TAUNTON SCHOOL

Year 12 Syllabus in a nutshell

A Level INFORMATION COMMUNICATION TECHNOLOGY

Year 12 Syllabus in a nutshell – A Level Information Communications Technology

Information Communications Technology encourages learners to become effective and discerning users of IT. It helps them to develop a broad range of IT skills, knowledge and understanding. Learners study the structure and use of IT systems within a wide range of organisations, including the use of a variety of computer networks. As a result, learners gain an understanding of IT system life cycles, and how these affect the workplace. They also learn about the wider impact of IT on society in general. At A Level, learners also study simple programming for the web relevant to their own use of IT.

Syllabus:

https://www.cambridgeinternational.org/programmes-and-qualifications/cambridge-international-as-and-a-level-information-technology-9626/

Text Book:

Cambridge International AS and A Level IT Coursebook: Paul Long, Sarah Lawrey, Victoria Ellis

Year 12

	Autumn	Spring	Summer
Theory	Data, information, knowledge and processing Hardware and software Monitoring and control	E-safety and health a safety The digital divide	Using networks Expert systems
Practical	Video Editing With Adobe Premier Sound Editing With Adobe Audition	Spreadsheets With Excel	Microsoft Access

Year 13

	Autumn	Spring	Summer
Theory	Emerging technologies, The Role And Impact Of IT In Society, Networks	Project Management, The Systems Life Cycle	Revision And Exam Preparation
Practical	Graphics Using Adobe Photoshop And Illustrator And Animation Using Adobe Animate Mail Merge Using Microsoft Word	Programming For The Web Using Adobe Dreamweaver And JavaScript	Revision And Exam Preparation

Topic	Content
Data, information, knowledge and processing	Data, information and knowledge • define data, clearly identifying that data has no meaning • define information and show how data can become information through context and meaning • define knowledge and understand that information becomes knowledge when human experience is applied Sources of data • define static data and give an example • define dynamic data and give an example • compare the use of static information sources with dynamic information sources • define direct and indirect data source • understand the advantages and disadvantages of gathering data from direct and indirect data sources Quality of information • understand how accuracy, relevance, age, level of detail and completeness of the information can affect its quality Coding, encoding and encrypting data • describe the coding of data (including: M for male, F for female) and more intricate codes (including: clothing type, sizes and colour of garment) • discuss the advantages and disadvantages of the coding of data • evaluate the need for encoding data and analyse the different methods that can be used to encode data (including: codecs)

	• define encryption and describe different methods of encryption (including: symmetric, asymmetric, public key, private key) • evaluate the need for encryption and how it can be used to protect data such as on a hard disk, email or in HTTPS websites • discuss encryption protocols (including: the purpose of Secure Socket Layer (SSL)/Transport Layer Security (TLS) and the use of SSL/TLS in client server communication) Checking the accuracy of data • define validation and analyse a range of validation methods (including: presence check, range check, type check, length check, format check and check digit, lookup check, consistency check, limit check) • define verification and analyse verification methods (including: visual checking and double data entry) • explain the need for both validation and verification • define proofreading
Hardware and software	Hardware • define the term hardware • evaluate internal hardware devices (including: central processing unit (CPU), motherboard, random access memory (RAM), read-only memory (ROM), graphics card, sound card, hard disk drive (HDD), solid-state drive (SSD)) • evaluate external hardware devices (including: monitor, keyboard, mouse, printer (laser, inkjet, dot matrix, plotter), speakers, camera (digital, video), webcam, scanner, magnetic ink character reader (MICR), optical mark reader (OMR), optical character reader (OCR), bar code reader, pen drive, portable hard disk drive, blu-ray disc drive, memory card) • explain the purpose of storage devices • evaluate storage devices (including: cloud, magnetic tape drive, optical, hard disk drive (HDD), solid-state drive (SSD)) • explain the purpose of input and output devices • evaluate different input, storage or output devices for a given task System, application and user interface software

	• define the term software • evaluate types of software (system software and application software) • explain the purpose of system software (including: compilers, interpreters, linkers, device drivers, operating systems and utilities) • evaluate application software (including: word processing, spreadsheet, database management systems, control software, measuring software, applets and apps, photo editing software, video editing software, graphics manipulation software, communications software, web authoring software) • evaluate application software for a given task • evaluate the characteristics of different types of user interface (including: command line interface, graphical user interface, dialogue interface, gesture based interface) • evaluate the use of colour, layout, font size, quantity of information and controls when designing a user interface • evaluate mental models and how they can be used when designing a user interface Utility software • define utility software • describe the role of different utility software (including: anti-virus, backup, data compression, disk defragmentation, formatting, file copying, deleting) Custom written software and off-the-shelf software • compare the benefits and drawbacks of custom written software and off-the-shelf software Compiler and interpreter • describe the function of a compiler • describe the function of an interpreter • evaluate the difference between a compiler and an interpreter
Monitoring and control	Monitoring and control • identify a range of sensors and describe their use in monitoring technologies • identify a range of sensors and describe their use in control technologies

	• evaluate the use of monitoring technologies in everyday life (including: CCTV monitoring, environmental monitoring, workplace monitoring) • evaluate the use of control technologies in everyday life (including: household appliances, car park barriers, traffic lights)
eSafety and health and safety	eSafety and health and safety • explain why personal data should be kept confidential • describe how personal data can be gathered by unauthorised persons (including: by smishing, vishing, phishing and pharming), and how this might be prevented • discuss why eSafety is necessary • describe malware issues (including: Trojan horse, worms, spyware, adware, rootkit, malicious bots, ransomware) • describe a range of potential health issues that could arise from using IT • describe a range of safety issues relating to the use of IT
The digital divide	The digital divide • understand that the digital divide refers to the gap between people and regions that have access to aspects of modern technology (including: telephone, television, personal computers and the internet), and those that do not or those that have restricted access • understand that the digital divide can exist between: – people in cities and people in rural areas – the educated and the uneducated – socioeconomic groups – more and less industrially developed nations – high and low performance computers, wireless connections
Using networks	Using networks • Network types • discuss the advantages and disadvantages of networking computers • compare the characteristics of a local area network (LAN) with a wide area network (WAN)

	• describe client-server and peer-to-peer networks • describe the characteristics and purpose of virtual private networks (VPN) • discuss the advantages and disadvantages of different network types (including: client-server, peer-to-peer, VPN) • describe the characteristics and purpose of intranets and extranets • describe the characteristics and purposes of the internet • define the term the internet • describe how the internet is used for communication (including: IM, VOIP and news services) • discuss the benefits and drawbacks of using the internet • define the term World Wide Web • discuss the difference between the internet and the World Wide Web • discuss the advantages and disadvantages of mobile networks Video and web conferencing • describe how to set up a video-conference • describe how to set up a web-conference • describe the use of networks in video and web-conferencing (including: Integrated Services Digital Network (ISDN), LAN, WAN, VPN, 802.11 a/b/g/n (wireless), Asynchronous Digital Subscriber Lines (ADSL), Synchronous Digital Subscriber Lines (SDSL), 3G/4G mobile networks) • discuss the impact of video-conferencing on society (including: the general public, legislation, education, medicine, business, media) • describe how data is transmitted and converted in a video-conference (including: use of codecs)
Expert systems and other types of processing	Expert systems and other types of processing • describe the components of an expert system • explain how the components of an expert system produce possible solutions • explain how an expert system can be used by organisations • describe the terms backward chaining and forward chaining • explain the use of master and transaction files (including in: payroll and customer orders)

	• analyse the different types of processing and their uses (including: batch, online (interactive), real time)
Spreadsheets	Create a spreadsheet • create structure – explain the purpose of cells, rows, columns, ranges, worksheets and multiple worksheets in a single data file – insert a row and a column, delete a row and a column, resize a row and a column, hide a row and a column – manipulate cells and their content (including: date and time functions; extracting numeric values from strings, concatenating cell content, protecting: cells, rows, columns, worksheets and multiple worksheets in a single data file) – adjust cell, row and column width and height – freezing panes and windows • create formatting – format cells (including: date, time, text, numeric, currency, percentage, fractions, text orientation, alignment, conditional formatting) – format cell emphasis (including: colour, shading, merge, borders, comments) – format page (including: page setup, fit to page, margins, header, footer) • create formulae and functions – explain the difference between a formula and a function – use formulae (including: add, subtract, multiply, divide, indices) – use absolute reference, relative reference, nested formulae, named cells, named ranges – explain why absolute and relative referencing are used – use functions (including: sum, average, minimum, maximum, integer, rounding, counting, IF, nested IF, lookup (including:

	vertical, horizontal), INDEX/MATCH, conditional formulae to include counting, sum, average) • use validation rules (see 1.5) • test validation applied to a spreadsheet • test a spreadsheet model and evaluate the effectiveness of test plans for a spreadsheet model • verify and validate data entry • extract data – search using: text, numeric, date, time, Boolean operators (AND, OR, NOT), ., ,, =, .=, ,=, contains, starts with, ends with • sort data (including: ascending, descending) on multiple columns • summarise and display data using pivot tables and pivot charts • import and export data (including: .csv, .txt, .rtf, graphs and charts) Graphs and charts • analyse and select the most appropriate type of graph or chart (including: bar chart, pie chart, line graph, comparative bar chart, comparative line graph) • create a graph or chart (including: appropriate data series, from contiguous data, from non-contiguous data, specified range(s)) – label a graph or chart (including: title, legend, segment labels, segment values, percentages, category axis labels, series labels, value axis labels, scales, set axis scale maximum, set axis scale minimum) Modelling • use of what-if analysis (including: the use of scenarios) • describe the characteristics of modelling software • analyse the need for computer models • evaluate the effectiveness of spreadsheet models (including for: financial forecasting) Simulations • describe the advantages and disadvantages of using a model to create and run simulations

	• evaluate the use of simulation (including for: natural disaster planning, pilot training, car driving, nuclear science research)

Database and file concepts	Create a database
	
	• assign a data type and an appropriate field size to a field (including: text, alphanumeric, numeric (integer, decimal), date/time, Boolean)
	• describe the three relationships: one-to-one, one-to-many and many-to-many
	• create and use relationships (including: one-to-one and one-to-many)
	• create and interpret an entity relationship diagram
	• evaluate the difference between a flat file and a relational database and why one might be preferred in certain situations
	• create a relational database
	• analyse the function of key fields (including: primary key, compound key, foreign key)
	• set keys (including: primary key, compound key, foreign key)
	• define and use referential integrity and explain its importance
	• validate and verify data entry
	  – use validation rules (see 1.5)
	  – test validation applied to a database
	  – verify data entry (see 1.5)
	• perform searches
	  – simple query on single criterion
	  – complex queries using multiple criteria
	  – queries using static parameters
	  – queries using dynamic parameters
	  – nested queries
	  – summarise data (including: cross-tab query/pivot table)
	  – using text, numeric, date, time, wildcard, Boolean operators (AND, OR, NOT), ., ,, =, .=, ,=
	• use arithmetic operations, numeric and logical functions to perform calculations within a database (including calculated controls and calculated fields)
	• sort data
	  – ascending, descending, grouped

	• design, create and evaluate an appropriate data entry form (including: appropriate font styles and sizes, spacing between fields, character spacing of individual fields, use of white space, radio buttons, drop down menus, highlighting key fields, use form controls, create linked subforms) • design, create and evaluate database reports including grouped reports • design, create and evaluate a switchboard/menu within a database • import data (including: .csv, .txt, .rtf) • export data (including: table, query, report, export as .csv, .txt, .rtf) Normalisation to third normal form (3NF) • describe the characteristics of data in unnormalised form (0NF), first normal form (1NF), second normal form (2NF) and third normal form (3NF) • discuss the advantages and disadvantages of normalisation • normalise a database to 3NF Data dictionary • describe the components of a data dictionary • select appropriate data types for a given set of data and a given situation • identify different data types (including: text, alphanumeric, numeric (integer, real, percentage, currency), date/time, Boolean/logical (yes/no, true/false)) Query selection • evaluate the use of static and dynamic parameters in a query • analyse when static and dynamic parameters should be used in queries • analyse when simple, complex, nested and summary queries (including: cross-tab queries/pivot tables) should be used File and data management • evaluate different file types and their use • explain what is meant by proprietary and open-source file formats, and why open-source file formats are needed • explain why generic file formats are needed • explain the use of indexed sequential access

	• explain the use of direct file access • explain the use of a hierarchical database management system • describe the features of a management information system (MIS) • explain how a MIS can be used by organisations
Sound and video editing	Sound and video editing • edit a video clip to meet the requirements of its intended application and audience – set an aspect ratio – trim a video clip to remove unwanted footage – join together video clips – create text based slides – create credits – add captions and subtitles – add fading effects – add animation effects – extract a still image from a video clip – insert a still image – add sound to a video clip – remove sound from a video clip – alter the speed of a video clip – export a video clip in different file formats – compress a video to different resolutions to suit different media (including: DVD, internet) • describe how typical features found in video editing software are used in practice • edit a sound clip to meet the requirements of its intended application and audience – trim a sound clip to remove unwanted material – join together two sound clips – fade in and fade out a sound clip – alter the speed of a sound clip – change the pitch of a sound clip – add or adjust reverberation – overdub a sound clip to include a voice over – export a sound clip in different file formats – compress (including: the use of MP3) the sound file to different sample rates to suit different media

	• describe how typical features found in sound editing software are used in practice • describe how file sizes depend on sampling rate and sampling resolution
Emerging technologies	Emerging technologies • describe emerging technologies (including: 3D printing, 4G and 5G cellular communications, artificial intelligence, augmented reality, biometrics, cloud computing, computer-assisted translation, holographic and 4th generation optical data storage, holographic imaging, quantum cryptography, robotics, • QR codes, wearable computing, ultra-high definition television (including: 4K resolution screens) vision enhancement, virtual reality, and their possible uses in different fields, (including: medicine, manufacturing, space exploration) • evaluate the impact of emerging technologies on individuals and their lifestyles (including: smartphones performing many of the tasks that PCs and laptops perform) • evaluate the impact of emerging technologies on organisations • evaluate the impact of emerging technologies on medicine (including: development of prosthetics and medical products, tissue engineering, artificial blood vessels and the design of medical tools and equipment) • evaluate the impact of emerging technologies on the environment • discuss the advantages and disadvantages of storing data in the cloud
Role and impact of IT in society	Role and impact of IT in society eBusiness • evaluate the impact of information technology on eBusiness (including: banking, shopping, trading goods) • describe how it is possible to be subjected fraud when using credit cards online • evaluate the impact of digital curren (including: Bitcoin, Litecoin) • explain how IT is used in eBusiness (includir electronic funds transfer, automatic sto control, electronic data exchange, business-t business buying and selling, online stores) • discuss how organisations mine data to analy social and economic trends

	Social networking • evaluate methods used for social networki (including: chat rooms, instant messagir forums, email, blogs, microblogs) and the impact on changing social patterns Video conferencing and teleworking • describe video-conferencing and the hardwa and software used • describe web-conferencing and the hardwa and software used • discuss the advantages and disadvantages video-conferencing on employers a employees • discuss the advantages and disadvantages web-conferencing on employers a employees • describe teleworking • discuss the effects of teleworking employers and employees Technology in society • evaluate the impact of information technolo on society (including: sport, manufacturir medicine, education, banking, eBusiness) Technology enhanced learning • discuss the advantages and disadvantages software-based training methods • evaluate the impact of technology on learni (including: Massive Open Online Cours (MOOC), computer based training, onli tutorials, video-conferencing)
Networks	Network components • describe the role and operations of t following components in a network: switche hubs, wireless access points, network interfa cards, wireless network interface car routers, repeaters, gateways, bridge, firewa (hardware and software) and servers • describe bandwidth • describe bit rate • describe bit streaming (both real-time and demand) • discuss the importance of bit rates/broadba speed on bit streaming • describe packet switching, circuit switchi and message switching

	• describe optical communication/transmissi methods (fibre optic, laser), their advantage disadvantages and their typical applications • evaluate wirele communication/transmission metho (including: Bluetooth®, infrared, WiFi, radi their advantages, disadvantages and th typical applications • explain the importance of bandwidth and b rate when transmitting data • analyse how different types communication/transmission media (cable wireless, optical) govern the bandwid available for transmitting data • describe what a protocol is and different typ of protocols (including: Wide Area Netwo protocols and Local Area Network acce protocols) • describe how the BitTorrent protocol provid peer-to-peer file sharing Network security • describe the security issues that could ari from networking computers • explain how security issues can be prevent on a computer network • evaluate a range of physical and softwa based security methods for a comput network • list the principles of a data protection act • analyse the need for a data protection act • evaluate methods for combating IT crin (including: physical security metho biometric methods, firewalls, back-u encryption, access rights, malware securit anti-virus, anti-spyware) Satellite Communication Systems • describe how satellite communication syster are used and work in data transfer system television and radio broadcasting systems a global positioning systems (GPS) • discuss the advantages and disadvantages using satellites for data transfer system television and radio broadcasting systems, a GPS
Project management	Stages in project management • describe the stages of project manageme from project conception to project close Types of project management

	• discuss the types of project manageme software and the advantages a disadvantages of each type Project management software • explain how project management software used (including: planning, scheduling of tas allocation of resources, costing communications, decision-making) Critical path analysis • describe, interpret and create a critical pa analysis Gantt charts • describe, interpret and create a Gantt chart Disaster recovery management • describe disaster recovery manageme (including: risk analysis, perpetrator analys risk testing, quantifying the risk, securing t risk, software protection, password contro recovery management) Prototyping • describe prototyping • describe types of prototyping (includin evolutionary, incremental, throw-away, rapi • discuss the advantages and disadvantages prototyping • describe Rapid Application Development (RA and other methods of software developme (including: the conventional 'waterfa method) • discuss the advantages and disadvantages rapid application development (RAD) CAD/CAM • evaluate the use of computer-aided desi (CAD) and computer-aided manufacturi (CAM) • describe the uses of computer-aided desi (CAD) and computer-aided manufacturi (CAM) • discuss the benefits and drawbacks of usi computer-aided design (CAD) and compute aided manufacturing (CAM)
System life cycle	Analysis

	• analyse and evaluate different methods of researching a situation (including: questionnaires, interviews, observation, document analysis) • describe the content of the requirements specification, system specification and design specification Design • identify a flow of data through a system and create a data flow diagram (DFD) and a system flowchart • design and evaluate data collection forums and screen layouts • design and evaluate validation routines • create a data dictionary for a given situation • evaluate suitable hardware and software for a new system Development and testing • describe the purpose of test data • explain the purpose of alpha testing • explain the purpose of beta testing • analyse the difference betwen alpha testing and beta testing • explain the purpose of black box testing • explain the purpose of white box testing • analyse the difference between black box testing and white box testing • explain the importance of testing and having a test plan • describe how a test plan is created • create a test plan for a given situation Implementation • describe the different methods of implementing a system (including: parallel running direct changeover, phased implementation, pilot implementation) • analyse the suitability of an implementation method for a given situation Documentation • design and develop elements of technical documentation • design and develop elements of user documentation • explain the need for technical and user documentation

	Evaluation and maintenance • evaluate a new system in terms of efficiency, ease of use and meeting user requirements • explain the need for maintenance • explain perfective, adaptive, preventive and corrective maintenance
Graphics creation	Vector images • create a vector image that meets the requirements of its intended application and audience – use layers to overlap items – use grouping or merging tools – use rotation and place an item – use transform tools to resize – use selection tools to select parts of an image – use crop tools to crop part of an image – use fill tools to colour items – use colour gradients – use node editing – fit text to a path – save an image in different file formats – compress an image to different resolutions using file formats (including: .jpg and .png) to suit different media file size requirements Bitmap images • create a bitmap image that meets the requirements of its intended application and audience – use layers to overlap items – use rotation and place an item – use grouping or merging tools – use selection tools to select parts of an image – use crop tools to crop part of an image – use masking tools – use tools to improve parts of an image (including: blend, replicate, retouch) – use tools to remove red eye – use filters (including: blur, distort, sharpen) – convert between colour, duotone and black and white images

	– use colour gradients – resize an image – resize the canvas – change the opacity of all or part of an image – use text tools to include text – save an image in different file formats – compress an image to different resolutions using file formats (including: .bmp, .jpg, .png, .gif to suit different media file size requirements) • describe the difference between a bitmap and a vector graphic • describe how typical features found in bitmapped and vector graphics software are used in practice • evaluate their suitability for a given scenario • evaluate the impact of image editing on society (including: media, advertising, fashion, shopping, politics, entertainment)
Animation	Animation • create and evaluate an animation (stop frame and key frame) that meets the requirements of its intended application and audience – place objects – place an image – use frames – set key frames – use timings – use layers – show and hide objects – resize objects – use coordinates to move and place objects – understand the use of tweening and what effect it creates – use tweening (motion tweening) to create a smooth transition between frames – use morphing (shape tweening) – understand the use of morphing and what effect it creates – use morphing to create a smooth transition between images – add text

	– change the opacity of objects and text – use masking layers
Mail merge	Mail Merge • create a master document structure (including: standard letter) • create a source file using appropriate software • link a master document to a source file, identifying and using correct field names, using conditional operators • specify rules for managing recipients and content of a mail merge • set up fields for manual completion • create appropriate prompts to the user for manual completion • use the software to automatically select the required records • use manual methods and software tools to ensure error-free accuracy • perform mail merge using the master document and data sources • create variable fields to control record selection and omission when merging • explain why mail merge documents are created
Programming for the web • It is recommended that for this section of the syllabus, candidates should have a working knowledge of HTML and CSS	Programming for the web • demonstrate a range of object-based programming techniques – recognise data types (including: number, string, Boolean, array, object) – assign and understand the term variables – carry out calculations and basic string manipulation – use arrays – use comparison and logical operators – use conditional statements (including: if, else, else if, switch) – use loops (including: for, for/in, while, do/while) – use iterative methods – create functions – trap errors – control events – create html forms to interact with the user – add comments to explain JavaScript code • output/display data to:

	– HTML documents – HTML elements – alert boxes – the browser console • add interactivity to web pages • explain JavaScript terms and programming techniques