About us

Oxbridge Inspire is a STEM education initiative established by researchers from the University of Cambridge and Imperial. Our mission is to make Science, Technology, Engineering and Mathematics (STEM) engaging and accessible to young people (14 to 18-year-olds), to inspire young people to pursue STEM beyond the school curriculum, and to support applications to study STEM subjects at top universities.

We run courses during the school holidays, which encourage young people to discover how the world is constructed through conducting practical experiments and creating their own products. Our teaching team is made up of STEM researchers from top institutions, such as the University of Cambridge, Oxford and Imperial, and teachers who are keen to teach STEM in more innovative and engaging ways.

More broadly, we conduct research into STEM education and engage with schools by running STEM writing competitions and Exhibition of Ideas events with lively discussions between young people, teachers and industry. We are also constantly on the lookout for opportunities to collaborate with other STEM education initiatives, including not-for-profits and charities.

Words used by participants to describe our first Exhibition of Ideas

Courses 2018

Our courses are built from innovative activity-based teaching techniques centred around topical real-world problems. This summer we are running two courses: Secrets and Cyphers, on the Mathematics behind Cryptography and Autonomous Cars, on the STEM principles behind autonomous cars.

University Support Packages

An optional university support package is offered alongside our courses, for those seeking to pursue STEM subjects at degree level. This includes a review of the student's personal statement and a mock interview either by Skype or in person.

Secrets and Cyphers Summer School

Learn about cyphers through history and learn the mathematics underpinning modern encryption. For 14 to 18-year-olds with a keen interest in Mathematics, puzzles and problem-solving. More advanced students have the opportunity to tackle degree-level mathematical problems.

Topics covered: Modular Arithmetic, Combinatorics, Number Theory, Algorithms, RSA algorithm

Part 1: Cyphers through History, Modular Arithmetic

- Encoding and decoding
- Substitution and transposition
- Vigenère
- Public keys and secrets
- Modular arithmetic

Part 2: Enigma, Factorisation, Primes

- Enigma
- Bombes and computational code cracking
- Primes, Euler's totient function, Fermat's little theorem

Part 3: RSA, Modern cryptography

- RSA and testing for primes
- Implications of quantum computing
- End-to-end encryption
- Ethics of cryptography

Autonomous Cars Summer School

Learn important STEM and design principles by making your own autonomous car. For 14 to 18-year-olds who are passionate about science and engineering, and who enjoy hands-on practical activities. The course ends with a competition between the cars created by students. More advanced students will be exposed to degree-level physics topics and engineering techniques.

Domains/Topics covered: Electrical engineering, Mechanical engineering, Programming, Linear algebra, Trigonometry, Geometry, Electricity, Kinematics, General relativity, Special relativity.

Part 1: How Autonomous Cars work

- Hardware and software systems
- Key challenges of autonomy
- Simulation

Part 2: Design Specifications

- Problem decomposition, formalisation of decision-making and encoding rules
- Dealing with uncertainty
- Processors and sensors

Part 4: Speed Control

- Circuit Design and specification with circuit diagrams
- Energy conversion and the mechanics of motors
- Transistors and semi-conductors
- Linear and saturation regions of transistors
- Tuning motor speed with transistor switching rate calculations

Part 5: Detecting Obstacles

- Ultrasound and infrared proximity sensing
- Sensing ranges and fields of view
- Radio and light detection and ranging sensor technology
- Camera-based sensing and visual processing
- Localisation by filtering for multiple sensors

Part 6: Programmatic Control

- Loops and control structures
- Path planning algorithms (Dijkstra, A*)
- Tuning behaviour through manipulating thresholds
- Handling unexpected events and errors

School Engagement and Research

As part of our mission to improve STEM education for young people, we would like to engage as many schools as possible and encourage schools and industry to have conversations. These conversations also inform the development of our curriculum and teaching methodology. We are happy to come to schools to deliver events that inspire and engage young people in STEM and encourage them to voice their views on STEM and STEM education.

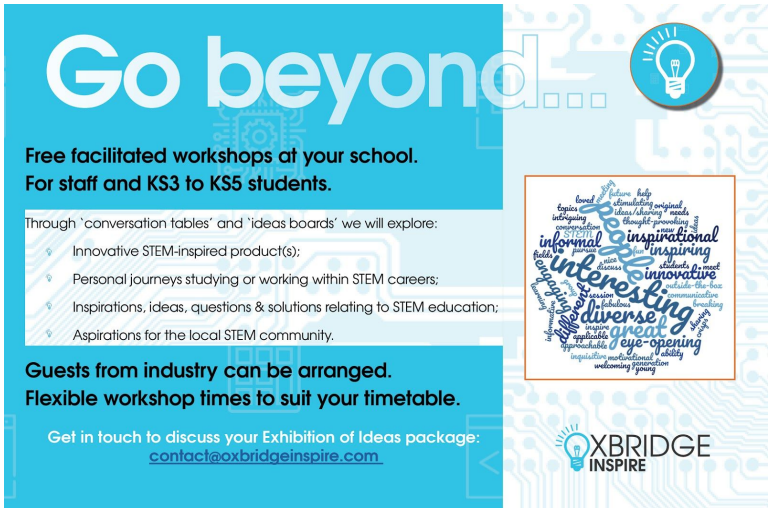
Exhibition of Ideas

An Exhibition of Ideas is a facilitated conversation between students, teachers and industry. Conversation cards are used to focus discussion and the outcomes of discussion are consolidated to give the school insight into various aspects of STEM and STEM education. Examples of topics include:

- Personal journeys studying or working within STEM;
- Inspirations, ideas, questions, solutions relating to STEM education;
- What makes STEM-inspired product(s) innovative?;
- Aspirations for the local STEM community.

Please contact us directly if you wish to run an Exhibition of Ideas event at your school. We are also looking for industry participants wishing to reach out to young people and encourage them to pursue STEM careers.

Photograph taken by Cambridge Independent, March 2018



Writing Competitions

We run regular STEM writing competitions for young people aged 13 to 18-years-old. Entrants can submit an article (or up to three) on a STEM topic of their choice.
Examples of topics include:

- Explaining a STEM-related project that the writer has undertaken;
- Discussing first-hand experience of STEM education;
- Sharing a viewpoint on a topical STEM-related issue;

Winning articles are published on our platform and all entrants receive 10% off our courses.

To be notified of the next writing competition, subscribe to our mailing list.

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