## Unit 29: Geotechnics & Soil Mechanics

<table>
<thead>
<tr>
<th>Unit code</th>
<th>T/615/1415</th>
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<tr>
<td>Unit Level</td>
<td>5</td>
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<td>Credit value</td>
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### Introduction

This unit explores the essential relationship between civil engineering and the Earth’s crust, in the support of built structures and highways. The ability to understand, evaluate and develop solutions; related to soil and rock, is a key aspect of civil and structural engineering.

Topics included in this unit are: rock types, soil description and classification, methods and techniques used when undertaking site investigations and laboratory testing, determination of soil properties and the importance of these geotechnical procedures and resultant findings to civil engineers.

On successful completion of this unit students will be able to analyse and evaluate modern geotechnical methods and apply these skills and knowledge to the initial design of infrastructure.

### Learning Outcomes

By the end of this unit students will be able to:

1. Review rock types, their formation and uses within civil engineering.
2. Explore and classify soils to current codes of practice.
3. Analyse soil properties determined by geotechnical procedures.
4. Produce a proposal to address identified geotechnical weaknesses and problems.
Essential Content

LO1 Review rock types, their formation and uses within civil engineering

Rock type formation and classification.
Rock type susceptibility to weathering and weathering processes.
Discontinuous nature of rock mass, folding and faulting.
The use of rock within civil engineering.
The use of uncemented sediments within civil engineering.

LO2 Describe and classify soils to current codes of practice

Ground and site investigation.
Soil sampling.
Soil types.
Soil descriptions.
Soil classifications.
Soil particle size.
Soil specific gravity.
Soil plasticity index.

LO3 Analyse soil properties determined by geotechnical procedures

Shear strength.
Compressibility.
Moisture content.
Soil density.
Specific gravity.
Liquid and plasticity indices.
California bearing ratio.

LO4 Produce a proposal to address identified geotechnical weaknesses and problems

Shear strength and embankment design.
Compressibility and foundation design.
Liquid and plasticity indices and foundation design.
California bearing ratio and highway design.
<table>
<thead>
<tr>
<th>LO1 Evaluate rock types, their formation and uses within civil engineering</th>
<th>LO2 Explore and classify soils to current codes of practice</th>
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<tbody>
<tr>
<td><strong>P1</strong> Discuss rock type formation and classification, susceptibility to weathering and the weathering processes.</td>
<td><strong>P3</strong> Explore methods and techniques used in ground and site investigation, soil sampling, soil descriptions and soil classifications to current codes of practice.</td>
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<td><strong>P2</strong> Analyse the discontinuous nature of rock mass.</td>
<td><strong>P4</strong> Explore how soils are classified from soil particle size, soil types, specific gravity and plasticity indices to current codes of practice.</td>
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<tr>
<td><strong>M1</strong> Evaluate the use of rock and uncemented sediments within civil engineering.</td>
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<td><strong>M2</strong> Evaluate methods and techniques used in ground and site investigation and soil sampling.</td>
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<td><strong>D1</strong> Critically analyse example that address problems caused by the discontinuous nature of rock mass when tunnelling and constructing bridges, using case studies as examples.</td>
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<td><strong>D2</strong> Assess the importance of site investigation, soil sampling and determination of soil properties for infrastructure projects.</td>
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<td><strong>LO3</strong> Analyse soil properties determined by geotechnical procedures</td>
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<td><strong>P5</strong> Evaluate how soil properties are determined, including moisture content, density, specific gravity, shear strength compressibility, liquid and plasticity indices, California bearing ratio.</td>
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<td><strong>P6</strong> Produce design proposals to address geotechnical problems related to embankments, bridge and road foundations for a given site.</td>
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Recommended resources

Textbooks


Journals
Building Magazine. CMP.
Construction News. Emap.

Websites
www.ciob.org.uk Chartered Institute of Building (General Reference)
www.geology.com Geology.com – Geology News and Information (General Reference)
www.ice.org.uk Institution of Civil Engineers
www.thomastelford.com Thomas Telford (General Reference)

Links
This unit links to the following related units:
Unit 2: Construction Technology
Unit 3: Science & Materials
Unit 7: Surveying, Measuring & Setting Out
Unit 8: Mathematics for Construction
Unit 26: Advanced Construction Drawing & Detailing
Unit 30: Advanced Structural Design
Unit 42: Highway Engineering
Unit 43: Hydraulics