Computer Science Accelerator

A guide for senior leaders in secondary schools and colleges.
Improving your computing department through a flexible professional development programme.

Find out more at teachcomputing.org
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Introduction
About this guide

Skills for a digital world

Putting computer science at the heart of a broad and balanced curriculum will give your students a solid grounding in computational thinking and problem solving, which will prepare them for opportunities that will come their way and careers that may not exist yet. The subject will enable young people to gain the knowledge and skills that will help them make sense of, and contribute to, the society and world they live in.

The challenge faced by schools

In the wake of the move from ICT to computer science, there is a shortage of teachers with the right skills and knowledge to deliver strong results and drive uptake at key stage 4. Recruiting and retaining teachers in this subject is presenting enormous challenges for many secondary school and college leadership teams.

How Computer Science Accelerator can help

The National Centre for Computing Education (NCCE) is funded by the Department for Education to provide support for computing education in England. It is working to equip and empower teachers in this high-demand subject by providing free computing courses and resources for schools and colleges.

This guide provides an overview of Computer Science Accelerator, a learning programme that provides a flexible solution to the challenge of delivering high quality computing education, by upskilling teachers already in your school. The course will help improve the knowledge and confidence of existing and trainee computing teachers and help non-specialists gain the knowledge and skills to teach computing.

Find out more at teachcomputing.org
Computer Science Accelerator: at a glance

What is Computer Science Accelerator?

A free flexible professional development programme designed to give any teacher the subject knowledge and confidence to teach computer science at GCSE level.

<table>
<thead>
<tr>
<th>Who is the programme for?</th>
<th>Why do they take part?</th>
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</thead>
<tbody>
<tr>
<td>Current and trainee GCSE computer science teachers</td>
<td>Improve subject knowledge</td>
</tr>
<tr>
<td>Current key stage 3 computing teachers</td>
<td>Improve subject knowledge and / or enable them to teach GCSE computer science</td>
</tr>
<tr>
<td>Teachers of other subjects and phases</td>
<td>Convert to teaching computing / computer science, as a main or second subject</td>
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</table>

There are suggested learning pathways for each group – recommended core courses that will meet their needs – or you can browse courses and build your own tailored package.

When and where?

Courses are available in several formats:

- **ONLINE**
  Learn at your own pace, any time.

- **LIVE REMOTE**
  Learn in a live online class – a range of times are available during and outside of school hours.

- **FACE TO FACE**
  Attend courses in person, at centres throughout England.

Find out more at teachcomputing.org
Benefits for schools and senior leaders

- deliver a broad and balanced curriculum
- improve teacher retention
- develop staff’s subject knowledge
- drive attainment in computing, and bring benefits for other subjects: a deeper understanding of computing will better equip students to tackle mathematical, scientific or engineering based problems
- offer effective support for those teaching outside their main areas of expertise

DELIVER A BROAD AND BALANCED CURRICULUM

IMPROVE TEACHER RETENTION

COURSES ARE FREE*

* to participants from state-maintained schools in England

Bursaries

Bursaries are available for teachers at state-funded secondary schools and colleges in England, with up to £1,800 for every teacher who completes the programme. This could be to pay for travel and cover, and support the computing department.

With some schools sending multiple members of staff on the courses, the bursaries can add up and make a significant difference to your computing department.

Annie Cuffe Davis, Computer Science Teacher

“The bursary has had a real, visible impact. We have been able to invest in our department, getting laptop computers for our students and robots for our coding clubs. We’ve also now got so many resources for our lessons that have come from all of the courses I took, which my colleagues are using now too.”

Find out more at teachcomputing.org
Benefits for teachers taking the courses

- enhance subject knowledge to teach with confidence, whatever the starting point, and drive attainment
- lead others and implement change
- increase opportunities for career development
- access effective support for those teaching outside their main areas of expertise
- improve job satisfaction
- drive attainment
- obtain a professionally-recognised training certificate, awarded by BCS, The Chartered Institute for IT

In a 2020 survey of CS Accelerator graduates:

98% teachers who complete the programme say that their confidence, subject knowledge and enjoyment have increased due to the programme.

Spencer Organ, Computer Science Teacher

“The course not only secured and developed the skills and subject knowledge for me to deliver computer science at both key stage 3 and GCSE but also the skills to help support other colleagues in the school who will also be delivering the units.”

Find out more at teachcomputing.org
Benefits for your students

» benefit from more inspiring, engaging lessons, driving interest and achievement in a subject closely related to a growth area of employment

» gain enhanced awareness of the digital world and the opportunities it may afford

» develop computational thinking skills and problem-solving ability, transferable to other subjects and careers

In a 2020 survey of CS Accelerator graduates:

50% of teachers who complete the programme say that more students are studying computer science due to the programme.

“Computer Science Accelerator has enabled our non-specialist staff to upskill and to gain confidence in the subject. Through a blend of online and remote learning courses, they are now equipped to teach the key stage 3 computing curriculum to our students at Hessle High School.”

Jo Anderson, Senior Leadership Team

Find out more at teachcomputing.org
Getting started

As a senior leadership team, identify your challenges, and consider how Computer Science Accelerator can help you. Teachers can enrol and take a quiz to assess their subject knowledge on the website. This will help direct them to the most appropriate courses. The learning pathways on the following pages will also provide a starting point for senior leaders and teachers to work together to decide which courses are most appropriate.

If a shortage of teachers is stopping you from offering GCSE computer science, do any teachers of other subjects have spare capacity?

If your results are not where you would like them to be, would your teachers benefit from deepening their subject knowledge?
Learning pathways
## Learning pathway: New to computing / non-specialist

**Recommended for**
non-specialist teachers of subjects other than computing / computer science:

- with spare capacity to teach computing / computer science as a second subject
- converting to make computing / computer science their main subject

### COURSE TYPE

<table>
<thead>
<tr>
<th>COURSE TYPE</th>
<th>COURSE NAME</th>
<th>TIME REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LIVE REMOTE OR FACE TO FACE</strong></td>
<td>Foundation knowledge of computer systems for Key Stage 3 and GCSE</td>
<td>Live remote: 1 day (across several sessions)</td>
</tr>
<tr>
<td></td>
<td>Introduction to algorithms, programming and data in GCSE computer science</td>
<td>Live remote: 1 day (across several sessions)</td>
</tr>
<tr>
<td></td>
<td>Introduction to computer systems, networking and security</td>
<td>Live remote: 1 day (across several sessions)</td>
</tr>
<tr>
<td><strong>ONLINE</strong></td>
<td>How computers work: demystifying computation</td>
<td>2 hours per week (4 weeks)</td>
</tr>
<tr>
<td></td>
<td>Programming 101: an introduction to Python for educators</td>
<td>2 hours per week (4 weeks)</td>
</tr>
<tr>
<td></td>
<td>Impact of technology: how to lead classroom discussions</td>
<td>2 hours per week (3 weeks)</td>
</tr>
</tbody>
</table>

Together, these six courses offer a comprehensive introduction to the whole GCSE curriculum.

The Computing / non-specialist learning pathway gives more details on recommended courses, and suggests additional courses to enhance this pathway.

### Julie Simmons, English Teacher

“The hard work paid off and studying has made me feel confident teaching computer science. I’m now part of an exciting future.”

Find out more at [teachcomputing.org](http://teachcomputing.org)
## Learning pathway:
### Preparing to teach GCSE computer science

**Recommended for**
key stage 3 computing teachers wanting to improve their subject knowledge to enable them to teach GCSE computer science.

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<tr>
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</table>
| **LIVE REMOTE OR FACE TO FACE** | Python programming constructs: **sequencing, selection & iteration** in GCSE computer science | **Live remote:** 1 day (across several sessions)  
**Face to face:** 1 day |
|             | The internet and **cyber security**                                        | **Live remote:** 1 day (across several sessions)  
**Face to face:** 1 day |
|             | **Representing algorithms** using flow-charts and pseudocode                | **Live remote:** 1 day (across several sessions)  
**Face to face:** 1 day |
| **ONLINE**  | How computing works: **demystifying computation**                           | **2 hours per week** (4 weeks)                     |
|             | Understanding **computer systems**                                         | **2 hours per week** (4 weeks)                     |
|             | An **introduction to computer networking** for teachers                    | **2 hours per week** (4 weeks)                     |

The **Preparing to teach GCSE computer science learning pathway** gives more details on the core recommended courses, and suggests additional courses to enhance this pathway.

Find out more at [teachcomputing.org](http://teachcomputing.org)
Learning pathway: Advanced GCSE computer science

Recommended for teachers already confident teaching GCSE computer science and wanting to improve student progress and attainment even further.

<table>
<thead>
<tr>
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<th>TIME REQUIRED</th>
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</table>
| **LIVE REMOTE OR FACE TO FACE** | Higher attainment in GCSE computer science – meeting the challenge of the exams | Live remote: 1 day (across several sessions)  
Face to face: 1 day |
| Python programming projects: advanced subject knowledge, implementation and testing | Live remote: 1 day (across several sessions)  
Face to face: 1 day |
| **ONLINE** | Programming with GUIs | 2 hours per week (3 weeks) |
| Design and prototype embedded computer systems | 2 hours per week (3 weeks) |

The Advanced GCSE computer science learning pathway gives more details on the core recommended courses, and suggests additional courses to enhance this pathway.

Find out more at teachcomputing.org
Learning pathway:
New to algorithms and programming

**Recommended for**
teachers wanting to improve their confidence in a specific area.

### COURSE TYPE  
**LIVE REMOTE OR FACE TO FACE**

<table>
<thead>
<tr>
<th>COURSE NAME</th>
<th>TIME REQUIRED</th>
</tr>
</thead>
</table>
| Introduction to algorithms, programming and data in GCSE computer science | Live remote: 1 day (across several sessions)  
Face to face: 1 day |
| Python programming constructs: sequencing, selection & iteration | Live remote: 1 day (across several sessions)  
Face to face: 1 day |

### ONLINE

<table>
<thead>
<tr>
<th>COURSE NAME</th>
<th>TIME REQUIRED</th>
</tr>
</thead>
</table>
| Programming 101: an introduction to Python for educators | 2 hours per week  
(4 weeks) |
| Programming 102: think like a computer scientist | 2 hours per week  
(4 weeks) |

The *New to algorithms and programming learning pathway* gives more details on the core recommended courses, and suggests additional courses to enhance these pathways.

Find out more at [teachcomputing.org](http://teachcomputing.org)
# Learning pathway: New to computer systems

**Recommended for**
teachers wanting to improve their confidence in a specific area.

<table>
<thead>
<tr>
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<th>TIME REQUIRED</th>
</tr>
</thead>
</table>
| **LIVE REMOTE OR FACE TO FACE** | **Introduction to computer systems, networking and security in GCSE computer science** | Live remote: 1 day (across several sessions)  
Face to face: 1 day |
|                        | **Computer processors**                                                     | Live remote: 1 day (across several sessions)  
Face to face: 1 day |
| **ONLINE**             | **An introduction to computer networking for teachers**                     | 2 hours per week (3 weeks)                          |
|                        | **Representing data with images and sound: bringing data to life**          | 2 hours per week (3 weeks)                          |

The **New to computer systems learning pathways** give more details on the core recommended courses, and suggests additional courses to enhance these pathways.

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*Leroy David, Computer Science Teacher*

“I definitely feel more confident as I have picked up a range of skills and techniques that I will be able to use within my classroom and also to enhance my subject knowledge.”

Find out more at [teachcomputing.org](http://teachcomputing.org)
How else can the NCCE support your school?
How else can the NCCE and Teach Computing support your school?

The Teach Computing curriculum

Our curriculum contains everything you need to teach computing at key stages 1 to 4, including lesson plans, slides, worksheets, homework and assessments. All of the content is completely free to use, and has been created by expert teachers, based on the latest pedagogical research and teacher feedback. It also provides an innovative progression framework where computing content (concepts, knowledge, skills, and objectives) has been organised into interconnected networks we call learning graphs. Using the Teach Computing Curriculum allows schools to offer an ambitious course of study without adding unduly to the workload for their staff.

Support from subject matter experts

We offer fully funded consultancy and guidance to schools and colleges who meet our eligibility criteria. This is provided by a network of computing education specialists, called subject matter experts. Our experts can work with you and your staff to identify an action plan for improving or delivering computing and computer science in their school or college. You can find more information about available support and funding at teachcomputing.org/bursary.