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Paul Dunn

Southchurch High School

Abstract

Students are carefully provided with feedback on their learning to enable them to improve.   
They gain the knowledge leading onto the skills that are necessary to enable them to become successful lifelong learners.

Curriculum – COMPuter science

Intent, Curriculum Map & Curriculum

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# Whole School INTENT

**Southchurch students embrace learning opportunities.**

# INTENT, IMPLEMENTATION & IMPACT

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| **Intent**   * Southchurch students will draw on real world experiences to provide an engaging viewpoint of computing concepts and solve problems by building their own programmes and applications. |
| **Implementation**  • Sequencing of the curriculum  • Adaptive teaching (to take into account of what the learners know and don't know)  • Extending opportunities for extracurricular |
| **Impact**  • All students will achieve their potential with altered trajectories |

# KS2 Links

[KS 1 & 2 Computing](https://assets.publishing.service.gov.uk/media/5a7c576be5274a1b00423213/PRIMARY_national_curriculum_-_Computing.pdf)

# CURRICULUM MAP

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| **Year Group** | **Half-term 1** | **Half-term 2** | **Half-term 3** | **Half-term 4** | **Half-term 5** | **Half-term 6** |
| **Year 7** | **Clear messaging in digital media**  Students will use different applications to create posters and slides on a given theme.  Students will be assessed on their final piece of work. | **Networks from semaphores to the Internet**  Students will learn about networks and the benefits of networking, before learning how data is transmitted across networks using protocols.  Students will complete an end of unit assessment. | **Programming essentials in Scratch – part I**  The main programming concepts in this unit are sequencing, variables, selection, and count-controlled iteration.  Students will be assessed on their final program. | **Modelling data using spreadsheets**  Students will be introduced to spreadsheets and the concept of cell referencing. They will collect, analyse, and manipulate data, before producing graphs and charts.  Students will be assessed on their final spreadsheet. | **Programming essentials in Scratch – part II**  Students will build upon their knowledge of sequence, selection and iteration, developing their problem-solving skills. Students will learn how to create subroutines, and to create and use lists.  Students will complete an end of unit assessment. | **Using media – gaining support for a cause**  Students will develop a deeper understanding of IT and digital literacy to create a blog post about a real world cause they are passionate about.  Students will complete an end of unit assessment. |
| **Year 8** | **Media – vector graphics**  Students will produce an illustration or logo using vector graphics. Students will use Inkscape which is a vector graphics editor.  Students will complete an end of unit assessment. | **Layers of computing systems**  Students will develop a concise overview of how computing systems operate, conveying the essentials. Contemporary topics of AI and open source software are included in this unit.  Students will complete an end of unit assessment. | **Developing for the web**  Students will explore the technologies that make up the internet and the World Wide Web, including exploration o HTML and CSS.  Students will complete an end of unit assessment. | **Representations – from clay to silicon**  Binary digits will be introduced to students as the symbols computers use to record, process and transmit information.  Students will complete an end of unit assessment. | **Mobile app development**  Students will learn through the design and development process of creating their own mobile app, using App Lab. Students will understand how hardware components can improve user experience and safety.  Students will complete an end of unit assessment. | **Introduction to Python programming**  Students will begin by writing simple programs that involve input and output, moving on through arithmetic operations, randomness, selection and iteration.  Students will complete an end of unit assessment. |
| **Year 9** | **Python programming with sequences of data**  Students will learn how data can be represented and processed in sequences, such as lists and strings.  Students will complete an end of unit assessment. | **Data science**  Students will be introduced to data science, and they will be empowered how to use data to investigate problems. Students will gain an understanding of how visualising data can help identify patterns and trends.  Students will complete an end of unit assessment. | **Representations – going audiovisual**  Students will focus on making digital media such as images and sounds, and discover how media is stored as binary code. GIMP and Audacity will be used to manipulate images and sounds.  Students will complete an end of unit assessment. | **Introduction to cybersecurity**  Students will learn the techniques that cybercriminals use to steal data, disrupt systems, and infiltrate networks. Students will also learn how to protect against these attacks.  Students will complete an end of unit assessment. | **Applying programming skills with physical computing**  Students’ programming skills will be applied and enhanced in the context of physical computing, using the BBC micro:bit.  Students will complete an end of unit assessment. | **IT and the world of work**  Students will develop a deeper comprehension of the methods employed by organisations and the impact the use of IT in the working environment has on all stakeholders.  Students will complete an end of unit assessment. |
| **Year 10** | * 1. **Systems architecture**   Students will learn about the FDE cycle, CPU components and their functions and Von Neumann Architecture. They will learn about the factors that impact on CPU performance, and embedded systems.  Students will complete an end of unit assessment.   * 1. **Memory and storage**   Students will learn about primary and secondary storage. They will learn the units of capacity and how to calculate file size. | * 1. **Memory and storage**   Students will learn to convert between binary, denary and hexadecimal. Students will learn how characters, images and sound are stored using binary digits.  Students will complete an end of unit assessment.   * 1. **Networks & topologies**   Students will learn about types of networks and the hardware needed for a Local Area Network. Students will learn about modes of connection, and the common protocols used.  Students will complete an end of unit assessment. | * 1. **Network security**   Students will learn about threats to computer systems and networks, and how to identify an prevent vulnerabilities.  Students will complete an end of unit assessment.   * 1. **System Software**   Students will gain an understanding of operating systems. | * 1. **Systems software**   Students will learn the purpose and functionality of utility software.  Students will complete an end of unit assessment.   * 1. **Ethical, legal, cultural and environmental impact**   Students will learn the impacts of digital technology on wider society. Students will understand the legislation relevant to Computer Science.  Students will complete an end of unit assessment. | **2.1 Algorithms**  Students will learn the principles of computational thinking, learning to design, create and refine algorithms. This will be developed into understanding the steps of the algorithms for searching and sorting.  Students will complete an end of unit assessment. | **Unit 2.1 continued**  Students will learn the principles of computational thinking, learning to design, create and refine algorithms. This will be developed into understanding the steps of the algorithms for searching and sorting.  Students will complete an end of unit assessment  Students will revise for and complete their end of year exams. |
| **Year 11** | **2.2 Programming fundamentals**  Students will develop a practical use of the techniques in Python. Students will be able to use comparison and arithmetic operators in their programs. Students will be able to use the four data types within their code.  Students will extend their coding to include string manipulation. Students will learn basic SQL commands.  Students will complete an end of unit assessment.  **2.3 Producing robust programs**  Students will understand how to deal with invalid data in a program. Students will learn how to test a program and identify syntax and logic errors  Students will complete an end of unit assessment. | **2.4 Boolean Logic**  Students will understand the operators AND, OR and NOT and be able to produce truth tables for them.  Students will complete an end of unit assessment  **2.5 Programming languages and IDEs**  Students will know the differences between high and low level languages Students will understand the tools and IDE can provide.  Students will complete an end of unit assessment. | **REVISION** | **REVISION** | **REVISION AND EXAMS** |  |

# KS5 Links

[AS & A-Level Computer Science](https://www.gov.uk/government/publications/gce-as-and-a-level-for-computer-science)

[Cambridge Technical Level 3](https://www.ocr.org.uk/qualifications/cambridge-technicals/information-technology/#specification-tab-2)

# KS4 END OF COURSE EXPECTATIONS

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| **OCR’s GCSE (9–1) in Computer Science** | |
| **Aims and learning outcomes** | * Understand and apply the fundamental principles and concepts of Computer Science, including abstraction, decomposition, logic, algorithms, and data representation * Analyse problems in computational terms through practical experience of solving such problems, including designing, writing and debugging programs * Think creatively, innovatively, analytically, logically and critically * Understand the components that make up digital systems, and how they communicate with one another and with other systems * Understand the impacts of digital technology to the individual and to wider society * Apply mathematical skills relevant to Computer Science |
| **Assessment objectives** | * AO1: Demonstrate knowledge and understanding of the key concepts and principles of Computer Science. * AO2: Apply knowledge and understanding of key concepts and principles of Computer Science. * AO3: Analyse problems in computational terms:   + to make reasoned judgements   + to design, program, evaluate and refine solutions. |

[OCR Specification](https://www.ocr.org.uk/Images/558027-specification-gcse-computer-science-j277.pdf)

# NATIONAL CURRICULUM LINKS

[KS3 & KS4 national curriculum](https://assets.publishing.service.gov.uk/media/5a7cb981ed915d682236228d/SECONDARY_national_curriculum_-_Computing.pdf)

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| **Purpose of study**  A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world. Computing has deep links with mathematics, science and design and technology, and provides insights into both natural and artificial systems. The core of computing is computer science, in which pupils are taught the principles of information and computation, how digital systems work, and how to put this knowledge to use through programming. Building on this knowledge and understanding, pupils are equipped to use information technology to create programs, systems and a range of content. Computing also ensures that pupils become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world. |
| **Aims**  The national curriculum for computing aims to ensure that all pupils:   * Can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation * Can analyse problems in computational terms and have repeated practical experience of writing computer programs in order to solve such problems * Can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems Are responsible, competent, confident and creative users of information and communication technology. |

# PERSONAL DEVELOPMENT CURRICULUM

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| **Aims**  The computing curriculum is designed to support and promote the vision of Southchurch High School, “A community of Opportunity, Learning and Aspiration”. The curriculum recognises not only the importance of allowing students to flourish academically but also our wider role in preparing our students for their adult life beyond school. Our Personal Development programme is underpinned by five core pillars;   * **Equality and Diversity** * **Cultural Capital** * **Community and Wellbeing** * **Careers and Employability** * **Character Development.** |
| **Character Development:** All members of the school community (regardless of background or ability) understand, develop and demonstrate the values that underpin our student mission of a Community of Opportunity, Learning and Aspiration.   * **Community of Opportunity** – All students are supported and encouraged to perform Infront of their peers and watched with mutual respect. Students are provided with various, collaborative group tasks each lesson in which all learners are supported to engage equally and freely share their ideas and opinions. * **Learning** – All students have equal opportunity to access the curriculum. Students are taught and placed into mixed ability classes, ensuring all students are supported with adapted practice, where necessary, to ensure curriculum access. All students are invited to an array of enrichment opportunities including; clubs, trips and visits. * **Aspiration** – Students are encouraged to develop their love of design through careers talks, trips and external speakers. They take every opportunity within lesson to learn and take control over their own personal development. |
| **Equality & Diversity:** The computing curriculum aims to develop an understanding through discussions and research showing how people of different faiths, convictions, ability, gender, heritage and ethnicity can form a successful, cohesive and happy community that draws from the best in each of us.   * Students will explore how the development of computer systems takes into consideration of cultural, ethical, and religious factors within the designing of new system. * Promotion of Computer Science to female students because it is currently a male dominated subject. |
| **Wellbeing & Community** – The computing curriculum recognises the importance of our students knowing how to care for themselves both mentally and physically, whilst they also develop personal traits and virtues that will motivate and guide students with confidence and resilience. |
| **Cultural Capital** – The computing curriculum supports the school’s vision in ensuring that all students gain the knowledge and cultural capital they need to succeed in life through a wealth of experiences both in and outside the taught curriculum.   * **Extra curricular**   + **BBC Microbits**   + **Raspberry Pi Foundation projects**   + **Mini Sphero** * **Trips and visits**   + **Bletchley Park** * **Events**   + **BEBRAS challenge for all subject students - November** * **British Values:** * **Individual Liberty**: In computing we understand how to use our right to freedom of speech in a respectable and thoughtful way, being considerate of how this speech will affect * others. We understand the freedom the internet and computers offer us in discovering information and connecting us with the world. * **Mutual Respect**: Students are respectful when listening to the opinions and views of other students. We understand that as we are connected with the world while accessing * the internet, we are exposed to the widest range of views, and we are learning to respect them. * **The Rule of Law:** The classroom rules enable all students to develop their skills in an environment where equipment and each other’s feelings are respected. * The classroom rules ensure students are all responsible for the learning environment. * **Tolerance:** Students are tolerant of the opinions and creative ideas of each other. Students value the wide variety of cultures that we explore from all over the world and are tolerant of different faiths and beliefs in the styles we study. We use the opportunities offered in computing to question, challenge and understand people with these different characteristics to support and develop our tolerance of them. * **Democracy:** Students are all part of the learning experience and are listened to. Students assess each other’s work and celebrate each other’s successes. All students are granted autonomy and have the opportunity to make choices on how to develop their own creativity. In computing we learn to understand and be considerate of the views of other internet users. |
| **Careers & Employability –** The computing curriculum is designed to ensure students have a breadth of opportunities and experiences that our pupils can start to build their own future pathways on. Through the computing curriculum, our students are supported to develop the following skills;   * Communication * Confidence * Teamwork and Leadership * Listening and Responding * Logical thinking * Programming to extend critical thinking and problem solving * Maths skills * Research   **Events**   * BEBRAS challenge |

# SMSC CURRICULUM LINKS

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| **Spiritual development**  Through the projects we offer and the curriculum we deliver at both key stages, the pupils are taught how to investigate computing system. This includes the environmental, cultural and ethical impacts of how products affect the quality of our daily lives. Pupils are encouraged to develop their thinking skills and explore the wider natural world around them. They are taught to reflect upon what they see and develop ideas and solutions to problems which are both workable and innovative. |
| **Moral development**  Pupils are faced with moral decisions throughout the computing curriculum. This includes looking at the legislations linked to computing with the Computer Misuse Act and the Data Protection Act. Students also look at Creative Commons License, which is transferrable across their entire curriculum. The ethics within computing are discussed across many areas such as; when looking at “hacktivists”; the mining and disposal of materials; and the development of computer systems using AI. Within the classroom and the wider community, the pupils are expected to show respect to others and take responsibility for their own actions and of those around them, taking into consideration the consequences. |
| **Social development**  Pupils are often asked to make decisions and justify their answers with regards to a given scenario. Pupils learn to articulate their thoughts and feelings about their own and other's work. To do this they need to take criticism without offence and provide feedback which is carefully considered and constructive. |
| **Cultural development**  Pupils are taught that all their computing work should be sensitive to needs and beliefs of different backgrounds, ensuring all imagery, text and ideas won't cause offence. Pupils must consider how their ideas can impact the world around them, particularly the impact of the creation of more e-waste across the world. |

# Equality, Diversity and Inclusivity Links

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| **Aims**  Within the different projects we look to ensure that there is a broad range emphasising equality, diversity and inclusivity. We ensure that all students work together within pairs, groups and teams to strengthen professional relationships within the classroom and promote an acceptance for all students and the wider world around them. |