



Cursusomvang (nominale waarden; effectieve waarden kunnen verschillen per opleiding)

Studiepunten 5.0 Studietijd 150 u Contacturen 62.5 u

Aanbodssessies en werkvormen in academiejaar 2018-2019

A (semester 2)	Engels	groepswerk	15.0 u
		werkcollege: PC- klasoefeningen	15.0 u
		zelfstandig werk	10.0 u
		hoorcollege	15.0 u
		begeleide zelfstudie	7.5 u
B (semester 2)		werkcollege: PC- klasoefeningen	15.0 u
		begeleide zelfstudie	7.5 u
		groepswerk	15.0 u
		zelfstandig werk	10.0 u
		hoorcollege	15.0 u

Lesgevers in academiejaar 2018-2019

Vermeulen, Karel LA26 Verantwoordelijk lesgever

Aangeboden in onderstaande opleidingen in 2018-2019

	stptn	aanbodssessie
Master of Science in Bioinformatics (afstudeerrichting Systems Biology)	5	A
Master of Science in Statistical Data Analysis	5	B
Uitwisselingsprogramma Bioinformatics (niveau master)	5	A

Onderwijstalen

Engels

Trefwoorden

Statistics, experimental design, sampling, sample size calculation, optimal experimental design, factorial designs, response surface design.

Situering

The course content is closely related to the theory and practice of linear statistical models (e.g. regression analysis and analysis of variance) as taught in 'Analysis of Continuous data'. Although the design phase of a study appears prior to the experimentation and statistical analysis phases, a design cannot be constructed without knowing how the data, that will arise from the designed study, will be analysed. A very good knowledge of the theory of linear statistical models is therefore very important.

The importance of experimental design for scientific and operational research is evident. A good design is necessary to make the statistical analysis of the data resulting from the experiment correctly interpretable. Moreover, efficiency in terms of cost versus precision may be considerably increased by choosing an appropriate design. The aim of this course is not only to teach students to design studies, but also more generally to broaden their understanding of the relation between experimenting and induction.

Inhoud

- **General concepts:** sampling from a population, randomization, random sampling, stratified sampling, cluster sampling, bias, confounding.
- **Sample size calculation:** exact methods, approximation methods using simulation,

- asymptotic approximation, adaptive designs and interim analysis.
- **Optimal experimental design:** methods based on the Fisher information matrix (e.g. A, D and E optimality), orthogonality of a design, designs for parameter estimation versus prediction, Federov algorithm.
- **Factorial designs (designs for ANOVA):** screening designs, full and fractional factorial designs (aliasing and confounding), resolution of a design, blocking, replication, orthogonal designs.
- **Designs for regression:** response surface methodology, central composite designs, alpha for rotatability or orthogonality.
- **Split-plot designs.**
- **Specialized topics:** Cross-over, sample size calculation under multiple testing, comparative studies.

Begincompetenties

Experimental Design builds on certain learning outcomes of the course unit Analysis of Continuous Data. A basic knowledge in matrix algebra is also required.

Eindcompetenties

- 1 Translate the study objectives into an appropriate design.
- 2 Assess the relation between the design and the statistical analysis method.
- 3 Construct an appropriate design for a specific research question.
- 4 Analyze the data resulting from a given design correctly.
- 5 Interpret the results of the statistical analysis correctly.
- 6 Adequately report on the design and analysis of an empirical study.

Creditcontractvoorwaarde

Toelating tot dit opleidingsonderdeel via creditcontract is mogelijk mits gunstige beoordeling van de competenties

Examencontractvoorwaarde

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

Didactische werkvormen

Begeleide zelfstudie, groepswork, hoorcollege, zelfstandig werk, werkcollege: PC-klasoefeningen

Toelichtingen bij de didactische werkvormen

Use of the electronic learning environment Minerva.

Leermateriaal

A syllabus is available: Approx. 10 EUR. The pdf and supporting R-files are also available from Minerva.

Referenties

- Goos, P. and Jones, B. (2011). Optimal design of experiments a case study approach. John Wiley & Sons.
- Casella, G. (2008). Statistical Design. Springer.
- Cox, D. and Read, N. (2000). The theory of the design of experiments. Chapman and Hall.
- Weber, D. and Skillings, J. (2000). A first course in the design of experiments. CRC Press.
- Cobb, G. (1998). Introduction to design and analysis of experiments. Springer-Verlag.

Vakinhoudelijke studiebegeleiding

In the PC labs the students are coached by an assistant. Students can make an appointment to ask questions to the lecturer. Questions and answers can be exchanged in Minerva.

Evaluatiemomenten

periodegebonden en niet-periodegebonden evaluatie

Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Openboekexamen, mondeling examen

Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Openboekexamen, mondeling examen

Evaluatievormen bij niet-periodegebonden evaluatie

Werkstuk

Tweede examenkans in geval van niet-periodegebonden evaluatie

Examen in de tweede examenperiode is mogelijk

Toelichtingen bij de evaluatievormen

Periodical evaluation: oral examination after written preparation (open book).

Non-periodical evaluation: the marks for the take home problem sets will be based on the written reports, and the marks for the project will also be based on the written report. The project assignment is a group work.

Eindscoreberekening

Theory and exercises: periodical evaluation (40%) and non-periodical evaluation (2 or 3 take home problem sets (25%) and 1 project (35%)), provided that the student did not fail for any separate component (with a score below 10/20).

If the student fails for this course in the first examination period and if he/she wants a retake in the second examination period, the non-periodical evaluation will be presented in a revised form in the second examination period.