GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Pharmaceutical Multivariate Design and Analysis of Experiments (J000455)

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
			independent work
			lecture

Lecturers in academic year 2024-2025

De Beer, Thomas	FWO2	lecturer-in-charge

Offered in the following programmes in 2024-2025	crdts	offering
Master of Science in Teaching in Health Sciences(main subject Pharmaceutical Sciences)	3	A
Master of Science in Drug Development	3	A
Master of Science in Pharmaceutical Engineering	3	A
Exchange Programme Faculty of Pharmaceutical Sciences	3	A

Teaching languages

English

Keywords

design of experiments, multivariate data-analysis, pharmaceutical applications.

Position of the course

Pharmaceutical experiments generally aim at investigating the influence of multiple parameters upon multiple responses (e.g., what is the influence of manufacturing process settings and formulation properties upon drug product properties such as drug release profiles). Design of experiments (DOE) is a rational and cost-effective approach to practical experimentation that allows the effect of variables to be assessed using only the minimum of resources. Furthermore, the well designed experiments allow determining the optimum combination of variables leading to desired product properties, with a guaranteed probability. Furthermore, since pharmaceutical experiments are usually performed using modern analytical techniques providing numerous data simultaneously, it is a second objective of this course is to learn how to convert this multivariate data tables into robust and reliable models and figures that can be easily interpreted and overviewed.

Contents

- create efficient experimental designs to match the objectives (screening, optimisation and robustness designs)
- analyze experimental data using sound statistical principles
- determine the optimum combination of experimental settings leading to the desired responses with a guaranteed probability
- make a risk estimate of decided settings
- organization, visualization and treatment of different types of data
- multivariate data modeling and diagnostics (PCA, PLS)
- report results in simple graphical formats
- use of software for exercises (diverse relevant pharmaceutical applications)

Initial competences

De farmaceutische bacheloropleiding met succes gevolgd hebben of de erin beoogde competenties op een andere manier verworven hebben.

Final competences

1 • The student knows how to design relevant experimental work to match the objectives
  • The student can judge the necessary amount of experimentation, take into account practical restrictions and anticipate and prevent/mitigate sources of the types of bias often encountered.
  • The student is able to carry out analysis of data from a given experimental design.
  • The student is able to determine the optimum combination of experimental settings leading to the desired responses with a guaranteed probability.
  • The student is able to analyze multivariate data-sets.
  • The student is able to develop and validate multivariate models.
  • The student is able to report the data analysis results in simple graphical formats using a software package.

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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

Study material

Type: Slides

Name: slides DOE & MVA
Indicative price: Free or paid by faculty
Optional: no
Available on Ufora : Yes
Online Available : Yes
Available in the Library : No
Available through Student Association : No

Type: Software

Name: Modde & Simca
Indicative price: Free or paid by faculty
Optional: no
Available on Athena : Yes
Online Available : Yes
Available in the Library : No
Available through Student Association : No
Usability and Lifetime within the Course Unit : not applicable
Usability and Lifetime after the Study Programme : not

References

1. Design of Experiments: Principles and Applications. L.Erikson et al. Umetrics Academy
2. Multi- and Megavariate Data Analysis. Part I and Part II. L.Erikson et al. Umetrics Academy

Course content-related study coaching

Assessment moments

end-of-term assessment

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

Written assessment with open-ended questions

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

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Calculation of the examination mark