GREYFRIARS CATHOLIC SCHOOL

A-Level Biology

Transition Pack

'Somewhere, something incredible is waiting to be known.' Carl Sagan, Astrobiologist

A short guide containing a programme of activities and resources to prepare you to start your A-Level studies in Biology in September. It is aimed to be used over the Summer Holidays after completion of your GCSE qualification, to ensure you are ready top begin your course in September.

GET REDY FOR A-LEVEL

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A-Level Biology Course

WHAT TO EXPECT

COURSE CONTENT

- Module 1 Development of Practical Skills in Biology. (planning, implementing, analysing, and evaluating).
- Module 2 Foundations in Biology. (biological molecules, enzymes, cell structures, cell division).
- Module 3 Exchange & Transport. (exchange surfaces and transport in animals and plants).

• Module 4 - Biodiversity, Evolution, and Disease.

(taxonomy, evolution, diseases, prevention, the immune system).

- Module 5 Communication, Homeostasis, and Energy. (homeostatic control, photosynthesis, respiration).
- Module 6 Genetics, Evolution, and Ecosystems. (inheritance, biotechnology, ecosystems, and sustainability).

ASSESSMENT

The course will be assessed through the following examination papers:

Biological Processes (01) - (2hrs 15mins written examination)

- 37% of the total A-level mark; multiple choice questions, structured questions, and extended responses, covering theory and practical skills.
- **Biological Diversity (02)** (2hrs 15mins written examination)
- 37% of the total A-level mark; multiple choice questions, structured questions, and extended responses, covering theory and practical skills.
 Unified Biology (03) (1hr 30mins written examination)
- 26% of the total A-level mark; structured questions, and extended responses, covering theory and practical skills.

A pass/fail **practical endorsement** will be reported alongside your grade. This is assessed through the course by your teacher.

ROUTES FOR PROGRESSION

A-level biology is an excellent base for a university degree in healthcare professions, such as medicine, veterinary science, and dentistry, as well as biological sciences, such as biochemistry or forensic science. It can also complement the study of sport science, psychology, and many other disciplines.

For questions or any further inquiry, please speak with any member of the science department or email: r.angeliciastgregoryoxford.org.uk



Kick back this summer with a good read. The books below are all popular science books and great for extending your understanding of Biology



A Journey Through the Dark Matter of the Genome

Junk DNA

Our DNA is so much more complex than you probably realize, this book will really deepen your understanding of all the work you will do on Genetics. Available at amazon.co.uk

The Red Queen

Its all about sex. Or sexual selection at least. This book will really help your understanding of evolution and particularly the fascinating role of sex in evolution. Available at amazon.co.uk



AATT RIDLEY

Bill Bryson A Short History of



A Short History of Nearly Everything A whistle-stop tour through many aspects of history from the Big Bang to now. This is a really accessible read that will re-familiarise you with common concepts and introduce you to some of the more colourful characters from the history of science! Available at amazon.co.uk

Interested in anthropological ecology? Collapse: How Societies Choose to Fail or Succeed

What happened to the people who made the forlorn long-abandoned statues of Easter Island? Diamond's work has been influential in the fields of anthropology, biology, ornithology, ecology and history, among others.





Studying Geography as well? Hen's teeth and horses toes Stephen Jay Gould is a great Evolution writer and this book discusses lots of fascinating stories about Geology and evolution. Available at amazon.co.uk



An easy read.. Frankenstein's cat Discover how glow in the dark fish are made and more great Biotechnology breakthroughs. Available at amazon.co.uk

Movie Recommendations

GREYFRIARS CATHOLIC SCHOOL

Everyone loves a good story and everyone loves some great science. Here are some of the picks of the best films based on real life scientists and discoveries. You wont find Jurassic Park on this list, we've looked back over the last 50 years to give you our top 5 films you might not have seen before. Great watching for a rainy day.



Inherit The Wind (1960) Great if you can find it. Based on a real life trial of a teacher accused of the crime of teaching Darwinian evolution in school in America. Does the debate rumble on today?





Andromeda Strain (1971) Science fiction by the great thriller writer Michael Cricthon (he of Jurassic Park fame). Humans begin dying when an alien microbe arrives on Earth.

Gorillas in the Mist (1988) An absolute classic that retells the true story of the life and work of Dian Fossey and her work studying and protecting mountain gorillas from poachers and habitat loss. A tear jerker.





Lorenzo's Oil (1992) Based on a true story. A young child suffers from an autoimmune disease. The parents research and challenge doctors to develop a new cure for his disease.



Something the Lord Made (2004)

Professor Snape (the late great Alan Rickman) in a very different role. The film tells the story of the scientists at the cutting edge of early heart surgery as well as issues surrounding racism at the time.

There are some great TV series and box sets available too, you might want to check out: Blue Planet, Planet Earth, The Ascent of Man, Catastrophe, Frozen Planet, Life Story, The Hunt and Monsoon.

Movie Recommendations

If you have 30 minutes to spare, here are some great presentations (and free!) from world leading scientists and researchers on a variety of topics. They provide some interesting answers and ask some thought-provoking questions. Use the link or scan the QR code to view:

A New Superweapon in the Fight Against Cancer

Available at :

http://www.ted.com/talks/paula_hammon d_a_new_superweapon_in_the_fight_agai nst_cancer?language=en

Cancer is a very clever, adaptable disease. To defeat it, says medical researcher and educator Paula Hammond, we need a new and powerful mode of attack.









Why Bees are Disappearing Available at :

http://www.ted.com/talks/marla_spivak_ why_bees_are_disappearing?language=en Honeybees have thrived for 50 million years, each colony 40 to 50,000 individuals coordinated in amazing harmony. So why, seven years ago, did colonies start dying en-masse?

Why Doctors Don't Know About the Drugs They Prescribe Available at :

http://www.ted.com/talks/ben_goldacre_ what_doctors_don_t_know_about_the_dr ugs_they_prescribe?language=en

When a new drug gets tested, the results of the trials should be published for the rest of the medical world — except much of the time, negative or inconclusive findings go unreported, leaving doctors and researchers in the dark.









Growing New Organs Available at :

http://www.ted.com/talks/anthony_atala_ growing_organs_engineering_tissue?langu age=en

Anthony Atalla's state-of-the-art lab grows human organs — from muscles to blood vessels to bladders, and more.





Research, reading and note making are essential skills for A level Biology study. For the following task you are going to produce 'Cornell Notes' to summarise your reading.

1. Divide your page into three sections like this



2. Write the name, date and topic at the top of the page



3. Use the large box to make notes. Leave a space between separate idea. Abbreviate where possible.

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4. Review and identify the key points in the left hand box



5. Write a summary of the main ideas in the bottom space

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Images taken from http://coe.jmu.edu/learningtoolbox/cornellnotes.html

Research activities



The Big Picture is an excellent publication from the Wellcome Trust. Along with the magazine, the company produces posters, videos and other resources aimed at students studying for GCSEs and A level.

For each of the following topics, you are going to use the resources to produce one page of Cornell style notes.

Use the links of scan the QR code to take you to the resources.

BigPicture



Topic 1: The Cell

Available at: <u>http://bigpictureeducation.com/cell</u> The cell is the building block of life. Each of us starts from a single cell, a zygote, and grows into a complex organism made of trillions of cells. In this issue, we explore what we know – and what we don't yet know – about the cells that are the basis of us all and how they reproduce, grow, move, communicate and die.





Topic 2: The Immune System Available at:

http://bigpictureeducation.com/immune

The immune system is what keeps us healthy in spite of the many organisms and substances that can do us harm. In this issue, explore how our bodies are designed to prevent potentially harmful objects from getting inside, and what happens when bacteria, viruses, fungi or other foreign organisms or substances breach these barriers.

Topic 3: Exercise, Energy and Movement Available at:

http://bigpictureeducation.com/exercise-energyand-movement

All living things move. Whether it's a plant growing towards the sun, bacteria swimming away from a toxin or you walking home, anything alive must move to survive. For humans though, movement is more than just survival – we move for fun, to compete and to be healthy. In this issue we look at the biological systems that keep us moving and consider some of the psychological, social and ethical aspects of exercise and sport.











Topic 4: Populations Available at:

http://bigpictureeducation.com/populations

What's the first thing that pops into your mind when you read the word population? Most likely it's the ever-increasing human population on earth. You're a member of that population, which is the term for all the members of a single species living together in the same location. The term population isn't just used to describe humans; it includes other animals, plants and microbes too. In this issue, we learn more about how populations grow, change and move, and why understanding them is so important.





Topic 4: Populations

Available at: <u>http://bigpictureeducation.com/health-and-climate-change</u>

The Earth's climate is changing. In fact, it has always been changing. What is different now is the speed of change and the main cause of change – human activities. This issue asks: What are the biggest threats to human health? Who will suffer as the climate changes? What can be done to minimise harm? And how do we cope with uncertainty?





Science on Social Media



Science communication is essential in the modern world and all the big scientific companies, researchers and institutions have their own social media accounts. Here are some of our top tips to keep up to date with developing news or interesting stories:

Follow on Twitter: Commander Chris Hadfield – former resident aboard the International Space Station @cmdrhadfield

Tiktaalik roseae – a 375 million year old fossil fish with its own Twitter account! @tiktaalikroseae

NASA's Voyager 2 – a satellite launched nearly 40 years ago that is now travelling beyond our Solar System

@NSFVoyager2

Neil dGrasse Tyson – Director of the Hayden Planetarium in New York @neiltyson

Sci Curious – feed from writer and Bethany Brookshire tweeting about good, bad and weird neuroscience @scicurious

The SETI Institute – The Search for Extra Terrestrial Intelligence, be the first to know what they find! @setiinstitute

Carl Zimmer – Science writer Carl blogs about the life sciences @carlzimmer

Phil Plait – tweets about astronomy and bad science @badastronomer

Virginia Hughes – science journalist and blogger for National Geographic, keep up to date with neuroscience, genetics and behaviour @virginiahughes

Maryn McKenna – science journalist who writes about antibiotic resistance @marynmck

Find on Facebook:

Nature - the profile page for nature.com for news, features, research and events from Nature Publishing Group

Marin Conservation Institute – publishes the latest science to identify important marine ecosystems around the world.

National Geographic - since 1888, National Geographic has travelled the Earth, sharing its amazing stories in pictures and words.

Science News Magazine - Science covers important and emerging research in all fields of science.

BBC Science News - The latest BBC Science and Environment News: breaking news, analysis and debate on science and nature around the world.





Science websites



These websites all offer an amazing collection of resources that you should use again and again through out your course.



Probably the best website on Biology.... Learn Genetics from Utah University has so much that is pitched at an appropriate level for you and has lots of interactive resources to explore, everything from why some people can taste bitter berries to how we clone mice or make glow in the dark jelly fish.

http://learn.genetics.utah.edu L



LIVING CONSERVATION

In the summer you will most likely start to learn about Biodiversity and Evolution. Many Zoos have great websites, especially London Zoo. Read about some of the case studies on conservation, such as the Giant Pangolin, the only mammal with scales. https://www.zsl.org/conserva tion



At GCSE you learnt how genetic diseases are inherited. In this virtual fly lab you get to breed fruit flies to investigate how different features are passed on.

http://sciencecourseware.org/vcise/dro sophila/



DNA from the beginning is full of interactive animations that tell the story of DNA from its discovery through to advanced year 13 concepts. One to book mark! http://www.dnaftb.org/



Ok, so not a website, but a video you definitely want to watch. One of the first topics you will learn about is the amazing structure of the cell. This BBC film shows the fascinating workings of a cell... a touch more detailed than the "fried egg" model you might have seen.

http://www.dailymotion.com/video/xz h0kb_the-hidden-life-of-thecell_shortfilms

If this link expires – google "BBC hidden life of the cell"

Science: Things to do!

Day 4 of the holidays and boredom has set in? There are loads of citizen science projects you can take part in either from the comfort of your bedroom, out and about, or when on holiday. Wikipedia does a comprehensive list of all the current projects taking place. Google 'citizen science project'



Conservation









Want to stand above the rest when it comes to UCAS? Now is the time to act.

MOOCs are online courses run by nearly all Universities. They are short FREE courses that you take part in. They are usually quite specialist, but aimed at the public, not the genius!

There are lots of websites that help you find a course, such as edX and Future learn.

You can take part in any course, but there are usually start and finish dates. They mostly involve taking part in web chats, watching videos and interactives.



Completing a MOOC will look great on your Personal statement and they are dead easy to take part in!





Revision Task 1: The Cell

At A level you will look in much closer detail at the inner workings of cells, and how they are seen using different types of microscope.

Use one of your biology books (or the Web if you have not purchased a book yet) to label as many parts of this animal cell as you can.

Afterwards, fill in the summative chart below with relevant information about different organelles.



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Organelle	Structure and Function	Animal Cell	Plant Cell
Nucleus References Weight and the second Methods and the second Meth			
Mitochondria			
Lysosome U C C C C Lusser			
Ribosome			
Endoplasmic reticulum			
Golgi apparatus			
Chloroplasts			
Centrioles Version References Centric			

Revision Task 2: *Microscopy*

Microscopes are the reason for our fascinating knowledge of biological processes. You task is to research in detail the differences between the following types of microscopes, including how each one works:

- Light microscope
- Transmission electron microscope
- Scanning electron microscope

Please, ensure you also include a summary of their relative advantages and disadvantages.



Revision Task 3: Movement across Membranes

There are a number of ways that substances may move into and out of living cells. Some of these are passive (*i.e. they require no energy*) and others are active (*i.e. they require energy*).

Describe each of these types of cell transport, and give specific examples of each one:

- a. Diffusion
- b. Facilitated diffusion
- c. Osmosis
- d. Active Transport

KNOW THE DIFFERENCES

Diffusion Passive
 Osmosis Transport
 Active Transport

A Level Biology Transition Baseline Assessment



The following 40 minute test is designed to test your recall, analysis and evaluative skills and knowledge. Remember to use your exam technique: look at the command words and the number of marks each question is worth. A suggested mark scheme is provided for you to check your answers.

1.	a) What are the four base pairs found in DNA?	
		(2)
	b) What does DNA code for?	
		(1)
	c) Which organelle in a cell carries out this function?	
		(1)
2. a) What theory did Charles Darwin propose?	
		(1)
b)) Why did many people not believe Darwin at the time?	
		(1)
с) Describe how fossils are formed.	
		(3)
d) The fossil record shows us that there have been some species that have formed and some that hav	e
	become extinct. i) What is meant by the term 'species'?	
		(2)
	ii) Describe how a new species may arise:	
		(3)
		(3)



3. Ecologists regularly study habitats to measure the species present and the effect of any changes. One team of ecologists investigated the habitat shown in the picture below:



Image taken from http://www.macaulay.ac.uk/soilquality/Dune%20Succession.pdf

a) Define the following keywords: i) Population ii) Community (2) b) Give an example of one biotic factor and one abiotic factor that would be present in this habitat Biotic: Abiotic: (2) c) Describe how the ecologists would go about measuring the species present between the coast and the inland. (6)



4. Every living organism is made of cells.



Image taken from http://prestigebux.com/worksheet/label-an-animal-cell-worksheet

a) Label the following parts of the animal cell:

2	
5	
8	
	(3)
b) Describe how is the structure of the cell membrane related to its function?	
	(3)

5. A medical research team investigated how quickly the body deals with glucose after a meal. They studied the blood glucose concentration of people who exercised versus those who did not. Here are their results:



Image taken from https://memoirsofanamnesic.wordpress.com/category/blood-glucose/

a) What organ in the body regulates blood glucose concentration?

.....



b)	Explain how the stag	es that would bring	about a return to	normal blood glu	cose concentrations
	Explain now the stag	cs that would bring		normal blood glu	

	(4)
c) Name one variable the researchers will have controlled.	
	(1)
d) The researchers made the following conclusion:	
"Blood glucose returns to normal values for all people after 4 hours"	
To what extent do you agree with this conclusion.	
	(3)

6. Scientists need to be able to interpret data in graphs to decide if there are trends in the results. For each graph bellow, describe the trend.



http://www.myearthwatchexperience.com/Essential%20Ecology.htm