GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Environmental Assessment Methods and Quality of Coastal Water (I002864)

Course size *(nominal values; actual values may depend on programme)*

Credits 7.5 **Study time 200 h**

Course offerings in academic year 2025-2026

A (semester 1) English Gent

Lecturers in academic year 2025-2026

Olsen, Yngvar	TRONDH01	lecturer-in-charge
Aberle-Malzahn, Nicole	TRONDH01	co-lecturer

Offered in the following programmes in 2025-2026	**crdts**	**offering**
International Master of Science in Health Management in Aquaculture	7.5	A

Teaching languages

English

Keywords

Water quality assessment, coastal water, analytical methods, biogenic wastes, environmental EU legislation, EU Water Framework Directive, human waste sources of pollution

Position of the course

The course introduces a selection of key scientific methods for environmental and resource-oriented scientific studies of marine ecosystems, with an emphasis on surface seawater (open waters) studies. Such studies often aim to establish knowledge on the ecological and chemical state of the ecosystem based on measurements of physical, chemical and biological environmental variables. These are requirements set by EU environmental legislation; the Water Framework Directive. The course introduces how such investigations can be conducted and reported. Emphasis is placed on both theoretical knowledge, hands-on experience with methods, compiling results into a report where assessment of environmental sustainability has a focus.

Contents

1 International environmental legislation
2 Importance of scientific basis in management versus the precautionary principle
3 Water Framework Directive (WFD)
4 Ecological and chemical states, as questioned in the WFD, ecosystem health
5 Ecosystem's ability to assimilate biogenic (non-toxic) emissions, their carrying capacity
6 Environmental footprint of salmon production
7 Mechanisms for understanding algae blooms
8 Spreading of microorganisms
9 Field and laboratory work in assessment study
10 Analytical methods for water quality assessment.
11 Report worked out in scientific format

Initial competences

Competence for admission to EM AquaH study program and first semester courses at UGent. Batchelor of marine science and aquaculture for national program MSOCEAN

Final competences

1 After completing the course, the candidate should have:

Detailed scientific knowledge of, and "hands-on" experience with, methods for investigating ecological and chemical state of marine ecosystems, including environmental sustainability related to human activity in coastal waters

2 Comprehensive knowledge of the scientific and legal basis for environmental and resource-oriented studies of marine ecosystems in marine surface waters and be familiar with how such studies are conducted and reported in a scientific format
3 Have a scientific methodological foundation as a basis, and be able to expand this to answer new questions in the field, including questions about the impact and sustainability of the coastal zone benthic ecosystem
4 Be familiar with past and recent development of relevant methodology in the subject area, and based on this, be able to analyze new issues related to the marine environment and resources area
5 Based on methodological knowledge, be able to critically evaluate different sources of information on new relevant methods that can be used in the assessments/studies of surface water ecosystem, but also of other ecosystems such as the benthic

6 Analyze and evaluate the scientific relevance and suitability of various methods for specific investigations of environmental and resource issues in coastal waters, among these newer digital methods that generate large datasets
7 Use new and established methods to independently determine ecological and chemical states as well as potential influences on environmental sustainability in coastal waters affected by human activity
8 Participate in research project and under supervision be able to carry out an independent part of the work and report the results in a scientific format
9 Have an active relationship to relevant issues within the scientific basis of the field and with ethical issues of research, especially aimed to marine environmental issues related to sustainability
10 Apply their knowledge and skills to carry out advanced projects and other tasks in their field, including tasks relevant to other marine ecosystems
11 Master written and oral scientific rhetorics as a basis for dissemination and other communication
12 Communicate academic issues and important conclusions within their methodical subject area with professional experts, colleagues and with the public
13 Contribute to new concepts and methodology for mapping the environment and resources in marine sites, with a special focus on future digitized environmental surveying and monitoring

Conditions for credit contract

This course unit cannot be taken via a credit contract

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Group work, Lecture, Practical, Independent work

Extra information on the teaching methods

The course involves 24 lectures, off which 10 is given by external lecturers, one day of method demonstration, 3 days of field work followed up by analytical work and paper writing, with a learning by doing profile.

Study material

None

References

OSPAR Commission, 2005. Ecological Quality Objectives for the Greater North Sea with Regard to Nutrients and Eutrophication Effects. OSPAR Background Document on Eutrophication. ISBN 1-904426-71-9, Publication Number: 2005/229, pp. 33.
Olsen, Y., S. Agusti, T. Andersen, C. M. Duarte P. Gasol, I. Gismervik, A-S. Heiskanen, E. x Hoell, P. Kuuppo, R. Lignell, H. Reinertsen, U. Sommer, H. Stibor, T. Tamminen, O. Vadstein, D. Vaqué, M. Vidal. 2006. A comparative study of responses in planktonic food web structure and function in contrasting European

coastal waters exposed to experimental nutrient addition. Limnol. Oceanogr. 51: 488-503.
Tett P. 2008. Fish Farm Wastes in the Ecosystem In: Holmer M, Black K, Duarte CM, Marbà N, Karakassis I (Eds.) Aquaculture in the Ecosystem. Springer Science+Business Media B.V. ISBN 978-1-4020-6809-6. pp. 1–46.
Olsen Y; Reinertsen H; Sommer, U; Vadstein, O. 2014a. Responses of biological and chemical components in North East Atlantic coastal water to experimental nitrogen and phosphorus addition– a full scale ecosystem study and its relevance for management. Science of the Total Environment. 473-474: 262-274.
Gismervik I, Olsen Y and Vadstein O. 2002. Micro- and mesozooplankton response to enhanced nutrient input – a mesocosm study. Hydrobiologia 484: 75–87, 2002.
Intergovernmental Oceanographic Commission of ©UNESCO. 2010. Karlson, B., Cusack, C. and Bresnan, E. (editors). Microscopic and molecular methods for quantitative phytoplankton analysis. Paris, UNESCO. (IOC Manuals and Guides, no. 55.) (IOC/2010/MG/55).110 pages.
Percy, D.R., Hishamunda, N. & Kuemlangan, B. 2013. Governance in marine aquaculture: the legal dimension. In A. Lovatelli, J. Aguilar-Manjarrez & D. Soto, eds. Expanding mariculture farther offshore: technical, environmental, spatial and governance challenges. FAO Technical Workshop, 22–25 March 2010, Orbetello, Italy. FAO Fisheries and aquaculture Proceedings No. 24. Rome, FAO. pp. 245–262.

Course content-related study coaching

PhD students acts as course advisers in practical phase, support from 2-3 permanently employed engineers, guiding upon request, student advice on agreement, guiding of paper writing.

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Oral assessment, Assignment

Examination methods in case of periodic assessment during the second examination period

Oral assessment, Assignment

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

Oral examination in the end 100/100.

Calculation of the examination mark

The normal grades are A-F and 7.5 ECTS achieved if passed (E and better, 40%)
Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.