
FACULTY OF ENGINEERING, SCIENCE AND THE BUILT ENVIRONMENT

Unit title:	Environmental Engineering
Unit number:	BCE/3/132
Unit Level:	3
Unit value:	1.0
Unit co-ordinator:	J T Douglas
Contact time:	Lectures 36 hours
	Tutorials 14 hours
	Assessment 3 hours
Private study time:	97 hours
Total study time:	150 hours
Unit pre-requisites:	None

SHORT DESCRIPTION

This unit takes the principles of environmental engineering and applies them to practical applications of analysis and design. The student will develop an understanding of the hydrological cycle, apply these principles to the calculation of runoff and reservoir yield, and consider risk factors in the design and construction of engineering works. The student will be introduced to consequences of urbanisation, will learn how to design both foul and stormwater sewers, and consider sustainability issues. The student will also investigate the problem of contamination in groundwater and prepare a risk assessment.

AIMS

To provide a systematic analysis of the distribution and movement of water in the physical environment and to introduce the engineering principles involved in water resources.

LEARNING OUTCOMES

The student should be able to:

- understand the hydrological cycle,
- determine how to measure precipitation,
- evaluate the relationship between rainfall intensity, duration, and frequency,
- understand the rainfall – runoff relationship
- understand the concept of the unit hydrograph and synthesise design flood hydrographs,
- carry out flood routing analyses,
- assess reservoir yield,
- evaluate flood frequencies and return periods,
- understand the principles of urban drainage and design simple sewer systems,
- carry out a risk calculation based on the concentration of a toxin and standard toxicity data,
- demonstrate a critical understanding of the methodologies used for environmental impact assessment and their respective advantages and shortcomings
- calculate ground-level air pollutant concentrations using a Gaussian plume model

TEACHING AND LEARNING PATTERN

Lectures and tutorials supplemented by printed handouts. There will be an emphasis on problem-solving activities to illustrate the principles and concepts developed. This will be used extensively in the lecture programme and will be further supported in regular tutorial sessions.

INDICATIVE CONTENT

The Hydrological Cycle

Precipitation. Evapotranspiration. Infiltration. Rainfall – runoff relationship. Unit hydrograph.

Flood routing

Reservoir and river routing. Muskingham method.

Water resources

Reservoir yield. Mass curves. Flood frequencies.

Urban Hydrology

Urban drainage systems. Stormwater and foul sewers.

Contaminated Land

Risk assessment for contaminated groundwater or soil

ASSESSMENT METHOD

70%	3 hour end of unit examination
30%	2 No. Courseworks

INDICATIVE SOURCES

Core

Butler, D. and Davies, J. W., Urban Drainage, E & FN Spon, 2nd edition, 2004.

Masters, G. M., Introduction to Environmental Engineering and Science, Prentice Hall, 1998.

Petts, J., Cairney, T., & Smith, M., Risk-based Contaminated Land Investigation and Assessment, John Wiley, 1997.

Shaw, E., Hydrology in Practice, Chapman and Hall, 3rd edition, 1994.

Wilson, E. M., Engineering Hydrology, MacMillan, 4th edition 1990