

# CHEM4078: AQUATIC ECOLOGY

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## Effective Term

Semester A 2025/26

## Part I Course Overview

### Course Title

Aquatic Ecology

### Subject Code

CHEM - Chemistry

### Course Number

4078

### Academic Unit

Chemistry (CHEM)

### College/School

College of Science (SI)

### Course Duration

One Semester

### Credit Units

4

### Level

B1, B2, B3, B4 - Bachelor's Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

Nil

### Precursors

CHEM2067/BCH2067 Diversity of Life and Evolution and/or  
CHEM3068/BCH3068 General Ecology

### Equivalent Courses

BCH4078 Aquatic Ecology

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

In this course, students will:

- explore the physical and chemical characteristics and processes, as well as biodiversity, of aquatic ecosystems;
- identify and examine biotic interactions and physical and/or chemical factors determining the community structure in aquatic habitats;
- review and evaluate contemporary issues related to human impacts on the aquatic ecosystems.

**Course Intended Learning Outcomes (CILOs)**

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe and explain physical and chemical characteristics and processes, as well as the ecological structure, of aquatic ecosystems.	40	x	x	
2	Demonstrate investigative skills in conducting scientific investigations on aquatic ecosystems and interpreting species interactions and their significance in the determination of community structure and patterns.	30		x	x
3	Critically evaluate the impact of human activities on the ecology of aquatic ecosystems.	30		x	x

**A1: Attitude**

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

**A2: Ability**

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

**A3: Accomplishments**

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

**Learning and Teaching Activities (LTAs)**

LTAs	Brief Description	CILO No.	Hours/week (if applicable)
Lectures, tutorials, and quizzes	Students will learn to identify and describe factors determining the ecological characteristics of aquatic ecosystems through lectures, tutorials, and quizzes.	1	Lecture (2 hrs), tutorials (0.5 hrs)
Group activities	Students will work in small groups and employ basic ecological techniques to discover physical, chemical and biological characteristics of aquatic ecosystems.	2	3 hrs

3	Small group project	Students will design a small-scale laboratory/ field study to investigate an ecological question in aquatic ecology	2	1 hr
4	Group presentations/ debates, investigation of the literature or other data	Through large and small group presentations/ debates, investigation of the literature or other data, students will critically evaluate the impact of anthropogenic activities on aquatic ecosystems.	3	

**Assessment Tasks / Activities (ATs)**

	ATs	CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?
1	Short Quizzes	1, 2	10	They are closed book quizzes.	No
2	Group Activities / Presentations/ Debates	3	10	-	Yes
3	Laboratory / Field Investigation Reports	2	20	-	Yes
4	Small group project	2	10	-	Yes

**Continuous Assessment (%)**

50

**Examination (%)**

50

**Examination Duration (Hours)**

3

**Minimum Continuous Assessment Passing Requirement (%)**

40

**Minimum Examination Passing Requirement (%)**

40

**Assessment Rubrics (AR)****Assessment Task**

Short Quizzes

**Criterion**

Understanding of the topic and reading materials; correctness of interpretation and analysis of the experimental data

**Excellent (A+, A, A-)**

An excellent understanding of the principles of various topics of aquatic ecology and is fully capable of interpreting and analyzing experimental data.

**Good (B+, B, B-)**

Able to describe and explain the principles of various topics of aquatic ecology and is capable of interpreting and analyzing experimental data.

**Fair (C+, C, C-)**

Able to describe and explain some of the principles of various topics of aquatic ecology and is partially capable of interpreting and analyzing experimental data.

**Marginal (D)**

Barely able to describe and explain some of the principles of various topics of aquatic ecology and is marginally capable of interpreting and analyzing experimental data.

**Failure (F)**

Poor understanding of the principles of various topics of aquatic ecology and is unable to interpret and analyze experimental data.

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**Assessment Task**

Group Activities / Presentations / Debates

**Criterion**

Understanding of the topic and material; completeness of the presentation; logic of the presentation structure; clarity of talk; appropriate use of photos and figures in the illustration of concepts; ability to discuss the presented topic

**Excellent (A+, A, A-)**

Deliver fluent, well organized and well prepared presentations to demonstrate excellent understanding of the principles and practice of the selected topics of aquatic ecology.

**Good (B+, B, B-)**

Deliver fluent presentations, with evidence of proper preparation, to describe and explain the principles of the selected topics of aquatic ecology.

**Fair (C+, C, C-)**

Deliver presentations, with evidence of proper preparation, to describe and explain some key principles of the selected topics of aquatic ecology.

**Marginal (D)**

Deliver comprehensible presentations to briefly describe isolated principles of the selected topics of aquatic ecology.

**Failure (F)**

Fail to present relevant principles of any topics of aquatic ecology in coherent and comprehensible manners.

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**Assessment Task**

Laboratory / Field Investigation Reports, Small Group Project

**Criterion**

Completeness and correctness of data interpretation and analysis; quality of experimental work and data collection; clarity and organization of report writing; quality and depth of discussion on experimental data

**Excellent (A+, A, A-)**

Able to demonstrate an excellent understanding of the principles and practice of various field and laboratory skills in aquatic ecology and is highly competent in conducting independent experimental analysis.

**Good (B+, B, B-)**

Able to describe and explain the principles of various field and laboratory skills in aquatic ecology and is competent in conducting independent experimental analysis.

**Fair (C+, C, C-)**

Able to describe and explain some key principles of selected field and laboratory skills in aquatic ecology and is able to conduct experimental analysis.

**Marginal (D)**

Able to briefly describe isolated principles of selected field and laboratory skills in aquatic ecology, and can barely conduct experimental analysis.

**Failure (F)**

Fail to accurately describe and explain relevant principles of any field and laboratory skills in aquatic ecology and is unable to conduct experimental analysis.

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**Assessment Task**

Examination

**Criterion**

Completeness and correctness of calculations/answers; correctness of interpretation and analysis of experimental data; application of knowledge in solving real life problems; logic of argumentation and intelligent use of course content/ original thinking

**Excellent (A+, A, A-)**

Able to demonstrate an excellent understanding of the principles of various topics of aquatic ecology.

**Good (B+, B, B-)**

Able to describe and explain the principles of various topics of aquatic ecology.

**Fair (C+, C, C-)**

Able to describe and explain some of the principles of various topics of aquatic ecology.

**Marginal (D)**

Barely able to describe and explain some of the principles of various topics of ecology.

**Failure (F)**

Poor understanding of the principles of various topics of ecology.

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## Part III Other Information

**Keyword Syllabus**

- Hydrological cycle
- Physiography of standing water and flowing water
- Ocean circulation, physical and chemical parameters
- Diversity of aquatic organisms
- Aquatic communities
- Species and community interactions
- Nutrient cycling and energy flow

- Water pollution, Ocean acidification, Marine debris
- Introduced species

### Reading List

#### Compulsory Readings

Title	
1	Nil

#### Additional Readings

Title	
1	Ecology of Freshwater: Earth's Bloodstream, 5th edition. Moss, B.R. John Wiley & Sons, 2018.
2	Freshwater Ecology: Principles and Applications. Jeffries, M., Mills, D. John Wiley and Sons, 1995.
3	Marine Biology (Botany, Zoology, Ecology and Evolution). 10th edition. Castro, P., Huber, M.E. McGraw-Hill Education, 2015.
4	The Biology of Rocky Shores (Biology of Habitats Series). 2nd edition. Little, C., Williams, G.A., Trowbridge, C.D. Oxford University Press, 2009.
5	The Ecology of Sandy Shores. 3rd edition. McLachlan, A., Defeo, O. Academic Press, 2017.
6	The Biology of Soft Shores and Estuaries (Biology of Habitats Series). 1st edition. Little, C. Oxford University Press, 2000.