



Mathematics

CPD activities

Secondary, post-16 and FE

We provide all involved in the teaching of STEM subjects access to subject-specific, high-quality resources and CPD, so they can teach effectively and inspire the young people they work with.

We offer bursary support to help with associated costs of attending CPD

www.stem.org.uk/bursaries

Our online resource collection hosts thousands of free teaching materials to support your mathematics lessons.

www.stem.org.uk



STEM Learning is pleased to announce a suite of continuing professional development (CPD) to support teachers of secondary and FE mathematics

Leadership

New and aspiring leaders of mathematics

"The course has been brilliant. I have been able to identify the root of my frustrations and identify my own strengths and weaknesses, as well as reflect on others within my department. In doing this I will now be able to return and move forward in a positive and motivational way. Leading others and the department to further success." Past participant

We are pleased to be offering another round of our New and aspiring leaders of mathematics programme for teachers looking to lead a mathematics department in secondary schools. This intensive two part residential professional development course has been developed for teachers new or aspiring to lead a mathematics department in secondary schools and will equip you with the knowledge and skills you need to run a successful department. This course is also suitable for mathematics leaders in FE colleges.

By participating you will:

- employ a range of methods to strategically lead and manage a department
- evaluate the skills you have and identify areas you need to develop to become a highly effective leader
- explain what outstanding teaching and learning in mathematics is and use this to provide effective feedback
- use a variety of strategies to make teaching and learning in mathematics more engaging and inspiring for students and colleagues
- employ a range of techniques to enable you to create a high performing team and develop team members
- produce an action plan linked to your School Development Plan to implement and evaluate back in school or college

www.stem.org.uk/my200

Enhancing your mathematics teaching

Mastering mathematics at key stage 3

It is important that mathematics at key stage 3 builds upon the mathematical experiences students experience at primary school. Designed for teachers of mathematics at key stage 3, explore what is meant by mastery, consider the transition between primary and secondary school and the mapping of progression through key stage 3.

Develop techniques to establish problem solving skills and resilience in the context of hard to teach topics encountered in key stage three including fractions, proportional reasoning, standard form and powers, the geometry of arithmetic and geometric sequences, exploring graphs using Geogebra, solving problems in three dimensions and Venn diagrams in probability.

Undertake a gap task and produce an action plan to embed into your teaching the skills developed in the course.

By participating you will:

- develop a deeper understanding of the requirements of the key stage three mathematics specification
- consider approaches to teaching 'hard to teach' topics in key stage three
- complete a gap task giving the opportunity to put theory into practice

www.stem.org.uk/my218

Teaching mathematics GCSE content with understanding

Explore the content of the mathematics GCSE and gain an understanding of the importance of mathematical reasoning and problem solving.

Develop problem solving skills and resilience in the context of hard to teach GCSE topics. Topics covered include trigonometry, linear graphs, proportional reasoning, standard form and powers, frequency trees, Venn diagrams, equations of circles, turning points, iterative processes, quadratic sequences, vectors and proof.

"I feel more able and confident to teach a number of topics (specifically those covered by the course) in a manner that would enable my learners to gain a greater understanding of the topics and therefore apply that understanding to problem solving." (Past participant)

By participating you will:

- develop a deeper understanding of the requirements of the mathematics GCSE
- consider approaches to teaching some of the 'hard to teach' topics at GCSE level
- complete a gap task giving the opportunity to put theory into practice

www.stem.org.uk/my207

Using manipulatives to enhance understanding in secondary mathematics

Encourage active learning in secondary and GCSE mathematics lessons with the use of manipulatives.

Manipulatives - or 'objects to think with' - include counters, interlocking cubes, Cuisenaire rods, tiles and more. Research suggests that their use is beneficial to mathematical understanding, and can help student retention, problem solving and reasoning.

This two day, residential, hands-on, practical experience is suitable for all teachers of mathematics in secondary school. Teachers of GCSE Maths resits will also benefit from attendance.

Sessions include:

- the amazing world of interlocking cubes
- a hundred and one things to do with dice and dominos
- games on geoboards
- bar modelling
- proof by origami

www.stem.org.uk/my210

Developing you mathematics teaching

Building confidence as a newly qualified mathematics teacher

Join us to explore what makes good mathematics teaching. This course suitable for NQTs and mathematics teachers who are in the early years of their teaching career considers a range of teaching strategies to help engage and inspire students during your first teaching post. We will look at questioning, promoting positive behaviour, planning for learning and ways of giving feedback that make a difference.

The course consists of two residential periods to help build confidence and support you as a newly qualified mathematics teacher.

"There were a lot of useful tips and strategies given to us. We discussed situations from our teaching that were not good and got advice on how to improve it, change it, etc. I have few things I'm going to try out to improve my practice." (Past participant)

By participating you will:

- establish a vision for your teaching and explore strategies to maintain resilience as a new teacher
- experience methods for increasing progress for low attaining students, and methods for promoting positive behaviour
- discover activities to generate stimulating displays and mathematics outside the classroom
- explore problem solving skills, questioning strategies, resources and feedback that makes a difference

www.stem.org.uk/my205

Building confidence as a newly qualified mathematics teacher summer school

Starting teaching mathematics in September? Just completed your NQT year?

Join us this July to explore what makes good mathematics teaching. As well as exploring a range of teaching strategies to help engage and inspire students during your first teaching post we will look at questioning, promoting positive behaviour, planning for learning and ways of giving feedback that make a difference.

"A really enjoyable course with engaging and inspiring facilitators. Would recommend this course to any new Maths teachers." (Past participant)

The summer school will provide time and space to reflect upon your practice working in a highly supportive and stimulating environment. The course is suitable for teachers of mathematics who are in the early years of their teaching career

During this course, we will:

- establish a vision for your teaching and explore strategies to maintain resilience as a new teacher
- experience methods for increasing progress for low attaining students, and methods for promoting positive behaviour
- explore problem solving skills, questioning strategies, resources and feedback that makes a difference
- action plan for changes in your own practice resulting from your learning on the summer school

By participating you will:

- explore what makes good mathematics teaching
- experience teaching methods to build confidence and help develop the teaching and learning in mathematics
- complete an action plan in order to put theory into practice

www.stem.org.uk/my506

Building confidence as a non-specialist secondary mathematics teacher

Perfect for teachers of mathematics who aren't specialists, increase your skills and knowledge of the subject and become more confident in your teaching of mathematics.

Do you want to feel more inspired and confident? Want to increase your knowledge and skills when teaching mathematics even though mathematics is not your specialism? Explore the characteristics of good mathematics teaching and develop strategies that promote good learning and deeper understanding. Develop strategies to teach algebra for understanding, build ratio and proportion on a firm foundation of multiplicative reasoning, use manipulatives and multiple representations, and approaches to problem solving.

By participating you will:

- understand what makes good mathematics teaching
- develop strategies for overcoming difficulties typically faced by non-specialist teachers
- teach for deeper understanding in mathematics
- build resilience in your students
- develop questioning techniques to encourage mathematical thinking

www.stem.org.uk/my213

Teaching assistants in secondary mathematics

Discover ways of working that support students' progress in mathematics, and also develop your knowledge of both mathematics content and pedagogy. Explore:

- proportional reasoning
- fractions, decimals and percentages: making the links
- algebra with understanding
- progression in calculation

By participating you will:

- use questioning to strengthen mathematical thinking
- develop reasoning and problem solving skills
- identify and resolve students' misconceptions
- assess mathematical understanding
- strengthen literacy in mathematics

www.stem.org.uk/my212

Teaching mathematics post 16

Teaching GCSE mathematics post-16 in a year

Do you want to offer something different for students required to take GCSE mathematics post-16? This two day residential course, run in conjunction with MEI, is designed for mathematics teachers, in schools or colleges, faced with the challenge of inspiring young people who are yet to achieve the required grade.

Explore the requirements of the new curriculum such as problem solving, justification, reasoning and proof. Different ways of teaching and learning which is more suited to GCSE resit students are examined, look at adapting and contextualising existing resources, as well as how to restructure your scheme of work.

By participating you will:

- develop expertise in the teaching and learning of GCSE resit post-16
- gain confidence and skills in delivering GCSE resit post-16
- explore a variety of freely available teaching resources
- create and share resources
- examine how to restructure your scheme of work

www.stem.org.uk/my504

An introduction to Core Maths

Core Maths is the new Level 3 qualification for students who achieved at least a Grade 4 (formerly a Grade C) in GCSE mathematics and wish to develop their practical skills so they may apply these in work, study or everyday life.

Core Maths is about students doing meaningful mathematical problems to increase their confidence in using mathematics to be better equipped for the mathematical demands of other courses, higher education and employment.

By participating you will:

- gain a clear understanding of the role of core maths in schools and colleges
- experience a different approach to teaching mathematics making it a different experience to GCSE mathematics
- consider different sources of resources and how they may be used in the classroom
- develop a strategy for assessing and tracking student progress
- compare the different available qualifications
- discuss different models for implementing core maths in your school or college

www.stem.org.uk/my507

New to teaching A level mathematics summer school

Our highly acclaimed annual four day summer school, run in conjunction with MEI and the University of Sheffield, is designed for teachers who have little, or no, experience of teaching A level mathematics. Develop pedagogical knowledge in order to improve teaching skills, thus giving the confidence to teach for understanding and engagement, rather than 'teaching to the test'. Experience a range of teaching techniques delivered through 12 sessions: eight featuring topics from pure mathematics, two from mechanics and two from statistics. Also, plan and deliver a team taught twenty minute lesson.

Designed for teachers who are:

- New to teaching, e.g. have no more than three years teaching experience. Ideal for teachers who have just completed their initial teacher training programme and are about to take up their first post

Or

- more experienced teachers of mathematics who are new to teaching A level

By participating you will:

- have a deeper understanding of the key concepts that underpin A level mathematics, and how these ideas are linked together across the subject
- have developed a range of active learning approaches to teaching these concepts
- understand the importance of practical approaches to teaching applied mathematics

www.stem.org.uk/my500

Teaching the new mathematics A level

Changes to A level specifications are to be introduced in 2017. These will require all students to study aspects of Pure mathematics, Statistics and Mechanics. In addition, three overarching themes of Mathematical Argument and Proof, Problem Solving, and Mathematical Modelling must be applied across the whole A level content. New material is included at both AS and A level. This course will explore approaches to teaching that strengthen the overarching themes, and aspects of the new content will be considered in detail. The traditional division of mathematics into separate teaching areas will also be discussed, together with the implications that the common content has for developing integrated Schemes of Learning. This course is run in conjunction with MEI.

By participating you will:

- how to meet the demands of the overarching themes of the new A level mathematics curriculum: mathematical argument, language and proof; mathematical problem solving; mathematical modelling
- the benefits and challenges of integrated teaching of pure mathematics, mechanics and statistics
- the use of technology to enhance teaching and learning at A level

Participants will complete a gap task putting into practice ideas considered in the first residential period.

www.stem.org.uk/my216

Teaching for deep understanding in A level mathematics

Are you a teacher of A level mathematics who wishes to reflect on their A level teaching in preparation for the new curriculum? Explore subject pedagogical knowledge in order to develop confidence to teach for understanding and engagement. Discuss the impact of previous professional development and reflect on the effectiveness of pedagogical strategies in the mathematics classroom. Work with other teachers to develop and present effective approaches to the introduction of key ideas in A level mathematics. The advantages of using technology to enrich your teaching will also be explored. In addition you will be introduced to the overarching themes for the new specifications and the changes to applied maths. This course is run in conjunction with MEI.

By participating you will:

- deepen your subject knowledge in areas of AS/A level mathematics
- work with colleagues in developing effective approaches on introducing key ideas in A level mathematics
- learn about the new A level in mathematics, the overarching themes and changes to applied maths
- use dynamic geometry to enhance understanding and encourage problem solving in the classroom

www.stem.org.uk/my501

Maths in...

Developing shared approaches to maths in science and science in maths

There is significant overlap between science and mathematics curricula, but students' experience of shared topics is often very different in the two subjects. Are applications from science regularly used to explore concepts in maths lessons? Are the mathematical techniques that students learn in science developed with understanding?

This course aims to identify common content and explore ways of teaching that develop sufficient mathematical understanding whilst providing fluency in the skills required for science. The course is designed for teachers of GCSE science and teachers of GCSE maths. Experience shows that the most is gained from this course if a science teacher and a maths teacher from the same school attend together.

By participating you will:

- explore the requirements of the mathematics and science specifications
- experience the mathematical content in science examinations
- discuss what makes good teaching
- consider practical models for departments working together
- carry out a gap task to investigate the use of common resources
- create an action plan to be implemented back in school

www.stem.org.uk/my214

Mathematics for biology teachers

There is an increased mathematical demand in both the GCSE and A level biology specifications. This course is ideal for teachers of biology who want to improve their understanding of the mathematics, to successfully teach GCSE and A level biology.

Explore teaching strategies for a wide range of mathematical topics including: standard form, ratio, percentages, significant figures, relationships between variables and handling data. In addition, consider the mathematical topics necessary for success at A level: logarithms and the statistical tests, Spearman's rank, student t-test and chi-squared.

By participating in this course you will:

- improve your knowledge of the mathematical topics required for GCSE and A level biology
- have a deeper understanding of the reasons why students have difficulty applying their mathematical skills in a biological context
- identify pedagogies to help address these issues
- explore mathematics resources suitable for teaching GCSE and A level biology

www.stem.org.uk/ny284

Developing mathematics skills for the new design and technology GCSE

Designed to support teachers from all material areas, this CPD activity will develop your subject knowledge in mathematics ready for delivery of design and technology GCSE.

With support from our mathematics specialists, investigate the subject knowledge needed to solve mathematics problems that form part of the assessed material in the new design and technology GCSE. Develop successful teaching methods for delivery in the classroom. Identify areas of the key stage 3 design and technology curriculum where mathematics could be incorporated, increasing student exposure to the practical application of mathematics outside of their maths lessons, and better preparing students for the new key stage 4 and key stage 5 design and technology qualifications.

The mathematics content covered during the course will help with the teaching of rearranging equations, comprehension of graphs, tessellation and calculations of measurements such as percentages, ratios, fractions, scale, calculating costs and quantities, area and volume.

By participating you will be able to:

- develop your own subject knowledge in the teaching of mathematics
- create your own teaching resources to support teaching the new design and technology GCSE
- identify areas in the key stage 3 curriculum that can help develop mathematics skills, strengthening design and technology qualifications and maths across the curriculum

www.stem.org.uk/ty225

Developing mathematics skills for the new design and technology AS and A levels

Designed to support teachers to develop their subject knowledge in mathematics, helping to prepare you for delivery of the new AS and A levels in design and technology.

With support from our mathematics specialists, we will investigate the subject knowledge needed to solve design engineering, product design and fashion and textiles maths problems and develop teaching methods for delivery in the classroom. We will also help to identify areas of the KS3 design and technology curriculum where mathematics could be incorporated, increasing student exposure to the practical application of mathematics outside of their lessons, and better preparing students for the new KS4 and KS5 design and technology qualifications.

The mathematics content covered during the sessions will help with the teaching of rearranging equations, trigonometry, comprehension of graphs and calculations of measurements such as percentages, ratios, areas, volumes, geometry, statistics, and probability. (Note: we will not be covering projectile motion and calculus; from the design engineering specification.)

By participating you will:

- develop your own subject knowledge in the teaching of mathematics
- create your own teaching resources to support teaching the new AS and A Levels
- identify areas in the KS3 and KS4 curriculum that can help develop mathematics skills, strengthening design and technology qualifications and maths across the curriculum

www.stem.org.uk/ty222

On-line Courses

Assessment for Learning

Assessment for Learning (AfL) is a term that's widely used in education, but applied in ways that are variable in their effectiveness. This free online course - designed for STEM teachers in primary and secondary schools, and sixth form and further education colleges - will help you understand and use it more effectively.

As the course progresses, you'll be encouraged to try things out in your laboratory and classroom; actively reflect on what you discover in the process; and share your experience as part of the course discussions.

You'll also be invited to read some of the scientific literature about Assessment for Learning. Your learners will gain as a result - and you'll enjoy your teaching more

www.stem.org.uk/online-cpd

Differentiating for learning in STEM teaching

Flexible participation. Improve your practice of differentiating for learning, by diagnosing your students' current levels of understanding and differentiating for learning by task. Led by experts in assessment for learning Dylan William, Chris Harrison and Andrea Mapplebeck.

Join this course to examine the key principles of effective differentiated learning and get a range of practical ideas for how you can best respond to the assessment evidence elicited from your students. Designed for STEM teachers in primary and secondary schools, and in 6th form and FE colleges, improve your understanding and use of differentiating for learning within science, technology, engineering and maths.

This course takes around three hours per week to complete. You can choose when and where to participate, studying around your work and life commitments. You are supported and encouraged to discuss your ideas with fellow teachers, try out activities, apply concepts to your teaching context and reflect on your practice. You will have access to high-quality resources, including classroom footage and guidance from experts in STEM education and assessment.

www.stem.org.uk/online-cpd

Managing behaviour for learning

Transform your classroom by making small shifts in your own behaviour. This free, online course has been developed by the National Science Learning Centre (United Kingdom) as part of their suite of high impact professional development for teachers of science, technology, engineering and mathematics.

Paul Dix, a leading voice in behaviour management in the UK and internationally, will help you learn how to positively influence the behaviour of your students through small shifts in your own behaviour.

Other areas covered in this course include how to develop the habits of effective behaviour managers; mechanisms for communicating success with students, parents and colleagues; how to use group rewards to change behaviour; and how to manage difficult confrontations.

Participants will develop a good understanding of how to be proactive about encouraging good behaviour in your classroom and reactive in responding calmly to poor behaviour.

The course is for teachers of science, technology, engineering and mathematics subjects, focusing mainly on the context of UK schools and colleges. It aims to help them learn how to maintain discipline when dealing with unruly students. Although the course draws from examples experienced in the UK, the material covered is relevant to an international audience.

You will be able to:

- assess how your own behaviour influences the behaviour of your students
- apply rules and routines to achieve consistency
- apply recognition intelligently to motivate students
- demonstrate how to reduce friction when students behave badly
- develop reparation and restorative practice

www.stem.org.uk/online-cpd



Project ENTHUSE is a unique partnership of government, charities and employers that have come together to bring about inspired science teaching through the continuing professional development of teachers of science and technicians across the UK. The ENTHUSE Partners are the Wellcome Trust, the Department for Education, BAE Systems, Biochemical Society, BP, Institution of Engineering and Technology, Institution of Mechanical Engineers, Rolls-Royce and Royal Society of Chemistry.

ENTHUSE bursary

ENTHUSE bursaries are provided by Project ENTHUSE which is a unique partnership of government, charities and employers that have come together to bring about inspired STEM teaching through the professional development of teachers, technicians and support staff across the UK.



The process:



ENTHUSE bursaries contribute towards the costs of attending world-class professional development provided by the National STEM Learning Centre for all UK state funded schools and colleges. All eligible schools are able to apply and will receive the Award on completion of CPD activities.