
COMPUTER SCIENCE/IT DEPARTMENT KEY STAGE 3 CURRICULUM OVERVIEW

The Computer Science /IT department key stage 3 curriculum is designed to implement the Academy’s vision of “Deepening Learning, Raising Aspiration”, in line with the OAT curriculum strategy of “Teach, Develop, Change”. Our curriculum is carefully designed to build resilience, aspiration and independence in our learners.

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.

Fundamentally, we aim to develop the following in our learners at Ormiston Rivers Academy:

- Understanding and applying the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation
- Analysing problems in computational terms, and having repeated practical experience of writing computer programs in order to solve such problems, these are tools that our students will be able to use in other subject areas to better improve their problem-solving skills.
- Evaluating and applying information technology, including new or unfamiliar technologies, as our students live in what is classed as a rural area so they are heavily reliant on information technology in most aspects of their lives.
- Responsibility, competence, confidence and creativity as users of information and communication technology to ensure that our students will become viable competitors in the work force.
- Understanding of how diversity helps build toward more viable and innovative digital products.

**Year
7**

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

Autumn

Using Computers Safely, Effectively and Responsibly

Diversity

Computational thinking

File Management/
Social Networking

Keeping Data safe/Using Email

Decomposition, Abstraction,

Algorithms

Bebras Competition

Spring

Understanding Computers

E-safety Movie Making/Leaflet Computer Crime and Cyber-Security

Diversity

Elements of a Computer/CPU

Binary/Storage devices

Movie Maker / Publisher Skills
Computer Misuse
Cyber Crime

Copyright
Personal Data

Summer

Spreadsheets

Visual programming

Fundamentals

Formulae

Program Structure

Program Design

Autumn Half Term 1**Block 1 – Weeks 1 to 3**

- To gain the ability to manage files in File Explorer
- Understand about the possible dangers of social networking sites
- Learn how to respond to threats on the Internet
- Learn how to protect your identity online

Block 2 – Weeks 4 to 6

- Learn how to avoid being a victim of an email scam
- Introducing the use of email and be aware of the advantages and disadvantages of email
- Learn techniques to use a search engine efficiently

Notes/Links/Interleaving

- Completing an online game to find out if they are a good online citizen (Digizen) by recording responses in certain scenarios
- Establishing an understanding of the individual learning journeys of each learner

Additional Higher Content

- Research and comparison tasks
- Students will be introduced to the iDea Digital Duke of York Award- this will be monitored throughout the academic year with many students gaining an industry recognised award

Autumn Half Term 2**Block 3 – Weeks 7 to 9**

- Know the definition of the terms, Decomposition, Abstraction, Pattern Recognition
- Using those tools to help break down a large problem into smaller tasks
- Learn to recognise and identify patterns from a list of instructions

Block 4 = Weeks 10 to 12

- Create an Algorithm
- Evaluate an Algorithm
- Improve Algorithm after feedback/testing
- *Bebras Challenge*- Introduce the concept of Computational thinking (Decomposition) for problem solving.

Notes/Links/Interleaving

- Building on problem solving skills acquired in the Bebras challenge
- Link to GCSE Computer Science
- Links to all subjects/problem solving

Additional Higher Content

- Clearly articulate how pattern recognition can lead to improved problem solving and more efficient solutions
- Bebras challenge will enable students that do well to take part in the Oxford University TCS OCC competition

Spring Half Term 1

Block 1 – Weeks 1 to 3

- Introducing the hardware and software components that make up computer systems, and how they communicate with one another and with other systems
- Draw a block diagram showing CPU, input, output and storage devices
- Name different types of permanent storage device

Block 2 – Weeks 5 to 6

- Suggest appropriate input and output devices for a simple scenario
- Explain what RAM and ROM are used for
- Show how numbers and text can be represented in binary
- Explain the impact of future technologies
- Convert Binary to decimal/denary and vice versa

Notes/Links/Interleaving

- Using low stakes quizzing to recall the topics weekly
- Content is directly linked to Computer Science GCSE

Additional Higher Content

- Identify input and output devices for more complex scenarios
- Perform Binary addition
- Introduction to Hexadecimal

Spring Half Term 2

Block 3 – Weeks 7 to 9

- Acquiring video/document editing skills
- List some of the Health and Safety hazards associated with computer use
- Describe how to safely dispose of an old computer
- Introducing self-evaluation skills with a view to improve work.

Block 4 = Weeks 10 to 12

- Production of a leaflet/ movie that serves its purpose.
- Describe some of the dangers of putting personal data on social networking sites
- Protect their online identity using Privacy settings

Notes/Links/Interleaving

- Building on the understanding of dangers and threats using the internet.
 - Introducing the need to understand an audience and how that determines language and visuals used.
 - The production of leaflet/Movie will run alongside this topic displaying understanding of how to use technology safely, respectfully, responsibly and securely, how to recognise inappropriate content, contact and conduct and to report concerns
- Concentration on spelling and grammar to improve literacy skills.

Additional Higher Content

- Researching established E-Safety movies/leaflets and making effective modifications to own work, effectively creating a narrative.

Summer Half Term 1**Block 1 – Weeks 1 to 4**

- Introduce examples of how computer models are used in the real world
- Begin Practicing skills such as setting up a spreadsheet, entering data, analysing data
- Use simple formulae and functions
- Use a simple spreadsheet model to explore different “what if” scenarios

Block 2 – Weeks 5 to 6

- Manipulating data on a spreadsheet to create graphs to present information effectively
- Explain what is meant by a financial model
- Format, construct and manipulate a simple spreadsheet model using formulae
- Use conditional functions in calculations
- Use a spreadsheet model to predict and test the outcomes for different scenarios

Notes/Links/Interleaving

- Direct link to BTec Digital Information Technology Assessments
- Create an understanding of how spreadsheets are used in business
- Introducing the concept of manipulating Data
- This will also link to accountancy and business studies

Additional Higher Content

- Discuss benefits of models to society and how they used them in primary school, in a shop.
- Evaluate the effectiveness of a computer model

Summer Half Term 2**Block 3 – Weeks 7 to 9**

- Introduction to visual programming using KODU
- Identify what the terms program, navigate, object and world mean in computer games design
- Introduction to a range of game techniques
- Introducing what is meant in programming by the term selection
- Understanding why it is important to define program steps in a series of very specific instructions
- Revisit the concept of Computational thinking (Decomposition and Abstraction)

Block 4 = Weeks 10 to 12

- Design and create a simple program. (Kodu)
- Testing the program works correctly
- Apply a range of skills to modify and create a simple game world which interacts with objects
- Apply knowledge and understanding to modify a game to make a Kodu move in response to behaviours
- Explain how to use scoring and methods add additional depth to games

Notes/Links/Interleaving

- Computational thinking- Decomposition, this ability can be applied in all subjects and problem solving.
- Understanding that a computer program requires a precise series of instructions to operate as a scaffold to further programming

Additional Higher Content

- Link knowledge and understanding to independently create or modify a game, adding extra depth and complexity by using a range of more advanced game techniques such as power ups, timers etc.
- Create an algorithm that represents the program created

**Year
8**

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

Autumn

Law and Legislation

Diversity

Computational Thinking

Laws and Ethics

Environmental and Cultural issues

Computational Thinking- Application

Sort algorithms

Spring

Computer Architecture

HTML/ Web Design

Diversity

CPU, Registers, Translators

Dreamweaver HTML User Interfaces- Demographics Accessibility

Summer

Textual Programming

APPSHED

Diversity

Python Fundamentals

App Design, Audience needs, Research

Autumn Half Term 1**Block 1 – Weeks 1-3**

- Discover the main laws protecting users online (*Data Protection Act (GDPR), Computer Misuse Act, Copyright Design and Patent Act*)
- Identify which law is protecting users online in given scenarios

Block 2 – Weeks 4-6

- Discuss key arguments or points regarding cultural and environmental issues concerning technology.
- Introduce what is meant by a key stakeholder
- Identify stakeholders in a range of scenarios

Notes/Links/Interleaving

- Building on computer laws from year 7.
- Links to Btec DIT and CS GCSE
- Improving literacy skills and structure of written responses

- **Additional Higher Content**

- “I stream the latest movies online and never pay for my music. Everyone does it.”—Discuss the ethical issues around this.
- Students will be reminded about the iDea Digital Duke of York Award- this will be monitored throughout the academic year with many students gaining an industry recognised award

Autumn Half Term 2**Block 3 – Weeks 7-9**

- Recap of computational thinking
- Applying knowledge to activities to ensure deep understanding
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Block 4 = Weeks 10-12

- Introduction to Algorithms used by Processors to sort data
- Introducing Merge, Insertion and Bubble sort algorithms

Notes/Links/Interleaving

- Building on skills learnt in year 7
- Direct links to Maths and comprehension skills

Additional Higher Content

- Research into the O notation regarding sort algorithms and their efficiency of sets of data
- Bebras challenge will enable students that do well to take part in the Oxford University TCS OCC competition

Spring Half Term 1**Block 1 – Weeks**

- Recap on CPU and the role it plays within a computer
- Introduction to the concept of registers
- Data flow within a processor (CPU)

Block 2 – Weeks

- Introducing Translators- Compilers and Interpreters
- Understanding how each is used in regard to high and low level languages

Notes/Links/Interleaving

- Building on year 7 knowledge-CPU
 - The understanding of how a CPU works and why code needs to be translated is required to explain why Python must be compiled.
- Linked to GCSE CS

Additional Higher Content

- Investigation into the Advantages and Disadvantages of programming in Low and High Level languages

Spring Half Term 2**Block 3 – Weeks**

- Write HTML code to create a simple web page and display it in a browser
- Create a multi-page website about the main Laws and ensure they are described on your website using Dreamweaver/ Google Sites.
- Refining the website (User Interface) to be in line with the Equality Act 2010.

Block 4 = Weeks

- Understanding of User Interfaces and Accessibility
- Constructing a professional, well-formatted interactive website that is suitable for its intended audience (Demographic)
- *Bebras Competition*- Revisit the concept of Computational thinking (Decomposition and Abstraction) for problem solving.

Notes/Links/Interleaving

- Basic IT skills such as finding images and sizing or cropping them to fit a given space, selecting and editing text will be built upon.
 - Language is used effectively on the website to engage and inform the audience and show understanding.
- Ensure understanding of the meaning of accessibility regarding User Interfaces (Inc Website)

Additional Higher Content

- Create their own website at home using Google Sites or HTML

Summer Half Term 1**Block 1 – Weeks**

- Introduction into textual programming by way of Python
- Introducing variables and how they work
- Writing a basic program
- Debugging programs to ensure fit for purpose

Block 2 – Weeks

- Adding control structure to programs such as selection and iteration
- Using gained skills to create a quiz in Python

Notes/Links/Interleaving

- Students will be building upon the skills gained using Kodu (year 7)
- Quiz will become a revision resource for an academic subject of their choice

Additional Higher Content

- Installing Python IDE on home computer and practicing at home from Python.org
- Installing an App on smart device – such as SoloLearn to improve skills

Summer Half Term 2**Block 3 – Weeks**

- Evaluate a simple GUI (Graphical User Interface)
- Distinguish between a ‘web app’ and a ‘native app’
- Create a simple GUI (Graphical User Interface) within a web application

Block 4 = Weeks

- Create a quiz in their app
- Test their app to ensure all parts of it work
- Understand the importance of writing a good App description
- Add web links, gallery and other features to enhance the App

- **Notes/Links/Interleaving**

- Knowledge of user interfaces from prior learning used to produce a user-friendly App for the target audience
- Students can publish apps to their phone

Additional Higher Content

- Students can continue at home using APPSHED online
- Creating a quiz using the Blockly Visual Programming editor
- Use native JavaScript within the App

Year 9		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	System Architecture						Networks Diversity						
	Registers/Data flow			Storage devices			LAN, WAN PAN Ad Hoc			Wired Vs Wireless			
Spring	Algorithms						Textual Programming Diversity						
	Flow Charts(all), Pseudocode						Python- Next Steps- Functions, Iteration, Selection, Sequence						
Summer	Boolean Logic						Databases Diversity						
	AND/OR/NOT Gates, Truth Tables						Using a Database, create Queries Validation, Verification Database Design						

Autumn Half Term 1**Block 1 – Weeks 1 to 4**

- Introducing how common characteristics of CPUs affect their performance such as: Clock Speed, Cache Size, Number of Cores
- Understanding embedded systems and their purpose
- Further study of Registers – descriptions and role in data flow.

Block 2 – Weeks 5 to 6

- Introducing the need for secondary storage
- Recognising the different types of storage device and their characteristics
- Understanding the different ways data is stored

Notes/Links/Interleaving

- Building on the knowledge gained in Year 7- CPU's
- Building on the knowledge gained in Year 8- Registers
- Use of multiple-choice questions to highlight misconceptions

Additional Higher Content

- Produce a list of embedded systems found around the home
- Write a report discussing how the technology has changed over the last 40-50 years.
- Students will be reminded about the iDea Digital Duke of York Award- this will be monitored throughout the academic year with many students gaining an industry recognised award

Autumn Half Term 2**Block 3 – Weeks 7 to 9**

- Introducing the concept of networks, focusing on LAN, WAN, PAN and Ad-hoc
- Acquiring knowledge regarding what is meant by a client-server network, peer-to-peer networks and the role of each piece of hardware in a LAN
- Understanding what is meant by the cloud, virtual networks and why VPN's are used

Block 4 = Weeks 10 to 12

- Developing skills to be able to compare Advantages and Disadvantages of Wi-Fi and Ethernet
- Introducing Encryption and how/ when it is used on a network
- Understanding performance issues with ad hoc networks and issues affecting network availability

Notes/Links/Interleaving

- Direct links to GCSE CS and Btec DIT
- Use of multiple-choice questions to highlight misconceptions

Additional Higher Content

- Researching the different frequencies of Wireless communications
- Bebras challenge will enable students that do well to take part in the Oxford University TCS OCC competition

Spring Half Term 1**Block 1 – Weeks 1 to 4**

- Introduction to producing an algorithm using flowcharts, why they are used and how they are interpreted.
- Acquiring the basic skills to produce an algorithm using pseudocode

Block 2 – Weeks 5 to 6

- Practicing finding and correcting errors in algorithms.
- Acquiring the skills to complete algorithms where code is missing.

Notes/Links/Interleaving

- Link to business studies/ electronics/ CS GCSE and Btec DIT
- Building on skills acquired in year 7 and 8 (Decomposition and Abstraction)
- This will also allow for better program design when coding in Python

Additional Higher Content

- Challenge booklet will be available to students, who can use this to practice the algorithms with a view to writing more efficient code in Python

Spring Half Term 2**Block 3 – Weeks**

- Recap on how to use data types correctly and casting
- Introducing the skill to use a loop to repeat a section of code
- Write programs that use lists (known as 'arrays' in some languages)
- Use counters correctly in conjunction with **for** loops

Block 4 = Weeks

- Acquiring skills to create and call a function or procedure
- Explain the advantages of functions and procedures for reusable sections of program code
- Find and debug syntax errors
- Look at a given section of code and describe its function

Notes/Links/Interleaving

- Building on programming Skills acquired in Year 8
- Link to Computer Science GCSE
- Follow on from Algorithms to create a deeper understanding of programming

Additional Higher Content

- Create a program that is easy to use, caters for user input errors, has explicit error messages telling the user what the correct form of entry is.
- Installing Python IDE on home computer and practicing at home from Python.org
- Installing an App on a smart device – such as SoloLearn to improve skills

Summer Half Term 1**Block 1 – Weeks**

- Recap of why data needs to be in binary form
- Acquiring the skill to draw diagrams for the AND, OR and NOT gates
- Introducing Truth Tables for AND, OR and NOT gates and how they work

Block 2 – Weeks

- Drawing Logic Circuits and Truth Tables for 2nd Level Logic Circuits
- Using Logic gates to determine outcome of a written program

Notes/Links/Interleaving

- Direct link to Electronics/ CS GCSE
- Building on the understanding of how CPU's process data and how it works with programming control structures (Selection)

Additional Higher Content

- Create a half or full adder circuit
- Introduction to Boolean Algebra

Summer Half Term 2**Block 3 – Weeks**

- Introducing the concept of Databases- how and why they are used by organisations
- Acquiring the skills to create a database table and adding features to an input form to make it more user-friendly
- Create a basic input form to input data

Block 4 = Weeks

- Introduce the concept of Queries using more than one criterion
- Create a basic report with suitable headings with some customisation to make it user friendly
- Create a front-end application menu with buttons linking to a form and a report

Notes/Links/Interleaving

- Use of databases in the real world
- Links to Business
- Building on the importance of Data types

Additional Higher Content

- Create professional Reports that are fit for purpose
- Link two tables (relational database)
- Practice SQL <https://www.w3schools.com/sql/>