Computing

Curriculum Principles

By the end of their education a student of Computing at Dixons Brooklands Academy will:

- Understand that the world of technology is constantly evolving. Students will be able to use their knowledge of threats and dangers that technology poses to ensure that members of the community can keep themselves safe online.
- Recognise the significance of Computer Science and emerging technologies, using skills like abstraction and computational thinking to solve real-world problems and develop programs in professional coding languages.
- Develop proficiency in information and communication technology, enabling them to create professional documents, preparing them for success in the modern workforce.
- KS4 Digital Information Technology students will have developed abilities to understand the threats IT businesses face and provide real-life proactive solutions to reduce these risks, as well as comprehending IT decisions made on behalf of the company, environment, and society.

Our department vision is "The Computing Department fostered a collaborative learning environment where students became passionate, skilled, and innovative. We equipped them to thrive in the ever-changing world of technology. Our students were well-prepared to contribute meaningfully and work effectively in teams, shaping the future together."

In order to achieve a true understanding of Computing, topics have been intelligently sequenced based on the following rationale:

- The curriculum is designed for a progressive learning journey. Building upon foundational knowledge acquired in Year 7 such as algorithm creation and effective working practices, each year in KS3 offers progressively more complex challenges and opportunities to build upon prior learning. This spiral approach ensures key concepts are revisited and recalled throughout KS3.
- The curriculum integrates the four core areas of computing: Information Technology (IT), Digital Safety, Computer Science, and Entrepreneurship. This interweaving approach ensures students develop a holistic understanding of computing and its applications in the real world.
- The curriculum fosters strong literacy links to embed key computing terminology. This ensures students develop a confident and precise vocabulary, enabling them to articulate themselves as computer scientists from Year 7 onwards.
- The Computing curriculum equips students with the ability to understand and apply the fundamental principles and concepts of computer science, including, abstraction, logic, algorithms, and data representation.
- Students develop the ability to analyse problems from a computational perspective and formulate solutions through the creation of computer programs using programming languages widely used in the working world.

The Computing curriculum will address social disadvantage by addressing gaps in students' knowledge and skills:

- To bridge the digital divide and provide access for all students learning opportunities, the curriculum prioritises in-school access to technology. This includes offering IT suites during breaks and after school so students who lack home access can complete coursework and homework assignments.
- The curriculum is designed to be inclusive by equipping all students with the technological skills, such as programming, computational thinking needed to thrive in an increasingly digital world. This is achieved by exposing students to carefully sequenced schemes of work that mirror real-life applications and developments in technology. These relevant learning experiences ensure students leave with the foundational skills to succeed in a wide range of technology-driven careers.
- The curriculum is designed to ensure students from disadvantaged backgrounds are exposed to real-life applications that are used within the technology workforce and foster an environment of collaboration, where students learn from their mistakes and progress in each sequenced lesson. Every lesson focuses on a skill or key concept and students will be provided with the opportunity to utilise this skill against a real-world scenario to promote flexible knowledge ensuring they are successful post-16.
- The curriculum fosters a culture of experimentation through engaging schemes of work that utilise a variety of tools and applications. Scaffolding and differentiated instruction are provided to ensure all students, including those with additional needs, have the opportunity to explore and succeed.
- Through regular formative assessments, including low-stakes quizzes and interleaved content delivery, the curriculum identifies knowledge gaps early on. This allows for targeted interventions and scaffolded instruction to address these gaps and ensure all students, regardless of background knowledge, have the opportunity to succeed.

We fully believe Computing can contribute to the personal development of students at DBK:

- Beyond the curriculum, the department offers a robotics and programming club. This extracurricular activity fosters valuable personal development skills by encouraging students to create programs that mimic real-life scenarios. Through this process, students develop problem-solving, critical thinking, and collaboration skills, all while nurturing creativity and innovation.

- The curriculum actively promotes inclusivity by featuring diverse role models in computing from across the globe. Highlighting these key figures from various backgrounds demonstrates the wide range of people who have and continue to contribute to the field of computing.
- The curriculum emphasizes the development of computational thinking skills, specifically abstraction and decomposition. These skills empower students to break down complex problems into manageable steps and identify the underlying core principles. This approach is then applied to real-world scenarios within relevant schemes of work, fostering critical thinking, resilience, and the ability to find creative solutions.
- The curriculum integrates opportunities to develop strong oral communication skills. Students engage in debates and discussions linked to the legal system and its application in the technological world. By tackling complex topics like ethical hacking, legal implications, and responsible IT use, students refine their debate skills, learn to articulate nuanced viewpoints, and develop critical thinking in a relevant context. This promotes personal development by building confidence, communication skills, and the ability to navigate complex ethical issues.

At KS4, our belief is that homework should be interleaved revision of powerful knowledge that has been modelled and taught in lessons. This knowledge is recalled and applied through a range of low-stakes quizzing and practice.

- In KS4 Computer Science and Digital IT, homework utilises interleaved worksheets. These worksheets revisit key procedural knowledge at spaced intervals, disrupting the forgetting curve and solidifying this knowledge in students' long-term memory. Additionally, teachers can strategically utilise targeted worksheets or revision questions to address knowledge gaps identified through assessment.
- KS4 Computer Science utilises a low-stakes online platform for regular homework assignments set by the teacher. This platform functions as a spaced repetition system, where personalised questions are reviewed and revisited upon incorrect answers, actively interleaving revision topics to combat the forgetting curve and enhance long-term knowledge retention.

Opportunities are built in to make links to the world of work to enhance the careers, advice and guidance that students are exposed to:

- Throughout the first three years of our Computing curriculum, students engage with 'Career Spotlights' integrated within each Scheme of Work. These spotlights showcase real-world applications of the skills they are learning, connecting classroom concepts to careers. For example, in Year 7, students explore how algorithms are used in everyday life through Flowol programming, followed by a 'Career Spotlight' demonstrating how similar algorithms optimize traffic light patterns, introducing them to the field of traffic engineering.
- Recognising the underrepresentation of women in the computing sector, our curriculum actively engages girls in Years 8-9 through targeted sessions and activities. These sessions introduce them to the exciting fields of technology and cybersecurity, showcasing the impactful contributions women can make in these areas. In previous years girls have attended events such as Cyber-First where they have voiced their pleasure in pursuing a career in cybersecurity.
- Careers links are made evident in the curriculum from Years 7 through to 11. These links are signposted in the Long Term Plan, Schemes of Work and Curriculum Overviews.
- A true love of Computing involves learning about computational thinking to create solutions and digital artefacts, sparking a passion for problem-solving and creativity. We teach beyond the specification requirements, but do ensure students are well prepared to be successful in GCSE examinations:
- Our curriculum is designed to equip students with the knowledge and skills needed to excel in their GCSE exams. It aligns with the key principles of the National Curriculum for England, ensuring a broad and balanced foundation. By interleaving topics across Computer Science, Information Technology, and Digital Literacy, students develop a comprehensive understanding of these essential areas. Additionally, we utilise engaging gamified learning applications like Flowol, Kodu, and Binary Cisco Game to foster creativity and cater to diverse learning styles, maximizing student success in their GCSE examinations.
- Beyond the core curriculum, our department provides exciting enrichment opportunities that cultivate a culture of teamwork and creativity. Students employ robotic kits like Kitroniks and Micro:Bits to engage in collaborative problem-solving and unleash their innovative potential.