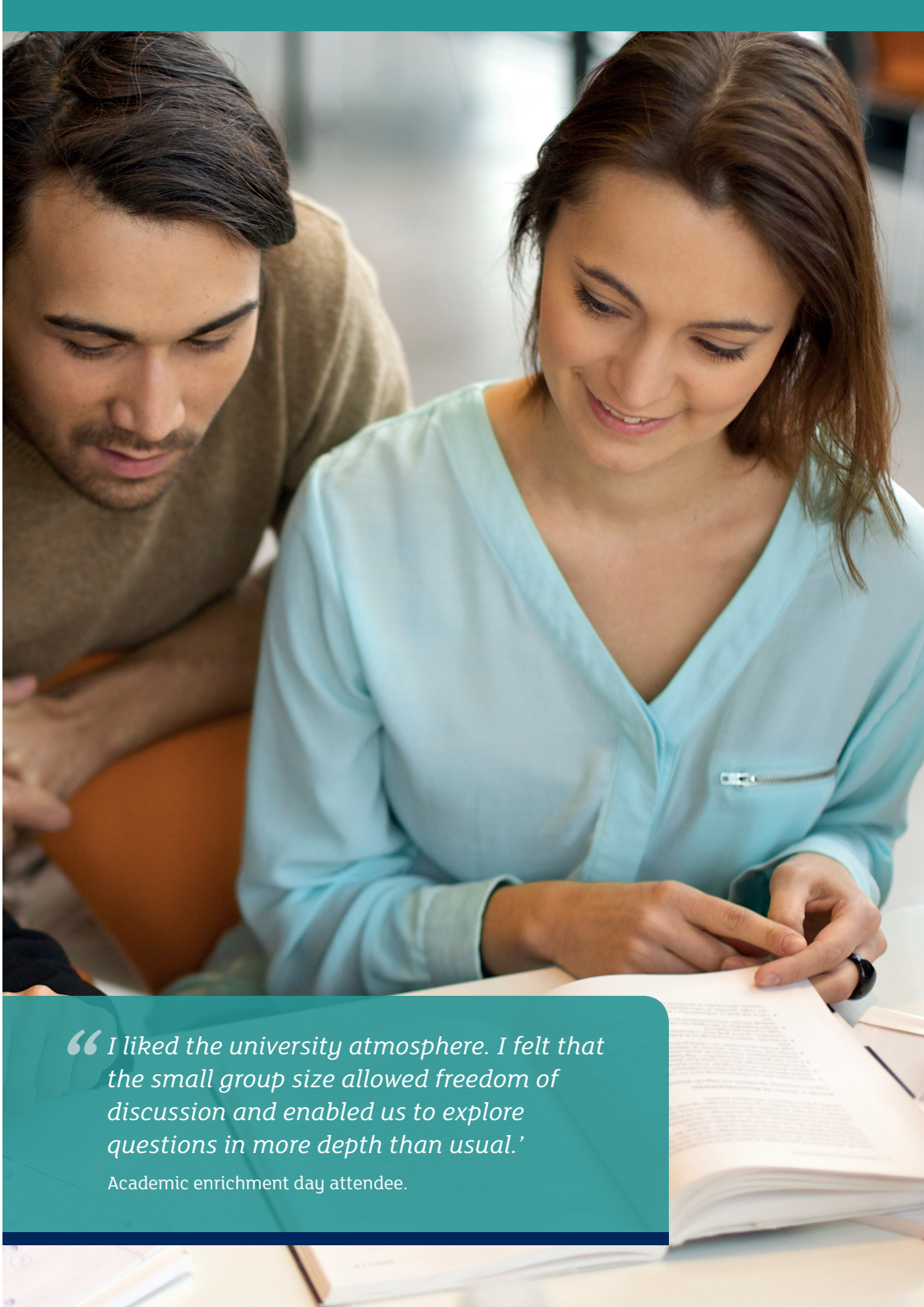


INDEPENDENT THINKERS COURSES



STEM Webinars





INTRODUCTION

For two and a half years Independent Thinkers Courses has been delivering university preparation and academic enrichment workshops in schools and colleges across the country. In all that we do, we place particular emphasis on helping students to become critical, independent and passionate learners and problem solvers. Now, as schools have moved online, we are offering our stimulating and enjoyable courses as webinars.

The courses in this brochure, aimed at students in Years 12 and 13, have two aims: to introduce young people in the final two years of secondary school to the excitement, pleasure and rigour of university level study; and, to help prepare them effectively for the next stage of their academic careers.

All courses are designed, developed and delivered by experts in their respective fields committed to sharing with the next generation their passion for complex problem solving and the wonder elicited by scientific enquiry.

For each set of webinars, as well as the materials covered in the course, we provide further materials – and, where relevant, reading – for students to work on by themselves, with their peers and with their teachers.

We look forward to working with you and your students.

Jane Slinn and Bono Xu
Independent Thinkers Courses

“I liked the university atmosphere. I felt that the small group size allowed freedom of discussion and enabled us to explore questions in more depth than usual.”

Academic enrichment day attendee.

BIOLOGY AND MEDICINE

BIOLOGY I: Studying Biology at University: An Introduction to Scientific Literature (2 one-hour webinars)

An important part of being a scientist is the ability to read and understand scientific literature. This often provides one of the greatest challenges in an undergraduate science degree. These two seminars will:

- Introduce A-Level students to the world of scientific literature.
- Explain how publishing papers in scientific journals contributes to the progression of science.
- Relate the format of scientific papers to lab reports written by students as part of their A-Level courses.
- Encourage students to begin exposing themselves to scientific papers relevant to their areas of interest.
- Give students advice on how to interpret information from scientific papers.

BIOLOGY II: Protein Synthesis: Beyond the Central Dogma of Molecular Biology (3 one-hour webinars)

The central dogma of molecular biology, often summarised as 'DNA makes RNA makes protein', is an explanation of how genetic information flows in living organisms. While this idea is indeed the basis of all life, it is a greatly simplified view of the myriad processes that orchestrate gene expression in living cells. These seminars will introduce students to the complex processes that cells use, and will include discussions on epigenetics, DNA condensation, transcription factors and regulatory RNAs.

“I enjoyed all the tips and strategies for each section of the test. The tutor was an excellent speaker and very helpful. It was great to talk about my subject with Cambridge University Ph.D. students.”

Test preparation and academic enrichment day attendee.



MEDICINE

MEDICINE I: Homeostasis in Physiological Systems (3 one-hour webinars)

Homeostasis has a critical role in all physiological systems. In the first of these sessions, we will discuss the underlying mechanisms involved in breathing, the changes that occur during stress, and how the body can adapt to overcome them. Subsequent sessions will cover the homeostatic mechanisms of controlling blood sugar and the consequences of homeostatic failure in diabetes, as well as providing participants with the opportunity to apply their knowledge from earlier sessions in clinical scenarios. These webinars are adapted from tutorials in Physiology given as part of the undergraduate Medicine degree at Cambridge University. The course tutor supervises Cambridge undergraduates in this subject.

MEDICINE II: An Introduction to Anatomy (3 one-hour webinars)

These three sessions will introduce students interested in Medicine to the study of anatomy in clinical settings. In the first session, students will learn about the wrist joint and the diagnosis and treatment of wrist fractures in a clinical setting. The second session will explore the nerves of the upper limb and provide an introduction to the brachial plexus; the third session will introduce students to the study of the hip joints through anatomy, pathology and clinical medicine.

MEDICINE III: An Introduction to Psychiatry (3 one-hour webinars)

This set of webinars introduces participants to the diagnosis and treatment of two of the most common psychiatric conditions: depression and anxiety. Students will learn about the current clinical guidelines for diagnosing these conditions, psychopathological and biochemical theories of depression and anxiety and, finally, explore the main drugs used to treat depression and anxiety. These webinars are also of interest to students studying Psychology A-level and/ or who intend to apply for Psychology at university.

MEDICINE IV: BMAT Preparation Course (4 one-hour webinars)

This course is made up of four webinars: one session on BMAT critical thinking (Section 1); one session on BMAT problem solving (Section 1); one session on BMAT Section 2 (Scientific Knowledge and Applications); and, one session on preparing for the essay section of the BMAT. Students will have the opportunity to do a practice BMAT essay and receive written feedback on their performance from a tutor who has marked the BMAT essay section for Cambridge Assessment.



MATHS AND COMPUTER SCIENCE

MATHS I: STEP Maths Preparation (3 one-hour webinars)

1. Introduction to STEP: Moving on from A-Level:

This webinar introduces students to mathematical problems at STEP level, and explains how they differ from A-Level questions. The session will include a discussion of the STEP syllabus, and the best tips for exam strategy.

2. Differentiation & Integration in STEP Questions:

Calculus is a prominent topic in STEP papers, with marks usually to be achieved from two full questions. This webinar will deal with the common types of calculus problems seen in STEP, and discuss how to best approach these.

3. Algebra & Functions in STEP Questions:

While based on the A-Level syllabus, questions involving algebraic manipulation and functions in STEP are much more involved. By the end of this session, students will have gained the confidence to attempt difficult questions in these key areas.

MATHS II: Oxbridge Maths (4 one-hour webinars)

These four webinars will prepare students for Oxbridge admissions tests and interviews by focusing on techniques for tackling more challenging problems in key areas assessed at A-level, in admissions tests and at interview. The four sessions are as follows: (i) Maths MCQs; (ii) Maths Longer Questions; (iii) Advanced Calculus; (iv) Graph Sketching. Participants will have the opportunity to sit a mock MAT/ Cambridge at-interview Maths assessment and receive written feedback on their performance.

COMPUTER SCIENCE I: Oxbridge Computer Science (4 one-hour webinars)

These four webinars will prepare students applying to study Computer Science at the most competitive universities. Two sessions cover problem solving for Computer Science, one covers techniques for Maths MCQs, and one covers advanced Maths. For all sessions, the focus will be on problem solving in areas specific to Computer Science, such as logic and deduction, sequences, combinatorics and functions. Students will have the opportunity to sit a mock MAT/ Cambridge CTMUA paper and receive written feedback on their performance.



“It was even better than I expected: perfect.”

Test preparation and academic enrichment day attendee.

“ Thank you so so much for all your help - this was definitely the most helpful experience I had, absolutely invaluable for feeling confident and prepared when I went to my interviews.”

Oxford offer holder for 2019 who attended academic enrichment, test preparation and interview preparation workshops over the course of an academic year.

NATURAL SCIENCES & ENGINEERING

NATURAL SCIENCES & ENGINEERING I: Oxbridge Engineering & Physical Natural Sciences (4 one-hour webinars)

These four webinars will prepare candidates applying for Engineering, Physics and Physical Natural Sciences at Oxford or Cambridge by focusing on techniques for tackling more challenging problems in key areas assessed at A-level, in admissions tests and at interview. The four sessions are as follows:

- (i) Advanced Circuits;
- (ii) Maths for Physics and Engineering;
- (iii) Advanced Physics for the PAT and NSAA;
- (iv) Estimating Complex Quantities for Physics (a key skills for interviews).

NATURAL SCIENCES II: Preparing for the Cambridge NSAA for Biologists and Chemists (4 one-hour webinars)

These four webinars will prepare candidates applying for Biological Natural Sciences at Cambridge. One session covers the compulsory Maths MCQs for the NSAA, and students then choose between two sessions on the Biology NSAA or two sessions on the Chemistry NSAA. (NB From autumn 2020, NSAA candidates will answer on ONE not two sciences in the NSAA). The fourth webinar will be an interactive interview skills session for students applying for Biological Natural Sciences, Biology, Chemistry and Biochemistry.



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