GHENT UNIVERSITY

# Course Specifications

Valid in the academic year 2018-2019

## Aquatic and Terrestrial Ecology (I000482)

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

| | | | | | |
|---|---|---|---|---|---|
| Credits | 5.0 | Study time | 135 h | Contact hrs | 60.0 h |

Course offerings and teaching methods in academic year 2018-2019

| | | | |
|---|---|---|---|
| A (semester 1) | English | practicum | 7.5 h |
| | | guided self-study | 6.25 h |
| | | excursion | 15.0 h |
| | | fieldwork | 7.5 h |
| | | lecture | 23.75 h |

Lecturers in academic year 2018-2019

| | | |
|---|---|---|
| Janssen, Colin | LA22 | lecturer-in-charge |
| Goethals, Peter | LA22 | co-lecturer |
| Steppe, Kathy | LA21 | co-lecturer |

| Offered in the following programmes in 2018-2019 | crdts | offering |
|---|---|---|
| Master of Science in Bioscience Engineering: Forest and Nature Management | 5 | A |
| Master of Science in Bioscience Engineering: Environmental Technology | 5 | A |

### Teaching languages

English

### Keywords

Aquatic ecology, limnology, marine ecology, hydrobiology, terrestrial ecology, productivity, anthropogenic impact, experimental set-up, relation between biotics and abiotics

### Position of the course

This course builds on the acquired knowledge in the course ‘ecology’ (second bachelor). In contrast with the aforementioned course the most important ecological processes in both aquatic and terrestrial ecosystems will be studied in detail and will have a quantitative approach. The course has as general aim to give an insight in the structure and the functioning of aquatic and terrestrial ecosystems. Thus the foundation is laid for the many applications of the ecology and also the assessing of the anthropogenic impact and the monitoring, which are necessary. The aquatic part includes the physical and chemical characteristics, as well as the qualitative and quantitative composition of the biological communities in aquatic ecosystems. The interactions between biotics and abiots are emphasised, as well as productivity. In the terrestrial part especially the exchange processes between live organisms and their terrestrial environment is studied. Carbon-, water- and the nutrient removal are discussed in detail. The theoretical knowledge introduced in both parts will be illustrated by case studies with sampling in the site and development in the laboratory, as well as by exercises.

### Contents

*Part 1: Freshwater ecology*
1. The place of aquatic ecology in natural sciences
2. Distribution, age and genesis of inland waters
3. Structure and physical properties of water
4. Physical relationships in natural water bodies
4.1. Luminous environment
4.2. Heat balance of water bodies

4.3. Water movement in lenthic and lotic waters
4.4. Tide movements in seas and oceans
5. Chemical properties of water
5.1. Salinity
5.2. Dissolved oxygen content
5.3. Inorganic carbon budget
5.4. Nitrogen, phosphorus, iron, sulphide and silica cycle
6. Biological and ecological processes in aquatic ecosystems
6.1. Structure and zonations in aquatic ecosystems
6.2. Biological communities
6.3. Productivity in aquatic ecosystems
6.4. Dynamics of the food web
7. Casestudies

*Part 2: Marine ecology*
1. General characteristics of the marine environment
2. Zonations in the marine environment
3. Physical factors
4. Chemical factors
5. Systematics of marine organisms
6. Ecology of pelagic communities
7. Ecology of benthic organisms
8. Synecology of the benthos
9. Productivity of marine ecosystems
10. Exploitation of marine systems - fisheries and aquaculture

*Part 3: Terrestrial ecology*
1. Carbon balance of terrestrial ecosystems
1.1. Photosynthesis: physiological and physical basis
1.2. SLA, nitrogen concentration and photosynthetic capacity
1.3. Influence of climatic factors on the photosynthetic response
1.4. Growth and carbon storage
1.5. Biogeochemical cycles
1.6. Respiration
2. Water and energy balance of terrestrial ecosystems
2.1. Energy balance
2.2. Water input in ecosystems
2.3. Water movement through ecosystems
2.4. Water losses from ecosystems
3. Global change and global dimming
4. Long-term changes in the climate

## Initial competences

General biology, general ecology

## Final competences

1 Understanding the main theoretical processes driving ecosystem dynamics in aquatic and terrestrial ecosystems.
2 Based on this theoretical knowledge the student should be able to estimate possible consequences of human interactions in the different aquatic and terrestrial ecosystems.

## Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

## Conditions for exam contract

This course unit cannot be taken via an exam contract

## Teaching methods

Guided self-study, excursion, lecture, practicum, fieldwork

## Extra information on the teaching methods

Theory: discussions in different groups, oral lectures
Exercises: microscopically examination of samples, projection of videos, field excursions and case-studies, and calculation exercises under guidance

## Learning materials and price

## References

J. Schwoerbel- Handbook of limnology. Ellis Horwood Ltd. Chichester (1984). 228 p
R.G. Wetzel - Limnology. Saunders College Publishing. Forth Worth (1983). 767 p
R. Barnes, Invertebrate Zoology, Saunders College Publishing (1986). 893 p

J.W. Day et al., Estuarine Ecology, John Wiley and Sons (1989). 446
H. Thurman and H. Weber, Marine Biology, Merill Publ. Comp. (1984). 558 p
W. Larcher. Physiological Plant Ecology, Springer, 4rd edition (2003), 513 p
J. Aber & J. Melillo. Terrestrial Ecosystems, Saunders College Publishing (1991), 429 p
Principles of Terrestrial Ecology (F. Stuart Chapin III), 2002, Springer, 436 p.

Course content-related study coaching

Oral presentations, discussions in groups (of different sizes), forums in Minerva, guided excercises, contact hours for individual guidance upon request.

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination with open questions, written examination with multiple choice questions

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

Written examination with open questions, written examination with multiple choice questions

Examination methods in case of permanent evaluation

Participation, assignment, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

Extra information on the examination methods

Theory: period aligned evaluation
Exercises: non-period aligned evaluation
Students who do not participate in the period aligned and/or non-period aligned evaluations may be failed for this course.
Theory: written (closed book) examination
Exercises: calculation excercises: quantification of the main exchange processes (carbon, water and energy) and case studies

Calculation of the examination mark

The examination consist of three partims: freshwater ecology, marine ecology and terrestrial ecology. The final score for this course is calculated as the mean of all partims (i.e. the three partims have an equal weight). In the scores for the individual partims both the theoretical exam and the practical exercises are taken into account (weight dependent on the partim).
Students who do not participate in the period aligned and/or non-period aligned evaluations may be failed for this course.