GHENT UNIVERSITY

# Course Specifications

Valid as from the academic year 2024-2025

## Introduction to Multivariate Data Analysis (C004412)

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

**Credits 3.0** **Study time 90 h**

**Course offerings and teaching methods in academic year 2024-2025**

| | | | |
|---|---|---|---|
| A (semester 2) | English | Gent | seminar |
| | | | lecture |

**Lecturers in academic year 2024-2025**

| | | |
|---|---|---|
| Sabbe, Koen | WE11 | lecturer-in-charge |

| **Offered in the following programmes in 2024-2025** | **crdts** | **offering** |
|---|---|---|

**Teaching languages**

English

**Keywords**

Multivariate data analyse, cluster analyse, indirecte en directe ordinatie

**Position of the course**

De studenten leren hoe ze algemeen gebruikte multivariate technieken kunnen toepassen om multidimensionele biologische (bv. ecologische) data sets te analyseren, en hoe deze technieken te implementeren in R

**Contents**

1 Algemene inleiding tot de multivariate data analyse:algemene concepten in multivariate dataanalyse, associatie-matrices
2 Clusteranalyse
3 Eigenanalyse gebaseerde indirecte en directe ordinatie
  1 Eigenanalyse
  2 Principal Component Analysis, Correspondence Analysis
  3 Discriminant Analysis
  4 Redundancy Analysis, Canonical Correspondence Analysis
  5 Randomisatietesten in de multivariate analyse, variance partitioning.
4 Distance-based ordinatie analyse
  1 Multidimensional scaling
5 Permutational Multivariate Analysis of Variance (PERMANOVA)
6 Exercises in R, individual assignmen

**Initial competences**

The course builds on the basic statistical concepts taught in Statistics I (Biol Ba1), Biostatistics (Biol Ba3) and Advanced biostatistics (Biol Ma1).

**Final competences**

1 The student knows and understands the most important basic concepts and principles of multivariate data analysis.
2 The student is able to independently extract the essential information from biologival multivariate datasets by selecting and applying the appropriate multivariate techniques.
3 The student is able to formulate the statistical results scientifically and to depict them graphically in an appropriate way.

**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**

Seminar, Lecture, Independent work

**Extra information on the teaching methods**

(1) seminar practical PC room classes: analysis of biological and simulated datasets using specialised multivariate analysis software R
(2) an (individual) assignment in which the student chooses between several ecological or morphometric data sets. This will enable the student to gain more in-depth knowledge of the most relevant statistical methods.

**Study material**

Type: Slides

Name: Multivariate Data Analysis
Indicative price: Free or paid by faculty
Optional: no
Language : English
Available on Ufora : Yes

**References**

Legendre & Legendre (2012). Numerical ecology. Elsevier.3rd Ed.
Borcard, Gillet & Legendre (2018). Numerical ecology with R. 2nd Ed.

**Course content-related study coaching**

Opportunity for questioning the lecturers during the orals and seminars, and outside these via email, personal contact and via the electronic teaching environment UFORA

**Assessment moments**

end-of-term assessment

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

Oral assessment, Written assessment with open-ended questions, Assignment

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

Oral assessment, Written assessment with open-ended questions, Assignment

**Examination methods in case of permanent assessment**

**Possibilities of retake in case of permanent assessment**

not applicable

**Extra information on the examination methods**

The assignment is discussed.

**Calculation of the examination mark**

1st and 2nd examination period: periodic evaluation (100 %). The assignment is discussed during the oral exam and counts for 60% of the final score.