
CIVE97xxx Experimental Environmental Engineering

Course leader:	Dr Geoff Fowler
Other contributors:	
Module status:	
Pre- or co-requisites:	
Term:	Autumn
Contact hours:	30
ECTS units:	5
FHEQ Level:	7
Assessment:	Coursework

1.0 Aims

This laboratory module is a unique opportunity to undertake a number of core environmental engineering experiments (eight in total) which measure key environmental engineering parameters relevant for water treatment and environmental pollution assessment. These are routinely applied as environmental quality indicators. Along with developing important laboratory-based practical skills, you will learn data quality assessment techniques and the importance of health and safety and risk control within a laboratory environment. These are important learning objectives which readily translate to the civil and environmental engineering sector.

2.0 Syllabus

There are 8 experiments, one lecture and two tutorials, which make up this module. The foundation purpose of the course is to communicate knowledge about, and the relevance of, important water and environmental quality indicators, conveyed through a laboratory-based practical environment. You will learn how to 1) carry out volumetric measurements and how to perform titrations. Using these and other skills you will then learn to undertake accurate analysis of 2) the presence of ammonia in water, 3) Chemical Oxygen Demand of wastewater, 4) Metals in soils, 5) ozone treatment of wastewater, 6) activated carbon adsorption for water treatment, 7) the cause of hardness in water and 8) Kjeldahl nitrogen and phosphorus in grass. Learning how to produce reliable and reproducible data underpins all the experiments completed. Understanding risks and how to manage them is also a core part of the module. Full risk analysis of each experiment is provided, and you will develop skills in understanding and applying the information in the assessments.

Week	Date	Experiment Description
1	Wednesday 9am-12pm	Laboratory Induction, Safety presentation (~ 40 minutes in lecture room) followed by Experiment 1 - Titrations and Volumetric measurements (In laboratory)
2	Wednesday 9am-12pm	Experiment 2 - Ultraviolet/Visible Spectroscopy for the analysis of Ammonia in water
3	Wednesday 9am-12pm	Experiment 3 - Chemical Oxygen Demand (COD)
4	Wednesday 9am-12pm	Experiment 4 - Determination of Metals in Soil: Acid digestion and ICP-OES analysis
5	Wednesday 9am-12pm	Tutorial, to run through previous labs, marking report sheets in class
6	Wednesday 9am-12pm	Experiment 5 - Ozonation for the treatment of contaminated water Set up adsorption experiment
7	Wednesday 9am-12pm	Experiment 6 - Adsorption of pollutants by activated carbon
8	Wednesday 9am-12pm	Experiment 7 - Ca and Mg hardness of water by titration Set up Kjeldahl experiment
9	Wednesday 9am-12pm	Experiment 8 - Kjeldahl Nitrogen and total Phosphorous
10	Wednesday 9am-12pm	Tutorial, to run through previous labs, marking report sheets in class

3.0 Intended learning outcomes

On completion of the course you will be able to:

- Exemplify the core principles of good laboratory practice.
- Interpret and apply the laboratory health and safety documents and practices.
- Develop risk assessments for application in a practical environment
- Interpret and express the quantities of chemicals in samples within an environmental context.
- Conduct sample preparation to ensure reliability and reproducibility of analytical data.
- Describe the procedures involved in selected key wet chemical and instrumental analysis methodologies used in environmental engineering
- Make judgements on the reliability of data, their interpretation and quality assurance.
- Explain the limitations of analytical techniques.
- Select and apply key methodologies and define protocols as applied to laboratory work in a practical environmental engineering context.

4.0 Teaching methods

This laboratory-based module is delivered (with close supervision) as a suite of practical classes to the cohort with provision of detailed context, alongside written methods, demonstrations and instructions. The module will be supported by tutorial sessions to aid learning, with the assistance of GTAs familiar with the delivery of a similar module to the MSc Module (Environmental Analysis).

5.0 Assessment

This is a laboratory-based module, underpinned by a short introductory lecture and two tutorial sessions which will include supervised peer assessment. Assessment will be by coursework only, with weekly submission of short (1-2 page) laboratory results and summary analysis reports required.

The coursework marking will be evaluated against a set of defined criteria using a peer-to-peer methodology, in a tutorial environment, with each student assessing and scoring another's lab report against the stated criteria. A QA check process will be used to ensure the marking is within the boundaries and there is no evidence of bias. Verbal feedback from the Module Coordinator will be provided during the tutorial sessions and GTA support will be utilized.

6.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

S	Quantitative Chemical Analysis, Daniel C Harris, 8 th /9 th Edition
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7.0 Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

Design	Health & Safety Risk Management	Sustainability
C	S	C