

ENVS3009: Advanced Water Science and Resource Management

Callaghan

Semester 1 - 2024



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description

Under the pressures of global population growth and climate change, sustainable management of resources for public water supply is one of modern society's most critical and complex challenges. Central to the problem is the issue of water quality and the safety, operational and environmental implications of increasing contamination of natural water resources and aquatic systems. Building on foundation knowledge acquired in ENVS2009, ENVS3009 explores the key concepts, issues and latest science associated with modern management of water supply resources, including integrated supply strategies, key regulatory issues, emerging contaminants, advanced analytical techniques and key interrelationships between ecosystem function and water quality.

Via simulated exercises based on real world scenarios designed to develop technical and systems knowledge, students will perform authentic tasks and experience the challenges faced by water managers and researchers. Comprising coordinated lectures, field visit, practical activities, and workshops led by water industry professionals, this capstone water management course will equip students with the necessary skills for entry into water focused research and industry careers.

Academic Progress Requirements

Nil

Assumed Knowledge

ENVS2009 Catchment and Water Resource Management
Students must have successfully completed at least 120 units to enrol in this course.

Contact Hours

Callaghan

Field Study *

Face to Face Off Campus

5 hour(s) per week(s) for 1 week(s) starting Week 8

Lecture

Face to Face On Campus

2 hour(s) per week(s) for 13 week(s) starting Week 1

Workshop *

Face to Face On Campus

3 hour(s) per week(s) for 6 week(s) starting Week 2

Workshops occur in weeks 2,3,5,9,11,12

Workshop *

Face to Face On Campus

6 hour(s) per day for 2 day(s)

This is a 12hr lab intensive (Tue/Wed) in the mid semester break.

* This contact type has a compulsory requirement.

10

Unit Weighting

Workload

Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

COURSE OUTLINE

www.newcastle.edu.au

CRICOS Provider 00109J

CONTACTS

Course Coordinator	Callaghan Dr Craig Evans Craig.Evans@newcastle.edu.au (02) 4405 0695 Consultation: By appointment
Teaching Staff	Other teaching staff will be advised on the course Canvas site.
School Office	School of Environmental and Life Sciences Room C228 Chemistry Building Callaghan Science-SELS@newcastle.edu.au (02) 4921 5080 9am-5pm (Mon-Fri)

SYLLABUS

Course Content	The topics to be covered include: <ol style="list-style-type: none">1. Integrated supply strategies for sustainable water supply.2. Key regulatory issues for water resource managers.3. Modern approaches to catchment management.4. Emerging water quality issues and monitoring design.5. Advanced monitoring, analytical and water treatment technologies.6. 'Ecosystem/water quality' interrelationships in water storages.
Course Learning Outcomes	On successful completion of this course, students will be able to: <ol style="list-style-type: none">1. Integrate assessment of water quality risks and supply process knowledge to design an effective monitoring program;2. Connect practical skills and theoretical knowledge to generate, analyse and interpret results of advanced water quality analyses;3. Explain key relationships between ecosystem function, water quality and treatment implications in water storage systems;4. Apply systems thinking to key catchment management challenges and develop an action plan;5. Apply their skill set and present ideas in simulated professional workplace scenarios.
Course Materials	Required Reading: <ul style="list-style-type: none">• A variety of relevant reading materials will be posted and available via the course Canvas site as the course progresses.• Required readings may be derived from various sources and will be advised in advance where applicable.• There is no formal textbook required for this course.

COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL the following compulsory requirements:

Contact Hour Requirements:

Field Study: There is a compulsory attendance requirement in this course. Students must attend Field Study visit as it will inform a large component of their assessment.

Field excursion cost: The cost for this excursion will be approximately \$35. This will be dependent upon the final number of students enrolled in the course - the amount will be confirmed early in the semester.

Workshop: There is a compulsory attendance requirement in this course. Students must attend at least 80% of Workshops in order to be eligible to pass the course. Due to time constraints and the availability of industry professionals, it will not be possible to re-attempt missed workshop sessions.

SCHEDULE

Week	Week Begins	Lecture	Laboratory/Workshop	Assessment Due
1	26 Feb	Course introduction/Sustainable water supply (I)		
2	4 Mar	Sustainable water supply (II)	Water resilience & integrated water management (W) - John Stanmore (Hunter Water Corporation (HWC))	In class assessment
3	11 Mar	Priority issues in water quality management	Considerations in water quality monitoring design (W) - Abigail Morrow (HWC)	Workshop includes tutorial for Assessment 1
4	18 Mar	Emerging water quality issues (I)	No practical	
5	25 Mar	Emerging water quality issues (II)	Evaluating 'manufactured water' supply options (W) - Clara Laydon (HWC)	In class assessment
6	1 Apr	Advanced monitoring & analysis (I) - the molecular toolkit	No workshop	Assessment 1: Design a water quality monitoring program
7	8 Apr	Advanced monitoring & analysis (II) - faecal source tracking	No workshop	
Mid-Semester Recess				
Mid-Semester Recess (Apr 23/24 – 2 day lab intensive) *				
8	29 Apr	Advanced monitoring & analysis (III) - remote and real-time sensing	Field visit - Grahamstown Reservoir catchment & supply system (FT)	
9	6 May	The drinking water regulatory framework	Catchment risk assessment and health-based targets (W) - Abigail Morrow (HWC)	In class assessment
10	13 May	No lecture - free week to work on major report	No workshop - free week to work on major report	Assessment 3: Major report - Advanced water quality analysis
11	20 May	Ecosystem/water quality relationships (I)	Prioritisation of contaminants (W) - Zoe Rogers (HWC)	In class assessment
12	27 May	Ecosystem/water quality relationships (II)	'Anageddon' - the cyanobacterial threat (W) - Abigail Morrow (HWC)	In class assessment
13	3 Jun			
Examination Period				
Examination Period				

*(Apr 23/24) – 2-day Lab Intensive: molecular detection of faecal indicators; detection of cyanotoxins; fluorometry & faecal source tracking; environmental DNA & bioinformatics.

ASSESSMENTS

This course has 4 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Water Quality Monitoring	Week 6 - Wed April 3	Individual	20%	1, 3
2	Workshop Participation	Progressive throughout semester	Combination	10%	3, 4, 5
3	Lab Report	Week 10 - Wed May 15	Individual	30%	2
4	Exam	Formal examination period	Individual	40%	1, 2, 3, 4

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Water Quality Monitoring Design

Assessment Type	Addressing CLO-1 & 3, this task is designed to evaluate student capacity in relation to catchment and source water quality hazard identification, prioritisation of water quality risks, and development of an effective and sustainable monitoring program.
Purpose	Given a hypothetical catchment and reservoir scenario, students will design a monitoring program for assessment of source water quality and water treatment priorities for a drinking water supply system.
Description	20%
Weighting	Week 6 - Wed April 3
Due Date	Specific Location NOTE: This assessment item must be submitted both electronically via Canvas AND in HARD COPY to the course assignment box (foyer area outside labs on lower level, Science Building).
Submission Method	Provided in class and via Canvas
Assessment Criteria	Specific Location
Return Method	Returned Work - Feedback will be provided with each marked assignment

Assessment 2 - Workshop Participation

Assessment Type	Participation
Purpose	Addressing CLO-3,4 & 5, the workshops are designed to develop technical and systems knowledge, and to provide an experience of the challenges faced by water managers and researchers in this field.
Description	The workshops comprise a series of interactive sessions with water industry professionals, where students are presented with and complete activities on, a range of water management concepts and challenges.
Weighting	10%
Due Date	Progressive throughout semester
Submission Method	In Class Activities to be completed and submitted in class where relevant
Assessment Criteria	To be provided during the relevant sessions and via Canvas where applicable
Return Method	In Class
Feedback Provided	In Person - Group and individual feedback provided throughout semester as applicable

Assessment 3 - Lab Report

Assessment Type	Report
Purpose	Addressing CLO-2, this task evaluates the students' capacity to connect practical skills and theoretical knowledge to generate, analyse and interpret results of advanced water quality analyses; and to provide a comprehensive assessment of water quality and likely contamination sources based on these results.
Description	A report based on data generated during a 2-day lab intensive in the mid-term break, where students conduct a variety of analyses on a range of water samples from a drinking water catchment system, then use this data in conjunction with knowledge of catchment land uses and sample collection sites, to draw conclusions regarding water quality threats and

Weighting	contaminant pathways in the catchment. 30%
Due Date	Week 10 - Wed May 15
Submission Method	Specific Location NOTE: This assessment item must be submitted both electronically via Canvas AND in HARD COPY to the course assignment box (foyer area outside labs on lower level, Science Building).
Assessment Criteria	Provided in class and via Canvas
Return Method	Specific Location
Feedback Provided	Returned Work - Feedback will be provided with each marked assignment

Assessment 4 – Exam

Assessment Type	Formal Examination
Purpose	The formal examination is designed to test the individual student's knowledge across the full breadth of course material, especially with regard to elements of CLOs 1, 2, 3 and 4 that are not fully addressed by the other assessment items. Marks are awarded in accordance with Table 1 from the Workload Assessment Marking and Grading Policy (Policy 000649) at http://www.newcastle.edu.au/policy/000649.html
Description	Online exam comprising written answer questions
Weighting	40%
Due Date	Formal examination period
Submission Method	Formal Exam
Assessment Criteria	Provided via Canvas
Return Method	Not Returned
Feedback Provided	No Feedback.

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Attendance

Attendance/participation will be recorded in the following components:

- Field Study (Method of recording: Online payments register; on site attendance sheet)
- Workshop (Method of recording: In class attendance sheet)

Communication Methods	Communication methods used in this course include: <ul style="list-style-type: none">- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.- Email: Students will receive communications via their student email account.- Face to Face: Communication will be provided via face to face meetings or supervision.
Course Evaluation	Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.
Oral Interviews (Vivas)	As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure . In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule .
Academic Misconduct	All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35 .
Adverse Circumstances	The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where: <ol style="list-style-type: none">1. the assessment item is a major assessment item; or2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;3. you are requesting a change of placement; or4. the course has a compulsory attendance requirement . Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at: https://policies.newcastle.edu.au/document/view-current.php?id=236
Important Policy Information	The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures that support a safe and respectful environment at the University.

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

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