2016 Suite

OCR
Oxford Cambridge and RSA

Cambridge **TECHNICALS LEVEL 3**

APPLIED SCIENCE

Cambridge TECHNICALS 2016

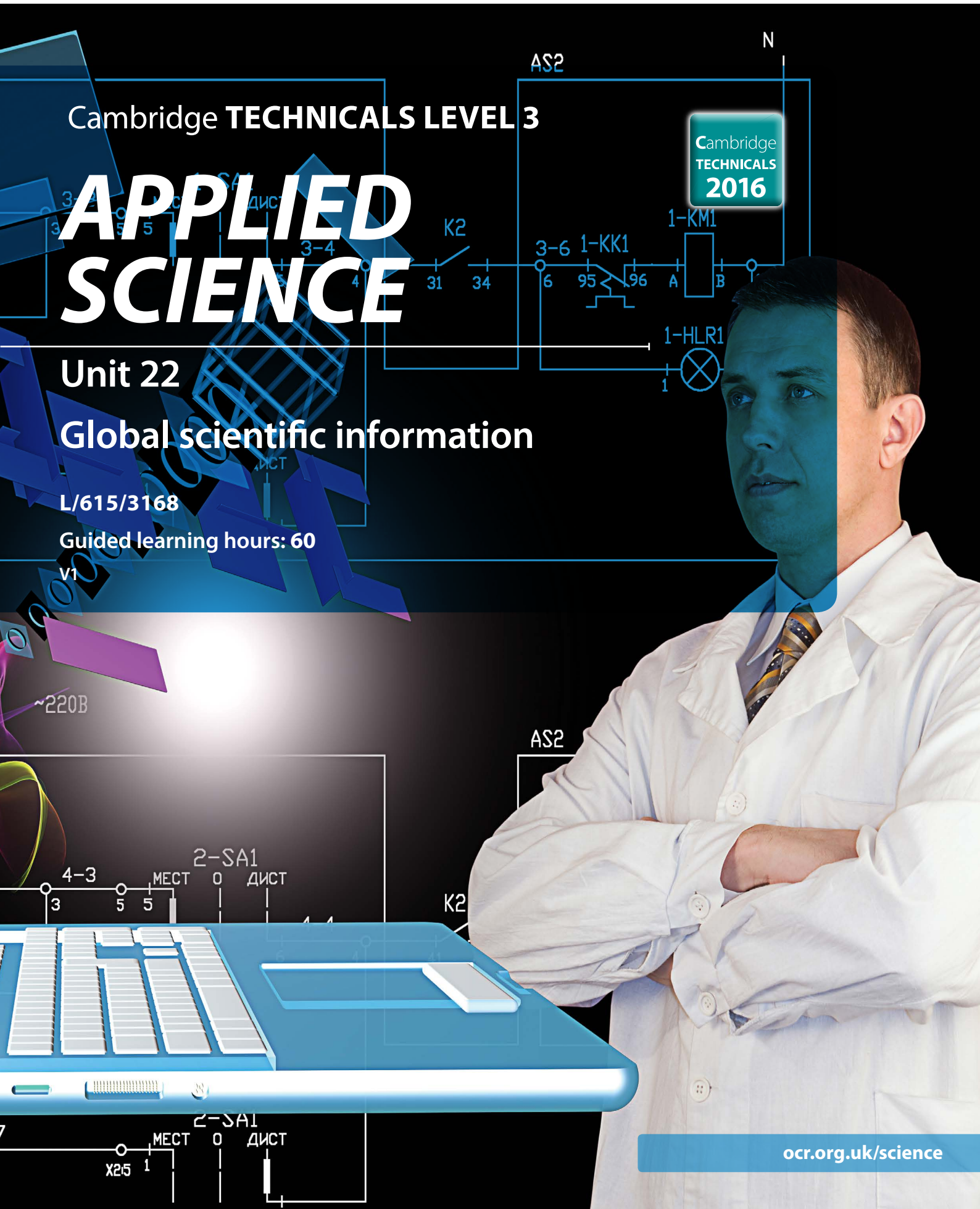
Unit 22

Global scientific information

L/615/3168

Guided learning hours: 60

V1



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LEVEL 3

UNIT 22: GLOBAL SCIENTIFIC INFORMATION

L/615/3168

Guided learning hours: 60

Essential resources required for this unit: None

This unit is externally assessed by an OCR set and marked examination.

Unit aim

The purpose of this unit is to enable you to understand that scientific research and scientific knowledge is rarely the work of one individual or team working in isolation. Most of it includes collaborative working across disciplines, countries and continents. Scientific research relies heavily on the work of others. The great British physicist and mathematician Sir Isaac Newton stated that, "If I have seen further it is by standing on y^{e} shoulders of Giants."[1]. In other words, his contribution to knowledge was achieved by building upon the work already carried out and recorded by other great scientists. He could not have imagined the amount of information available to modern day scientists nor the speed at which information can cross the globe.

You will understand how organisations share and use information to further our understanding of physical, chemical and biological phenomena and how this shared knowledge aids the technicians who work in these areas.

Data is power and there are concerns about how the information gathered or developed around the World in stored, shared and protected and this unit will also help you to understand the implications of the various regulations and laws which cover data and information.

[1] Newton to Hooke, 5 Feb. 1676; Correspondence I, 416

TEACHING CONTENT

The unit content describes what has to be taught to ensure that learners are able to access the highest grade.

Anything which follows an i.e. details what must be taught as part of that area of content.

Anything which follows an e.g. is illustrative.

Where teaching content contains i.e. and e.g. under specific areas of content, the following rules will be adhered to when we set questions for an exam:

- A direct question may be asked about unit content which follows an i.e.
- Where unit content is shown as an e.g. a direct question will not be asked about that example.

Learning Outcome The Learner will:		Teaching Content The Learner must be taught:		Teaching exemplification
1. Understand by whom, where and why scientific information is held globally and how it is stored for transmission	1.1	Categories of information holders, i.e: 1. individual researchers 2. research department of companies, 3. educational institutions governments 4. research groups, 5. charitable organisations 6. international bodies	1.1	The delivery of this unit could be linked to the learner's personal research and other activities they undertake while working on other units in their programme. Learners should know about different holders of scientific information, their category. Companies such as drug, food and environmental will be researching to develop new products. Educational institutions such as university medical schools, physics departments, biomedical engineering food departments, environmental departments research into new products supported by grants Research groups such as The Royal Society, Department of Health Department of the Environment, Food and Rural Affairs which are part funded by Government carry out research which is used to support the Government.

Learning Outcome The Learner will:	Teaching Content The Learner must be taught:			Teaching exemplification
				Charities funded by public and company donations such as Nuffield Trust, Wellcome Trust, healthcare services carry out ongoing research. International bodies such as the European Space Agency, CERN, are funded by a number of countries and carry out research.
	1.2	Location of scientific information: 1. developing country 2. developed country 3. country 4. urban 5. rural 6. home 7. workplace 8. libraries/online libraries 9. online 10. the 'cloud'		
	1.3	Reasons for transmission of scientific information i.e. 1. funding 2. access 3. ownership 4. sharing 5. promotion	1.3	Transmission between developed and developing countries should lead to an understanding of the access issues to sharing information across the globe; allowing for greater recognition leading to increased sales and funding and the benefits of exchange of information. This can lead to access issues between organisations/countries.

Learning Outcome The Learner will:	Teaching Content The Learner must be taught:		Teaching exemplification	
	1.4	Access issues raised by transmission i.e.: 1. compatibility of IT networks/systems/software packages 2. different languages/translation 3. unreliable data storage 4. lack of infrastructure	1.4	
	1.5	Advantages and disadvantages of using different types of information storage i.e.: 1. types of information storage media a. paper b. optical media c. magnetic media d. solid state media 2. advantages a. recording b. portability c. durability d. access e. backup f. capacity g. data access speed 3. disadvantages i.e. a. loss b. contamination c. unreadability d. unreliability	1.5	With the development of media communication and storage, scientific information can be found almost anywhere across the Globe. Learners should also know about the different ways in which scientific information can be stored from written text in forms, handwritten notes, laboratory notes to multimedia storage i.e. CD, DVD, magnetic hard drives and tapes, SSD hard drives, memory sticks.

Learning Outcome The Learner will:		Teaching Content The Learner must be taught:		Teaching exemplification
2. Understand the classification and quality management of scientific information	2.1	Information classification i.e.: 1. sensitive 2. non-sensitive 3. private 4. public 5. confidential 6. classified 7. partially anonymised 8. completely anonymised	2.1	Learners should know about different classifications of information; scientific research can include a mixture of different types of information and it is important that the technician understands the nature of this information, since this affects how it must be handled.
	2.2	Impacts on different stakeholders i.e: 1. stakeholders 2. public 3. organisations 4. communities 5. populations Impacts 1. knowledge 2. products 3. processes	2.2	Research which uses patient data, for example, may be anonymised to protect the privacy of individuals. This should lead to an understanding of why it is important science technician holders or users of scientific information have access to good quality information and the impacts when information quality is poor.
	2.3	Quality management of scientific information, i.e.: 1. characteristics a. accuracy b. accessibility c. scientific terminology 2. importance of good quality information to stakeholders a. knowledge b. reassurance c. reputation d. sound basis for further investigation 3. consequences of poor quality information on stakeholders a. misinformation b. bad decision making c. delusion d. emotional stress/anxiety e. loss of reputation	2.3	Characteristics can determine the quality of scientific information, i.e. valid, bias, reliable, comparable. The importance of good quality information allows stakeholders to work accurately, i.e. innovate, carry out accurate diagnosis, and accurately record. Learners should understand the consequences of poor quality information on stakeholders, e.g. misinformation, poor or incorrect diagnosis, incorrect recording of results, reputational damage.

Learning Outcome The Learner will:		Teaching Content The Learner must be taught:		Teaching exemplification
3. Be able to apply the key features, impact and consequences of legal, regulatory frameworks and information governing the storage and use of global scientific information	3.1	UK legislation and regulation relating to the storage and use of information, i.e.: 1. current UK legislation and regulation: a. Data Protection Act (DPA) 1998 b. Protection of Freedoms Act 2012 c. Freedom of Information Act 2000 d. Computer Misuse Act 1990 e. Information Commissioner's Office (ICO) codes of practice f. Copyright, Designs and Patents Act 1988 g. Equality Act (EQA) 2011	3.1	Learners should know about the different legislation and regulation that relates to the storage and use of scientific information, especially but not exclusively to information held on individuals. New scientific discoveries and developments in drugs, equipment, etc are important to researchers and companies as they raised reputation, attract funding and potentially can be worth many millions of pounds in the future, protecting the investment in time, money and ingenuity must be protected. This should lead to an understanding of the impact and consequences of legislation and regulation on holders of information
	3.2	Global information protection legislation and regulation, i.e.: 1. regulation relating to data protection outside the UK (i.e. USA, Far East and Africa) 2. comparison between data protection legislation and regulation in different countries (i.e. similar legislation in many countries, but not all) 3. UN Convention on the Rights of Persons with Disabilities (UNCRPD) 4. UNCRPD specifically recognises (under articles 9 and 21) that access to information, communications and services, including the internet, is a human right	3.2	Learners must develop an understanding of how the actions carried out by holders of information must comply with legal and regulatory requirements. It is important that learners are aware of the most recent legislation when studying this unit. Learners will understand the comparison between data protection legislation and regulation in different countries, i.e. similar legislation in many countries, but not all.
4. Understand the principles of information security and risks	4.1	Principles of information security, i.e.: • confidentiality • integrity • availability	4.1	Learners should know about the aims of information security for holders of information, which also affects technicians, since they are the individuals who are often charged with gathering, storing and collating information. Confidentiality of information means that it can only be accessed by individuals, groups or processes authorised to do so. Integrity of information is maintained, so that it is up to date, accurate, complete and fit for purpose.

Learning Outcome The Learner will:		Teaching Content The Learner must be taught:		Teaching exemplification
	4.2	Risks, their impact and how they can be reduced i.e.: Risks • unauthorised or unintended access to data • accidental loss of data • intentional destruction of data • intentional tampering with data Impacts • slowing/stopping research • loss of contracts • competitor/others/media accessing data • loss of reputation • repeat of research Reduction of risk • use back-up files • use encryption • file closure systems • data retrieval systems • training of personnel to use security protocols	4.2	Availability of information means that it is always available to and usable by the individuals, groups or processes that need to use it. However there are security risks when storing information. This should lead to an understanding of the risks of breaches in information security and their impact on scientific investigation. Unauthorised or unintended access to data can lead to espionage (competitors/others/media) due to a poor information security policy. Human error, equipment failure can lead to accidental loss of data. Computer virus, targeted malicious attack can lead to intentional destruction of data. Fraudulent activity by hacking can lead to intentional tampering with data.

ASSESSMENT GUIDANCE

All LOs are assessed through externally set written examination papers, worth a maximum of 60 marks, and 1 hour 30 minutes in duration.

Learners should study where information is held in a global context, including the different styles and classification, as well as how it is managed and transmitted in a scientific context. With any gathering, processing, storing and transmitting of information, legislation and regulation considerations need to be addressed. It is important, therefore, that learners study the relevant legislation and regulation not only within the UK but globally, and assess its impact on how organisations and individuals handle scientific information. Learners study how information is used and shared internally and externally within and between organisations and individuals and the benefits it provides. Exam papers for this unit will include a pre-released case study which will be the focus for the questions for Part A of the paper, while Part B will consist of questions of a more general nature. Questions will provide sufficient information to support the application and interpretation of the taught content of the unit. During the external assessment, learners will be expected to demonstrate their understanding through questions that require the skills of analysis and evaluation in particular contexts. Some providers for the industry qualifications offer quizzes, tests and assessments. Reference to these websites may support knowledge and learning. www.vmware.com/uk

LEARNING OUTCOME (LO) WEIGHTINGS

Each learning outcome in this unit has been given a percentage weighting. This reflects the size and demand of the content you need to cover and its contribution to the overall understanding of this unit. See table below:

LO1 Understand by whom, where and why scientific information is held globally and how it is stored for transmission	25%
LO2 Understand the classification and quality management of scientific information	25%
LO3 Be able to apply the key features, impact and consequences of legal, regulatory frameworks and information governing the storage and use of global scientific information	25%
LO4 Understand the principles of information security and risks	25%

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