OCR
Oxford Cambridge and RSA

Cambridge **TECHNICALS LEVEL 3**

APPLIED SCIENCE

Cambridge TECHNICALS 2016

Unit 22 – Global scientific information

DELIVERY GUIDE

Version 2

ocr.org.uk/science

CONTENTS

INTRODUCTION

This Delivery Guide has been developed to provide practitioners with a variety of creative and practical ideas to support the delivery of this qualification. The Guide is a collection of lesson ideas with associated activities, which you may find helpful as you plan your lessons.

OCR has collaborated with current practitioners to ensure that the ideas put forward in this Delivery Guide are practical, realistic and dynamic. The Guide is structured by learning outcome so you can see how each activity helps you cover the requirements of this unit.

We appreciate that practitioners are knowledgeable in relation to what works for them and their learners. Therefore, the resources we have produced should not restrict or impact on practitioners' creativity to deliver excellent learning opportunities.

Whether you are an experienced practitioner or new to the sector, we hope you find something in this guide which will help you to deliver excellent learning opportunities.

If you have any feedback on this Delivery Guide or suggestions for other resources you would like OCR to develop, please email resources.feedback@ocr.org.uk.

OPPORTUNITIES FOR ENGLISH AND MATHS SKILLS DEVELOPMENT AND WORK EXPERIENCE

We believe that being able to make good progress in English and maths is essential to learners in both of these contexts and on a range of learning programmes. To help you enable your learners to progress in these subjects, we have signposted opportunities for English and maths skills practice within this resource. We've also identified any potential work experience opportunities within the activities. These suggestions are for guidance only. They are not designed to replace your own subject knowledge and expertise in deciding what is most appropriate for your learners.

English

Maths


Work

Please note

The activities suggested in this Delivery Guide **MUST NOT** be used for assessment purposes. The timings for the suggested activities in this Delivery Guide **DO NOT** relate to the Guided Learning Hours (GLHs) for each unit.

Assessment guidance can be found within the Unit document available from www.ocr.org.uk. The latest version of this Delivery Guide can be downloaded from the OCR website..

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 ye 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 is 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.

Unit 22 Global scientific information	
LO1	Understand by whom, where and why scientific information is held globally and how it is stored for transmission
LO2	Understand the classification and quality management of scientific information
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
LO4	Understand the principles of information security and risks

To find out more about this qualification, go to: http://www.ocr.org.uk/qualifications/vocational-education-and-skills/cambridge-technicals-applied-science-level-3-certificate-extended-certificate-foundation-diploma-diploma-extended-diploma-05847-05849-05879-05874-2016-suite/

Cambridge TECHNICALS 2016

2016 Suite

- **New suite for first teaching September 2016**
- **Externally assessed content**
- **Eligible for Key Stage 5 performance points from 2018**
- **Designed to meet the DfE technical guidance**

RELATED ACTIVITIES

The Suggested Activities in this Delivery Guide listed below have also been related to other Cambridge Technicals in Applied Science units/Learning Outcomes (LOs). This could help with delivery planning and enable learners to cover multiple parts of units.

This unit (Unit 22)	Title of suggested activity	Other units/LOs	
LO1	Scientific information: Who holds it and where is it located?	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
		Unit 3 Scientific analysis and reporting	LO2 Be able to use graphical techniques to analyse data LO7 Be able to record, report on and review scientific analyses
		Unit 20 Conservation of biodiversity	LO4 Be able to investigate the efficacy of practical measures to conserve biodiversity
		Unit 21 Product testing techniques	LO1 Understand the influence of regulatory bodies on development of consumer products
		Unit 23 Scientific research techniques	LO1 Be able to develop a research plan
	The benefits of transmitting data across the scientific community	Unit 3 Scientific analysis and reporting	LO7 Be able to record, report on and review scientific analyses
		Unit 20 Conservation of biodiversity	LO4 Be able to investigate the efficacy of practical measures to conserve biodiversity
		Unit 23 Scientific research techniques	LO3 Be able to design a scientific investigation for a given scenario
	The difficulties of transmitting data and information across the scientific community	Unit 23 Scientific research techniques	LO7 Be able to record, report on and review scientific analyses
	Research of actual examples of issues arising when sharing information across the scientific community	Unit 20 Conservation of biodiversity	LO4 Be able to investigate the efficacy of practical measures to conserve biodiversity
		Unit 23 Scientific research techniques	LO1 Be able to develop a research plan
	The types of scientific information which need to be stored and the most appropriate medium to be used	Unit 3 Scientific analysis and reporting	LO7 Be able to record, report on and review scientific analyses
		Unit 13 Environmental surveying	LO4 Be able to analyse and present environmental survey findings
		Unit 14 Environmental management	LO1 Understand principal characteristics of environments
		Unit 23 Scientific research techniques	LO2 Be able to conduct secondary research in a given scenario to a given brief
	Selecting the appropriate information type and storage medium for a global research project	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
		Unit 3 Scientific analysis and reporting	LO2 Be able to use graphical techniques to analyse data LO7 Be able to record, report on and review scientific analyses
LO2	Classifying information by sensitivity of the content	Unit 3 Scientific analysis and reporting	LO3 Be able to use keys for analysis LO7 Be able to record, report on and review scientific analyses
		Unit 13 Environmental surveying	LO3 Be able to use field and laboratory techniques to conduct environmental investigations
	Applying information classification to scientific study	Unit 3 Scientific analysis and reporting	LO7 Be able to record, report on and review scientific analyses
		Unit 13 Environmental surveying	LO3 Be able to use field and laboratory techniques to conduct environmental investigations
		Unit 16 Waste management	LO4 Be able to test air and water emissions
	Stakeholders in scientific information usage	Unit 21 Product testing techniques	LO1 Understand the influence of regulatory bodies on development of consumer products
		Unit 23 Scientific research techniques	LO2 Be able to conduct secondary research in a given scenario to a given brief LO3 Be able to design a scientific investigation for a given scenario
	The impact of good quality and poor quality scientific information	Unit 10 Testing consumer products	LO2 Understand how product testing determines the development of consumer products

This unit (Unit 22)	Title of suggested activity	Other units/LOs	
LO2	Characteristics of the quality of scientific information	Unit 3 Scientific analysis and reporting	LO4 Be able to analyse and evaluate the quality of data
		Unit 10 Testing consumer products	LO2 Understand how product testing determines the development of consumer products
		Unit 23 Scientific research techniques	LO1 Be able to develop a research plan
	The consequences of poor quality information for the information holder	Unit 3 Scientific analysis and reporting	LO4 Be able to analyse and evaluate the quality of data
		Unit 23 Scientific research techniques	LO4 Be able to draw conclusions and make recommendations from research, analysis and feedback
LO3	UK legislation and regulation important for storage and use of scientific information	Unit 5 Genetics	LO4 Understand the impact of an innovation in an application of genomics
		Unit 11 Drug development	LO1 Understand drug discovery and development principles
		Unit 14 Environmental management	LO3 Understand how legislation, regulation and agreements impact on managing natural and built environments
	Investigation of the importance of compliance with legal requirements for the scientific community	Unit 5 Genetics	LO4 Understand the impact of an innovation in an application of genomics
		Unit 10 Testing consumer products	LO1 Understand the influence of regulatory bodies on development of consumer products
		Unit 14 Environmental management	LO3 Understand how legislation, regulation and agreements impact on managing natural and built environments
	Legislation relevant to global collaboration and the storage and usage of scientific information	Unit 5 Genetics	LO4 Understand the impact of an innovation in an application of genomics
		Unit 14 Environmental management	LO3 Understand how legislation, regulation and agreements impact on managing natural and built environments
LO4	Investigating examples of information security risks The impact of failing to control risks	Unit 5 Genetics	LO4 Understand the impact of an innovation in an application of genomics

KEY TERMS

Explanations of the key terms used within this unit, in the context of this unit	
Key term	**Explanation**
Data	Characters, symbols, images which can be collected, created and stored but which have no value without further intervention such as sorting, mathematical calculations, editing.
Data transmission	The process of sending digital data or signals over a communication medium, e.g. wireless from one device to another, is the accepted definition. However, written data may also be sent to another device (person) via internal or external mail services (communication medium).
Impact	The consequences, to an individual or organisation, of an action. For example, stolen data being used to ruin the reputation of an individual.
Information	Anything which informs individuals and groups. Data once it has been subject to processing for a particular purpose becomes information as it informs the thinking and knowledge of the recipients.
Information holder	An individual or organisation that holds information. The holder may be legally responsible for the safety of the information in their care.
Information quality	The fitness for purpose of the information provided. Is it accurate, timely, sufficient, etc?
Infrastructure	The physical systems of an organisation e.g. computer networks, hardware.
Risk	Something which is considered to be a threat to an individual or organisation, e.g. the risk of stolen personal information from an organisation if it is not protected.
Stakeholder	An individual or organisation which is affected by the actions of another organisation. For example, in an organisation the stakeholders will include employees (internal) and suppliers and government departments (external).

MISCONCEPTIONS

Some common misconceptions and guidance on how they could be overcome		
What is the misconception?	**How can this be overcome?**	**Resources which could help**
All hackers are criminals	Learners need to know that there are security specialists who are employed to test systems and organisations for vulnerabilities in the systems' security.	Cracking Security Misconceptions Andrew Peterson http://www.oreilly.com/webops-perf/free/files/cracking-security-misconceptions.pdf A 35-page booklet setting out eight common security misconceptions. The author is the CEO and co-founder of an information security company that focuses on attack detection and protection for websites and mobile applications.
Big organisations are the most secure	These organisations are as vulnerable as anyone else to lax procedures and through the outsourcing of IT without careful consideration of the security arrangements of the partner.	Cracking Security Misconceptions Andrew Peterson http://www.oreilly.com/webops-perf/free/files/cracking-security-misconceptions.pdf A 35-page booklet setting out eight common security misconceptions. The author is the CEO and co-founder of an information security company that focuses on attack detection and protection for websites and mobile applications.

SUGGESTED ACTIVITIES

LO No:	1		
LO Title:	**Understand by whom, where and why scientific information is held globally and how it is stored for transmission**		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Scientific information: Who holds it and where is it located?	Learners could work in small groups to investigate possible holders of information for a specific scientific area, possibly linked to the area of laboratory work in which they wish to specialise or research areas covered by the Sanger Institute (http://www.sanger.ac.uk/science). The institute specialises in British genomics and genetics research and collaborates both nationally and internationally. The range of possible holders may vary with the specific area selected but should cover national and international holders e.g. individual researchers, company research departments, universities, government agencies, charities and international bodies. The findings could be recorded as a flip chart or slide presentation. Learners should go on to present their findings to the wider group and the tutor could lead a discussion on the similarities and differences of information holders across different scientific areas e.g. mostly charity based, government led, private firms, individual Nobel laureates, etc. The tutor could lead a discussion on the similarities and differences between the types of information holders across the different areas. Learners could return to their small groups and then research where the information for their scientific is predominantly held e.g. workplace, research libraries/databases, online, cloud based, developing countries. The findings could be recorded as a flip chart or slide presentation. The tutor should bring the wider group together to consider how the type of scientific area affects or is affected by the location of the information it needs. For example, do the studies of new materials, specific types of disease or improvement in crop yields mean that the information is held close to the origin of the need for a scientific outcome e.g. is information gained on the Zika virus predominantly held by scientists and research laboratories in Brazil? Is information on some areas of science more likely to be held across the globe with scientists able to access the information through online libraries/research databases?	3 hours	Unit 2 LO1 Unit 3 LO2, LO7 Unit 20 LO4 Unit 21 LO1 Unit 23 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
The benefits of transmitting data across the scientific community	The learners could work in small groups, linked to their own preferred scientific area, to investigate reasons for transmitting and sharing information with other scientists and scientific institutions. Depending on the number of groups available, the tutor could assign each group a particular reason e.g. funding, promotion of the scientific specialism, sharing of knowledge for the greater good as required in the teaching content, or require each group to look holistically at the reasons for transmitting data within their specialism. Learners should record the outcomes of their investigations and present them to the larger group as a presentation or flip chart presentation. The tutor should guide the group in summarising their findings and providing an agreed view of the benefits of transmitting data cross the scientific community. Useful links to aid the learners are: Opportunities, Challenges and Good Practices in International Research Cooperation between Developed and Developing Countries OECD Global Science Forum http://www.oecd.org/sti/sci-tech/47737209.pdf OECD Global Science Forum OECD http://www.oecd.org/science/inno/oecdglobalscienceforum.htm Open Science – OECD Project Innovation Policy Platform https://www.innovationpolicyplatform.org/open-science-oecd-project Open Science Innovation Policy Platform https://www.innovationpolicyplatform.org/content/open-science Data sharing policy Wellcome Trust Sanger Institute http://www.sanger.ac.uk/legal/#t_2 Innovative Collaborations Wellcome Trust Sanger Institute http://www.sanger.ac.uk/science/collaborations	2 hours	Unit 3 LO7 Unit 20 LO4 Unit 23 LO3

Title of suggested activity	Suggested activities	Suggested timings	Also related to
The difficulties of transmitting data and information across the scientific community	The learner group could come up with a list of problems which might arise when trying to transmit scientific data and information both nationally and internationally. These should include technological and non-technological issues i.e. incompatible hardware, software, poor infrastructure, unreliable data storage, difficulties of translating between one language (e.g. English) and another (e.g. Chinese).	1 hour	Unit 3 LO7
Research of actual examples of issues arising when sharing information across the scientific community	The learners could, individually, investigate an example of compatibility issues, unreliable data storage, lack of infrastructure, language translation which they should present to the wider group. The tutor could then use a whole group discussion to identify specific useful examples to ensure that learners have understood their findings. Sharing Scientific Data, with a Focus on Developing Countries International Council for Science (ICSU) http://www.icsu.org/publications/cfrs-statements/data-sharing/data-sharing Sharing Science: Enabling Global Access to the Scientific Literature National Center for Biotechnology Information, U.S. National Library of Medicine https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3262002/ Global Research Data Infrastructures: Towards a 10-year vision for global research data infrastructures Technological & Organisational Aspects of a Global Research Data Infrastructure: A view from the experts GRDI2020 Consortium http://www.grdi2020.eu/Repository/FileScaricati/9a85ca56-c548-47e4-8b0e-86c3534ad21d.pdf New and emerging technology The Royal Society https://royalsociety.org/topics-policy/new-emerging-technology/ Data sharing policy Wellcome Trust Sanger Institute http://www.sanger.ac.uk/legal/#t_2	2 hours	Unit 20 LO4 Unit 23 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
The types of scientific information which need to be stored and the most appropriate medium to be used	The tutor could discuss types of scientific information which needs to be stored, temporarily or permanently e.g. drawing up of plans for research activity, laboratory notes, results of experimentation, reports, research papers, articles and books. Learners, working in groups, could investigate the different storage media which could be used to hold the information types identified. They should also include the advantages and disadvantages of each medium. The tutor could require the learners to feed back their findings to the wider group and lead a discussion to identify an accurate range of media and their advantages and disadvantages. Dr Tim Cutts | Head of Scientific Computing Wellcome Trust Sanger Institute http://www.sanger.ac.uk/people/directory/cutts-tim A profile of the role of a manager responsible for the provision of all the IT services which specifically deliver scientific data and computation.	2 hours	Unit 3 LO7 Unit 13 LO4 Unit 14 LO1 Unit 23 LO2
Selecting the appropriate information type and storage medium for a global research project	The tutor could provide the learners with a scenario; for example: A university in the UK is carrying out joint research with a university in the USA and with government research centres in India and Kenya. Each scientist is required to keep original copies of their work. All results and reports need to be uploaded to their institution's own network and these must be made available to all researchers engaged in the project at any time. The USA based university lies on the San Andreas Fault, which means an earthquake is an ever increasing risk, and the UK university is aware that there are growing concerns that the UK may not be able to ensure a stable electricity supply within three years if new energy sources are not found. Researchers from India and Kenya will spend a significant part of their time working in the field on loss of habitats and conservation, which could result in difficulties with connectivity. The learners should be asked to make recommendations on what types of information will need to be collected and how it should be stored. They should then go on to provide a rationale for why they have chosen one medium over another. As an alternative to using the scenario, learners could base this activity on one of the Sanger Insitute programmes such as The Mouse and Zebrafish project. Open science and data The Royal Society https://royalsociety.org/topics-policy/open-science-and-data/	3 hours	Unit 2 LO1 Unit 3 LO2, LO7

SUGGESTED ACTIVITIES

LO No:	2		
LO Title:	**Understand the classification and quality management of scientific information**		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Classifying information by sensitivity of the content	Learners, individually, could investigate the difference between sensitive and non-sensitive information as they relate to scientific studies and provide a brief definition for each classification. The learners should then investigate other ways in which information can be classified i.e. public, private, confidential, classified, partially anonymised, completely anonymised, and could record their answers on sticky notes or flip charts and the whole group could review the various classifications and descriptions. They should provide comments on whether they agree or disagree with each offering and provide reasons why. The tutor should then discuss the findings with the group and decide on the most appropriate range and descriptions, which may be a synthesis of several of the learners' work. Learners should retain the list of classifications and definitions for future activities.	1.5 hours	Unit 3 LO3, LO7 Unit 13 LO3
Applying information classification to scientific study	Learners could develop their knowledge of the application of information classification to scientific study by investigating examples of each one; learners must explain the context to which the classification relates e.g. a person's health records are sensitive because they are personal and there is a possibility that they could be used to disadvantage or harm the individual if they were disclosed. Learners could record their information in a table and this could be shared with the larger group for discussion and agreement on an appropriate range of examples. Open Access Science Wellcome Trust Sanger Institute http://www.sanger.ac.uk/about/who-we-are/policies/open-access-science	1.5 hours	Unit 3 LO7 Unit 13 LO3 Unit 16 LO4
Stakeholders in scientific information usage	The tutor should explain the meaning of 'stakeholder' to ensure a common understanding of the term. Learners could then be given case studies, reports, news items relating to scientific studies and research, and be asked to identify the stakeholders in each one. This could be a whole group or small group activity but an agreed range of stakeholders should be identified. Learners should go on to identify the information that the stakeholders would require in each case. GA4GH presents vision for genomic and clinical data sharing Wellcome Trust Sanger Institute http://www.sanger.ac.uk/news/view/ga4gh-presents-vision-model-genomic-and-clinical-data-sharing	2 hours	Unit 21 LO1 Unit 23 LO2, LO3

Title of suggested activity	Suggested activities	Suggested timings	Also related to
The impact of good quality and poor quality scientific information	The learners could continue to use the case studies, etc provided for the previous suggested activity or be given new examples of scientific study. The tutor should discuss with the learners the meaning of good quality and poor quality information and agree an accepted definition for each. The learners should then review the examples of scientific studies and identify whether their purpose is to: • develop current knowledge about a particular scientific area e.g. accurate prediction of earthquakes • improve current products or create new ones e.g. new drugs for multiple sclerosis • improve or create better processes e.g. for manufacturing graphene. For each one the learners should identify the impact that good or poor quality data would have on these activities.	2 hours	Unit 10 LO2
Characteristics of the quality of scientific information	Learners, working in small groups, could first research the characteristics relating to the quality of scientific information. They could then investigate how these characteristics are recognised within scientific activities. The tutor could facilitate a whole group discussion which could result in the creation of a formal definition for each characteristic and how this would be recognised in a scientific setting. For example, accuracy includes reliability and so the results of a test or experiment must be reproducible in future testing. The following links may prove helpful in developing the discussions: National Aeronautics and Space Administration Guidelines for Ensuring the Quality of Information NASA https://www.nasa.gov/sites/default/files/517756main_FINAL_NASA_guidelines.pdf Evaluating Data from Scientific Investigation Study.com http://study.com/academy/lesson/evaluating-data-from-scientific-investigation.html	1 hour	Unit 3 LO4 Unit 10 LO2 Unit 23 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
The consequences of poor quality information for the information holder	Learners, working in small groups, could investigate why it is important for holders of information to have access to good quality information. Each group could investigate a particular stakeholder of scientific information, e.g. The Royal Society, Institute of Physics, the Wellcome Trust, BAE, by investigating the information they use and answering the following questions: • What effect would it have on an organisation if some of its scientific information was not of high quality? • What are consequences for information holders of having poor quality information? Finding good information on the internet Kevin McCluney, guest blog for Scientific American https://blogs.scientificamerican.com/guest-blog/finding-good-information-on-the-internet/ Why we need high-quality reporting of clinical trials Doug Altman, The EQUATOR Network, Centre for Statistics in Medicine, Oxford, UK http://www.equator-network.org/wp-content/uploads/2011/10/High-quality-trial-reporting.pdf	2 hours	Unit 3 LO4 Unit 23 LO4

SUGGESTED ACTIVITIES

LO No:	3		
LO Title:	**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**		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
UK legislation and regulation important for storage and use of scientific information	Tutors should provide learners with a list of the most up-to-date pieces of legislation and regulation to ensure that only current legislation is used. Each small group of learners could be given responsibility for researching a piece of legislation and producing a blog, video, presentation or flip chart presentation as a learning aide for themselves and the wider group. (Note, learners must interpret the law; merely presenting a bulleted list of the eight principles of the Data Protection Act (1998), for example, would not be sufficient.) Useful links to supporting information: Data protection and research data Jisc https://www.jisc.ac.uk/guides/data-protection-and-research-data EU data protection legislation Medical Research Council https://www.mrc.ac.uk/about/policy/policy-highlights/eu-data-protection-legislation/ For organisations Information Commissioner's Office (ICO) https://ico.org.uk/for-organisations/ Data Saves Lives: The Impact of the Data Protection Regulation on Personal Data Use in Cancer Research Directorate-General for Internal Policies, European Parliament http://www.europarl.europa.eu/RegData/etudes/STUD/2016/569992/IPOL_STU(2016)569992_EN.pdf Managing and Sharing Data UK Data Archive http://www.data-archive.ac.uk/media/2894/managingsharing.pdf Copyright Brunel University London http://www.brunel.ac.uk/services/library/learning/copyright	1.5 hours	Unit 5 LO4 Unit 11 LO1 Unit 14 LO3

Title of suggested activity	Suggested activities	Suggested timings	Also related to
UK legislation and regulation important for storage and use of scientific information (continued)	Rigour, Respect, Responsibility: A Universal Ethical Code for Scientists Government Office for Science, Department for Innovation, Universities & Skills https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/283157/universal-ethical-code-scientists.pdf The Protection of Freedoms Act 2012 (Destruction, Retention and Use of Biometric Data) (Transitional, Transitory and Saving Provisions) Order 2013 The National Archives http://www.legislation.gov.uk/uksi/2013/1813/made		
Investigation of the importance of compliance with legal requirements for the scientific community	The learners, in small groups, could take a specific scientific area and investigate which legislation is important to individuals and organisations that hold or use information about the area and why this is the case. They should consider the loss of research data, the misuse of sensitive data, limitations on holding and destruction of data. Learners should present their findings to the wider group and the tutor could use these as a basis for a discussion to clarify any inconsistencies or errors of understanding. Supporting information for general discussion may be found at: Governance Wellcome Trust Sanger Institute http://www.sanger.ac.uk/about/who-we-are/policies/animals-research/governance-ethics-and-welfare/governance Open Access Science Wellcome Trust Sanger Institute http://www.sanger.ac.uk/about/who-we-are/policies/open-access-science Good Research Practice Wellcome Trust Sanger Institute http://www.sanger.ac.uk/about/who-we-are/policies/good-research-practice Material Transfer Agreements Wellcome Trust Sanger Institute http://www.sanger.ac.uk/legal/#t_3	3 hours	Unit 5 LO4 Unit 10 LO1 Unit 14 LO3

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Legislation relevant to global collaboration and the storage and usage of scientific information	The tutor could introduce the topic by explaining that across the globe, some countries have the same or similar legislation to the UK, some have their own laws which may be quite different and others may have no specific legislation at all. Learners, working in groups, could take responsibility for looking at two or three countries each from three different continents and investigate their data protection, computer misuse and copyright and patent legislation. The findings could be presented as a wall chart or set of wall charts which could be displayed and the wider group could then come together to compare and contrast the different approaches and identify any areas of particular concern or good practice. Useful links: Data Protection Laws of the World DLA Piper https://www.dlapiperdataprotection.com/index.html#handbook/law-section International Copyright Basics: What is copyright? RightsDirect http://www.rightsdirect.com/international-copyright-basics/ Managing Intellectual Property Managing IP http://www.managingip.com/ Cybercrime Law Cybercrimelaw.net http://www.cybercrimelaw.net/Cybercrimelaws.html	3 hours	Unit 5 LO4 Unit 14 LO3
Ensuring compliance with legislation and regulation when collaborating globally	The tutor could provide the learners with a case study or scenario (the one used in the first suggested activity for Learning Outcome 1 could be used). The learners could work in small teams to identify the legislation which would need to be adhered to by each party, including local legal requirements. The learners should present their findings, via a flip chart presentation or table of findings, to the wider group. The tutor could summarise the findings, drawing out the importance of understanding national and supranational requirements.	2 hours	

SUGGESTED ACTIVITIES

LO No:	4		
LO Title:	**Understand the principles of information security and risks**		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
The principles of information security	Learners could carry out research into the meaning and purpose of information security and from this devise a definition of what it means. They should then investigate the three principles: confidentiality, integrity and availability, and justify their role in information security. They should present their evidence to the larger group as a presentation, or video of role play.	1 hour	
Identifying information security risks	The tutor could introduce the topic of information security risks with these video presentations below. The tutor could then lead a discussion on the content, encouraging learners to share their thoughts and experiences of the types of risks which can occur. At the end of the session learners should have developed an accurate understanding of the concept of information security risk. All your devices can be hacked Avi Rubin http://www.ted.com/talks/avi_rubin_all_your_devices_can_be_hacked What's wrong with your pa$$w0rd? Lorrie Faith Cranor http://www.ted.com/talks/lorrie_faith_cranor_what_s_wrong_with_your_pa_w0rd	2 hours	
Investigating examples of information security risks	Learners could undertake research, including news stories and news videos, on each of the following types of risk: • Unauthorised or unintended access to data (e.g. espionage, poor information security policy, ignorance of limitations of authority) • Accidental loss of data (e.g. human error, equipment failure) • Intentional destruction of data (e.g. computer virus, targeted malicious attack including theft) • Intentional tampering with data (e.g. fraudulent activity, hacking, deception). The research does not need to be limited to scientific information risks but instead should concentrate on general concepts. The learners should present their findings to the wider group and an agreement on the type of risk or risks each example highlights reached. Learners and tutor should keep copies of the final list for future reference.	2 hours	Unit 5 LO4

Title of suggested activity	Suggested activities	Suggested timings	Also related to
The impact of failing to control risks	The tutor could use the list created in activity 3 to enable learners, in small groups, to carry out further investigation into examples of actual information security breach and the impact these had on the individual or organisation whose information had been at risk. For each occurrence, the learners should record the following information in tabular form: • Name and/or title of the Information holder • Type of breach (using the list if risk identified in activity 3) • Classification of the information affected (from the list in activity 1 of LO2) • The date of the risk • Description of the risk • What was the response by the authorities? (For example, charges, prosecution, fines or imprisonment) • What was the impact on the information holder? (For example, loss of earnings, loss of reputation, failure of compliance.) These findings should be presented to the wider group and the tutor could use these as a basis for a discussion on how these findings relate to scientific information and the information holders. Cyber Security – Top 10 Threats Fujitsu Global https://www.youtube.com/watch?v=dVW1FNWSaTg Security as a Business Risk – How Data Breaches Impact Bottom Lines Data Breach Today http://www.databreachtoday.co.uk/whitepapers/security-as-business-risk-how-data-breaches-impact-bottom-lines-w-537	3 hours	Unit 5 LO4

The small print

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