Digital Production, Design & Development T Level Curriculum Map – Year 12

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Key dates			Mock ESP – January 2024		Paper 1 – 3rd May 2024 AM 2Hrs 30Mins Paper 2 – 8th May 2024 AM 2Hrs 30Mins ESP – 13th May to 10th June 2024 14 hours & 30 minutes	Beginning of work experience.
Content Headline	**Paper 1** 2 –Introduction to programming **Paper 2** 5 – Business context **ESP Pre-mock practice**	**Paper 1/ESP** 1 – Problem solving 2. Introduction to programming (Cont) **Paper 2** 6 – Data **ESP Pre-mock practice**	**Mock ESP** **Paper 1** 3 – Moral & Ethical Issues **Paper 2** 7 – Digital Environments	**Mock ESP** **Paper 1** 4 – Legislation and regulatory requirements **Paper 2** 7 – Digital Environments (cont) 8 – Security Risks		
ESP	**2.1** Program Data Understanding basic Python programming. Data types, variables and constants. Program inputs, outputs and string manipulation. The use of data structures e.g. lists/arrays and dictionaries. **2.2** Operators Know how to use mathematical operators. Know how to use relational operators. Understand and using Boolean operators, NOT/AND/OR. **2.3** File handling Understand how to use text files for input/output of data. **2.4** Program structure Understand the terms sequencing, selection & iteration. Be able to write Python programs containing selection & Iteration.	**ESP Pre-mock practice** Understand how to set up the report for the ESP and how to structure a response. Understand the requirements of an ESP, and how to meet the criteria. Understand the planning tools necessary to produce software solution, including Gantt charts. Understand how to thoroughly test program code using a test plan. Understand how to effectively plan a software solution using both pseudocode and flowcharts. Understand how to use the Python libraries Matplotlib and Pandas.	**ESP** Sit the ESP in exam conditions. Use additional sample assessment material.	**ESP** Completion of mock ESP. Use the feedback from the mock ESP to re-teach/revise content.		

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	To understand the differences between count-controlled & condition-controlled iteration.					
Paper 1 Content	**1.1** Computational Thinking Being able to use top-down, bottom-up and modularisation approaches to solve problems. Be able to decompose problems. Be able to use pattern recognition. Be able to use abstraction. **1.2** Algorithms Understand how to use flowcharts to solve a problem. Understand how to use pseudocode to write algorithms. **2.8** Testing Understand the fundamentals of testing, e.g. concept, unit, boundary, integration, performance, system, acceptance & usability, regression & load/stress testing. Understand how to apply root cause analysis to solve problems. Understand how to construct an effective test plan.	**2.4** Program structure Be able to declare and call functions and procedures. Understand and trace the standard algorithms of linear/binary search & bubble/merge/insertion sort. **2.5** Built in functions Be able to write code that makes use of user-written and pre-written code e.g. built in functions and standard libraries. **2.6** Validation and error handling Understand and use different types of validation to handle common & unexpected errors, e.g. presence, length, type, format, range checks. **2.7** Maintainable code Understand what is meant by Python's PEP 8 accepted style convention works.	**3.1** Moral & Ethical issues Understand the ethical and moral issues that an increasing reliance on technology raises, and how organisations and individuals can respond to these challenges. Understand how organisations and individuals respond to ethical and moral issues when designing and developing digital systems Understand how individuals use a range of observational techniques to inform situational awareness. **3.4** Emerging trends & technologies Understand how developments in digital technologies impact on organisations, individuals and society e.g. IoT, AI, AR & VR.	**4.1** Legislation Understand the role of current legislation and its impact on the design, development and use of digital in relation to: Health & Safety when working with computers. Data Protection Act/GDPR. Computer Misuse Act. Equality Act. Intellectual Property Act. Understand the use of digital technologies for monitoring the workplace. Understand the role of legislation relating to international law and its importance when designing, developing and using digital systems. **4.2** Guidelines and codes of conduct Understand the purpose and role of codes of conduct produced by professional bodies for the use of digital: BCS & Institute of analysts and programmers code of conduct. Understand the guidelines provided in professional codes of practice, e.g. professional responsibilities, contribution to society, safety, privacy & security and innovation. Understand the impact that implementing guidelines from professional codes of practice has on organisations and their stakeholders. Understand how guidelines and agreed standards ensure the accessibility and quality of IT systems, including ISO, WCAG 1.0 & 2.0, W3C and IETF. Understand the role and implications of acceptable use policies within an organisation	Revision in the lead up to the exams.	
Paper 2 Content	**5.1** The business environment Understand the purpose of different types of organisations in a range of sectors.	**6.1** Data and information in organisations Understand the differences and links between data, information & knowledge.	**7.1** Physical environments Understand the features and characteristics of different types of physical computer system.	**7.3** Virtual Environments Understand the key features of virtual environments (Increased security, managed execution, sharing, aggregation, emulation, isolation & portability.)	Revision in the lead up to the exams.	

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	Understand the key areas of organisations and how IT used to support them. Understand how digital supports the business needs of organisations. Understand the factors that determine the feasibility of a digital project. Understand how digital is used to meet user needs and ensure quality of product/service. Understand how the characteristics of end users affect the use and characters of digital technologies to access a service or product. **5.2** Digital value to business Understand the importance of digital within organisations, and the ways in which digital is used to add value to a company. **5.3** Technical change management Understand the factors that trigger change in organisations. Understand the technical change management process. Understand how organisations respond to, prepare for, manage and reinforce change (relevant to digital) in a range of contexts. Understand the benefits and drawbacks of technical change in organisations. **5.4** Risks in a business context Understand the potential risks to organisations of use of digital systems and technologies. Understand the potential impact of identified risks on the organisations and its stakeholders.	Understand why organisations need data and information and how they are used. Understand how data is generated. **6.2** Data formats Understand the forms that data can take and the implications this has on use and analysis, e.g. Data types (date, integer, real, character, string, boolean) and common forms of data format (JSON, fixed-width text file, CSV, ASCII & XML). Understand the differences between file-based and directory-based structures, and how they are used in data analysis. **6.3** Data systems Understand the features and functions of data systems and their importance to organisations. Understand the purpose of business information tools and their use in business, e.g. CRM software, business intelligence software and financial planning & analysis. Understand the features of different data models and how organisations use them to organise data. **6.4** Data management Understand the factors that determine how data is gathered, entered and maintained. Understand the purpose of data analysis tools and their use in business. Understand the role of metadata classification in defining the meanings of data. Understand the use of data/access entitlements/permissions	Understand the features and characteristics of hardware and peripherals used in physical computer systems. Understand the purpose and functions of software used in computer systems, including operating systems, application software, utility software & code development tools. Understand the benefits and drawbacks of software, hardware and peripherals in different contexts. Understand how physical data storage and recovery systems work, their features, benefits and drawbacks. **7.2** Networks Understand the benefits and drawbacks of connecting devices to form networks. Understand the features, characteristics, benefits & drawbacks of wireless connection methods. Understand the different types of network (LAN, WAN & PAN) Understand the concepts of bandwidth & latency, and their effect on the performance of networks and connected systems. Understand the concept of different network models (client-server, thin client & peer-to-peer). Understand the characteristics of network topologies (logical vs physical, star, mesh, tree, VLAN) Understand the role and characteristics of common components of a network.	Understand the benefits and drawbacks of the use of virtual environments for organisations in a range of contexts. **7.4** Cloud environments Understand the ways in which organisations use cloud environments to provide access to digital tools, services, storage & systems. Understand the concepts of cloud computing deployment in terms of applications, data, runtime, middleware, operating system, virtualisation, servers, storage & networking. Understand the common cloud delivery models and the way in which responsibility and ownership of resources are distributed between the subscriber and service provider , e.g. Iaas, Paas & Saas. Understand the concept of Daas. Understand how Daas is used by organisations and the benefits and drawbacks it provides for organisations and their stakeholders. Understand the concept of cloud sourcing and cloud portability, and the implications for service providers and organisations. **7.5** Resilience of environment Understand the need to ensure digital environments are resilient, and the impact on organisations and stakeholders if this is not achieved. Understand methods used to improve the resilience of digital environments: ● data and system redundancy ● back-up systems ● hot, cold and warm sites ● data back-up and recovery procedures ● device hardening Understand the benefits and drawbacks of methods used to improve the resilience of digital environments. **8.1** Security risks		

		management, and its impact on organisations and stakeholders. Understand how data can be accessed and managed across different platforms. Understand the concepts of data at rest, data in use and data in motion, and when each is used.	Understand the seven layer OSI model to describe how applications communicate over a network, including the functions and related protocols on each layer. Understand the four layer TCP/IP model to describe how applications communicate over a network, including the function and related protocols of each layer. Understand the role of data packets in transmitting over a network. Understand the role of common network protocols: DHCP, DNS, FTP, HTTP/S, NTP, POP3/IMAP4/SMTP, TCP/IP Understand how physical, virtual and cloud environments along with networks are used in combination including the Internet of Things, to solve problems and meet the needs of organisations. Understand the key features of virtual environments. Understand the benefits & drawbacks of the use of virtual environments for organisations in a range of contexts.	Understand the importance of maintaining privacy and confidentiality of an organisation's information, as well as that of stakeholders, including: (information about salaries, employee benefits/perks, client lists, trade secrets, sales numbers, customer information, news about pending restructuring). Understand the potential impact on an organisation of failing to maintain privacy and confidentiality. Understand potential technical threats and vulnerabilities to systems, data and information, including: ● botnets ● distributed denial-of-service (DDoS) ● hacking ● malware (including ransomware) ● social engineering (pharming, phishing) ● insecure Application Programming Interfaces (APIs) ● use of ad hoc or open networks ● eavesdropping/man-in-the-middle attacks. Understand potential physical vulnerabilities to systems, data and information, including: ● location of system or asset ● circumstances of use ● characteristics of users/community ● system or asset layout ● system or asset design/robustness. Understand potential human threats and vulnerabilities to systems, data and information, including: ● human error ● malicious employees ● disguised criminals ● targeted attack. **8.2** Threat Mitigation Understand the concept of the CIA (confidentiality, integrity, availability) and how it can be applied to define security aims. Understand the interrelationship between security, identity, confidentiality, integrity, availability, threat, vulnerability and risk		

				management within a business context. Understand processes and procedures to mitigate threats and ensure security, including: ● air gapping ● anti-virus and anti-malware programs ● certification of APIs ● configuration and management of software-based access control ● device hardening ● encryption (hashing, asymmetric, symmetric) ● user access restrictions o usernames, passwords and passphrases o data access levels/permissions o physical access control/restrictions ● multi-factor authentication (possession-based, biometric, knowledge, location-based) ● firewalls ● password managers ● policy, policy enforcement and training ● SYN cookies ● use of Virtual Private Networks (VPNs) ● security testing (penetration testing, white/grey hat hackers).		
Assessment	**Q1** Programming Paper Theory paper 5.1 to 5.3	**Q2** Programming and Theory Papers		**Q3** Paper 1 and Paper 2 full mock.		