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INTERNATIONAL ADVANCED LEVEL

INFORMATION TECHNOLOGY

SCHEME OF WORK

Unit 1

Pearson Edexcel International Advanced Subsidiary in Information Technology (XIT11) Pearson Edexcel International Advanced Level in Information Technology (YIT11)
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Pearson

INTRODUCTION

The following scheme of work provides an overview of the content of the 2018 International Advanced Level Information Technology and shows how the content could be taught as a guideline approach only.

It should be adapted by schools to fit their timetabling and staffing arrangements. It is based upon a two-year delivery model where all IAS content is being taught in the first year and the remaining IA2 content in the second year.

The scheme of work is broken up into units and topics, so that there is greater flexibility for moving topics around to meet planning needs.

It includes:

- Recommended teaching time for topics, though of course this is adaptable according to individual teaching needs
- Classroom activities, teaching points and suggested teaching resources
- Objectives for students at the end of the topic area and integrated Transferable Skills* that are being developed.

The number of guided learning hours for Advanced Level is 360. Teachers should be aware that the estimated teaching hours are approximate and should be used as a guideline only.

Unit 1

(Refer also to the specification and the delivery and assessment guidance in the Getting Started Guide)

Topic 1: Hardware and software Topic 1 deals with devices, technologies, and software, three areas where rapid changes are common. It is important that students are exposed to recent developments in these areas. It is important that the existing knowledge and experiences of students in using digital devices is built on in these early weeks and that this is shared with the whole group.			
Week	**Topic area / aims / learning outcomes**	**Exemplar classroom activities / teaching points / suggested teaching resources**	**Integrated Transferable Skills**
1	**1.1.1** Understand the features and functions of contemporary digital devices. Features and functions • portability • performance • storage • user interface • connectivity • media support • energy consumption • expansion capability • security features. Contemporary digital devices: • computers • embedded systems • peripheral devices • mobile phones • storage devices.	**Activity**: Students work in small groups to identify digital devices that they are familiar with and to list the features and functions of each. In order to carry out this task It is important that students understand what features and functions are in this context. As an illustration: features of computers are high speed, accuracy, large storage capacity, high reliability and versatility; functions are input, storage, processing and output. Groups report to whole class so that all students build up a more complete picture of contemporary digital devices. Devices could be categorised initially as computers, embedded systems, peripheral devices, mobile phones, storage devices. Students should be made aware that many devices are multi-function and fit into multiple categories. They should also do guided research into modern digital devices that may not have occurred to students. These might include: • Smart home devices such as TVs, light bulbs, locks, climate control. • Autonomous devices such as robot vacuum cleaners, self-driving vehicles, auto-pilots. • Medical / fitness devices such as treadmills, heart and respiration monitors, step counters.	Co-operation Communication

		There are numerous YouTube-style videos available showcasing digital devices. Tutors should filter these by date to avoid looking at superseded devices, unless teaching how the devices developed.	
2	**1.1.2** Understand the technologies used by digital devices: • Global Positioning System (GPS) • biometrics • touchscreen • sensor • memory • storage • battery power • miniaturisation • processors • radio-frequency identification (RFID) • near-field communication (NFC) • quick response (QR) code • connectivity	Students work individually or in small groups to identify the technologies used by a tutor-selected set of digital devices. The devices should use as wide a range of technologies as possible. Students should be able to transfer knowledge of the technologies between the devices. Students to be made aware that most technologies are under active development and that some will become deprecated or rendered obsolete by new developments. This may be illustrated by looking at the history of e.g. memory chips, storage media, or CPUs. Guided research into selected devices and technologies, with groups or individual students reporting on their findings. There are numerous YouTube style videos available showcasing digital devices. Tutors should filter these by date to avoid looking at superseded technology, unless teaching how the technology developed.	Co-operation Communication Adaptive learning Adapting prior knowledge, skills and experience of IT to deal with new situations/contexts Co-operation Communication
3	**1.1.3** Understand the term 'technical convergence' in the context of digital devices. **1.1.4** Understand the concept of, need for, features and functions of embedded systems. **1.1.5** Understand the concept of and need for firmware.	Guided research into technical convergence in familiar digital devices. For example: • Incorporation of items such as cameras, music players, voice recorders, internet browsers, into mobile phones. • Development of games consoles from dedicated games machines into multi-functional; home entertainment systems. The research should include one or more aspects of performance (1.1.6). Students work in small groups to identify familiar devices which contain embedded systems and to list the features and functions of each. Groups report to whole class to build up a more complete picture of embedded systems.	Co-operation Communication

	1.1.6 Understand factors that can be used to assess the performance of digital devices: • speed • capacity • portability • bandwidth • power efficiency.	Guided research into embedded systems that may not have occurred to students. For example: Wi-Fi routers and access points, vending machines, electronic toys, vehicle systems such as cruise control, fuel injection, anti-lock braking. Tutor led discussion on the need for and differences between software, embedded software, and firmware. Short video showing a firmware update being performed. https://www.intel.com/content/dam/support/us/en/multimedia/server-products/server-boards/6017/Firmware_Update_EFI_demo.htm	Adaptive learning Adapting prior knowledge, skills and experience of IT to deal with new situations/contexts
4	**1.1.7** Be able to calculate data file size and time needed to transmit a file. **1.1.8** Be able to use and convert between binary and denary as defined by the International Electrotechnical Commission (IEC). **1.1.9** Be able to select digital devices to meet the needs and requirement of individuals and organisations.	Tutor led discussion into how quantities are expressed in binary and denary and how to make a conversion. A possible approach is to use current advertising literature / device specifications. e.g. a digital camera may quote image size in megapixels (mega=1000x1000) but storage in megabytes (mega=1024x1024) The difference between SI units (based on 1024) and IEC units (based on 1000) must be understood. Worksheets on simple binary-denary conversions, some in the context of calculating: • file sizes • data transmission rates Note: the examination does not allow the use of a calculator. Tutor-set problems on selecting appropriate digital devices to meet the needs of simple scenarios involving individuals and/or organisations. These should include both simple problems, e.g. select from a list, and open-ended ones, e.g. propose and justify a solution.	
5	**1.2.1** Understand the purpose of: a. systems software b. applications software. **1.2.2** Understand the role of the operating system in managing: a. devices b. processes c. users d. security.	Students work in small groups to identify familiar devices which have an operating system and to identify the roles that the operating system performs. Devices might include those running Windows, iOS, Android, Linux. Groups report to whole class to build up a more complete picture of operating systems. The exercise could be extended to include applications software for the same devices.	Co-operation Communication

	1.2.3 Understand the different sources of software and copyright types: a. free b. open-source c. proprietary d. creative commons. **1.2.4** Understand licensing options: a. single user b. multiple user c. institutional d. fixed term e. indefinite f. network. **1.2.5** Understand the purpose of and how to manage software updates: a. patch b. automatic c. upgrade d. compatibility issues. **1.2.6** Be able to select software to meet the needs and requirements of individuals and organisations.	Guided research into software sources, copyright types and licensing options. Note: this is an area where rapid changes may happen due to both domestic and international politics, new trade agreements and changes in technology. Students should know about types of laws / regulations rather than specific detail that may be contained in them. Tutor led discussion on updates, drawing on student's experience, e.g. updating an operating system, patching a game, updating phone apps. The discussion should identify benefits, weaknesses and practical issues. Tutor-set problems on selecting appropriate software to meet the needs of simple scenarios involving individuals and/or organisations. These should include both simple problems, e.g. select from a list, and open-ended ones, e.g. propose and justify a solution.	

Topic 2: Networks **Topic 2 deals with networks, network devices, and protocols. There are opportunities in this topic for students to undertake practical networking tasks if suitable equipment is available.**			
Week	**Topic area / aims / learning outcomes**	**Exemplar classroom activities / teaching points / suggested teaching resources**	**Integrated Transferable Skills**
6	**2.1.1** Understand the features and functions of computer network models: • client-server • peer-to-peer • ad hoc networks • tethering **2.1.2** Understand the features and purposes of network communication protocols: • wireless –Wi-Fi • ZigBee® • Bluetooth® • cellular – Global System for Mobile (GSM) communications (3G/4G) • infrared • ethernet	Tutor led discussion (demonstration if equipment available) of network models. Guided research into network communication protocols. students produce lists of features for each protocol and identify common features and purposes. Tutor led discussion (demonstration if equipment available) of network connections using a range of protocols.	
7	**2.1.3** Understand the features, functions, and use of network standards and protocols: • transmission control protocol/internet protocol (TCP/IP) • voice over internet protocol (VOIP) • session initiation protocol (SIP)	Guided research into network standards and protocols. Tutor led discussion on the relationship between the TCP/IP and OSI models. students trace the movement of e.g. an image over a network, looking at the layers and protocols used in each model.	

	• 7-layer open systems interconnection (OSI) Model.		
8	**2.2.1** Understand the characteristics of different network transmission media: • wireless: ◦ microwave ◦ radio ◦ light ◦ satellite • wired: ◦ copper – twisted pair and cable ◦ fibre ◦ powerline. **2.2.2** Understand a variety of network metrics: • speed • bandwidth • throughput • scalability • latency • error rate • packet loss • availability • jitter. **2.2.3** Understand the role of components in networks: • switch • bridge • gateway • router	Guided research into transmission media, including physical characteristics and how the signal is carried. Students research the normal range of a variety of network metrics for each transmission media. Tutor led discussion on applying metrics to establish the best medium to use for a range of situations. Tutor led discussion (demonstration if equipment available) of network components.	Adaptive learning Adapting prior knowledge, skills and experience of IT to deal with new situations/contexts

	• multi-function device – combined router/switch • modem • repeater • server • network interface card (NIC) • wireless access point • hubs.		
9	**2.2.4** Be able to produce outline designs for networks to meet specified requirements that take account of location of devices.	Students practice producing network designs for specified requirements. Network design software would be useful but students will need to be able to draw their designs by hand in the examination. Students work in small groups. Each student presents and justifies their design to the others. The group must produce a final design using elements from each student's design.	Decision making Considering multiple options or alternatives, in order to select a solution that best fulfills requirements/needs Adaptive learning Adapting prior knowledge, skills and experience of IT to deal with new situations/contexts Co-operation Communication
	2.2.5 Understand the characteristics and function of: • IP addressing: ◦ internet protocol version 4 (IPV4) ◦ internet protocol version 6 (IPV6) ◦ static ◦ dynamic	Guided research into the history of IP addressing, bringing out the inherent limitations of IPv4, work arounds in current use and the implementation of IPv6. Tutor led discussion on the privacy and security implications of Ipv6 and how these are being addressed. Demonstration of setting up / configuring a simple DHCP server, configuring MAC lists. Most home routers and WAPs have DHCP and MAC functions built in if PC software is not available. Further practice in network design, incorporating knowledge of IP addressing for some components.	Reasoning/argumentation

	◦ dynamic host configuration protocol (DHCP) • media access control (MAC) addressing.		
10	**2.3.1 Understand the impact of network security issues on individuals and organisations (threats and solutions, open networks).** **2.3.2 Understand how to secure a network using both hardware and software:** **a. firewall** **b. security settings** **c. anti-malware** **d. user controls / access /rights/ profile** **e. authentication types (including passwords, two-factor, biometrics)** **f. encryption techniques** **g. physical controls.**	Tutor led discussion of network security issues. Students are likely to have some experience of this with their own devices or a school network, e.g. using antivirus, receiving phishing emails. This may help in introducing the topic. Guided research into network security. Students could look at: • threats; e.g. malware such as viruses and spyware, unauthorised access (hacking), inside attacks, social engineering, phishing, pharming, distributed denial of service (DDoS), ransomware • solutions; countermeasures to each threat identified. Tutor led discussion (demonstration if equipment and software available) of network security measures. There are numerous YouTube-style videos available explaining how to set up security measures. Guided research into security measures. Students could look at measures that cannot be easily demonstrated such as: • biometrics • two factor authentication • encryption • physical security. Students could be given tutor-created security scenarios and asked to recommend, with reason, suitable measures.	Reasoning/argumentation

Topic 3: The online environment It is probable that many students will have personal experience of using the internet, they may be members of one or more online communities and may interact via social media. Their experiences may form a useful starting point for some topics but it is important that they do not make the mistake of assuming that what they have seen is all there is.			
Week	**Topic area / aims / learning outcomes**	**Exemplar classroom activities / teaching points / suggested teaching resources**	**Integrated Transferable Skills**
11	**3.1.1** Understand what is meant by the internet and how it is structured (Internet Protocol (IP) addressing and Domain Name Service (DNS)). **3.1.2** Understand the features, functions, impact, and potential of the world wide web.	Tutor led discussion the internet and the world wide web, looking at IP addressing (linked back to 2.2.5) and the domain name system. Students work in small groups to research different aspects of the world wide web, e.g. social media, search facilities, online communities, e-commerce, security features. Groups report to whole class to build up a more complete picture of the features, functions, impact, and potential of the world wide web.	Critical thinking Co-operation Communication
12	**3.1.3** Understand the difference between static and dynamic web page content and the need to use the different types. **3.1.4** Understand the role of client-side scripting. **3.1.5** Understand the role of server-side scripting.	Note: this section has a strong link to Unit 2 but there is no requirement for students to be able to write scripts in Unit 1. Guided research into the features and uses of dynamic sites e.g. reddit.com, Amazon.com, eBay.com, airbnb.com; and static sites e.g. thisoxford.co.uk, gohugo.io, opendatahandbook.org. Guided research into the uses of client-side and server-side scripting, bringing out the differences and the overlap between them.	
13	**3.2.1** Understand the impact and potential of working in online environments for individuals and organisations. **3.2.2** Understand the security risks to personal data stored online and methods of protection.	Students work in small groups to research different types of online working. e.g. • office jobs / telecommuting / working from home • creative; designing graphics / artwork / photography / web design • teaching / tutoring • marketing / reviewing • blogging / vblogging • writing / translating / proof reading / editing • professional services such as accounting • IT support • data entry and management Groups report to whole class to build up a more complete picture of online environments.	Critical thinking Co-operation Communication

	3.2.3 Understand what a digital footprint is and the positive and negative aspects of these.	Tutor led discussion on security risks and protection methods. https://www.itgovernance.co.uk/blog/category/other-blogs/breaches-hacks/ describes many UK based data breaches, https://www.identityforce.com/blog is more US focused. Both cover international companies. Students work in small groups to identify their own public digital footprint. Tutor led discussion on public and private footprints.	Co-operation Communication Reasoning/argumentation
14	**3.3.1** Understand the concept of an online community and that online communities exist for social and professional purposes. **3.3.2** Understand the impact of online communities on individuals and organisations. **3.3.3** Understand the monetization opportunities provided by online communities: • use of customer data with targeted advertising • pay-per-click advertising • selling of customer data. • paid subscriptions (paywalls) • sponsored content.	Students work in small groups to research different types of online communities. To include how each is being monetised. Communities could include, e.g. • social communities such Facebook, Twitter, Instagram • action communities such as 38degrees.org.uk, change.org, zooniverse.org • professional communities such as LinkedIn, Xing • local communities such as teignmouthnews.co.uk, shetlink.com, • common circumstance communities such as assamassociationdelhi.org, mumsnet.com, singaporeexpats.com • common interest communities such as bigfooty.com, thephotoforum.com Groups report to whole class to build up a more complete picture of online communities.	Critical thinking Co-operation Communication

15	**3.4.1** Understand the concept, use and impact of cloud storage. **3.4.2** Understand the concept, use and impact of cloud computing.	Guided research into types and uses of cloud storage, such as: • hosted general storage such as mega.nz, dropbox • self-hosted storage such as Nextcloud, Seafile • personal/mobile storage such as Google drive, iCloud • storage for specific types of files such as Amazon Prime music, Apple music, Flickr, nikonimagespace Tutor led discussion on the impact of cloud storage covering e.g.: • security / privacy • costs • ease of access • bandwidth requirements • downtime	

Topic 4: IT systems Topic 4 deals with IT systems. There are opportunities in this topic for students to undertake practical design tasks if suitable equipment is available.			
Week	**Topic area / aims / learning outcomes**	**Exemplar classroom activities / teaching points / suggested teaching resources**	**Integrated Transferable Skills**
16	**4.1.1** Understand the concept of an IT system: • hardware • software • processes • people.	Students work in small groups to research different types of IT systems. To include their purpose as well as the hardware, software, processes, and people involved with each type. IT system types could include, e.g.: • Information systems ◦ Transaction Processing Systems ◦ Management Information Systems ◦ Executive Information Systems ◦ Decision Support Systems • Control systems ◦ central heating systems ◦ vehicle management systems ◦ robotic systems ◦ security systems • Communications systems ◦ email ◦ video conferencing ◦ Voice Over IP (VOIP) • Expert Systems and Neutral Networks ◦ medical diagnosis ◦ engine diagnosis ◦ financial advice and transactions (robo trading) ◦ rendering text to speech ◦ image recognition Groups report to whole class to build up a more complete picture of IT systems.	Co-operation Communication
17	**4.1.2** Understand how to decompose a system into smaller sub-systems and components. **4.1.3** Be able to design IT systems, from individual components and sub-	Students practice producing system designs for specified requirements. Design software would be useful but students will need to be able to draw their designs by hand in the examination. Students work in small groups. Each student presents and justifies their design to the others. The group must produce a final design using elements from each student's design.	Problem solving Decision making Considering multiple options or alternatives, in order to select a solution that best fulfills requirements/needs

	systems, to meet specified requirements. **4.1.4** Understand the concept of 'fitness for purpose' when evaluating systems.		Adaptive learning Adapting prior knowledge, skills and experience of IT to deal with new situations/contexts Co-operation Communication
18	**4.2.1** Understand the concept of and need for dataflow diagrams. **4.2.2** Be able to interpret and create data flow diagrams for a given scenario.	Students practice producing dataflow diagrams for specified requirements. Design software would be useful but students will need to be able to draw their diagrams by hand in the examination.	Interpretation and analysis Interpreting diagrams for given scenarios Decision making. Considering multiple options or alternatives, in order to select a solution that best fulfills requirements/needs Adaptive learning Adapting prior knowledge, skills and experience of IT to deal with new situations/contexts
19	**4.3.1** Understand the concept of and need for flow charts. **4.3.2** Be able to interpret and create flow charts for a given scenario.	Students practice producing flowcharts for specified requirements. Design software would be useful but students will need to be able to draw their flowcharts by hand in the examination.	Problem solving Adaptive learning Adapting prior knowledge, skills and experience of IT to deal with new situations/contexts

			Interpretation and analysis Interpreting flowcharts for given scenarios
20	**4.4.1** Understand the advantages and disadvantages of IT systems for individuals and organisations. **4.4.2** Understand how a range of contemporary digital devices, peripheral devices, storage devices and memory are used in IT systems to meet the needs of individuals and organisations.	Sections 4.4.1 and 4.4.2 could be taught alongside the previous sections of Topic 4. In which case a little more time should be spent on each section looking at advantages, disadvantages, and the use of as wide a range of devices as possible. Guided research into advantages and disadvantages of a wide range of IT systems, as looked at in 4.1.1	Critical thinking

Topic 5: Data and databases This topic has strong links to Units 3 & 4. Access to database software would be useful but students will need to be able to draw their diagrams by hand in the examination.			
Week	**Topic area / aims / learning outcomes**	**Exemplar classroom activities / teaching points / suggested teaching resources**	**Integrated Transferable Skills**
21	**5.1.1** Understand the difference between data and information. **5.1.2** Understand sources of and the difference between structured and unstructured data. **5.1.3** Understand the value to organisations of extracting meaningful information from data.	Tutor led discussion tying data and information back to previous topics, e.g.: • Topic 1, file size and transmission rate = data, transmission time = information • Topic 2, network metrics provide data, analysis of those metrics to find a solution provides information • Topic 3, website analytics provides customer data, analysis of that data gives information for targeted marketing • Topic 4, dataflow diagrams can show the process of converting data into information. Guided research into unstructured data sources and how information might be extracted from them. e.g.: • Emails, • letters, books, newspapers etc. • posts on forums, newsgroups, etc • Word Processing Files, PDFs, web pages, etc. • Spreadsheets • Photos (digital and film), video, audio Note: some of these may have some structure, e.g. spreadsheets, but they are not regarded as structured unless all their content can be processed by data mining tools.	
22	**5.2.1** Understand why databases are used to structure data. **5.2.2** Understand the structure of a relational database: • tables • primary keys • foreign keys	Students set up and operate relational databases for a number of tutor set scenarios. If database software is not available, there are numerous YouTube style videos available showing how databases are set up and used, but students should still practice database design tasks on paper. Note: normalisation is not tested in the Unit 1 examination. There are numerous free datasets available. e.g.	Problem solving Adaptive learning Adapting prior knowledge, skills and experience of IT to deal with new situations/contexts

	• records • fields.	• airports, airlines, aircraft, routes at https://openflights.org/data.html • films at https://www.imdb.com/interfaces/ • very large, employees database, including instruction manual at https://dev.mysql.com/doc/employee/en/ • DVD rentals database, including instruction manual at https://dev.mysql.com/doc/sakila/en/	
23	**5.2.3** Understand the concept of entities and the relationships between them: • one-to-one • one-to-many • many-to-many. **5.2.4** Be able to interpret and create entity relationship diagrams for a given scenario.	Students design, set up, and refine relational databases for a number of tutor set scenarios.	Problem solving Adaptive learning Adapting prior knowledge, skills and experience of IT to deal with new situations/contexts
24	**5.3.1** Understand how and why SQL is used to manipulate data and data structures. **5.3.2** Know how to select and use appropriate SQL commands, features, and functions to manipulate data: • perform queries and subqueries • create tables using appropriate data types • populate tables/insert, amend, delete • link tables (UNION, JOIN)	Students design, set up, and operate SQL based relational databases for a number of tutor set scenarios. If SQL database software is not available, there are numerous YouTube style videos available showing how SQL databases are set up and used, but students should still practice database design and SQL query tasks on paper.	Problem solving Decision making Considering multiple options or alternatives, in order to select a solution that best fulfills requirements/needs Adaptive learning Adapting prior knowledge, skills and experience of IT to deal with new situations/contexts

	• use wildcards (% and _) • grouping, ordering, counting.		
25	**5.3.2** Know how to select and use appropriate SQL commands, features, and functions to manipulate data. (continued)		

Topic 6: Wider issues Although Topic 6 has relatively few sub-topics, most of them are quite challenging and have substantial content which may change / develop rapidly.			
Week	**Topic area / aims / learning outcomes**	**Exemplar classroom activities / teaching points / suggested teaching resources**	**Integrated Transferable Skills**
26	**6.1.1** Understand the environmental impact of construction, use and disposal of information technology equipment. **6.1.2** Understand the positive impact that information technology makes to environmental monitoring (including smart houses and smart cities) and efficient use of resource	Guided research into environmental impact including, e.g.: • carbon footprint • raw material extraction and processing • water requirements • power requirements and sources • transport • disposal of toxic waste • consumables • batteries The research should also look at positive impacts, e.g.; • carbon footprint of books, newspapers, etc • reduction transfer of paper between locations • automation efficiencies over manual procedures Guided research into environmental monitoring and efficient use of resources including, e.g.: • emissions monitoring • remote sensing • more efficient process control • intelligent design of products to use less material • improved logistics Note: 6.1.2 includes smart houses and smart cities. This might be tied in to / taught with 6.3.1	Critical thinking
27	**6.1.1** Understand the environmental impact of construction, use and disposal of information technology equipment. **6.1.2** Understand the positive impact that information technology makes to environmental monitoring (including smart houses and smart	Tutor led discussion on the difference between ethics and morals. Ethics, e.g. external, objective, code of conduct, imposed by / on a group. Morals, e.g. internal, subjective, belief system of individual / group, self-imposed. Students work in small groups to identify factors affecting ethics and morals, e.g.: • personal belief and experience • religion • peer pressure • local customs and traditions • societal expectations	Critical thinking Reasoning/argumentation

	cities) and efficient use of resource	Guided research into a range of ethical and moral issues. Note: This can be a very contentious topic. There is very little that someone somewhere could not justify in terms of their own ethical or moral values. Students should be guided into thinking about what would be considered normal / acceptable in a modern, international context.	
28	**6.2.1** (continued) Understand the moral and ethical issues associated with the use of information technology systems: • privacy • inclusion • civil liberties • access • accessibility • expression • association.	Tutor led discussion on the difference between ethics and morals. Ethics, e.g. external, objective, code of conduct, imposed by / on a group. Morals, e.g. internal, subjective, belief system of individual / group, self-imposed. Students work in small groups to identify factors affecting ethics and morals, e.g.: • personal belief and experience • religion • peer pressure • local customs and traditions • societal expectations Guided research into a range of ethical and moral issues. Note: This can be a very contentious topic. There is very little that someone somewhere could not justify in terms of their own ethical or moral values. Students should be guided into thinking about what would be considered normal / acceptable in a modern, international context.	Critical thinking Reasoning/argumentation Ethics. Demonstrating awareness of moral and ethical issues associated with the use of IT Co-operation Communication
29	**6.3.1** Understand the impact of ubiquitous wireless access; smart cities	Note: this topic has links to 6.1.2 Tutor led discussion on the meaning of the term smart city. There are several different definitions of smart cities. The getting started guide suggests; a smart city is one that makes optimal use of all the interconnected information available today to better understand and control its operations and optimise the use of finite resources. Its citizens can easily access the information they need so as to make informed choices. These links (material written 2018) give a range of views on what smart cities are. https://www.theatlantic.com/technology/archive/2018/02/stupid-cities/553052/ https://www.technologyreview.com/s/610249/a-smarter-smart-city/ http://www.rics.org/uk/knowledge/glossary/smart-cities/ https://en.wikipedia.org/wiki/Smart_city	Critical thinking Reasoning/argumentation

30	**6.3.1** Understand the impact of ubiquitous wireless access; location awareness.	Guided research into types of wireless, location awareness technology, e.g.: • local systems using WiFi (in wireless LAN), RF tags, proximity detectors • national or regional systems using cell phone signals (GSM, LTE, 3G), • worldwide systems using GPS Guided research into uses of wireless, location awareness technology. e.g. • guides to tourist attractions, restaurants, transport services, shops, etc. • site guides to museums, art galleries, etc. • satellite navigation systems, vehicles, aircraft, shipping etc. • enhanced / augmented reality systems • surveying equipment • road tolls Tutor led discussion on the impact of location awareness on privacy and security.	Critical thinking Reasoning/argumentation