Stanborough

IT and Computing Department: Curriculum Intent and Vision

Our vision for the IT and Computing Curriculum at Stanborough is to provide all students with a supportive and challenging learning experience that balances all aspects of IT and computer science.

With technology playing such a significant role in society today, we believe that 'Computational Thinking' is a skill that students must be taught if students are to be able to participate effectively and safely in a digital world.

Our aim for students, upon completion of the curriculum, is for them to be digitally literate so that they are able to express themselves and develop their ideas through information and computer technology, at a level that is suitable for the future workplace and as active participants in the digital world.

Key Stage 3

What is your curriculum intent for Key Stage 3?
Our intent at this stage is to develop our students to become autonomous users of IT, taking a computational thinking approach to problem solving. Supporting students in becoming discerning users of data and information.

What have students been taught at Key Stage 2 to prepare them for Key Stage 3?
At KS2, students build a foundation to their understanding of IT and Computer Science through several different pathways: • Students learn the fundamentals of computing, developing their ability to apply logic and reasoning using Block Based coding interfaces and robotics. • Students solve problems through simple methods of decomposition and by learning how to create successful computational programs. This foundation of knowledge plays a key role in supporting our students at KS3 when they are introduced to more challenging elements of block-based programming and then progressing on to using text-based programming languages. Throughout primary teaching e-safety is paramount in their learning, building a picture of how technology effects them in everyday life and how to stay safe. Online safety and digital communication is the first unit taught at KS3 and revisited each year throughout secondary school. Students will have used a range of suitable Key Stage 1 and 2 software packages to support them with the use of data handling, graphics editing etc. as a foundation to packages then used at KS3. We are a primary liaison school, with links to our local feeder primary schools. Supporting is given via CPD sessions to primary teachers and Computer Science masterclasses to KS2 pupils, giving primary pupils' an insight into KS3 learning.

How are any gaps in student knowledge addressed to enable them to access the curriculum at Key Stage 3?
The focus at the start of a student's Key Stage 3 journey is to ensure that all students are fully aware of how to be safe online and understanding their digital footprint. Although this is studied at a primary level, our unit gives them a stronger understanding of how it affects them at their current age and as they progress throughout secondary school. We explore student's previous learning and build upon this to ensure students make sensible choices. Gaps in knowledge come mainly from understanding of programming. We have designed our units and resources to build students' programming knowledge and skill level using different programming platforms, but we also allow for students to work at an independent pace based on their needs. Students will have used some application software at a primary level. In each of our units taught, students are given the basic skills to use the tools to design and create digital products. From then we build on those skills and input stretch and challenge.

What do students cover in Key Stage 3? When do they study it?		
Year 7	**Year 8**	**Year 9**
Unit 1 – Digital Communication	**Unit 1 – Animation**	**Unit 1 – Spreadsheets**
In the first half term, students explore online safety and the power of online communication. Students are taught to understand how to use digital tools responsibly and the legal implications of online publishing. They also develop their research skills, learn to use search tools more effectively and being able to make judgements on reliable sources. Students create a digital poster to	In the first half term, students will incorporate their knowledge from the previous unit, digital design, to create animations. Students will explore the different types of animations, their features and their uses. They will learn to create simple animations using both stop-frame and key-frame animation. They will then plan, using storyboards, an animation for a given	In the first half term, students learn to use a spreadsheet application software. They will use spreadsheet tools to analyse data from a number of spreadsheet model scenarios. Students will learn use different formulae across a range of data and functions, to calculate data in a spreadsheet. They will also learn how to produce graphical data, in the form of charts, understanding the

demonstrate to others how they can stay safe online, using appropriate content and understanding of purpose and audience.
This unit covers many areas of RSE.

Unit 2 - Digital Design

In the second half of the Autumn term, students will cover one unit of work; Digital Design. This unit will teach students how to use IT skills in a business context. Students are given a product/service which they must promote using a variety of digital media. Students will develop their ability to create, re-use, revise and re-purpose digital artifacts for a given audience. They will explore how graphics are used in real world contexts, producing their own graphic products using bitmap and vector tools. Students will be taught the meaning of copyright when using other people's digital property.

Unit 3 – Computers and Coding

In the Spring term, students will build their understanding about the fundamentals of Computer Science. They will be able to identify the main components that make up a computer system, and explain how they fit and work together, to create real world systems. Students will learn how to use algorithms as a tool to think logically, supporting them to solve a computational problem.
They will learn how to convert between binary and decimal, as well as applying simple Boolean logic to programming. Students will use BBC Micro: bit technology to program, following instructions using a graphical, drag and drop code editor. Learning the basics of program flow and building on programs they create.

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scenario. Students will gather digital assets in which to re-purpose and create assets of their own.
They will learn and develop skills that allows them to create a seamless animation, using adequate time frames.

Unit 2 – Databases

In the second half of the Autumn term, students will learn to use database application software. This unit introduces students to the idea that organisations store data about people and items, looking at numerous real-world contexts. Learning the benefits of using a computerised database system. Students will understand the structure of a database which will allow them to build a 'Superhero theme' database. They will gather data to input and manipulate the data and information within their database. Students will go on to think about how a database can be designed for a specific audience and purpose, considering both the way it looks and how it functions.

Unit 3 - Programming Fundamentals

For the Spring term, students will learn fundamental programming concepts, using a text-based programming language, Python. They will use their previous knowledge from Scratch and using BBC Micro: Bits as a starting base for their programming development.
Students will be able to navigate their way around the integrated development environment, building their understanding of the basic features of the Python language. Students will develop their Python skills each week by creating different programs in the form of games and small interactive systems. They will test, debug and refine their programs regularly throughout development. Students will learn to program using input and output, apply previous drag and drop knowledge; sequence, selection and iteration to text based programs. They will be introduced to such techniques as string manipulation, use of mathematical operators and lists/arrays.

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importance of selecting the most appropriate chart type. Students will learn about the different ways that data can be presented and why different representations are suitable for different audiences and purposes. Understanding the importance of formatting a spreadsheet correctly by applying this to their work.
This unit will cover the importance and use of spreadsheet software in a real-world business context.

Unit 2 – App Development

In the second half of the Autumn term, students will learn to program using an App Development software. Students will develop their previous programming skills to plan and create applications that would be suitable for the use on a smartphone or tablet device. They will begin by learning how to navigate the different views of the programming interface and creating apps that use numerous programming techniques. Students will progress to the planning and development of their own apps. They will test, debug and refine their programs regularly throughout development in order to produce a fully working and suitable product.

Unit 3 – Movie Maker

For the Spring term, students will incorporate their knowledge from previous digital units.
They will learn to create simple movie clips using movie/video editing software. Students will use the skills learnt to plan for a movie/advert scenario, knowing the importance in understanding the needs of the client brief. This includes the use of storyboards, mood boards, scripting, and audio. Students will gather digital assets in which to re-purpose and create assets of their own.
They will learn and develop skills that will allow them to create a seamless movie, using adequate time frames.

Unit 4 – Scratch	Unit 4 – Web Development	Unit 4 – Enterprise
In the Summer term, students will undertake Game Design using Scratch programming software. Students will develop their understanding further, learning the basic concepts of programming by using a visual, drag and drop programming interface. They will develop their skills each week by creating different programs in the form of games, interactive stories and animations. Skills developed will include the use the sequencing, selection, iteration and using variables. Students will also apply their knowledge from the previous unit. This will lead them to planning, designing, creating, testing and debugging their own game. Students have a 1 hour lesson per week.	In the Summer term, students are introduced to communications and networking. Understanding ways in which we communicate, a basic structure of the internet and the use of web browsers and webpages. They will analyse existing websites focusing on the strengths and development areas of each design. Students will learn to use a web development software and its features, including navigation and the use of a master page. They will be given a scenario in which they will plan and design a website suitable for a particular purpose and audience. To stretch students, they will have a brief introduction to HTML programming. Students have a 1 hour lesson per week.	The final unit of key stage three incorporates the skills that students have learnt and developed throughout past units. They will combine multiple applications and demonstrate their skills learnt in IT and Computer Science within a business context. Students are given a scenario in which they will create a brand and product that they will market. Working in groups, students will create a range of digital promotional materials and carry out financial analysis for their product. They will learn the importance of using competitor and target audience research to drive a successful product. In their groups, they will understand the importance of teamwork, leadership, presenting and meeting deadlines. Students will pitch their ideas in a "Dragon's Den" style pitch. These key skills will support them in further education and beyond.

Why do they study it in that order?

When students begin their IT and Computing journey in secondary school it is important for them to start with matters of online safety to continue learning and using technology in a safe manner. Students need to be aware of their digital footprint and understanding how they behave online affects them and others. Therefore, we begin with the topic Digital Communication.

Students build on their programming skills and understanding of computer fundamentals (binary, algorithms, hardware etc.) throughout our Year 7 units – Computers & Coding and Scratch. This then builds and supports their ability to transfer the same programming concepts needed in Year 8 and Year 9 for more advanced text-based programming, such as Python.

Students learn early in KS3 how to problem solve by decomposing a problem and using algorithms, a vital skill needed when programming at any level. These skills are also transferable to the way student's problem solve in other subjects.

Students learn how to use graphics software early on in Year 7 by creating, reusing, revising and repurposing digital images and other digital artifacts. Students built their confidence and ability to use such software across a range of units. Each unit stems from learning how to use graphics software, as skills can be transferred across the other units.

Animation, Movie making, and web development all require knowledge and understanding of the tools within each software package.

By the end of Year 9, students will have gained and refined their skills to use multiple applications, which will be used within our Enterprise unit. Unit also supports student's creative development and allows them to focus on purpose and audience, as with many of our units.

Students will have experienced a range of topics during KS3 that will support them in making choices for KS4.
Each unit also gives insight into how they relate to the real world and possible career choices.

Does the Key Stage 3 coverage reflect the content in the national curriculum?

Our Key Stage 3 curriculum reflects the national curriculum expectations. This can be cross referenced with the key aims of the curriculum below.

The follow points in red are touched upon throughout each year at KS3. Units that cover the points below include:
Y7 Unit 3 – Computers and Coding, Unit 4 – Scratch
Y8 Unit 2 – Databases, Unit 3 - Programming Fundamentals
Y9 Unit 2 – App Development
- design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
- understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem
- use 2 or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions
- understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, binary addition, and conversion between binary and decimal]
- understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems
- understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits

The following points are covered extensively in several units.
Y7 Unit 2 – Digital Design
Y8 Unit 1 – Animation, Unit 4 – Web Development,
Y9 Unit 1 – Spreadsheets, Unit 3 – Movie Maker

- undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users
- create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, design and usability

The following point is covered in Unit 1 – Digital Communication and re-visited during Anti – bulling week and Safer internet week.

- understand a range of ways to use technology safely, respectfully, responsibly, and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct, and know how to report concerns

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How do you ensure students embed knowledge? What do you revisit? When do you revisit it?

Online safety is revisited regularly throughout KS3. Students use the internet most lessons therefore the importance of being safe and respectful online is reiterated. We also deliver lessons during anti – bulling week and safer internet week.

Programming is revisited during each year of KS3. Recapping of programming knowledge and cross referencing how students have achieved skills in a previous unit. Starting with computers and coding, students learn to program and understand the fundamentals of computer science this is then revisited, expanding their knowledge in Scratch, Programming Fundamentals and App Design.

Each IT unit recaps the use of the software skills required to create digital products. Students then revisit these units during their Enterprise unit.

Lessons provide several ways to embed knowledge into our students.
- Keyword and definition activities
- Recap activities from previous lessons. Knowledge check points.
- Homework based on class tasks to check and support student understanding
- Repetitive use of functions in programs to understand how they work in different scenarios

How do your curriculum choices contribute to the student's cultural capital?
Students learn early about what 'digital divide' means. Understanding that we are all different in the way we use technology as a part of our lives, for some it is more than others. Learning to respect people's choices. Students learn how their use of technology and systems may affect others, the way to communicate across social media and other means of communication respectfully. They are also taught about legal implications of the choices they make. Students learn to be considerate users of ICT. They explore the use of technology systems in the real world and how they have positively enhanced our daily lives. Also discuss how robotics and artificial intelligence impacts on our society in both positive and negative ways.

Key Stage 4

What is your curriculum intent for Key Stage 4?
Our intent at this stage is to broaden and deepen our students understanding of IT and Computer Science, allowing students to be more independent with their approaches to computational thinking and their solutions to complex problems relating to real world scenarios. Students can make links from the knowledge across different units to support their overall understanding of the course.

How does Key Stage 3 prepare students for Key Stage 4?
Throughout KS3 students will have worked on a range of topics covering vast elements of IT and Computer Science. Students are equipped with the foundation knowledge in the use of programming languages; Block based languages and text-based languages. They will have the basic knowledge of computer systems, giving them an understanding of the course context. Students will have used a range of software that will include the use of graphics manipulation, data handling and website design which they can apply to their course.

What do students cover in Key Stage 4? When do they study it?	
Year 10	Year 11
Students begin KS4 starting with programming, reinforcing their understanding from KS3 and learning more complex techniques that are needed for component 2 of their exams. *Extending Python Programming Knowledge* Students then move on to learning about the structure of a computer system. Learning in depth how the components function together. Students learn how a system works 'behind the scenes' and its hardware. Understanding a system processes data and carries out instructions, using input, process storage and output. This is covered in the following units: *1.1 Systems Architecture* *1.2 Memory & Storage* *2.4 Boolean Logic* Students learn how to use abstraction, decomposition, and algorithmic thinking to define a problem. They expand their knowledge of designing structure diagrams & flowcharts and use this to effectively write Pseudocode when planning to write a program.	Students begin the year learning in depth about how networks are formed, how we communicate and understanding the hardware needed for the transmission of data and communication. Students learn about the everyday threats to our computer systems and networks. Understanding the types of malicious threats and how to avoid them which is covered in the following units: *1.3 Computer Network Connections & Protocols* *1.4 Network Security* This unit teaches the issues that are created and addressed by technology, and the impact on society. This includes ethical, legal, cultural, and environmental impacts. Students look at how technology affects our daily privacy and the legal implications such as; Data Protection, computer misuse, copyright and licenses. This is covered in the following units: *1.6 Ethical, Legal, Environmental and Cultural Concerns*

Students learn to efficiently search and sort data and apply this to their programs.

Alongside the algorithm's unit students continue to expand their knowledge and the independence in programming. learning that there are different ways in which a problem can be solved.

Students cover a range of programming fundamental skills in more depth to create fully working, real world examples of systems. They work through a continuous system cycle of planning, creating, testing, debugging, and revisiting their plans. This is covered in the following units:

2.1 Algorithms
2.2 Programming Fundamentals

Students learn about the software needed in computer systems. They look at different operating systems & interfaces. Understanding the important function of an OS. Learn about utility software such as encryption, defragmentation and file management & data compression.
This is covered in the following units:

1.5 System Software

Students have learnt about testing throughout their programming experiences. This unit goes into greater depth about testing and debugging a program.

Students learn about defensive programming and the use of defensive designs while continuing to create code which is easy to maintain and knowing the purpose of testing and types used for validation.

Students then revisit algorithms and programming in preparation for their final exams.

Students learn the characteristics of both high and low-level languages. Looking at translators, compilers, interpreters. Tools in an IDE; editors, error diagnostics, run-time environments & translators.

This is covered in the following units:

2.3 Producing Robust Programs
2.5 Programming Languages & IDEs

Why do they study it in that order?

Students study these topics in this order as particular units complement each other, for example, 2.1 Algorithms and 2.2 Programming Fundamentals, to prepare them for each exam component.

Students begin with recapping and extending their programming.

This is followed on throughout both year 10 and 11 to ensure students are confident in their programming skills and able to continually build on their knowledge. Repetition and use of algorithms for multiple scenarios supports students understanding within component 2.

Students begin with 1.1 Systems Architecture and 1.2 Memory & Storage as it is important for students to understand the fundamentals of computing first, understanding how a computer system works and processes data to function. This then leads to other units such as System software. By understanding networking and communications first, students are then able to relate to network security issues.

Once most units are covered students have a solid understanding of technology and how it works, which allows them to apply this understanding to the ethical, legal, environmental, and cultural concerns within computer science.

How do you ensure students embed knowledge? What do you revisit? When do you revisit it?

To ensure students' knowledge is embedded, assessment opportunities are given midway through each unit using mini assessments and when each topic is completed students complete an end of unit assessment.

Throughout the units, students' complete multiple-choice quizzes and keyword terminology/definition activities to reaffirm their understanding. This is regularly revisited to ensure they are embedded in their written exam technique.

Students work to program a vast variety of mock systems to support them with their programming skills. Programming and pseudocode practice are revisited throughout both years of key stage 4 to support their understanding.

How do your curriculum choices contribute to the student's cultural capital?

The topics studied in 1.6 Ethical, Legal, Environmental and Cultural Concerns play a large part in teaching students about how technology and computer science can have a profound, positive effect of society.

Students are taught about the ethical impact of technology, such as the use of artificial intelligence and robotics in the workplace.
They are educated in the environmental issues that are created and how they can limit the impact of these issues.
Students learn about the legal aspects of the use of technology and how to behave safety and respectfully online and using others digital property.

Key Stage 5

What is your curriculum intent for Key Stage 5?
At KS5 we give our students the opportunity to study two pathways; • A – Level Computer Science • BTEC Level 3 in Information Technology. Both our courses prepare students with skills and knowledge needed to progress future careers or higher education study in IT or Computer Science. When given the tools, our intent is for students to become independent and focused learners, driven to develop their understanding of IT and computing concepts and tackling complex problems, relating to real world scenarios. It is our aim that students will make seamless links between different units to support their overall understanding of the course.

How does Key Stage 4 prepare students for Key Stage 5?
At KS4 we offer GCSE computer science. The units covered at this stage are an excellent foundation point for A level computer science. Many units covered at GCSE are covered in greater detail in the specification at A level. We follow the OCR specification through GCSE to A – Level to ensure consistency in their learning.

What do students cover in Key Stage 5? When do they study it?	
Year 12 **A-level Computer Science** Component 1 and Component 2 are taught in parallel throughout the year. **Component 1:** **Unit 1:** The characteristics of contemporary processors, input, output and storage devices. This unit covers in depth the function of the CPU and types of processors such as RISC and CISC. Looking at how processor architecture had evolved. Exploring different input, output and storage devices and their uses within a computer system **Unit 2:** Software and software development This unit looks at both systems and application software. Students study the different methodologies used in the software development lifecycle. They study the theory of different programming languages and apply to practical programming. **Unit 3:** Exchanging Data Students study how data is exchanged between different systems. Looking at methods of compression, encryption and hashing. Learning the key features of databases and how to create and manipulate a database through SQL. They study the characteristics and structure of networks as well as network security. Learning how to interpret and program using HTML, CSS and JavaScript languages. **Unit 4:** Data types, data structures and algorithms	**Year 13** **A-level Computer Science** Component 1 and Component 2 are taught in parallel throughout the year. In year 13 we revisit each unit layering on additional objectives in preparation for their final exam. **Component 1:** **Unit 1:** The characteristics of contemporary processors, input, output and storage devices. **Unit 2:** Software and software development **Unit 3:** Exchanging Data **Unit 4:** Data types, data structures and algorithms **Unit 5:** Legal, moral, cultural and ethical issues

Leaners study how data is represented and stored within different structures. Using different algorithms that can be applied to these structures. Students learn computer arithmetic, using binary and hexadecimal values, and Boolean algebra.

Unit 5: Legal, moral, cultural and ethical issues
Students discuss and debate the ethical, moral and cultural issues that surround computer science in the real world. Also, looking at computing related legislation such as the Data Protection Act and the Computer Misuse Act.

Component 2:
Unit 1: Elements of computational thinking

Understanding what is meant by computational thinking. Looking at the concepts within Thinking abstractly, ahead, procedurally, logically and concurrently when solving a problem.

Unit 2: Problem solving and programming
Students learn how computers can be used to solve problems and how programs can be written to solve them. They benefit from being able to program in a procedure/imperative language and object-oriented languages.

Unit 3: Algorithms
Students analyse and use algorithms to describe problems and different standard algorithms.

BTEC IT

Unit 3: Social Media
Learners explore how businesses use social media to promote their products and services. Learners also implement social media activities in a business to meet requirements.

Unit 2: Databases (Exam May)
Learners study the design, creation, testing and evaluation of a relational database system to manage information.

Component 2:
Unit 1: Elements of computational thinking

Unit 2: Problem solving and programming

Unit 3: Algorithms

Component 3: 20% of a students' final grade comes from completing a programming project based on a system of their own choosing. The project is introduced to students in the Summer term of year 12 and their Analysis is completed before the start of year 13.

Projects must include:

- Analysis of the problem
- Design of the solution
- Developing the solution
- Testing
- Evaluation

BTEC IT

Unit 1: IT Systems (Exam Jan)
Learners study the role of computer systems and the implications of their use in personal and professional situations.

Unit 6: Website Development
Learners investigate website development principles. They will design and develop a website using scripting languages.

Why do they study it in that order?

For computer science we follow the units in order of the specification. The components are taught parallel as there are objectives that cross-over between the units. Component 2 prepares students in completing their programming project in year 13.

For BTEC IT, the topics are taught in this order as it makes sense to finish on Unit 1: IT system, as this unit is an examined unit that incorporates the learning from the other units.

It is also useful for Website design to follow on from Social Media, as aspects from this unit follow through to Website design. We also teach the compulsory units first.

How do you ensure students embed knowledge? What do you revisit? When do you revisit it?

Throughout the year we ensure knowledge is embedded by:
- Given students topic tests at the end of each unit to assess their understanding

- Ensuring all students are given support material such as a course companion and keywords/definitions which are referred to each lesson.

Checklists are used that mirror the course specification objective, so students are able to RAG their understanding regularly.

We use Cornell note taking with students when they are watching concept videos to support their understanding when they revisit a topic.

Practice exam questions are worked on in class and for homework regularly.

How do your curriculum choices contribute to the student's cultural capital?

The topics studied in Legal, Moral, Cultural and Ethical Issues play a large part in teaching students about how technology and computer science can have a profound, positive effect of society.

Students are taught about the ethical impact of technology, such as the use of artificial intelligence and robotics in the workplace. They are educated in the environmental issues that are created and how they can limit the impact of these issues. Students learn about the legal aspects of the use of technology and how to behave safety and respectfully online and using others digital property.

When students plan for their programming project, they all take into account the impact their system will have in the real world and ensure they take into consideration the legal, moral, cultural and ethical issues surrounding their system**.**

Throughout the BTEC IT units, students build a sound understanding of how to effectively select and use appropriate IT systems that will benefit them personally and professionally, taking into consideration the impact this may have in the real world.

How do you prepare students for learning beyond Key Stage 5?

In both courses, students study a wide range of topics that build on their understanding and broaden their knowledge of how IT and computer science are utilised in the real world.

Those with knowledge and skills in computer science have the opportunity to pursue new and exciting careers in the conception of computer systems, that increasingly shape work and leisure activities.

Students cover a range of topics that help to inform them in the route they may wish to develop further through entry to Higher Education with the foundation knowledge needed to underetake degrees in Computer Science, Computer Programming or Computer Games Design.

Students are given necessary skills and knowledge to seek employment in areas that utilise computing, and continue to develop through practical experience and training.

Students complete a programming project that sees them apply a software development lifecycle, similar to the way systems are developed in the real world. This covers different areas such as design, development and testing of a system.

The BTEC Level 3 National Extended Certificate in Information Technology qualifies for UCAS points so on successful completion students could move on to study for a degree or BTEC Higher National Diploma in related subjects such as; IT, Computer Science, Information Systems, Multimedia, Software Engineering, Computer Networking, e-Business and Information Management.

Students are also equipped with the knowledge to allow them to go on to work based training such as IT User/Practitioner NVQs or vendor-specific qualifications.