Unit 114: Electrotechnical systems and equipment

# Sample scheme of work

This sample scheme of work covers both classroom and workshop-based learning for Unit 114. The suggested GLH is 140 hours and the percentage split between practical and theory will be based on your delivery requirements. However, apart from the Practical Assignment, the remainder of the GLH can be allocated to the different Learning Outcomes to ensure all of the criteria have been covered. It is an example only of a possible scheme of work, and is based on theory and practical within an FE centre, but can be amended to suit all learning facilities with the necessary adjustments to meet individual learners’ needs.

**You can use the sample scheme of work as it is, adjust it or extract content to create a scheme of work to suit your delivery needs. It can also be adjusted by adding theory and practical workshops to support learners who have/need additional learning time.**

Centres should also incorporate the following themes, where appropriate, as strands running through each of the sections within the qualification. Although they are not specifically referred to in the section content section, City & Guilds regards these as essential in the teaching of the qualification:

* health and safety considerations, in particular the need to impress upon learners the fact that they must preserve the health and safety of others as well as themselves
* Essential Skills (Application of Number, Communication, Digital Literacy and Employability)
* extension tasks and differentiation, inclusion, entitlement and equality issues
* spiritual, moral, social and cultural issues
* environmental education and related European issues
* British Values
* use of information learning technology (ILT).

Unit 114: Electrotechnical systems and equipment

# Sample scheme of work

**Course/qualification:** Foundation in Construction and Building Services Engineering **Tutor’s name:** Enter the tutor’s name here

**Number of sessions**:46 **Delivery hours**: 140 **Venue**:Enter the venue here **Group**: Enter the group here

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| **Learning outcomes**:   1. Know the underlying principles for electrotechnical work 2. Know the main principles of standard circuits 3. Know defined wiring systems, equipment and components used in electrical installations 4. Know how to plan for common tasks in electrotechnical work 5. Carry out common tasks in electrical installation 6. Understand methods of evaluating performance |

| Learning outcome number | Objectives/learning outcomes | Activities and resources | Skills check |
| --- | --- | --- | --- |
| 1  20 hours | 1. **Know the underlying principles for electrotechnical work** 2. The main roles and tasks in electrotechnical work 3. The main electrical principles of a circuit 4. The quantities that apply to basic electrical work 5. The use of formulas to calculate electrical quantities 6. The key features of how electricity is generated, transmitted and distributed 7. The main industry documents associated with electrotechnical work   . | Activities:  **Classroom session: Introduction to electrotechnical systems and equipment**   * Get the learners to discuss what they perceive as the range of personnel and tasks undertaken within the different working ranges of the electrotechnical sector. * Present PowerPoint 1on the different roles within the electrotechnical sector. * **Classroom discussion**: Get the class to discuss the importance of each individual during work on the different ranges of electrotechnical work. * Present PowerPoint 2 on the basic characteristics of protons, neutrons and electrons in respect to their charge. * **Class activity:** Demonstrate how to perform simple calculations for the above and then get the class to perform their own calculations. * **Classroom discussion**: Ask learners to give examples of different electrical quantities and SI units and what they do in an electrical circuit. * Present PowerPoint 3 on the different electrical quantities and general quantities used in electrotechnical work.   **Class activity:** Demonstrate how to perform simple calculations for the above and then get the class to perform their own calculations.   * **Classroom discussion**: Ask learners to give examples of how electricity is generated and distributed. * Present PowerPoint 4on the generation and distribution of power. * Present PowerPoint 5on the main industry documents associated with electrotechnical work. * Distribute relevant examples of documents. * Learners to complete Worksheets 1, 2 and 3.   Resources:   * **PowerPoint 1: The main roles and tasks in electrotechnical work** * **PowerPoint 2: Underlying principles for electrotechnical work** * **PowerPoint 3: Quantities** * **PowerPoint 4: Electricity generation, transmission and distribution** * **PowerPoint 5: Industry documents** * **Worksheet 1: Know the underlying principles for electrotechnical work 1** * **Worksheet 2: Know the underlying principles for electrotechnical work 2** * **Worksheet 3: Know the underlying principles for electrotechnical work 3** | .  Group activity to discuss the range of different operatives within the electrotechnical sector  Worksheet 1  Group activity to list the range of different electrical quantities  Practical demonstration on simple calculations  Worksheet 2  Worksheet 3 |
| 2  30 hours | 1. **Know the main principles of standard circuits**   2.1 Lighting circuits  2.2 ‘Power’ circuits  2.3 The overcurrent and earth fault protection used on standard circuits  2.4 The reason for the division of an installation into circuits  2.5 The key principles of standard circuits  2.6 The importance of earthing and protective conductors | Activities:   * Present PowerPoint 6on lighting circuits. * Explain the relevant conductors and their use. * **Classroom activity**. Draw the diagrams for a 1-way circuit, 2-way and intermediate circuits. * Present PowerPoint 6on ring final and radial final circuits. * **Class activity**. Draw the diagrams for a ring final and radial circuit. * Present PowerPoint 7on the range of overcurrent and earth fault protection used on standard circuits.   Present PowerPoint 7on the reason for the division of an installation into circuits.   * Present PowerPoint 7on the key principles of a standard circuit. * Present PowerPoint 7on the importance of earthing and protective conductors. * **Practical activity**: Demonstrate how to correctly install 1-way circuit, 2-way and intermediate lighting circuits. * **Practical activity:** Learners to install the above circuits. * On completion of each circuit, demonstrate how to perform the necessary ‘dead tests’ to ensure the circuit(s) have been installed safely. * Get the learner to undertake these tests. * **Practical activity:** Demonstrate how to correctly install a ring final and radial circuit. Using the information given get the learners to install the above circuits. * On completion of each circuit, demonstrate how to perform the necessary ‘dead tests’ to ensure the circuit(s) have been installed safely. * **Practical activity:** Get the learner to undertake these tests. * Learners to complete Worksheets 4 and 5.   Resources:   * **PowerPoint 6: Lighting and ‘power’ circuits** * **PowerPoint 7: The main principles of standard circuits** * **Worksheet 4: Know the main principles of standard circuits 1** * **Worksheet 5: Know the main principles of standard circuits 2** | Group activity to draw the different lighting circuits  Group activity to draw the different power circuits  Practical demonstration on lighting installation  Practical demonstration on testing procedures  Practical demonstration on installing power circuits  Practical demonstration on testing procedures  Worksheet 4  Worksheet 5 |
| 3  30 hours | 1. **Know defined wiring systems, equipment and components used in electrical installations**   3.1 The types of cables used within electrical installation work  3.2 The features, applications, advantages and limitations of defined containment systems  3.3 Common fixing and securing methods for cables and containment to the building fabric | Activities:   * **Classroom discussion**. Discuss with the learners what they know about the different types of cables used in electrotechnical work. * Present PowerPoint 8on the types of cables used in electrotechnical work. * **Practical activity**: Show the different types of cables used in electrotechnical work and demonstrate how to correctly terminate them. * **Practical activity:** Learners to terminate the different types of cable. * **Classroom discussion**. Discuss with the learners what they know about the different types of containment used in electrotechnical work. * Present PowerPoint 8on the types of containment used in electrotechnical work. * **Practical activity**: Show the different types of containment used in electrotechnical work and demonstrate how to correctly install them. * **Practical activity:** Get the learner to practise installing the containment. * **Classroom discussion**. Discuss with the learners what they know about the different fixing and securing methods for cables and containment to the building fabric. * Present PowerPoint 9on types of fixings and securing methods. * **Practical activity**: Show the different types of fixing and securing methods used in electrotechnical work and demonstrate how to correctly use them. * **Practical activity:** Get the learner to practise installing the different types of fixing and securing methods. * Learners to complete Worksheets 6 and 7.   Resources:   * **PowerPoint 8: Cables and containment systems** * **PowerPoint 9: Common fixing and securing methods for cable and containment** * **Worksheet 6: Know defined wiring systems, equipment and components used in electrical installations 1** * **Worksheet 7: Know defined wiring systems, equipment and components used in electrical installations 2**   . | Group activity to discuss the range of different cables  Practical demonstration on conductor termination  Group activity to discuss the range of different components  Practical demonstration on containment  Group activity to discuss the range of different fixing methods  Practical demonstration on fixing methods  Worksheet 6  Worksheet 7 |
| 4  10 hours | 1. **Know how to plan for common tasks in electrotechnical work**   4.1 Planning a sequence of work  4.2 Interpret relevant sources of information which will inform the installation work | Activities:   * Present PowerPoint 10on what is required to plan a sequence of work and how to interpret relevant sources of information. * Re-cap on completing risk assessments and method statements. * Re-cap on the circuit diagrams done in Learning Outcome 2 * Classroom discussion: discuss what is required to be completed during the planning process of an installation. * Present PowerPoint 11demonstrate the sequence of tests required and the relevant test sheet to be done after the practical assignment. * **Practical activity:** Getthe learners to practise the testing procedures. * Distribute paperwork required to be done during the planning process. * **Classroom activity**: Learners to complete Worksheet 8.   Resources:   * **PowerPoint presentation 10: Plan for common tasks** * **PowerPoint presentation 11: Inspection and testing** * **Worksheet 8: Know how to plan for common tasks in electrotechnical work** | Practical demonstration on testing  Worksheet 8 |
| 5  40 hours | 1. **Carry out common tasks in electrical installation**   5.1 Safe working procedures  5.2 Tools and equipment  5.3 The methods for installation, termination and connection of cables and conductors  5.4 Install wiring systems and equipment  5.5 Techniques and methods of termination and connection of cables | Activities:   * **Practical activity:** Complete the Practical Assignment given by the Assessor.   Resources:   * Tools and equipment * PPE * Layout drawing * Circuit diagrams * Materials list   . | Group to consult the circuit diagrams,  materials list,  risk assessments, and  method statements they produced in Learning Outcome 4 |
| 6  10 hours | 1. **Understand methods of evaluating performance**   6.1 Inspect work in accordance with the specification  6.2 Test de-energised circuits  6.3 Evaluation against set standards  6.4 Performance analysis | Activities:   * **Practical activity:**  Complete the range of ‘dead tests’ required after completion of the Practical Assignment. * On completion, undertake a 1:1 meeting with the learner to analyse their practical performance.   Resources:   * Tools and equipment * PPE * Layout drawing * Circuit diagrams | Testing procedures  Test forms |