2016 Suite

OCR
Oxford Cambridge and RSA

Cambridge **TECHNICALS LEVEL 3**

Cambridge TECHNICALS 2016

APPLIED SCIENCE

Unit 13

Environmental surveying

F/507/6160

Guided learning hours: 60

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LEVEL 3

UNIT 13: Environmental surveying

F/507/6160

Guided learning hours: 60

Essential resources required for this unit: A functioning laboratory and field testing equipment

This unit is internally assessed and externally moderated by OCR.

UNIT AIM

Understanding environments is essential in many roles and industries, from conservation of vulnerable habitats or sites of special scientific interest, to built environment planning, industrial development and mining and oil and gas activities. In order for this to be done effectively, a sound, evidence-based, scientific approach is required so that meaningful outcomes of studies are obtained, and informed recommendations enacted.

In this unit, you will take a practice-based approach to understanding, evaluating, interpreting and reporting on environmental information and data, drawing on your learning in fundamental science, and your practical and analytical skills. You will examine various types of environment and how they interact. You will then apply relevant scientific methods and analytical techniques in the field and the laboratory. You will survey different environments and information in the scientific literature to address scientific questions relevant to you, and report your findings and recommendations.

TEACHING CONTENT

The teaching content in every unit states what has to be taught to ensure that learners are able to access the highest grades.

Anything which follows an i.e. details what must be taught as part of that area of content. Anything which follows an e.g. is illustrative, it should be noted that where e.g. is used, learners must know and be able to apply relevant examples in their work, although these do not need to be the same ones specified in the unit content.

For internally assessed units you need to ensure that any assignments you create, or any modifications you make to an assignment, do not expect the learner to do more than they have been taught, but must enable them to access the full range of grades as described in the grading criteria.

Learning outcomes The Learner will:	Teaching content Learners must be taught:
1 Understand environmental impacts of human activity and natural processes	1.1 Increased human activity leading to i.e.: • water shortages • pollution • industrial and global transport • deforestation • soil erosion and desertification • loss of biodiversity • climate change • sea level rise 1.2 Natural processes i.e.: • water as an eroding and corrosive process (e.g. precipitation, surface permeability, exposed and sub-surface geology, surface and sub-surface water transport) • volcanic and seismic activity • extreme weather events (e.g. extreme temperatures) • oceanic events (e.g. oceanic currents, algae build up)
2 Understand environmental surveying	2.1 The purpose of environmental surveying i.e.: • natural environment conservation and protection • planning developments (e.g. industrial and energy developments) • infrastructure (e.g. transport, utilities transmission, waste handling, housing) • health and well-being of the human population (e.g. detection and analysis of pollution, on-site and off-site monitoring of industrial activities) • protection and conservation of regional environments and ecosystems (e.g. polar regions, deserts, tundra, rainforest) • global strategies for environmental management

Learning outcomes The Learner will:	Teaching content Learners must be taught:
3 Be able to use field and laboratory techniques to conduct environmental investigations	3.1 To set objectives for environmental investigations i.e.: • define the investigation (e.g. what is to be tested) • use of null and experimental hypotheses • use of controls • dependent and independent variables • extraneous and Confounding variables 3.2 To apply safe working practices in the field and laboratory i.e.: • health and safety (risk assessment) 3.3 Data collection techniques i.e.: • sampling (e.g. quadrats) • aerial/space surveys (e.g. topographic Light Detection and Ranging (LIDAR), remote sensing) • qualitative and quantitative laboratory techniques (e.g. simple chemical tests, chemical flame tests, visual inspections) 3.4 Recording Information i.e.: • qualitative and quantitative data • systematic recording (e.g. log books) • monitoring of performance against schedule plan (e.g. daily, weekly, monthly progress)
4 Be able to analyse and present environmental survey findings	4.1 Data analysis techniques i.e.: • use of experimental uncertainties o systematic and random uncertainties o assessing uncertainties o combining uncertainties • use of significant figures o deciding the number of significant figures in a measurement o determining the number of significant figures in calculations • Graphical methods o types of plot (pie chart, bar chart, scatter plot) o choice of plot to best present/interpret data 4.2 Statistical tests and methods depending on type and scope of data i.e.: • correlation coefficients • student's t-test • Mann-Whitney U test 4.3 Conclusions and evaluation (e.g. strengths, areas for improvement, recommendations for further research)

GRADING CRITERIA

LO	Pass	Merit	Distinction
	The assessment criteria are the Pass requirements for this unit.	To achieve a Merit the evidence must show that, in addition to the Pass criteria, the candidate is able to:	To achieve a Distinction the evidence must show that, in addition to the pass and merit criteria, the candidate is able to:
1. Understand environmental impacts of human activity and natural processes	*P1: Describe how a human activity has impacted on the environment		
	*P2: Describe how a natural process can impact on the environment		
2. Understand environmental surveying	*P3: Describe the purpose of environmental surveying for natural and human environments		
3. Be able to use field and laboratory techniques to conduct environmental investigations	*P4: Conduct safety assessments of field activity and laboratory activities	M1: Explain the factors which affect the choice of field and experimental techniques	D1: Analyse results from the investigation
	*P5: Carry out an environmental investigation, to include field and laboratory work which produces both qualitative and quantitative data		
	*P6: Demonstrate the keeping of systematic records or log		

LO	Pass	Merit	Distinction
4. Be able to analyse and present environmental survey findings	*P7: Use statistical techniques to analyse experimental data	M2: Explain causes of experimental uncertainty	D2: Discuss the validity of the outcomes of the investigation, in terms of their statistical significance, and showing an awareness of correlation versus causality
	*P8: Produce a scientific report on an environmental investigation		
		M3: Recommend actions to positively affect the environmental implications of environmental investigation	

ASSESSMENT GUIDANCE

LO1 & 2
As a practical unit, the core outcomes are LO3 and LO4 for which assessment will most effectively comprise observations and reviews of scientific logs. Assessments should use a range of reporting techniques, allowing learners to further develop communication as a transferable skill. Examples beyond simple narrative reports include:

- Oral presentations backed up by slides (PowerPoint etc) or other suitable material
  - Either as individuals, or as a group
  - In the case of group presentations, tutors need to ensure they have sufficient evidence of individual learner contributions
- Poster sessions, in which learners present and communicate their findings individually to peers and tutors in a graphical format
- Video presentations
  - Learners may provide video recordings reporting on the topic in question.

LO4 allows learners to develop the skill of formal reporting, so this should be in the form of a narrative report in the style of a scientific article.

Feedback to learners: you can discuss work-in-progress towards summative assessment with learners to make sure it's being done in a planned and timely manner. It also provides an opportunity for you to check the authenticity of the work. You must intervene if you feel there's a health and safety risk.

Learners should use their own words when producing evidence of their knowledge and understanding. When learners use their own words it reduces the possibility of learners' work being identified as plagiarised. If a learner does use someone else's words and ideas in their work, they must acknowledge it, and this is done through referencing. Just quoting and referencing someone else's work will not show that the learner knows or understands it. It has to be clear in the work how the learner is using the material they have referenced to inform their thoughts, ideas or conclusions.

For more information about internal assessment, including feedback, authentication and plagiarism, see the centre handbook. Information about how to reference is in the OCR Guide to Referencing available on our website: http://www.ocr.org.uk/i-want-to/skills-guides/.

SYNOPTIC LEARNING AND ASSESSMENT

It will be possible for learners to make connections between other units over and above the unit containing the key tasks for synoptic assessment. Please see Section 6 of the Qualification Handbook for more details. We have indicated in the unit where these links are with an asterisk.

Name of other unit and related LO	This unit:
Unit 2 Laboratory techniques LO1 Understand the importance of health and safety and quality systems to industry LO3 Be able to determine the concentration of an acid or base using titration LO4 Be able to examine and record features of biological samples LO5 Be able to identify cations and anions in samples	LO2 Understand environmental surveying (P3) LO3 Be able to use field and laboratory techniques to conduct an environmental investigation (P4, P5, P6) LO4 Be able to analyse and present environmental survey findings (P7, P8)
Unit 3 Scientific analysis and reporting LO1 Be able to use mathematical techniques to analyse data LO2 Be able to use graphical techniques to analyse data LO4 Be able to analyse and evaluate the quality of data LO5 Be able to draw justified conclusions from data LO6 Be able to use modified, extended or combined laboratory techniques in analytical procedures LO7 Be able to record, report on and review scientific analyses	LO3 Be able to use field and laboratory techniques to conduct an environmental investigation (P4, P5, P6) LO4 Be able to analyse and present environmental survey findings (P7, P8)
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	LO2 Understand environmental surveying (P3) LO3 Be able to use field and laboratory techniques to conduct an environmental investigation (P4, P5, P6) LO4 Be able to analyse and present environmental survey findings (P7, P8)

Name of other unit and related LO	This unit:
Unit 14 Environmental management LO1 Understand principal characteristics of environments LO2 Be able to identify pollution in the environment LO3 Understand how legislation, regulation and agreements impact on managing natural and built environments LO4 Understand environmental management assessments LO5 Be able to carry out an environmental management study	LO1 Understand environmental impacts of human activity and natural processes (P1, P2) LO2 Understand environmental surveying (P3) LO3 Be able to use field and laboratory techniques to conduct an environmental investigation (P4, P5, P6) LO4 Be able to analyse and present environmental survey findings (P7, P8)
Unit 15 Sustainability and renewable energy LO1 Understand the impacts of energy consumption	LO1 Understand environmental impacts of human activity and natural processes (P1, P2) LO4 Be able to analyse and present environmental survey findings (P7, P8)
Unit 16 Waste management LO1 Understand how to manage waste LO2 Understand how to manage air emissions LO3 Understand how waste water is managed LO4 Be able to test air and water emissions	LO1 Understand environmental impacts of human activity and natural processes (P1, P2) LO2 Understand environmental surveying (P3) LO3 Be able to use field and laboratory techniques to conduct an environmental investigation (P4, P5, P6) LO4 Be able to analyse and present environmental survey findings (P7, P8)
Unit 17 Food technology LO1 Understand the main features of food manufacturing operations LO2 Understand the importance of food safety in food manufacture LO3 Understand the importance of quality control in food manufacture LO4 Be able to test product samples	LO1 Understand environmental impacts of human activity and natural processes (P1, P2)

Name of other unit and related LO	This unit:
Unit 19 Crop production and soil science LO1 Understand how common crops are grown for commercial production in the UK LO2 Understand factors affecting the growth of crops LO3 Be able to monitor the growth of a crop plant species LO4 Be able to carry out soil testing	LO1 Understand environmental impacts of human activity and natural processes (P1, P2) LO2 Understand environmental surveying (P3) LO3 Be able to use field and laboratory techniques to conduct an environmental investigation (P4, P5, P6) LO4 Be able to analyse and present environmental survey findings (P7, P8)

To find out more
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Alternatively, you can email us on **vocational.qualifications@ocr.org.uk**

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