies in the world. On this day, students visit Bayer and have the opportunity to do an Enzyme workshop.

Students will:

- Understand what enzymes are made of, how they are used in the production of medicines, and their other medical and biotechnological uses
- Find out how the human body relies on enzymes for different processes from digesting foods and replicating DNA, to helping repair damaged cells