

## CLASS/MODULE DESCRIPTOR 2019/20

# CL446 Water & Environmental Management

<b>Registrar:</b> Dr T K Beattie	<b>Taught To (Programme):</b> BEng/MEng Civil and Environmental Engineering/ERASMUS	
<b>Other Lecturers Involved:</b>	<b>Credit Weighting:</b> 10	<b>Semester:</b> 1
<b>Assumed Pre-requisites:</b>	<b>Compulsory/ optional/</b>	<b>Academic Level:</b> 4

### Class Format and Delivery (hours):

Lecture	Tutorial	Laboratory	Coursework	Project	Private Study	Total
18	2		20		60	100

### Class Aim(s)

This course aims to provide an insight into water quality, water quality objectives and pollution control strategy, and introduce the design and control of water and wastewater treatment processes.

### Learning Outcomes

On completion of the course the student is expected to be able to

LO1 Understand the properties of surface water and how alterations to these, e.g. due to pollution events, can have an impact on water quality, biodiversity and human health

LO2 Discuss the impact of legislation on surface water quality

LO3 Discuss collection and treatment of community wastewater

LO4 Discuss treatment and provision of drinking water

### Syllabus

The class will teach the following:

Physical and chemical characteristics of water and wastewater, including BOD, COD, alkalinity, hardness, colour, turbidity, Fe, trihalomethanes.

Microbial quality of water and its measurement

Surface water and disease transmission

Effects of principal pollutants on the water ecosystem.

Marine, coastal, estuarine pollution issues and control, objectives in out-fall design, bathing beaches, shell fisheries.

River pollution, oxygen sag curve.

Pollution of lakes and reservoirs, eutrophication, thermal stratification

Review of sources of pollution control strategy on the basis of Environmental Quality Objective, Best Practical Environmental Option, Environmental Quality Standard.

Demand for water and production of wastewater.

Introduction to wastewater treatment: characteristics and quality.

Overview of sewage works design: preliminary processes including screens and grit removal, sedimentation, activated sludge design, sludge treatment and disposal.

Water Treatment: Review of water types and water quality objectives, overview of water treatment works design, coagulation, flocculation, filtration.

## Assessment Criteria

For each of the Course Learning Outcomes the following criteria will be used to make judgements on student learning:

LO1 Understand the properties of surface water and how alterations to these, e.g. due to pollution events, can have an impact on water quality, biodiversity and human health

C1 familiarity with physical, chemical and biological properties of surface waters, and the influence they have on water quality

C2 familiarity with major water pollutants and the effect they have on surface water quality

LO2 Discuss the impact of legislation on surface water quality

C1 familiarity with the influence and impact of various EU directives on national legislation and the provision of national water quality standards for wastewater, surface, bathing and drinking water

C2 have an understanding of pollution control strategies utilising water quality standards and objectives as defined by National/EU regulation

LO3 Discuss collection and treatment of community wastewater

C1 familiarity with wastewater collection systems

C2 have an awareness of wastewater treatment processes and the overall design of sewage works, including the design of settling tanks, activated sludge and sludge treatment

LO4 Discuss treatment and provision of drinking water

C1 familiarity with plant processing for provision of drinking water from raw sources through to delivery of drinking water to the consumer

C2 have an awareness of water treatment including water types, water quality objectives, the processes of coagulation and flocculation and the design of filtration systems

The standards set for each criterion per Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessments.

## Principles of Assessment and Feedback (<https://www.strath.ac.uk/staff/policies/academic/>)

Please state briefly how these are incorporated in this module.

Information issued at start of Semester includes simple & clear guidance on the overall assessment load throughout the Semester. Expectations in terms of time and effort are outlined clearly in the presentation of each assignment. These expectations are communicated clearly in class. Weightings for each assignment underscore the time expectations.

Students are given opportunities to engage in optional assessments using carefully managed mechanisms of only counting the contribution of this work if these marks are in the student's favour. This encourages more able students to try to achieve higher overall marks by taking their learning to a more advanced level, while at the same time avoiding overly penalising overloaded and/or less-able students who may be overwhelmed by the additional workload.

Criterion based feedback to students is an integral part of teaching. This is collated into 'generic' feedback that is shared with the whole class, to complement individual feedback for each student. The generic feedback is particularly useful inasmuch as any common or recurring difficulties experienced by many in the class could suggest ways in which teaching and guidance could be improved. The individual feedback is directed at how each student can improve, in all cases avoiding comparisons between students. Feedback sheets provide information allowing students to compare their work to the expectations for each assignment and reflect on improvements for future work.

Information issued at the start of the class, includes simple & clear guidance on performance criteria by reference to the University Guidance on Marking for Undergraduate Courses\*. Reference is made to equivalent p/g marking schemes in MSc handbooks. Marking criteria are outlined clearly in the assignment handout and multiple opportunities for clarification are available in class. Feedback sheets demonstrate what constitutes "excellent" work.

\*Guidance on Marking for Undergraduate Courses: <https://www.strath.ac.uk/staff/policies/academic/>

The course includes some assessment scenarios where creativity and ability to solve open-ended problems are valued. In such scenarios tightly specified goals or outcomes in advance may be inappropriate. Instead students are guided about the nature of the assignment and actively engaged in making their own judgements about what would constitute quality.

## Recommended Reading

### Background reading

Tebbutt, THY. Principles of Water Quality Control. Pergamon (5<sup>th</sup> Ed) 1998, ISBN 0 7506 3658 0.  
Gray, NF. Water Technology: an introduction for environmental scientists and engineers. Elsevier (2<sup>nd</sup> Ed.) 2005, ISBN0750666331  
Ellis, KV; Warn, AE & White, G. Surface Water Pollution & its Control. MacMillan ISBN 0 333 427645.  
Harrison, RH. Pollution: Causes, Effects & Control. (4<sup>th</sup> Ed) 2001 , Royal Society of Chemistry.

### Water research papers on MyPlace

### PLEASE NOTE:

**Students need to gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be re-examined during the August diet. This re-examination will consist entirely of an exam or coursework.**

### Resit Arrangements

The class registrar will inform the student of the details of the resit assessment after the June exam board. The resit will either be an exam during the August exam diet or a coursework due for submission in August.

### Approved

Programme Director Signature: Tara K. Beattie

Date of Last Modifications: August 2019

(Updated 9<sup>th</sup> August 2018)

