YEAR 10 COMPUTER SCIENCE

PREPARING STUDENTS FOR TOMORROW, BIT BY BIT

The Computing department will help to create, share, and apply knowledge in all branches of Computer Science and ICT. We will educate students to be successful, ethical, and effective problem-solvers with a passion to innovate and create, rather than just passive consumers and users of technology. We will develop an understanding and appreciation of all aspects of digital products, from how they work to how they look. We will foster curiosity and encourage exploration to create students who can contribute positively to the well-being of our society and who are prepared to tackle the complex 21st Century challenges facing the world.

Summary focus areas:

- Innovate, create, develop
- Solving 21st Century problems
- Active developers not passive consumers

Autumn		Spring		Summer	
Java Programming	Computer Systems and Architectures	Computer Networks	Digital Security	Java programming	Programming NEA Project

Homework for Computing is set weekly to support and extend the students' studies from their lessons. Work may be a mixture of practical, computer-based tasks and paper-based written work or design tasks. Activities set as homework may be:

- Preparatory work or research ahead of a new topic or concept being discussed in lessons.
- Extension work that allows the student to explore a topic in more depth or in other contexts.
- Application work that allows students to practise skills or demonstrate abilities.

Students are expected to spend around an hour on a homework activity each week and work is marked promptly to help students to identify and understand their weaknesses to make incremental improvements over the course of the year.

Unit	Duration (lessons)	Learning Objectives/Outcomes

Java programming	16	• Understand the different types of data and data structures:
		  ○ integers
		  ○ booleans
		  ○ reals
		  ○ characters
		  ○ strings
		• Be able to program with 1 and 2 dimensional arrays
		• Be able to use selection and iteration to control program flow and understand the uses of different type of loop
		• Be able to read from and write to files
		• Be able to generate and use random numbers
		• Be able to solve simple problems using code

Computer systems and architectures	14	• Explain the Von Neumann architecture
		• Explain the role and operation of main memory and the major components of a central processing unit (CPU)
		• Understand and explain the factors that affect the performance of a CPU:
		  ○ clock speed
		  ○ number of processor cores
		  ○ cache size
		  ○ cache type
		• Understand and explain the Fetch-Execute cycle
		• Understand the differences between main memory, secondary storage, RAM and ROM
		• Understand different types of secondary storage and their advantages/disadvantages
		• Explain the operation of solid state, optical and magnetic storage
		• Explain the term 'cloud storage' and discuss its advantages and disadvantages
		• Understand the term 'embedded system'

Computer networks	12	• Understand what a computer network is • Be able to discuss the advantages and disadvantages of using a computer network • Be able to describe and explain the bus and star networking topologies • Be able to discuss the advantages and disadvantages of each of these topologies • Be able to explain the different hardware needed as part of a network system and the role each piece of hardware plays • Understand common networking protocols and their role in communication between different devices • Explain the different layers of the TCP/IP protocol stack

Digital security	12	• Be able to define the term cyber security and be able to describe its main purposes
		• Understand and be able to explain the following cyber security threats:
		  ○ social engineering techniques
		  ○ malicious code
		  ○ weak and default passwords
		  ○ misconfigured access rights
		  ○ removable media
		  ○ unpatched and/or outdated software
		• Explain what penetration testing is and what it is used for
		• Define and describe the term social engineering
		• Describe malware and how it can be protected against
		  ○ computer virus
		  ○ trojan
		  ○ spyware
		  ○ adware
		• Understand and explain common security measures:
		  ○ biometric measures
		  ○ password systems
		  ○ CAPTCHA (or similar)
		  ○ two-factor authentication
		  ○ automatic software updates

Java programming & NEA project	28	• Further practice of programming techniques by solving problems using code • Completion of a 20-hour programming project as set by the exam board