OCR
Oxford Cambridge and RSA

Cambridge **TECHNICALS LEVEL 3**

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APPLIED SCIENCE

Unit 6 – Control of hazards in the laboratory
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 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

Running a research lab is a challenge. In all the hustle of loading the autosampler, pipetting, pouring, and mixing for research experiments, worker health and safety can be overlooked, inadvertently pushed aside or forgotten—sometimes with dire consequences. Understanding the legal requirements and recognizing hazards will help you to identify and minimize many of the common safety and health hazards associated with running a research laboratory.

This unit presents an overview of the most common hazards encountered in typical research labs and will help you maintain a safe work environment. It also links to many other units within the qualification and you can apply skills in the context of the practicals you will carry out elsewhere.

Unit 6 Control of hazards in the laboratory	
LO1	Understand the types of hazard that may be encountered in a laboratory
LO2	Be able to use health and safety procedures to minimise the risk presented by hazards in a laboratory
LO3	Be able to design a safe functioning laboratory to manage the risk presented by hazards

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/

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 6)	Title of suggested activity	Other units/LOs	
LO1	Biological agent hazards	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry LO6 Be able to use aseptic technique
		Unit 18 Microbiology	LO1 Be able to classify and identify microorganisms
	Chemical hazards	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	Physical hazards	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	The structure of viruses	Unit 18 Microbiology	LO1 Be able to classify and identify microorganisms
	Life cycle of a virus	Unit 18 Microbiology	LO1 Be able to classify and identify microorganisms
	The structure of bacteria	Unit 18 Microbiology	LO1 Be able to classify and identify microorganisms
	Bacterial toxins	Unit 18 Microbiology	LO1 Be able to classify and identify microorganisms
	Bacterial growth	Unit 18: Microbiology	LO1 Be able to classify and identify microorganisms
	Bacteriophages	Unit 18 Microbiology	LO1 Be able to classify and identify microorganisms
LO2	Hazard signs	Unit 2: Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	Hazcards	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	Reducing the risk of biohazards in the laboratory	Unit 2: Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry LO6 Be able to use aseptic technique
		Unit 18 Microbiology	LO1 Be able to classify and identify microorganisms
	How to write risk assessments	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	Understanding COSHH regulations	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	Understanding RIDDOR regulations	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	Using laboratory equipment safely	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	Using standard operating procedures	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
LO3	Designing the work area	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	How to store chemicals and equipment safely	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	How to use a fume cupboard	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
		Unit 16 Waste disposal	LO2 Understand how to manage air emissions
	How to dispose of waste chemicals	Unit 2 Laboratory techniques	LO1: Understand the importance of health and safety and quality systems to industry
		Unit 16 Waste disposal	LO1 Understand how to manage waste
	How to record working procedures	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	How to record accidents	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	Fire safety	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	Securing the laboratory	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry
	Health and safety laws	Unit 2 Laboratory techniques	LO1 Understand the importance of health and safety and quality systems to industry

KEY TERMS

Explanations of the key terms used within this unit, in the context of this unit	
Key term	**Explanation**
Anaesthetic	A drug or gas that can cause a reversible loss of consciousness. A general anaesthetic can be used during surgery.
Antigen	A substance foreign to the body that causes an immune response from the white blood cells.
Bacteriophage	A virus that infects bacteria. These are often used in genetic research to add genes to bacteria.
Binary fission	Asexual reproduction in bacteria. The bacteria elongate, duplicate their genetic material and divide into two equal-sized daughter cells.
Capsid	A protein coat that surrounds the genetic material of a virus.
Carcinogen	A chemical that can use cancer.
Disinfectant	A chemical that kills bacteria.
Endotoxin	A toxin that is released when bacteria disintegrate, which causes illness in the body.
Gram negative bacteria	A group of bacteria that have a thin cell wall and do not retain the violet Gram stain.
Gram positive bacteria	A group of bacteria that have a thick cell wall and take up the violet Gram stain.
Lysogenic cycle	A type of viral reproduction when a bacteriophage replicates inside a bacterium without lysing (breaking open) the bacterium.
Mutagen	A physical or chemical agent that can change the DNA and increase the frequency of mutations.
Nucleic acid	A biological substance that forms DNA or RNA molecules.
Phagocytosis	The ingestion of antigenic material, such as bacteria, by macrophages and neutrophils in the body.
Teratogen	A chemical that causes the malformation of an embryo.
Toxin	An organic poison from a plant or animal that causes illness in the body.

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**
The laboratory is not really that dangerous	Discuss some incidents that have happened in a laboratory because someone has been careless, or not followed the laboratory rules. Make it clear that accidents can and do happen.	Identifying Laboratory Hazards Interactive Solutions http://www.interactivesolutions.co.uk/games/flashGames/labHazards.htm A web-based interactive game identifying 13 hazards in a laboratory.
The chemicals in a laboratory are safe	Make the learners aware that the chemicals are safe so long as you use them properly. Always be aware of the hazard sign on the bottle or beaker. Keep flammable chemicals away from flames.	Laboratory Fire Safety Risk Management Services at the University of Alberta https://www.youtube.com/watch?v=hcucTtLYoWU A short video showing how easily a small fire can start in a laboratory.
Learners do not understand how small viruses are compared to bacteria, and have difficulty imagining the life cycle of viruses	Show images of viruses compared to bacteria, and discuss bacteriophages infecting bacteria. Use animations and video to show the life cycles of viruses.	Virus structure and classification Khan Academy and the Association of American Medical Colleges (AAMC) https://www.youtube.com/watch?v=4klKySxUYuk&nohtml5=False A video showing the structures of viruses. Viral replication: Lytic versus lysogenic Khan Academy and the Association of American Medical Colleges (AAMC) https://www.khanacademy.org/test-prep/mcat/cells/viruses/v/viral-replicaiton-lytic-vs-lysogenic A video showing the two life cycles of viruses.
All bacteria are harmful	Discuss that most bacteria are not harmful, and that we have non-harmful (often labelled 'good') bacteria living in our intestines and on our skin. Discuss that bacteria are useful to us, used to make food such as cheese and yoghurt, used in biotechnology to make medicines, such as human insulin.	You are your microbes TED-Ed https://www.youtube.com/watch?v=1X8p0vhsWRE An animation showing the bacteria that live on and in our bodies, and how they are useful to us.

SUGGESTED ACTIVITIES

LO No:	1		
LO Title:	**Understand the types of hazard that may be encountered in a laboratory**		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Biological agent hazards 	Tutors could discuss the types of biological agents likely to be encountered in a laboratory. Learners could produce a small booklet of the biological hazards that could be encountered in a level 1, 2, 3, and 4 biology laboratory. Biological hazards Ryerson University http://www.ryerson.ca/content/dam/irm/pdfs/BIO/2_BiologicalHazards_2010.ppt This is a good PowerPoint to use to introduce this topic. It describes the different types of biological hazard in a laboratory and how to minimise risk. Biological agents: Managing the risks in laboratories and healthcare premises Health and Safety Executive http://www.hse.gov.uk/biosafety/biologagents.pdf A detailed description of the different types of biological hazard in a laboratory.	1 hour	Unit 2 LO1, LO6 Unit 18 LO1
Chemical hazards	Tutors could show the presentation on chemical laboratory safety and discuss with the group how to reduce the risk of harm due to chemicals in the laboratory. Learners could produce a poster on chemical risk and safety precautions to take. Chemical Laboratory Safety Sheffield University https://www.sheffield.ac.uk/polopoly_fs/1.375067!/file/Chemicalsafety.ppt Tutors could use this PowerPoint to provide an overview of the chemical hazards in the laboratory.	1 hour	Unit 2 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Physical hazards 	Tutors could start by showing the learners this safety video from Marcom: Laboratory Ergonomics Safety Video Safety Training Videos https://www.youtube.com/watch?v=GWCQvQlufFo&nohtml5=False This video discusses how to set up a work area to avoid ergonomic injury. Tutors and learners could also discuss how to avoid slips and falls when using liquids, electrical, acoustic, and thermal hazards. A source of information for this discussion is the following resource: Physical Hazards in a Lab' Trent University https://www.trentu.ca/scienceservices/safety/documents/PhysicalHazardsinaLaboratory.pdf A detailed document covering many areas of physical hazards in a laboratory, including electrical, acoustic and thermal hazards. Learners could write a plan of their workspace to show that they have taken these risks into consideration when planning their workspace.	1 hour	Unit 2 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
The structure of viruses	Tutors could introduce the topic of viruses by showing this video: Virus structure and classification Khan Academy and the Association of American Medical Colleges (AAMC) https://www.youtube.com/watch?v=4klKySxUYuk&nohtml5=False This video describes the structure of different viruses, including the different types of nucleic acid, and capsid shapes. Tutors could add to this the presence of viral enzymes within the capsid, and the roles of one enzyme, for example reverse transcriptase in the human immunodeficiency virus (HIV). Some further information on virus structure can be found at the following website: Virus Structure Molecular Expressions https://micro.magnet.fsu.edu/cells/virus.html This website discusses the structure of different viruses and the roles of the nucleic acids, capsid and enzymes. Learners could produce their own labelled 3D virus. This web page by Ellen McHenry gives templates to make a 3D adenovirus or T2 virus: Cut-and-assemble model viruses Ellen McHenry http://www.ellenjmchenry.com/homeschool-freedownloads/lifesciences-games/documents/Cutandassemblevirusmodels.pdf This web page gives templates to make a 3D adenovirus or T2 virus.	1 hour	Unit 18 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Life cycle of a virus	The tutor could explain the difference between the lytic and lysogenic cycles as related to diseases. *Molecular Cell Biology*, 4th edition Lodish, H., Berk, A., Zipursky S.L., et al. New York: W. H. Freeman; 2000. http://www.ncbi.nlm.nih.gov/books/NBK21523/ This is a useful book with detailed information on this topic. Viral replication: lytic vs lysogenic Khan Academy and the Association of American Medical Colleges (AAMC) https://www.khanacademy.org/test-prep/mcat/cells/viruses/v/viral-replicaiton-lytic-vs-lysogenic This is a useful video by Khan Academy and AAMC that shows both cycles. Learners could create a poster comparing the lytic and lysogenic cycles.	1 hour	Unit 18 LO1
The structure of bacteria	Tutors could explain the structure and function of the parts of a bacterial cell including plasmids, pili, capsules and endotoxins in the cell wall (e.g. *Salmonella*), and why bacteria are grouped into Gram positive and Gram negative groups. Learners could produce a poster showing the structure and function of a bacterial cell. Structure and Function of Bacterial Cells Todar's Online Textbook of Bacteriology http://textbookofbacteriology.net/structure.html A web page detailing the structure and function of bacterial cells with diagrams. Bacterial Endotoxin Todar's Online Textbook of Bacteriology http://textbookofbacteriology.net/endotoxin.html Detailed information about endotoxins including a diagram of their location within the bacterial cell wall. Bacterial characteristics - Gram staining Khan Academy and the Association of American Medical Colleges (AAMC) https://www.youtube.com/watch?v=FgsgpoFhleA&nohtml5=False Shows why some bacteria hold the Gram stain and others do not.	1 hour	Unit 18 LO1
Bacterial toxins	The group could use online resources and textbooks to research common endotoxins and their symptoms. For example, the *Salmonella* endotoxin can cause vomiting and diarrhoea.	20 minutes	Unit 18 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Bacterial growth 	The group could begin this activity by watching the video: Bacteria dividing – Binary Fission cellsalive.com https://www.youtube.com/watch?v=j8_xoM8Wwgs This video shows bacteria dividing by binary fission. The tutor could explain the bacterial growth curve (lag phase, log phase, stationary phase, and death phase), and how the humidity, temperature, nutrient sources, pH, and aerobic/anaerobic conditions affect the growth curve. Learners could produce their own bacterial growth curve, annotating what happens at each stage. The Growth of Bacterial Populations Todar's Online Textbook of Bacteriology http://textbookofbacteriology.net/growth_3.html A web page that details the growth curve of bacteria with diagrams, and explains what is happening at each stage of the growth curve.	40 minutes	Unit 18 LO1
Bacteriophages	The group should already be familiar with the term 'bacteriophage' as it is mentioned in activity four on viruses. The tutor could remind the class of bacteriophages and show this animation: Bacteriophage T4 Virus – 3D Animation Amhaus https://www.youtube.com/watch?v=uFXuxGuT7H8 This video shows how a T4 bacteriophage infects a bacterial cell. Learners could produce their own poster or animation showing the life cycle of a bacteriophage. Bacteriophage Todar's Online Textbook of Bacteriology http://textbookofbacteriology.net/phage.html This web page discusses bacteriophages and their life cycle in detail.	1 hour	Unit 18 LO1

SUGGESTED ACTIVITIES

LO No:	2		
LO Title:	**Be able to use health and safety procedures to minimise the risk presented by hazards in a laboratory**		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Hazard signs	This is a good introduction to hazard signs: Hazards in the laboratory David Read https://www.youtube.com/watch?v=UW6KzNiFNLU Video that introduces some of the common hazard signs seen around a laboratory. Tutors could discuss more hazard symbols that the learners may come into contact with. Common Safety Signs and Hazard Symbols CLEAPSS www.cleapss.org.uk/attachments/article/0/E232/E232.pdf A pdf document detailing the safety signs and hazard signs found in a laboratory. An extensive list of symbols can be found on page five. Learners could play an online hazard symbols matching game in order to familiarise themselves with the most common hazard symbols. Hazard Pictograms Match The Memory http://matchthememory.com/hazardpictograms Card game to help learn the main hazard signs.	30 minutes	Unit 2 LO1
Hazcards	The tutor could show the group the hazcards that are kept in the classroom and explain what they are for. Learners could research four commonly used chemicals and write down the hazards of the chemical and precautions that should be taken when handling it, e.g. hydrochloric acid. Student Safety Sheets CLEAPSS http://science.cleapss.org.uk/resource/Student-Safety-Sheets-ALL.pdf Student safety sheets are a version of hazards. This pdf document contains student safety sheets for all chemicals that you might find in the classroom.	30 minutes	Unit 2 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Reducing the risk of biohazards in the laboratory 	Learners should already be familiar with the biohazards that may be encountered in a laboratory, as they were mentioned in the first activity suggested for Learning Outcome 1 on biological agent hazards. Tutors may wish to show this video: Take a look inside the world's most biosecure laboratory CSIRO https://www.youtube.com/watch?v=nx6GxmNqJ4I&nohtml5=False This video shows the highest level of biosafety in a level 4 biology laboratory and the safety precautions that must be followed there. Tutors could also discuss with the group recent disease outbreaks, e.g. Ebola, and what precautions the people working with the virus undertook. Learners could produce a small booklet of the precautions needed to be taken by people working in a level 1, 2, 3 and 4 biology laboratory. Biological hazards Ryerson University http://www.ryerson.ca/content/dam/irm/pdfs/BIO/2_BiologicalHazards_2010.ppt This is a good PowerPoint to use to introduce this topic. It describes the different types of biological hazard in a laboratory and how to minimise risk.	1 hour	Unit 2 LO1, LO6 Unit 18 LO1
How to write risk assessments 	The tutor could show the group a completed risk assessment and show the group how to complete one. Learners could complete a risk assessment for a fictional experiment. Some examples of completed risk assessments can be found in this resource: Risk assessment: Undergraduate lab modules National University of Singapore https://www.chemistry.nus.edu.sg/PSSO/safety/RAteaching.htm This web page lists a number of experiments. Click on the experiment to see the risk assessment. Risk assessment templates and additional information can be found here: Risk Assessment University of Birmingham https://intranet.birmingham.ac.uk/hr/wellbeing/worksafe/topics/riskassessment.aspx A blank risk assessment template for laboratories is provided, as well as guidance on how to complete risk assessments.	1 hour	Unit 2 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Understanding COSHH regulations 	The group could look at this PowerPoint presentation: An Introduction to COSHH University of Sheffield https://www.sheffield.ac.uk/polopoly_fs/1.375051!/file/CoSHH.ppt This PowerPoint explains simply what COSHH is and what needs to happen in a laboratory in order to follow the COSHH law. Learners could imagine that they are in charge of the laboratory and need to identify two or three hazardous substances in the room, and decide who is at risk. They should decide what control measures or procedures should be carried out, whether any safety equipment is needed, and what should happen in an emergency. What is COSHH? Health and Safety Executive (HSE) http://www.hse.gov.uk/coshh/basics.htm A basic introduction to the COSHH law and the responsibilities of employers. Working with substances harmful to health HSE http://www.hse.gov.uk/pubns/indg136.pdf A more detailed document discussing the myths of COSHH and what needs to be done by the employer to protect employees.	1 hour	Unit 2 LO1
Understanding RIDDOR regulations	Tutors could show this presentation: RIDDOR Ron Griffiths, HSE http://www.scottishcollegegovernance.ac.uk/download-document/3751-reporting-of-injuries-diseases-and-dangerous-occurences-regulations-riddor-ron-griffiths This PowerPoint presentation goes over the basics of RIDDOR and explains what can and cannot be reported. Learners could be given a number of different accident scenarios and decide if they should be reported or not. Some examples can be found on the HSE website: Examples of reportable incidents HSE http://www.hse.gov.uk/riddor/examples-reportable-incidents.htm This web page gives a list of different scenarios and lists whether or not they should be reported.	1 hour	Unit 2 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Using laboratory equipment safely	Learners could watch the following videos on handling glassware and electrical equipment safely: Laboratory Safety Lab Glassware Safety safetyissimple.com https://www.youtube.com/watch?v=kD0hsdUCXdc Short video that outlines the safe handling of glassware in the laboratory. Electrical Safety in the Laboratory Global Safety Council https://www.youtube.com/watch?v=dMlBOpjahno A short video that discusses electrical safety in the laboratory. Learners could select five pieces of laboratory equipment, including at least two different pieces of glassware and one piece of electrical equipment, and write a risk assessment for this equipment.	1 hour	Unit 2 LO1
Using standard operating procedures	Tutors could show the group this video: What is an SOP? ATETV https://www.youtube.com/watch?v=JY2uWUqfZkI This is a short video explaining what a standard operating procure (SOP) is. The group could discuss some of the common SOPs found in a laboratory. More information can be found here: Standard Operating Procedure University of Maryland https://www.des.umd.edu/ls/sop/GeneralLabSOP.pdf This pdf document by the University of Maryland details many common SOPs used in a laboratory. Learners could choose five pieces of safety/medical equipment or safety/medical situations in the laboratory and find out/write a SOP for each. For example, a fire extinguisher, fire safety blanket, eyewash, applying a plaster, dealing with a scald.	1 hour	Unit 2 LO1

SUGGESTED ACTIVITIES

LO No:	3		
LO Title:	**Be able to design a safe functioning laboratory to manage the risk presented by hazards**		
Title of suggested activity	**Suggested activities**	**Suggested timings**	**Also related to**
Designing the work area 	Tutors could discuss with the class how the laboratory has been designed. Learners could design their own laboratory including: • where in the building would the laboratory be? • how big is the room? • how will the benches and cupboards be arranged? • what type of seating will there be? • how will the room look/be decorated? • how will the room be lit? • how will the room be heated? • how easy will it be to move around the room? • where will the technician/s' workspace position be in relation to other rooms? • where will personal protective equipment (PPE) be stored? • where will personal belongings be stored? • where will the sinks/gas taps be located? • where will the fume cupboard be? • where will the fire safety equipment be located? • how easy will it be to escape the room in case of emergency? • how will the chemicals and equipment be secured? • what warning signs should be on the doors/around the room? Learners could draw their design by hand or using computer software and complete a report answering the queries listed above. More information can be found in this document: Designing and Planning Laboratories Association for Science Education (ASE) https://www.ase.org.uk/documents/lab-design-designing-and-planning-laboratories/ This document discusses in great detail how to design a school science laboratory. The Lab Design section of the ASE website also contains other documents on this topic: Lab Design Association for Science Education (ASE) http://www.ase.org.uk/resources/lab-design/ The document on 'School Science Laboratories Design for the 21st Century' may be particularly useful.	3 hours	Unit 2 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
How to store chemicals and equipment safely	Tutors could discuss how toxic, flammable, and radioactive substances are stored and demonstrate their storage to the group if there are any of these materials to hand. Tutors could also discuss and show the storage of biological materials e.g. frozen organs, slides of animal tissue. Tutors could also discuss and demonstrate how laboratory equipment is stored in the laboratory. Learners could add to their laboratory design: • how will toxic substances be stored? • how will flammable substances be stored? • how will radioactive substances be stored? • how will biological materials be stored? • where will the equipment be stored? More information can be found in this document: The Chemicals Store Association for Science Education http://www.ase.org.uk/documents/part-three-the-chemicals-store This document discusses in detail how to store chemicals in a school science laboratory.	1 hour	Unit 2 LO1
How to use a fume cupboard	The group could watch this video: Fume Hood safety: DOs and DON'Ts Labconco Corp https://www.youtube.com/watch?v=yqU5bGP0i5I This video shows two people using a fume cupboard – one of them is using it safely and the other one is not. The tutor could show the group how to correctly use a fume cupboard, and the learners could write a SOP for the correct use of a fume cupboard. More information can be found here: User guide to safe use of laboratory fume cupboards University of Reading https://www.reading.ac.uk/web/FILES/health-and-safety/CoP_49_Part_1_User_guide_to_safe_use_of_lab_fume_cupboards.pdf A guide to the safe use of fume cupboards.	30 minutes	Unit 2 LO1 Unit 16 LO2

Title of suggested activity	Suggested activities	Suggested timings	Also related to
How to dispose of waste chemicals	The tutor could discuss with the group the different ways to dispose of waste chemicals in a laboratory. The tutor could show some of these methods if it is practical to do so. Learners should already be familiar with hazcards from one of the activities suggested for Learning Outcome 2. Learners could use hazcards to find out how to dispose of three chemicals of their choice and write down the procedures. Useful information can be found on the University of St Andrews website: Waste Disposal – Disposal of Laboratory Wastes (Guidance) University of St Andrews https://www.st-andrews.ac.uk/staff/policy/healthandsafety/publications/waste/waste-disposaloflaboratorywastesguidance/ This web page discusses waste disposal procedures for different types of laboratory waste.	30 minutes	Unit 2 LO1 Unit 16 LO1
How to record working procedures 	The tutor could discuss with the group how the SOPs are filed in the laboratory, how a new SOP is initiated, and how one should be written. Learners could write an SOP on a given area, e.g. how to leave the room safely in case of a fire, and record it on the given proforma. An example of a proforma can be found here: 21+ Sample SOP Templates SampleTemplates http://www.sampletemplates.com/business-templates/sop-template.html This web page gives a list of profomas that can be used for writing an SOP. The second proforma on this list would work well for use in a laboratory. Useful information can be found here: Standard Operating Procedures Food and Agriculture Organization, United Nations http://www.fao.org/docrep/w7295e/w7295e04.htm This website gives a detailed account of who should record SOPs, how they should be written, and how they should be filed.	30 minutes	Unit 2 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
How to record accidents	Learners should be familiar with RIDDOR from Learning Outcome 2. The tutor could discuss how to record minor and major accidents in the laboratory, including where the minor accident book is kept, how to contact first aiders and when to contact RIDDOR. Learners could be given a list of potential accidents and decide how to record them and whether or not they should be reported to RIDDOR. Prevent Common Laboratory Accidents Scholar Chemistry http://www.scholarchemistry.com/articles/Prevent_Common_Lab_Accidents.pdf A list of common laboratory accidents. Reporting incidents and record keeping St John Ambulance https://www.sja.org.uk/sja/training-courses/first-aid-in-schools/incidents-and-record-keeping.aspx This website gives instructions on how to keep an accident book and gives further guidance for schools about reporting to OFSTED for more serious injuries. Reporting accidents, incidents and diseases Health and Safety Executive http://www.hse.gov.uk/toolbox/managing/reporting.htm This website gives an overview of recording and reporting more serious injuries.	30 minutes	Unit 2 LO1
Fire safety	The group should discuss the fire precautions and safety signs set out in the laboratory, and the locations of the fire safety equipment. The group could discuss how to operate the fire blanket and fire extinguisher. The tutor could show videos on how to use the fire blanket and fire extinguisher. How to Use a Fire Blanket Fire and Rescue NSW https://www.youtube.com/watch?v=GLvnAe6-DLg Short video showing how to use a fire blanket to put out a pan fire. Fire Safety Training – How to Use a CO2 Fire Extinguisher Fire Training Academy https://www.youtube.com/watch?v=aPhbJ95VGe0 Video showing how to use a carbon dioxide extinguisher.	30 minutes	Unit 2 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
Securing the laboratory	The tutor could discuss with the class what equipment and chemicals need to be kept secure and measures that are in place in the laboratory e.g. swipe card entry, locks on doors and cupboards, limited number of personnel with keys, video surveillance. Learners could add security information to their laboratory design report, from the first activity suggested for Learning Outcome 3. Information can be found at the NCBI website: Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards: 10 Laboratory Security National Research Council http://www.ncbi.nlm.nih.gov/books/NBK55881/ This is an excerpt from a book of the same title, detailing the security in the laboratory and why it is important.	30 minutes	Unit 2 LO1
Health and safety laws	Learners will be aware of some health and safety law, COSHH and RIDDOR from Learning Outcome 2. Learners could research other laws that affect the work in a laboratory, and write a short report including: • Health and Safety at Work • Codes of Practice • Control of toxic and flammable substances • Microbiological hazards. Health and safety legislation – laws in the workplace Health and Safety Executive http://www.hse.gov.uk/legislation/ A section of the HSE website describing the health and safety laws that affect different workplaces. Segregation of hazardous materials Health and Safety Executive http://www.hse.gov.uk/comah/sragtech/techmeassegregat.htm A section of the HSE website describing the rules surrounding the control of toxic and flammable substances.	1 hour	Unit 2 LO1

The small print

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