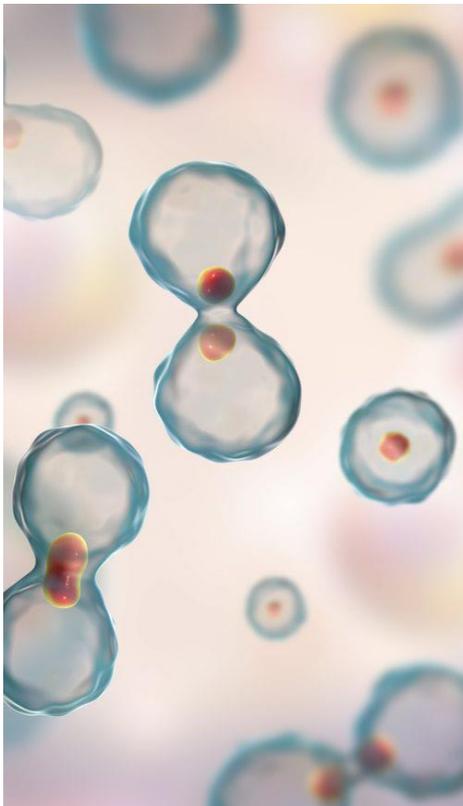




OXBRIDGE SUMMER ACADEMY



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# *Maths for Biologists*

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COURSE PROSPECTUS



## Mission Statement

Even students who have A\* grades in GCSE Maths struggle with *applying* their knowledge to the questions in Biology A-Level examinations. It is as if students are able to solve mathematical questions in a Maths paper, but are unable to recognise which techniques are relevant in a different context.

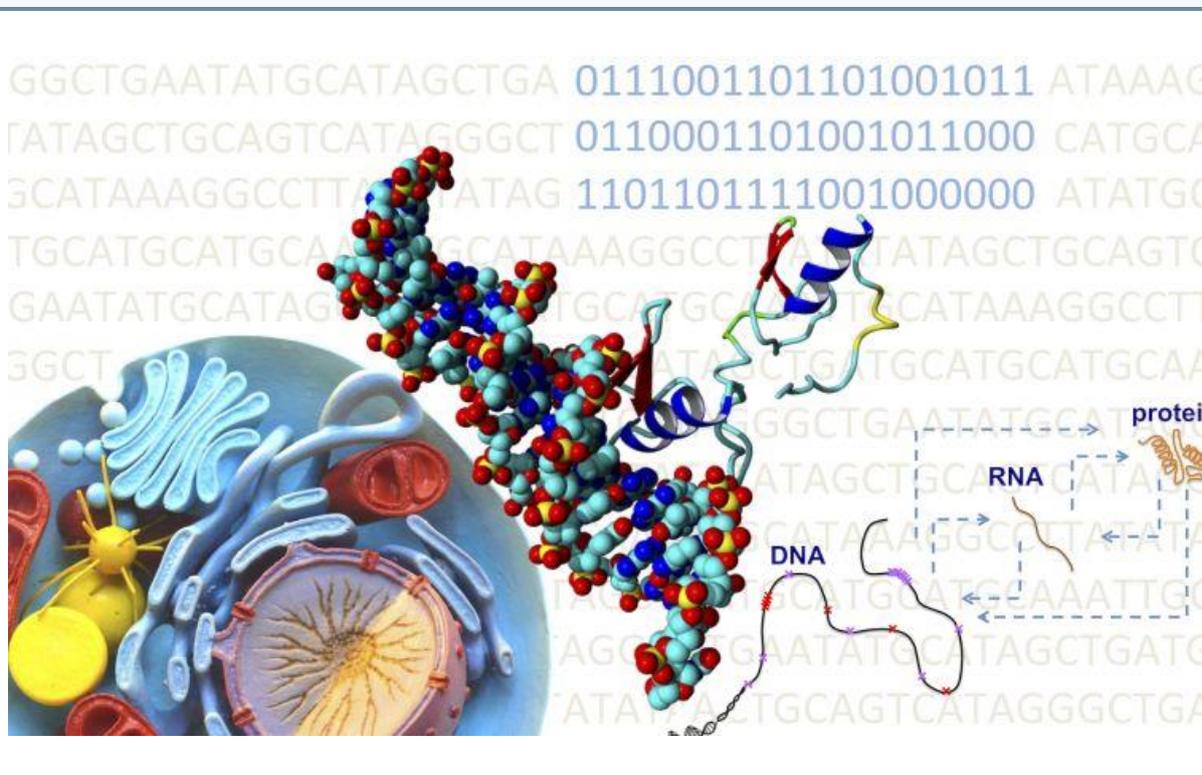
This course will take you through mathematical principles and techniques in Biology by introducing each as a solution to a particular Biological problem. We hope that this will enable you to see Maths as a natural expression of the various problems presented, so that you will easily be able to identify which part of your mathematical toolkit to use for any given question.

## Introduction

A level Biology is a big step up from GCSE and students are often in shock for the first few days due to the sheer volume of content of the course and learning about complicated new processes such as immunity and genetics. In 2017 the grade boundary for AS biology was 54% for getting an A and 62% for getting an A\*.

Most competitive schools do a great job in getting students to attain an A grade but the struggle is for getting that A\*.

The focus of national assessments in the UK has over the years shifted upwards away from the bottom two rungs of Bloom's hierarchy, requiring students to do more analysis and evaluation. Like all the sciences, Biology has gotten harder because this new focus requires an enhanced skills set – and it is in the mathematical questions in particular, in which students struggle the most. While most students can be taught to turn algorithms by rote, it can be challenging for them, without the proper guidance, to be able to authentically apply and analyse questions pertaining to mathematics.





Did you know?

If you study Natural Sciences at Cambridge, you get a selection of options to choose from. However, as a Biological Sciences student, you **must** select one of three Maths modules.

This is because Cambridge University wants you to develop mathematical skills because mastery of these skills is **essential** for anyone seriously wishing to study Biology.

*'It is highly desirable that students have continued with mathematics during their sixth form (or equivalent) studies.'*

Cambridge University website

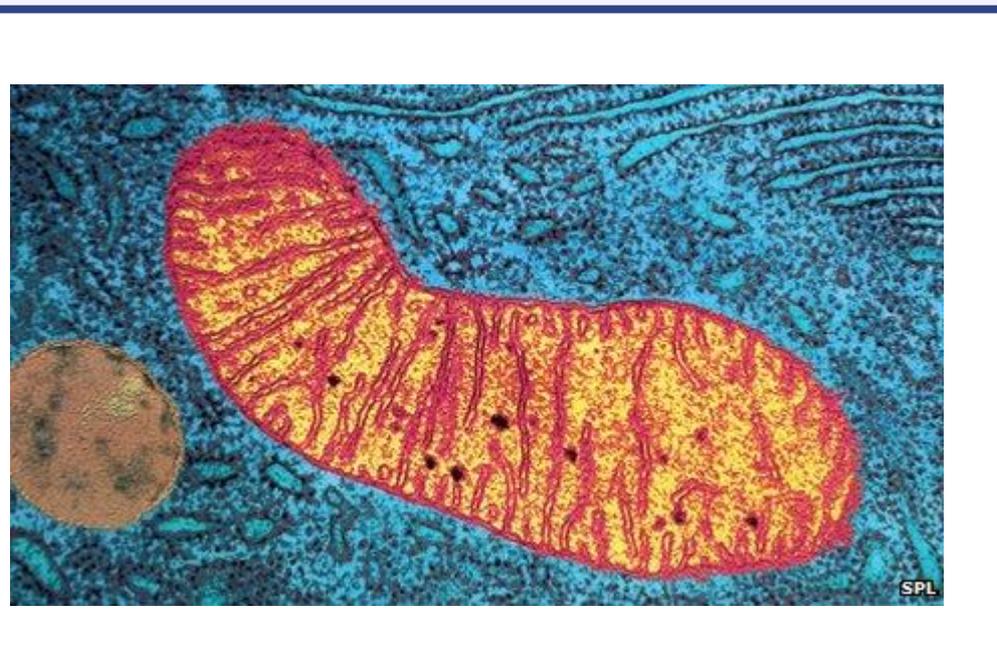
Mathematical Biology Part1A, Natural Sciences Tripos, Part IA



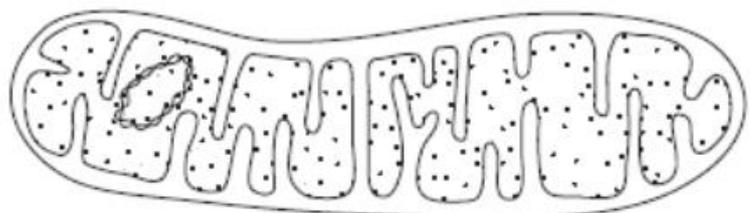
What will you learn?

We draw on an extensive bank of thousands of questions, our detailed analysis of Head Examiners' reports, and our own data and experience collected from teaching A level Biology in schools, to identify those areas of the mathematical topics in the A level Biology syllabus which cause students the most difficulties.

We will cover topics in Statistics, Algebra, Arithmetic and Graphs. We have broken these areas down into a total of 24 fine-grained sub-topics, and we can offer either an intensive short course focussing on the main problem areas, or a longer course that will cover a much broader selection.



The diagram is of a mitochondrion at a magnification of  $\times 30\,000$ .



Calculate the actual length of this mitochondrion in micrometres ( $\mu\text{m}$ ).

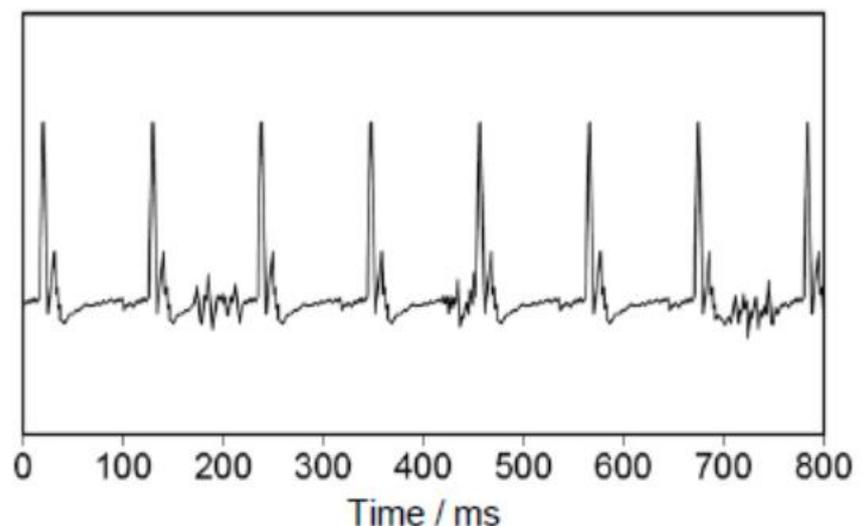
## How will you be taught?



There will be two instructors in the room with you – one a Maths specialist and one a Biology specialist. This is to ensure that both aspects of the practice questions are covered: questions in Biology papers are never purely on Maths, but rather, present a Maths-based question in the context of a Biology one.

You will be taught through worked examples and problem-solving exercises.

We also want to ensure that you can see some measurable progress made over the course. We will give you a 30 min assessment at the start to check where you are at the beginning of the course. At the end of the course, we will give you another 30 minute assessment to check your scores to see if you have indeed improved. We will provide you with booklets on topics with opportunities for later practice once you finish the course.





## Who will be teaching you?

**Course Director:** Emma Zaman

Emma completed her undergraduate degree in Education and Biological Sciences from the University of Cambridge. She gained a post graduate teaching qualification from King's College London and an M.Sc. in Learning and Teaching from University of Oxford. As a practicing qualified teacher, she has successfully prepared students for their Oxbridge interviews. One of the schools in which she has worked was in the national news while she was there on account of the number of Oxbridge offers their students received. Emma was responsible for prepping a number of these students.

**Course Designer:** Masum Shaikh

Masum studied Mathematics parts I, IIB and III from Trinity College, Cambridge University. He left Cambridge with an M.Math. degree. He then trained as a TeachFirst teacher and gained his QTS (qualified teaching status). He went on to a banking career, but returned to university to obtain a second masters: an M.Sc. in Financial maths from Warwick. He currently works with an international company in Cambridge, but alongside this he has been a supervisor at Cambridge University for the Mathematical Biology Course. He has also tutored students in the evenings and served as a governor for a local secondary school.

## Our commitment

At Oxbridge Summer Academy, we are confident that the two instructors for this course have a unique blend of strengths that you won't get anywhere else, and we hope that we will be able to pass on our enthusiasm and love of the course to you.

[www.oxbridgesummeracademy.co.uk](http://www.oxbridgesummeracademy.co.uk)

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