Identifying laboratory equipment

You have been asked to produce a number of leaflets for trainee technicians and learners, who are thinking of joining your organisation. The leaflets need to outline the type of procedures and communication methods used within the workplace.

Aim

Become familiar with basic pieces of glassware and equipment and then look at more complicated and specialised pieces of apparatus.

Before you start

You will need:

- access to basic pieces of equipment, including glassware, that are in common use in the school or college laboratory
- access to more complicated pieces of equipment that are used less often, or the internet, magazines or journals for research.

Safety

Be careful with the equipment that you will be using as it will be delicate and easily damaged or broken. Follow the advice and information given to you by your tutor or the technician.

What you need to do

1. Create a list of words (glossary) connected with working in science. Start by using the key terms listed in the Student Book and then include other words and terms that are important in the area of vocational applied science that you are studying. You can add to this list as you work through the unit.

2. Look at the basic pieces of equipment set out for you by your tutor. Draw a table like the one below and list their names and uses:

<table>
<thead>
<tr>
<th>Basic laboratory equipment</th>
<th>What it is used for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring cylinder</td>
<td></td>
</tr>
</tbody>
</table>

3. If you have access to more complicated or specialised pieces of equipment, then draw a table like the one below and list their names and uses:

<table>
<thead>
<tr>
<th>More specialist laboratory equipment</th>
<th>What it is used for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centrifuge</td>
<td></td>
</tr>
</tbody>
</table>

Extension

Think about the type of work you would like to do in a laboratory. Research the types of equipment you might use and the procedures you might follow. After this, choose a piece of laboratory equipment and consider the ways it would need to be maintained. If you have time, you could draw and write a simple step-by-step user’s manual for the piece of equipment.
Communication in the scientific workplace

You are producing leaflets for people who might like to work in science and you have been asked to highlight the importance of communication in the workplace and the problems that might occur when communication is bad.

Aim

To investigate ways of communicating in everyday life and in the science environment,

Before you start

You will need:

- to think about the ways that we communicate in everyday life outside of the workplace.
- to look at some signs that you might see outside the workplace.
- to look at some laboratory signs.

Safety

Is the information that you get from the internet or the newspapers always correct? Are the messages you write and the information you give safe on the internet?

What you need to do

We communicate socially in many different ways. How do these differ from those used in the workplace?

1. Listen carefully to the message that is whispered to you and then pass it on as accurately as you can to the next person. When the message has passed through the whole class listen to the message that has reached the end. Is it the same as when it started?

2. Think about the different types of information that might need to be communicated in the scientific workplace. What would be the best way to communicate this information?

<table>
<thead>
<tr>
<th>Communication type or skill</th>
<th>Why is it important?</th>
<th>Example of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intranet</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Using the evidence

Use the evidence to show that some forms of communication are more suitable for some types of information and in some circumstances but some forms are not appropriate in the workplace.

Extension

Role-play different communication situations.
Laboratory design

You are a Laboratory Manager and have been asked to design an additional new lab for your organisation.

Aim
To enhance awareness of the laboratory environment and what makes a workplace scientific.

Before you start
You will need:
• access to a laboratory of reasonable dimensions
• access to computers with suitable drawing packages
• measuring tapes, pencils, paper, graph paper and rulers.

Safety
While carrying out the measurements be careful not to do damage to the laboratory, equipment, furniture or yourselves.

What you need to do
The first thing to do is look around you at the laboratory you are in:
1. Draw a rough sketch plan of the laboratory you are in, as though you are looking down from above. Include doors and make a note of where they lead. Identify and list key features.
2. Using the measuring tapes, move about the room and take measurements of the room itself, the furniture (cupboards, benches or tables and equipment such as fume cupboard, centrifuges, ovens, etc.)
3. Put the measurements that you have taken either onto the sketch plan, or into a table like the one below. (Check with other learners or groups that you have the same measurements.)

<table>
<thead>
<tr>
<th>Measurements in metres and centimetres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of the laboratory</td>
</tr>
</tbody>
</table>

Using the evidence
Using the measurements draw an outline plan of your laboratory. On your plan change the layout of the laboratory to be more suitable for the tasks being carried out in it. You can either draw on graph paper or use a suitable computer drawing package. Mark on the plan where doors, sinks and services are located and add the locations of any safety equipment, e.g. fire extinguishers, eye wash bottles, etc.

Extension
Design your own specialist laboratory and draw a plan to a suitable scale, giving the scale that you have used and including all key features such as furniture, large equipment and services. List key features and justify their inclusion in the specialist laboratory (Look at Activity 2.2B in the Student Book. This activity will give you an understanding of what is required in a scientific workplace.)
Your laboratory storage of information has caused a few problems recently and you have been given the task of finding newer and better ways to store all of the different types of information.

**Aim**

To become familiar with modern computerised information storage systems.

**Laboratory Information Management Systems (LIMS)**

**Before you start**

You will need:

- to be aware of the different types of information that might need to be stored in a laboratory
- be aware of why it is important to store information accurately and safely.

**Safety**

There are no safety implications to this activity.

**What you need to do**

Safe and secure storage of information is vital in the scientific environment. You will be investigating the different types of Laboratory Information Management Systems that are available for use in the scientific environment and their uses.

1. List, in the table, the information that could be required for the efficient running of a laboratory.

2. Suggest, in the table, how it could be stored and then give options for other ways to store this information and say whether it is safe and secure.

<table>
<thead>
<tr>
<th>Information required for the efficient running of a lab</th>
<th>How it could be stored</th>
<th>Is this safe and secure?</th>
<th>Other options for storage</th>
<th>Is this safe and secure?</th>
<th>Does it need to be secure?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Using the evidence**

Decide on the best way to store this information.

**Extension**

Produce a power point presentation showing the advantages of using a LIMS.
Safe working practices

You are a journalist investigating the way laboratories are affected by Health and Safety rules and regulations in the workplace and the wider environment. The activities in this section will give you an understanding of the rules that scientific organisations have to obey starting with Risk assessment.

Aim

Raise awareness of the regulations and legislation in place to promote safety in the scientific workplace and to protect the wider environment.

Before you start

You will need:

- access to a computer with Internet access
- access to textbooks.

What you need to do

You will carry out a risk assessment on a piece of practical work from another unit.

1. Draw a table like the one below. List what equipment and chemicals are used in the practical.

2. Find out about, using various sources, the hazards of the equipment and chemicals used and the risks associated with them.

3. Use a copy of a typical risk assessment form, one used in your school or college, and complete it for the practical work under investigation.

<table>
<thead>
<tr>
<th>Chemical substance / piece of equipment</th>
<th>Hazard</th>
<th>Alternative if required</th>
</tr>
</thead>
</table>

Extension

Investigate some of the current legislation and regulations in the scientific workplace, such as the Health and Safety at Work Act.
# Procedures in a laboratory: Lesson plan 2.1(1)

<table>
<thead>
<tr>
<th>Duration</th>
<th>60 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>student book pages</td>
<td>XX-XX</td>
</tr>
<tr>
<td>working towards</td>
<td>P1, M1,</td>
</tr>
<tr>
<td>subject specialism</td>
<td>Vocational work in the scientific environment</td>
</tr>
</tbody>
</table>

## Lesson resources
- Information on careers in science produced by Institute of Biomedical Science, Institute of Chemists, etc.
- Examples of leaflets produced by Institutes etc. to show where science is carried out in the workplace, by whom, and procedures and practices carried out in laboratories.
- Basic pieces of equipment, including glassware, that are in common use in the school or college laboratory.
- More complicated pieces of equipment that are used less often, or access to the internet, magazines or journals for research.

## Interactive activities and weblinks

**Weblinks:**
- Association of Clinical Biochemistry
- Institute of Biomedical Science
- Society of Biology
- CLEAPSS

## Learning objectives

### All learners will be able to:
- outline some of the procedures and practices that are carried out in laboratories and have an understanding of terms and definitions used in the work of a laboratory.

### Most learners will be able to:
- understand the reasons that procedures and practices are carried out in the way that they are in the scientific environment and have some knowledge of the equipment used.

### Some learners will be able to:
- analyse the different aspects of laboratory work including various pieces of equipment and procedures.

## Suggested starter activity (10 min)

Lead a class discussion on where science is used in the workplace. Who works in science? Do the learners have ideas about possible careers in science and what they might be required to do in this career?

## Suggested main activities (40 min)

### Identifying laboratory equipment

Learners are shown some procedures and practices that are carried out in a school laboratory. They then look at procedures and practices in different types of laboratory starting with basic equipment and then more complicated and specialised equipment (if available) and the procedures that are involved.

## Suggested plenary activity (10 min)

Look at together and discuss information on careers in science.

## Stretch and support

Draw conclusions about the type of work carried out and any similarities or differences found in different scientific areas.

| Functional Skills | ICT – Find and select information
| English – Speaking and listening in class discussion |
| PLTS | IE1, 2 |
| Keywords | calibration, hierarchy, practice, procedure, scientific environment |
| Links to other subjects | Unit 1: Fundamentals of science
| Unit 4: Scientific practical techniques
| Unit 15: Microbiological techniques
| Unit 22: Chemical laboratory techniques |
# Communication in the scientific workplace:
## Lesson plan 2.1(2)

<table>
<thead>
<tr>
<th><strong>Duration</strong></th>
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<tr>
<td><strong>Working towards</strong></td>
<td>M2, P2, D1</td>
</tr>
<tr>
<td><strong>Student book pages</strong></td>
<td>XX-XX</td>
</tr>
<tr>
<td><strong>Subject specialism</strong></td>
<td>Communication</td>
</tr>
</tbody>
</table>

### Lesson resources
- Messages in pictures: these could be road signs or laboratory safety signs.
- Messages using technical words or phrases which will be a ‘foreign language’ to some.
- Messages in a foreign language, a short shopping list in French or Spanish.

### Learning objectives
- **All learners will be able to:**
  - identify how information is communicated in the scientific workplace.
- **Most learners will be able to:**
  - explain how information is communicated in the scientific workplace.
- **Some learners will be able to:**
  - analyse why laboratory procedures and practices must be communicated clearly and accurately.

### Interactive activities and video links
- Video links to complex science TV programmes.
- Video showing good and bad communication.

### Suggested starter activity (10 min)
- Carry out a game of ‘Chinese whispers’ in the class to see how information is passed on from person to person. Then do the same with messages in a foreign language.

### Suggested main activities (40 min)
- Consider all the different information that might need to be communicated within as well as to and from the scientific workplace.
- Suggest the best ways of communicating different types of information and the reasons for using these methods.
- Look at communication in the workplace and compare it to communication in social life.
- Include information about confidentiality and security of information.

### Suggested plenary activity (10 min)
- Run the ‘Chinese whispers’ game again and the foreign messages again to see if learners are now more aware of how important communication is.

### Differentiating the lesson
- Have longer more complicated messages for the more competent learners.

### Functional Skills
- **English – speaking and listening**
  - IE1, 2; TW1; SM2, 3

### Keywords
- **Hierarchy in the workplace, organisational structure, scientific terminology**
- **Links to other subjects**
  - Science and the World of Work, Level 2
### Information storage in the laboratory:

**Lesson plan 2.3**

<table>
<thead>
<tr>
<th>Duration</th>
<th>60 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working towards</td>
<td>P4,M4,D3</td>
</tr>
<tr>
<td>Student book pages</td>
<td>XX-XX</td>
</tr>
<tr>
<td>Subject specialism</td>
<td>Storage of date. Security of data</td>
</tr>
</tbody>
</table>

#### Lesson resources
- Research information on Laboratory Information Management Systems (LIMS) from the internet or laboratory journals and magazines.

#### Interactive activities and video links
- Downloads of different companies advertising their LIMS
- Weblink:
  - STARLIMS

#### Suggested starter activity (10 min)
List information that should be stored in the scientific workplace.

#### Suggested assignment scenario
You have been asked to research and provide information in preparation for the update of your laboratory’s data storage.

#### Suggested main activities (40 min)
Learn about Laboratory Information Management systems and the way that data must be processed for storage. Research several LIMS so a selection of uses and ways to store can be looked at.

#### Suggested plenary activity (10 min)
Learners reflect on the benefits of using a LIMS for the efficient and effective running of the laboratory and together summarise the advantages. How will it affect the ease of access to important information and data?

#### Differentiating the lesson
Power point presentations could be produced and used in the class to highlight the advantages of LIMS

<table>
<thead>
<tr>
<th>Functional Skills</th>
<th>ICT – Use ICT systems</th>
<th>PLTS</th>
<th>RL4, 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keywords</td>
<td>data, data protection, Data Protection Act</td>
<td>Links to other subjects</td>
<td>Level 1 Scientific toolkit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Level 2 Science and the World of Work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Level 3 Informatics in Science</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Level 3 Using Science in the Workplace</td>
</tr>
</tbody>
</table>

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Safe working practices: Lesson plan 2.4

<table>
<thead>
<tr>
<th>Duration</th>
<th>60 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working towards</td>
<td>P5, M5, D4</td>
</tr>
<tr>
<td>Student book pages</td>
<td>XX-XX</td>
</tr>
<tr>
<td>Subject specialism</td>
<td>Safe working practices</td>
</tr>
</tbody>
</table>

**Lesson resources**
- Newspaper articles relating to problems caused by unsafe working practices, such as accidents in the workplace or the spread of a disease due to bad procedures.
- Practical of suitable complexity with Risk Assessment completed by the tutor from another unit.
- Access to computers with internet access.
- Access to textbooks.
- Everyday items such as cleaning solutions or personal care products with hazard labels.

**Interactive activities and weblinks**
- Weblinks:
  - GlaxoSmithKline safety regulations
  - SARS outbreak and spread
  - Foot and mouth outbreak

**Learning Objectives**
- All learners will be able to:
  - demonstrate safe working practices in the laboratory with a knowledge of safe use of equipment and chemicals, and to be risk aware.
- Most learners will be able to:
  - explain the need for current regulations and legislation in safe working practices
  - have an understanding of the various regulations and legislation and the reasons for them to be in place in the running of a safe scientific workplace.
- Some learners will be able to:
  - evaluate the regulation of safe working practices in a scientific workplace.

**Suggested starter activity (15 min)**
Ask the learners to discuss, amongst themselves, current scientific accidents in the news and how they might have been caused. Ask for a few to see if the one you want to talk about comes up.
Ask learners to add definitions from the Student Book to the glossary started in AS1 and look at the general risks in the science workplace.

**Suggested main activities (40 min)**

**Safe working practices**
Learners carry out a Risk Assessment on a piece of practical work from another unit. (AS5 and TT5). List the safe working practices that are used in the science work in the school or college whilst undertaking practical work.

**Suggested plenary activity (5 min)**
Look at the hazard labels on a variety of everyday items such as cleaning solutions or personal care products. Facilitate a class discussion on the risks in everyday life.

**Stretch and support**
The Merit and Distinction learner will be allowed to research a scientific accident themselves from the news or the internet, but the Pass learner may require a situation or article to be produced for them.

**Functional Skills**
- ICT
- PLTS
- SM, IE, CT, RL, TW

**Keywords**
- risk, risk assessment, regulations, laws, carcinogen, mutagen, teratogen
- Links to other subjects
  - Unit 1: Fundamentals of science
  - Unit 4: Scientific practical techniques
  - Unit 15: Microbiological techniques
  - Unit 22: Chemical laboratory techniques
Identifying laboratory equipment

Aim

Look at procedures and practices in different types of laboratory starting with basic glassware and equipment and then proceeding to more complicated and specialised equipment and the procedures that are involved.

Equipment

- examples of leaflets produced by Institutes etc. to show where science is carried out in the workplace, by whom, and procedures and practices carried out in laboratories
- more complicated pieces of equipment that are used less often, or access to the internet, magazines or journals for research
- basic pieces of equipment, including glassware, that are in common use in the school or college laboratory.

Safety notes

Normal procedures to be used with equipment and glass work. Equipment should be in good order and repair and suitable for handling by the learners. Anything that could be considered hazardous should be handled only by the tutor or technician.

Running the activity

1. Discuss where science is used in the workplace including computer systems.
2. Look at some of the procedures carried out in the school or college laboratory. Laboratory staff could demonstrate equipment or talk about their work.
3. Learners start the activity by creating their own glossaries of words connected with working in science. This glossary can be added to as they work through the unit.
4. In the main part of the activity, learners handle and draw the pieces of equipment. They also name them and list their uses. This can be done individually or in small groups.
5. Labels with the names of equipment could be available for less able learners to use to name the equipment.
6. If more specialised pieces of equipment are not available, then learners can research them on the internet or in magazines and journals.

Expected outcomes

To have a working knowledge of the basic equipment used in procedures and practices in the school/college laboratory before moving on to more complicated or specialist equipment.

Links to other units within BTEC

Procedures and practices and use of equipment carried out in the practical work of other units.

PLTS and Functional Skills

IE1, 2; SM – Independent enquirers; self-managers

ICT, English
Communication in the scientific workplace

Aim
To investigate the ways that information can be communicated in the scientific workplace and the importance of clear, accurate communication.

Equipment
- Prepared cards with messages for starter activity.
- Resources showing laboratory signs.

Safety notes
Not applicable

Running the activity
This session is looking at communication. We all communicate socially but in the workplace special situations arise.

1. Try passing messages by ‘Chinese whisper’. Have a short message that is passed from person to person verbally in a whisper and compare the message from the last learner with how it started.

2. List all of the forms of communication. Try to include some historic ones such as ‘Carrier Pigeon’.

3. Look at various forms of communication using words, diagrams and illustrations.

4. Which forms are suitable in the workplace?

Expected outcomes
The learners will be aware that some forms of communication are appropriate for certain social situations, whereas others are appropriate in the workplace.

Links to other units within BTEC
Any unit where information is transferred from one person to another including results in practical work.

Other resources
Laboratory signs

PLTS and Functional Skills
IE1, 2; EP – Independent enquirers, effective participators
ICT – Develop, present and communicate information
Laboratory design

Aim
Investigate the scientific workplace in relation to its size and the facilities which are required.

Equipment
You will need:
- access to a laboratory of reasonable dimensions
- measuring tapes, pencils, paper, graph paper and rulers
- pre-printed plans of the laboratory (if this assists the less able learners)
- access to computers with suitable drawing packages.

Safety notes
The laboratory should be safe for learners to move about with a measuring tape. Ensure unnecessary equipment, furniture and bags are safely put away.

Running the activity
1 Learners often find this a stimulating activity and should be encouraged to use their imaginations. They will be moving about the laboratory using measuring tapes to take measurements of the room, the large furniture such as benches/tables or cupboards and equipment such as a fume cupboard, ovens or centrifuges. Ensure that the laboratory is safe, and any fragile or dangerous equipment is put away. Learners must be made aware of any hazards that cannot be moved, or should not be touched.
2 The learners must be split into small/manageable groups and directed during the measuring activity. Measurements can be put on the board to check that each group is working to the same data.
3 The learners then use the measurements to draw a plan of the laboratory either by hand or using a suitable computer drawing package. They mark on the plan where doors, sinks, services and safety equipment are located. They will probably need to use a key to identify items in their design.
4 If other science classes use different laboratories the differences between these laboratories could be highlighted.

Expected outcomes
At the end of the activity the learners should have drawn a plan of the laboratory or added to a pre-prepared plan.

PLTS and Functional Skills
CT1, 3, 4; EP3, 4 – Creative thinkers; effective participators
ICT
Information storage in the laboratory

Aim
To be aware of the amount and variety of information stored for laboratory use.
To become familiar with computerised information storage systems, e.g. LIMS

Equipment
- Computers for research on the internet.
- First-hand experience of the laboratory staff.
- Laboratory magazines with advertisements.

Safety notes
Not applicable

Running the activity
The information that needs to be stored for the day-to-day running of the laboratory can cover a vast amount of data. The information could include test procedures and results, patient details or evidence data. It could also include data about the staff working in the laboratory and its environment, or the requirements for the day-to-day running of the laboratory including Health and Safety rules and regulations and Standard Operating Procedures.

1 Ideally the learner will have been able to investigate different types of record and the reasons they need to be kept, either from a visit to a laboratory, or in-house with help in class. This should include the safety of information such as the Data Protection Act and peoples’ rights of access to information held about them. The data produced by labs may be financially valuable and should have limited access but safety procedures must be available to all.

2 Research LIMS available on the internet or using advertising in laboratory magazines or journals.

Links to other units within BTEC
Any where that information has to be stored such as practical results and other data obtained from experimental work either produced by themselves or that is given will fall into this category.

Other resources
Advertising by companies producing LIMS.

PLTS and Functional Skills
RL4, 5; SM2, 3 – Reflective learners; self-managers
Safe working practices

Aim
Raise awareness of the regulations and legislation in place to promote safety in the scientific workplace, and to protect the wider environment.

Equipment
- Practical of suitable complexity with risk assessment, completed by the tutor from another unit.
- Newspaper articles or videos relating to problems caused by unsafe working practices, such as accidents in the workplace or the spread of a disease due to bad procedures.
- Access to computers with internet access.
- Access to textbooks.

Running the activity
Before any type of practical work is carried out, a risk assessment is done to see if there are risks associated with the procedure. This will decide whether the risks are acceptable for the level of work being carried out and by the people carrying it out. Alternative strategies might be suggested to cut down the risk. In some cases the risk might be too high and no alternative can be found, in which case the practical work may have to be abandoned.

1. If a practical has been carried out in another class and the report written – including the risk assessment – then look at any unexpected risks that occurred during the practical. Learners will understand that the risks have been minimised but may not be totally excluded.

2. Learners will need to distinguish between risks and hazards, e.g. one of the hazards of concentrated sulphuric acid is that it burns skin. This hazard cannot be changed but the risk of using it can be reduced by using small amounts, wearing protective clothing, etc.

3. Show newspaper articles or videos of the consequences of risks not being sufficiently monitored. Learners need a good understanding of what risks are involved.

4. Conclude and summarise as a group some of the main points about the risks, and how to keep safe, when conducting practicals.

Expected outcomes
The learner will carry out a risk assessment on a practical. For less able learners, a templated practical schedule can be arranged for them to work on. More able learners should produce their own schedule.

Links to other units within BTEC
Unit 1: Fundamentals of science, Unit 4: Scientific practical techniques, Unit 15: Microbiological techniques
Unit 22: Chemical laboratory techniques or any other unit that involves practical work.

<B>PLTS and Functional Skills
SM, IE, CT, RL, TW – Self-managers: independent enquirers: creative thinkers: reflective learners: team workers
## Scheme of work: BTEC National Applied Science – Unit 2: Working in the science industry

**SB = Student Book**  
**NS = Non-supervised individual study time**  
**LP = Lesson plan**  
**R = Research**  
**AS = Activity sheet**  
**TT = Tutor/technician sheet**

**Academic year:**  
**Number of weeks:** 20  
**Tutor subject area(s):** Laboratory-based science  
**Duration of session:** 3 hour blocks  
**Guided learning hours:** 60 hours  
**Approx. total learning hours:** 100 hours  
**Credits:** 10

<table>
<thead>
<tr>
<th>Week</th>
<th>Outcome</th>
<th>Content</th>
<th>Learner activity</th>
<th>Resources</th>
<th>Grading Criteria &amp; PLTS</th>
<th>Stretch and support</th>
</tr>
</thead>
</table>
| 1    | LO1     | Know how procedures are followed and communicated in the scientific workplace. | • Introduction and overview of the unit including expected learning outcomes, assignments and grading.  
• Where is science used in the workplace?  
• Identifying some procedures that are carried out in laboratories and terms used in the workplace | • Tutor input – Introduction to the unit and an overview of content with expected learning outcomes.  
• General definitions of laboratory practices, procedures and personnel  
• **SB:** Activity 2.1A | • **LP2.1(1): Procedures in a laboratory**  
• **AS1, TT1:** Identifying laboratory equipment  
• Information from The Institute of Biomedical Science (IBMS) (leaflets, DVD, internet download) about the work carried out in a biomedical science laboratory | P1, P2, M1, M2, D1  
**PLTS:** IE1, 2, SM  
R: Research information about procedures used in a particular branch of science, individual learners vocational interest |
| 2    | 2 Know how procedures are followed and communicated in the scientific workplace | • Procedures (Handling and disposal of: glassware; solvents and poisons; radioactive substances; laboratory equipment. Safe | • **SB:** Activity 2.1B – student reporting/feedback  
• In small groups: random allocation of a practical handling/disposal/transfer scenario for research and informal presentation to peers  
• Make a Cartesian diver by tube cutting, tube bending, sealing, drawing and blowing | • **SB:** Activity 2.1B  
• Basic laboratory glassware and instruments.  
• Demonstration of glassblowing/repair. | P1, M1, D1  
**PLTS:** IE1, 2, 3; TW1; SM2, 3  
R: Research information on more complicated equipment. |
<table>
<thead>
<tr>
<th>Week</th>
<th>Outcome</th>
<th>Content</th>
<th>Learner activity</th>
<th>Resources</th>
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</table>
| 3    | Know how procedures are followed and communicated in the scientific workplace | Procedures cont. Use, maintenance, calibration and storage of laboratory equipment. Standard Operation Procedures | • Reporting back – Activity 2.1C  
• Tutor demonstration – using, maintaining, calibrating and storing laboratory equipment, e.g. centrifuge, pH meter, oscilloscope, autoclave, incubator, Geiger-Müller tube | • SB: Activity 2.1C  
• DVD Video of maintaining equipment | P1, M1, D1, P2  
*PLTS: IE1, 2; TW1; SM2, 3*  
R: Internet: Organisational hierarchies and structures.  
*PLTS: EP6; IE3* |  |
| 4    | Know how procedures are followed and communicated in the scientific workplace | Procedures cont. Laboratory personnel: authority and accountability; store management; ordering procedures; organisation of the laboratory; laboratory routines  
Team-working; carrying out tests; reporting of results; Communicating practices. Effective communication | **R:** Produce a fictitious scientific organisational hierarchy (organigram), stating job role, remit and lines of reporting for each member of laboratory staff | P2, M2  
*PLTS: IE1, 2; TW1; SM2, 3* | R: Preparation for Assessment  
Assessment Activity 2.1 |  |
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| 5    | Know how procedures are followed and communicated in the scientific workplace | Communicating practices (Communication in the scientific workplace; organisational practices, procedures and protocols.) | • Tutor exposition/group discussion – consolidation of materials covered thus far  
• Produce leaflets for prospective laboratory technicians  
• NS: Complete tasks for Assignment 1 submission | • LP2.1(2), AS2, TT2: Communication in the scientific workplace  
• Class notes  
• SB: Assessment Activity 2.1  
• Colour printer | P1, P2, M1, M2, D1  
PLTS: IE1, 2, TW1; SM2, 3 |
| 6    | LO2 Be able to design a laboratory | Design features of a laboratory | • Tutor exposition – laboratory safety  
• Look at a familiar laboratory and note its features.  
• Visit to an alternative laboratory facility OR  
• Visit from a guest speaker to discuss an alternative facility  
• Analyse and discuss the effectiveness and safety of the laboratory seen | • LP2.2: Laboratory design  
• Site to visit OR  
• Guest speaker  
• Be in a laboratory for the next few weeks if not normally timetabled for one. | D2  
PLTS: IE3 | R: Investigate a range of specialist laboratories |
| 7    | Be able to design a scientific laboratory | Non-specialist laboratory design: | • Measure and draw a sketch plan of a familiar laboratory noting the important facilities as a practice for designing your specialist laboratory  
• SB: Activity 2.2A/2.2B  
• NS: Produce a plan drawing of the science laboratory and identify the key individual features included, with an explanation for their inclusion in the facility. | • LP2.2, AS3, TT3: Laboratory design  
• Long tape measures  
• Graph paper  
• SB: Assessment Activity 2.2 | P3, M3  
PLTS: CT1, 3, 4; EP3, 4; TW1 | R: Read and prepare for the case study: ‘The importance of communication’ |
| 8    | Be able to design a scientific laboratory | Design features of a laboratory (furniture, access, workspaces) | • NS/SB: In small groups, read, discuss and provide bullet points relevant to the case study: ‘The importance of communication’.  
• Tutor-led discussion – case study feedback. | • LP2.2: Laboratory design  
• SB: Case study: ‘The importance of communication’  
• SB: Activity 2.2A/2.2B | P3, M3, D2  
PLTS: CT1, 3, 4; EP3, 4; TW1 | R: Investigate the impact of changes to laboratories that can adversely or positively affect efficiency and effectiveness |
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<td>9</td>
<td>Be able to design a scientific laboratory</td>
<td>Specialist laboratories (Materials, equipment; storage; clothing; security.)</td>
<td>• NS: Identify and describe how you might convert your non-specialist laboratory into one of the specialist laboratories identified, describing why you have selected to include specific pieces of equipment / facilities.</td>
<td>• LP2.2, AS3: Laboratory design • Suitable drawing materials</td>
<td>P3, M3</td>
<td>PLTS; CT1, 3, 4; EP3, 4</td>
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<td>10</td>
<td>Be able to design a scientific laboratory</td>
<td>Completion of assignment work</td>
<td>R/NS: Report writing – outlining changes that would impact upon the efficiency, effectiveness and safety of the specialist facility, if implemented NS: Complete tasks for Assignment 2 submission</td>
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<td>P3, M3, D2</td>
<td>PLTS: CT1, 3, 4; EP3, 4; SM2, 3</td>
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<td>11</td>
<td>LO3 Know about laboratory information management systems</td>
<td>What types of information and data must be stored in the laboratory and the security measures to ensure its safety</td>
<td>• Tutor exposition – Definition/Types of ‘Data’ • SB: Activity 2.3A – Data Protection Act • R/NS: Internet investigation activity</td>
<td>• SB: Section 2.3 • LP2.3: Information storage in the laboratory</td>
<td>P4, M4</td>
<td>PLTS RL4, 5</td>
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<td>12</td>
<td>Know about laboratory information management systems</td>
<td>Storage and Management of Information in the Laboratory: Workplace Records</td>
<td>• Tutor-led group discussion: LIMS Evaluation • R: Provide definitions for varieties of workplace documentation: test data; COSHH records; scientific data; scientific apparatus records; standard operating procedures, etc. • NS: In small groups, produce an exemplar document for a non-specialist laboratory for presentation and discussion with the class group.</td>
<td>• AS4, TT4: Information storage in the laboratory</td>
<td>P4, M4, D3</td>
<td>PLTS: RL4, 5; TW1</td>
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<td>13</td>
<td>Know about laboratory information management</td>
<td>Scientific Data Storage: Processing Samples - LIMS</td>
<td>• Tutor Exposition – Assessment Activity 2.3 Overview • Assessment Activity 2.3 (1); Describing the processes required</td>
<td>• SB: Section 2.3 / Assessment Activity 2.3 (1)</td>
<td>P4</td>
<td>PLTS: RL4, 5</td>
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| 14   | Know about laboratory information management systems | Scientific Data Storage: Processing and Storing of Information | • Group Evaluation of Assessment activity 2.3 (1)  
• Assessment Activity 2.3 (2); Explaining the nature and necessity of processes for the storing of scientific information | • Research findings / notes  
• SB: Section 2.3 / Assessment Activity 2.3 (2)  
• Assignment Brief 3 – Assessment Activity 2.3 (2) | P4, M4  
PLTS: RL4, 5 | NS/SB: Preparation for Assessment Activity 2.3 (3); Evaluating LIMS |
| 15   | Know about laboratory information management systems | Presenting Evidence: Updating LIMS in Scientific Laboratory Settings | • Tutor Exposition – Presenting Information  
• R/NS: Alternative LIMS  
• Assessment Activity 2.3 (3); Rationale and funding request for LIMS (An opportunity to present to peers upon completion should be provided at some point.) | • SB: Section 2.3 / Assessment Activity 2.3 (2) | P4, M4, D3  
PLTS: RL4, 5; SM2, 3 | NS: Complete tasks for Assignment 3 submission. |
| 16   | LO4 Be able to demonstrate safe working practices in the scientific workplace | Safe Working Practices: Labelling; CLEAPSS; Hazard Data Sheets; Handling, Storage and Transporting Chemicals. | • Tutor-led consolidation of the previous knowledge acquired: handling, storage and transporting safety practices  
• Tutor Exposition – CLEAPSS, and other Safety Information  
• SB: Complete Activity 2.4A  
• AS5: Produce a brief risk assessment identifying all pertinent hazard/safety issues for a prescribed experiment | • LP2.4, AS5, TT5: Safe working practices  
• SB: Activity 2.4A; Labelling /Safe Working Practices | P5  
PLTS: TW1 | R: How to apply safe working practices in specific scientific settings. |
| 17   | Be able to demonstrate safe working practices in the scientific workplace | Safe Working Practices: Practical Applications | • Carry out a scientific experiment in pairs, demonstrating the ability to apply knowledge of safe working practices in a practical manner, noting the appropriate practices in bullet point form.  
• OR use practical work already carried out in other classes and highlight procedures carried out  
• Assessment Activity 2.4 | • Scientific Apparatus / Equipment  
• Assessment Activity 2.4 | P5, D4  
PLTS: TW1, SM2, 3 | NS: Complete Assessment Activity 2.4 (1)  
R: Regulations and Legislation in specific settings |
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| 18   | Be able to demonstrate safe working practices in the scientific workplace | Regulations and Legislation in Scientific Laboratory Settings | • Share previous bullet points or highlighted points with peers  
• NS – Activity 2.4B Regulations and Legislation  
• Assessment Activity 2.4  
• Providing examples from internet sources, journals, newspapers etc, explain the need for current regulations and legislation in scientific settings | • Notes from previous sessions  
• Reference books, journals, newspapers, etc  
• SB: Activity 2.4B  
• Assessment Activity 2.4 | P5, M5 | NS: Complete Assessment Activity 2.4 (2) |
| 19   | Be able to demonstrate safe working practices in the scientific workplace | Investigative Journalism: Health and Safety in the Scientific Workplace | • Tutor Exposition – Scientific Journalism: Legislation, Rules and Regulations  
• R/NS: Assessment Activity 2.4  
Investigative Reporting; relevant health and safety legislation in a specific scientific workplace. | • Reference books, journals, newspapers, etc  
• Assessment Activity 2.4 | D4 | PLTS: CT1, 3, 4; SM2, 3 |
| 20   | Working in the Science Industry: Unit Overview | Learning Outcomes and Unit Content: Evaluation and Review | • Tutor-led consolidation of the underpinning knowledge acquired throughout the unit  
• Formative and Summative Assessment Review | • SB: All Sections  
• Assignment Briefs  
• Assessment Evidence  
• Unit Evaluation Forms | All criteria | PLTS: RL4, 5; EP6 |

NS: Complete tasks for Assignment 4 submission.  
NS: Provide a comprehensive evaluation of the unit.