Preparatory work for those starting 2023

To keep you in touch with biology, we have put together a list of recommended books and videos from the three streams that make up the first-year course. We emphasise that this list in not exhaustive, and that many great titles exist – so do feel free to read anything that you think looks interesting! We also include here the maths and chemistry preparatory sessions that will be sent to all students at the start of September. This is especially important for those who do not have maths or chemistry A level. There will be a chance to test your knowledge and to get support during the first few weeks of term.

Books

OUP produce a series called *Very Short Introductions*. Many of these are very good, but the level of detail varies. Of particular use for our course are:

The Animal Kingdom (Peter Holland)
Plants (Timothy Walker)
Sexual Selection (Marlene Zuk & Leigh Simmons)
Ecology (Jaboury Ghazoul)
Molecular Biology (Aysha Divan & Janice Royds)
The History of Life (Michael Benton)

Theme 1: Building a phenotype

The Epigenetics Revolution and/or Junk DNA (Nessa Carey)
The Gene: an intimate history (Siddharta Mukherjee)
The Immortal life of Henrietta Lacks (Rebecca Skloot)
The Emperor of all maladies (Siddharta Mukherjee)
What is Life? (Paul Nurse)
Transformer - the deep chemistry of life and death (Nick Lane)

Theme 2: The Diversity of Life

I Contain Multitudes (Ed Yong)
How to Clone a Mammoth (Beth Shapiro)
Bugs in the System (May Berenbaum)

Theme 3: Ecology & Evolution

The Ancestor's Tale (Richard Dawkins)
Why Evolution is True (J Coyne)
Guns, Germs & Steel (Jared Diamond)
Wilding (Isabella Tree)

Podcasts/Videos

Back Garden Biology (Lindsay Turnbull):
https://podcasts.ox.ac.uk/series/back-garden-biology
Big Biology:
https://www.bigbiology.org/

Links to the titles above and other recommended reading for the MBiol course can be found in ORLO [Oxford Reading Lists Online] here.

Some of the materials listed below for the review of maths, statistics and chemistry can be found here.

Maths
Students should be familiar with the following basic mathematical concepts that are covered in A-level mathematics:

Partial fractions
Logs and exponentials
Simple differentiations -- linear functions, powers, sums
Simple statistics -- mean, median, mode; standard deviation, variance, inter-quartile range; basic probability, adding and multiplying probabilites, Binomial distribution, Normal distribution (including standardising)

In addition, students will be expected to be able to perform simple algebraic manipulations including manipulating algebraic fractions, such as those required at GCSE. Students who have not taken A-level would be wise to revise these manipulations.

All the material can be found in two textbooks by Bostock and Chandler. First, everything except the statistics:

The text is Bostock and Chandler "Mathematics -- The Core Course for A-level". There are various editions, starting in 1978. Then under the title "Core Maths Advanced Level", starting in 1994, and continuing until 2013. These are available on Amazon. The newest edition is about £50 new, which is a lot. However, there are many available second hand for under £5 or under £10. The price difference reflects a key requirement of A-level textbooks, which is not important for us -- namely, being completely up to date with the prevailing A-level syllabus. Older editions are thus perfectly fine for our purposes, and indeed probably preferable because they proceed more expeditiously and cover more material. The relevant chapters of some of the different editions are as follows:

The 1981 edition:
Revision of basic algebraic manipulations, including fractions: Chapter 1
Partial Fractions - Chapter 1
Logs and exponentials - Chapters 2 and 3
Simple differentiations -- linear functions, powers, sums - Chapter 5

1994 and 2013 editions are more expansive (obviously, read the needed chapters in numerical order):
Revision of basic algebraic manipulations, including fractions: Chapter 1
Partial Fractions - Chapter 30
Logs and exponentials - Chapters 2 and 17
Simple differentiations -- linear functions, powers, sums - Chapter 13

Now for the statistics. The text is Bostock and Chandler "Modular Mathematics -- Statistics 1 Module C", from 1995. There are many cheap copies floating around. The contents of the

whole book are "Representing data; central tendency; dispersion; basic probability; probability laws; probability distributions and models for discrete variables; discrete uniform, binomial and Poisson probability models; probability models for continuous variables; the normal distribution; functions and combinations of random variables." Most of this is included in the requirements.

However: do note that the Biology course will require *familiarity* with the concepts mentioned above. Thus, you do not need to work through pages of exercises, but of course one or two on each topic will greatly assist learning.

Chemistry

All students will need to know the following basic chemistry concepts that are covered in A-level chemistry:

Atoms, atomic structure, electron orbitals
Bonding (ionic, polar, covalent)
Chemical formulae and molecular diagrams
Redox chemistry
Acids and bases
The concept of moles and molarity

Start by watching the video tutorials that can be found at:

1. https://sciencemusicvideos.com/basic-chemistry-tutorials/
2. https://sciencemusicvideos.com/ap-biology/carbon-and-functional-groups/

Then use Seneca Learning's 'Foundations in Chemistry' course for to revise the key concepts and to test your knowledge
https://app.senecalearning.com/classroom/course/d40348f4-579a-4f76-b2a8-12c562e9b836/section/b7c08d8e-7d74-4d9d-8949-95a5cbde6819/session

This will provide all the chemistry knowledge you need to prepare yourself for the first year of the Biology degree course. But if you want to go into more detail, the following textbook is a good reference:

Ritchie & Gent A Level Chemistry for OCR Year 1 and AS 2015 Oxford University Press https://www.cgpbooks.co.uk/secondary-books/as-and-a-level/science/chemistry/cratb52-a-level-chemistry-for-ocr-a-year-1-as