Biology

Brief Overview of the Course
(for further details, please see our Sixth Form Prospectus
Sixth Form Prospectus • Sir Thomas Rich's School (strschool.co.uk)*)*

Exam Board: OCR

Specification web link: https://www.ocr.org.uk/qualifications/as-and-a-level/biology-a-h020-h420-from-2015/

Topics Covered:
Year 12

- Cell Structure
- Biological Membranes.
- Cell Division, Cell Diversity and Cellular Organisation
- Biological molecules
- Nucleotides and nucleic acids
- Enzymes
- Exchange surfaces
- Transport in Animals
- Transport in Plants
- Biodiversity
- Classification and evolution
- Communicable diseases, disease prevention and the immune system

Topics Covered:
Year 13

- **Module 5: Communication, Homeostasis and Energy:**
- Nerves & Hormones
- Animal & Plant responses
- Excretion
- Respiration
- Photosynthesis

- **Module 6: Genetics, Evolution and Ecosystems:**
- Patterns of inheritance
- Cellular control
- Manipulating genomes
- Ecosystems and Populations
- Conservation and Sustainability

Plus a four-day residential field trip to Pembrokeshire.

Please follow the instructions in the boxes below. The aim of these activities is to introduce you to the study of Biology at Advanced Level by:

- reinforcing your core knowledge and understanding of your chosen subject;
- encouraging you to think more deeply about your subject;
- supporting you to develop a deeper understanding of and appreciation for your subject as an academic discipline.

Core Knowledge and Understanding Task

Please answer the following two questions. There are links below each question to help you discover the answers.

Question 1- **Why is water such an important and unusual substance which is essential for life**?
Try to summarise in under 500 words how the various properties of water make it a medium necessary and suitable to support the existence of life.

Link to support:
https://www.youtube.com/watch?v=HVT3Y3_gHGg

Question 2-: How has our knowledge and understanding of Genetic Inheritance changed over the course of time?
Every day we discover more about genes. Genetics is one of the fastest expanding areas of scientific research and knowledge in the world today. Produce a timeline documenting major developments in our knowledge and understanding of genetics and inheritance including reference to the work and theories of Mendel and Darwin

Links to support:
https://www.dna-worldwide.com/resource/160/history-dna-timeline
http://www.dnai.org/
https://www.nature.com/articles/s41437-019-0289-9

The Bigger Picture Task

As well as reinforcing your core knowledge and understanding, our A Level curriculum will expose you to what are called the 'established orthodoxies' within each subject, which can include key research, important people who have contributed to the field, as well as broader methods and theories that exist within the subject.

Prior to starting the A Level course, it is important that you are aware of the following themes and topics so that you can develop an understanding of how they contribute to some of the established orthodoxies within the study of Biology. It would be helpful to you if you are aware of the following themes and topics so that you can develop an understanding of 'The Heart and Circulation'.

Task 1: The Human Heart and Circulation:

William Harvey established in 1628 that the heart pumps blood around the body. Since then our knowledge and understanding of the heart and circulatory system has developed leading to the first successful human implantable pacemaker operation in 1958, the first human heart transplant by Dr Christiaan Barnard in 1967 and the first human stent implant in 1972. These days heart valves can be replaced in routine operations and stem cell implants into the heart to replace damaged tissue after a heart attack are being trialled.

Task- Produce a large, annotated diagram identifying and explaining the anatomy and function of the heart to include information on the cardiac cycle and the role of the SAN and AVN in coordinating the action of the heart.

Links to support:

https://web.stanford.edu/class/history13/earlysciencelab/body/heartpages/heart.html
https://www.sciencedirect.com/science/article/pii/S2214854X19300500
(Video of a heart dissection- Caution! -may not be for everyone):
https://www.youtube.com/watch?v=wr-bzzYaViU

Task 2: Animal Cells:

Microscopy has changed hugely since the early models of the light microscope used by Anton van Leeuwenhoek and Robert Hooke. The development of the electron microscope has further enhanced our knowledge and understanding of cytology (the study of cells).

Produce a piece of work that helps to explain the roles of the cell organelles that can be found in an animal cell. This can be done in a format of your choice- It could be a model, poster, annotated diagram, PowerPoint etc. It should include, in addition to the structures that you know from GCSE, the Golgi apparatus, centriole, endoplasmic reticulum and lysosome.

Links to support:
https://www.stem.org.uk/resources/elibrary/resource/28508/secrets-cells-suitable-home-teaching#&gid=undefined&pid=1

https://www.cellsalive.com/

https://learn.genetics.utah.edu/content/cells/

Recommended Reading List and the Department's 'Top Pick' Title

As an A Level student, we want you to value academic endeavour (scholarship) and develop a thirst for learning in your chosen subject.

Please find the full subject reading list alongside our prospectus on the Sixth Form section of the STRS website here: https://strschool.co.uk/sixthform/prospectus. We would encourage you to explore as many of these titles as you can.

Our most highly recommended books that you read before September are:

Bill Bryson: *The Body: A Guide for Occupants*
Isabella Tree: Wilding: *The Return of Nature to a British Farm*
Steve Jones: Y: *The Descent of Men*

Other Recommended Activities

Please find below a selection of suggested additional activities that the department feel it would be useful for you to explore prior to starting the A Level course in September. In many ways, this could be the most important thing you can do between now and September and hopefully will serve to stimulate your love of Biology and desire to study it in further depth.

Pre-A Level Biology specific links:

There is a publication called **Head Start to A-Level Biology**, by CGP Books, which aims to bridge the gap between GCSE and A Level. You will find this a very useful book to work through. The link to this from Amazon is:
https://www.amazon.co.uk/s?k=cgp+head+start+to+a+level+biology&crid=X3HWKQ4F03MB&sprefix=cgp+head+%2Caps%2C184&ref=nb_sb_ss_ts-doa-p_1_9

There are also a collection of Pre-A-Level Biology resources and activities (or links to them), which can be found at: https://www.gcsepod.com/getting-ready-for-ks5/

HowtoAcademy Podcast: Anil Seth- **How to make sense of Consciousness**:
https://www.howtoacademy.com/podcasts/anil-seth-how-to-make-sense-of-consciousness/

Ted talks (most are around the 5 minute mark so maybe you could try and watch one a day: https://www.ted.com/talks?topics%5B%5D=biology&topics%5B%5D

The Infinite Monkey Cage podcasts- a Radio 4 popular comedy and science series which takes a light hearted approach to examining current science issues:
https://www.bbc.co.uk/programmes/b00snr0w/episodes/downloads

More or Less – a radio 4 programme about numbers in the news but often includes lots of biological data. Very interesting and thought-provoking
https://www.bbc.co.uk/programmes/b006qshd/episodes/player

30 Animals That Made Us Smarter: interesting examples of how studying animals have allowed us to develop new engineering solutions.
https://www.bbc.co.uk/programmes/w13xttw7/episodes/player