Cursussen Statistiek
Courses in Statistics

2011-2012

UNIVERSITEIT
GENT

Inhoud / Contents

Address

Center for Statistics

ADDRESS   **Krijgslaan 281 - S9, 9000 Ghent**
URL   **www.cvstat.UGent.be**

Center for Statistics
Centrum voor Statistiek

Institute for Continuing Education in Science

ADDRESS   **Krijgslaan 281 - S3, 9000 Ghent**
PHONE   **09 264 44 26**   FAX   **09 264 85 90**
EMAIL   **ipvw.ices@UGent.be**
URL   **www.ipvw-ices.UGent.be**

**ICES will change location in September 2011.
Please check our website for the correct address.**

Institute for
Continuing Education
in Science

Instituut voor
Permanente Vorming
in de Wetenschappen

Onze dienst aanvaardt de opleidings-
cheques van de Vlaamse Gemeenschap.

Our service accepts the training vouchers
of the Flemish Community.

Deze reeks omvat cursussen die zijn opgenomen in
de Doctoral Schools programma's.

This series encompasses courses that are included
in the Doctoral Schools programs.

Voorwoord

Statistiek is de laatste decennia onmisbaar geworden in heel wat takken van de wetenschap. Denk maar aan sociologen die oorzaken van gedrag natrekken, artsen en biowetenschappers die DNA analyseren of de effectiviteit van nieuwe interventies evalueren, bio-ingenieurs die de kwaliteit van het milieu bewaken, industrielen die de productiekwaliteit bijsturen, economen die financiële tijdreeksen bestuderen, … Met de komst van gebruiksvriendelijke software wordt het opslaan en manipuleren van data haast kinderspel. Veel minder evident is het om relevante en kwaliteitsvolle gegevens te verzamelen, om efficiënt informatie te onttrekken en niet misleid te worden door naïeve conclusies. Een techniek en de interpretatie van haar resultaten hangen immers fundamenteel samen met het design en de implementatie van de studie, vaak ook met bijkomende onderstellingen over een complexe datastructuur.

Het Centrum voor Statistiek van de Universiteit Gent, i.s.m. het Instituut voor Permanente Vorming van de Faculteit Wetenschappen (IPVW), organiseert daarom elk jaar cursussen die inspelen op de noden van gebruikers van statistische methoden. Het aanbod richt zich vooral op het verwerven van inzicht in de basis van het statistisch onderzoek. Practica op pc stellen de kandidaat in staat om ook al doende te leren. Het doelpubliek bestaat uit professionelen en onderzoekers met een academische vorming. Of u nu kennis wil opfrissen, op de hoogte wil blijven van recente ontwikkelingen of belangstelling heeft voor een nieuw onderzoeksdomein, deze formule wil u in staat stellen om gericht kennis en vaardigheden op te doen. De nieuwe inzichten zullen uw bedrijf en uw onderzoek de extra voorsprong geven die het verdient. Ook de Vlaamse regering ziet zo'n training als een troef voor haar economisch beleid. Werkgevers kunnen genieten van financiële steun onder de vorm van de KMO-portefeuille. Werknemers kunnen gebruik maken van de opleidingscheques. Meer informatie over deze 'stimulerende middelen' vindt u op de websites www.kmo-portefeuille.be en www.vdab.be/opleidingscheques (zie ook pagina 16).

Tussen november 2011 en april 2012 wordt het pakket basismodules aangeboden, waarin statistische kennis gradueel wordt opgebouwd. Vooraf, in oktober 2011, geven twee modules een introductie tot het gebruik van de statistische software SPSS en SAS, waarvoor de Universiteit Gent een licentie heeft. Naar jaarlijkse gewoonte wordt dit programma aangevuld met een aantal meer gespecialiseerde cursussen: 'Multivariate Statistics' in januari 2012, 'Multilevel Analysis for Grouped and Longitudinal Data' en 'Structural Equation Modeling' in april 2012, 'Logistic Regression' in april-mei 2012, en 'Applied Longitudinal Analysis' in september 2012. Blijf op de hoogte van bijkomende korte cursussen (zoals

bijvoorbeeld voor de freeware R) via onze website of het formulier op pagina 19 van deze brochure. Alle cursussen (m.u.v. Module 1) worden in het Engels gedoceerd. Het geheel verloopt in een gemoedelijke sfeer met ruime mogelijkheid tot interactie met de docenten.

De IPVW-activiteiten waaraan een examen is verbonden worden ook opgenomen in het programma van de 'Doctoral Schools' die de UGent-doctoraatstudent ondersteunen bij zijn/haar onderzoek en opleiding (zie pagina 16).

Verder brengen we graag de volgende initiatieven onder uw aandacht:
In 2008 is aan de Universiteit Gent het IOF[1] valorisatieconsortium Stat-Gent CRESCENDO gestart, i.s.m. het Centrum voor Statistiek. Stat-Gent heeft tot doel de UGent statistiekexpertise te valoriseren via toepassingen voor overheid en industrie. Meer informatie hierover, ook over ons aanbod van short courses in statistiek en over een meer doorgedreven Master opleiding in Statistische Data-Analyse, die wetenschappers uit diverse disciplines een grondige vorming aanbiedt in de methodes van de toegepaste statistiek, vindt u op www.mastat.ugent.be en www.statgent.be.

**We hopen dat u het nieuwe aanbod kan smaken en wensen u alvast een leerrijk en productief jaar toe!**

---

[1] Industrieel OnderzoekFonds

Introduction

Statistics has become indispensable in many branches of science. Sociologists and psychologists searching to explain behavior, biologists analyzing DNA, clinicians evaluating new interventions, bio-engineers monitoring the environment, managers performing quality control, economists studying time series, … they all rely on statistical methods. Today's user-friendly software allows anyone to store and manipulate data quite easily. It remains a challenge however, to gather relevant, high-quality data and retrieve information efficiently to draw accurate inference. Without training and due professionalism one runs a high risk of arriving at misleading conclusions. One must recognize how the appropriate statistical technique and justified interpretation depend fundamentally on the design and conduct of a study in combination with any assumptions about the data structure.

To meet the needs of users of statistical methods, the Centre for Statistics of Ghent University in co-operation with the Institute for Continuing Education of the Faculty of Sciences (ICES) organizes a yearly series of courses. The goal is to train users of statistical software, providing them with insight in the basics of statistical research. Practical sessions on PC's allow participants to obtain this through hands-on experience. Our courses are aimed at professionals and participants with an academic training, who wish to refresh their knowledge, keep it up to date or discover new areas of research. The program is designed to offer specific knowledge and skills through separate modules. The new insights will give your company or research the extra edge it needs. The Flemish Community regards continuing training as an important element of its economic policy. Employers are granted financial support through the government's introduction of the KMO-portfolio and employees can use training vouchers. More information about these stimulating initiatives can be found on the websites: www.kmo-portefeuille.be and www.vdab.be/opleidingscheques (both in Dutch).

From November 2011 to April 2012, the program offers a classic series of basic modules which gradually build up statistical knowledge and techniques. Leading into these basic modules, in October 2011, two courses introduce the statistical software SPSS and SAS, for which Ghent University has a campus license. Every year, the program offers an additional number of more specialized courses: 'Multivariate Statistics' in January 2012, 'Multilevel Analysis for Grouped and Longitudinal Data' and 'Structural Equation Modeling' in April 2012, 'Logistic Regression ' in April-May 2012, and 'Applied Longitudinal Analysis' in September 2012. More information about additional short courses will be posted on our website or can
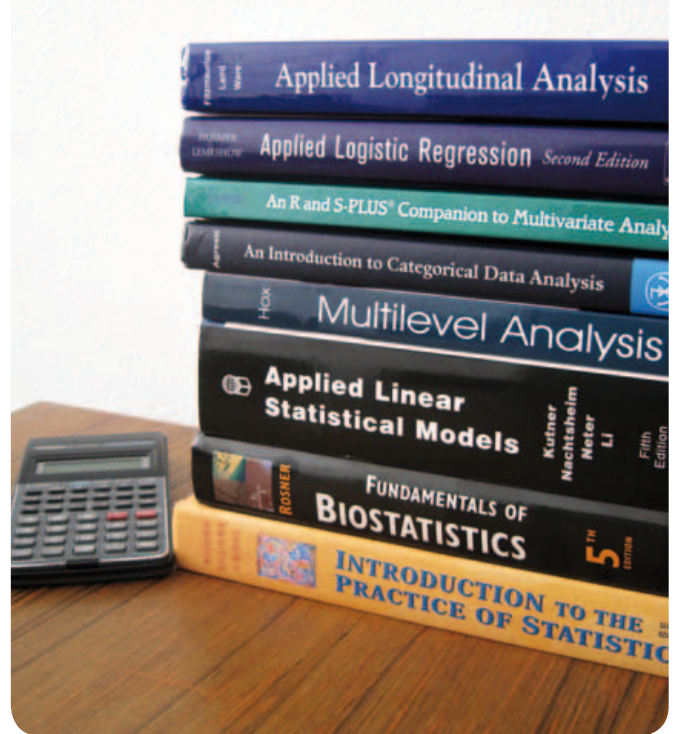
be requested through use of the form on page 19 of this brochure. With exception of the first module, all modules are taught in English to give international candidates the opportunity to participate. Classes take place in a pleasant atmosphere with ample opportunity to interact with the lecturers.

ICES-activities that include an exam will also be incorporated in the program of the Doctoral Schools, which support UGent doctoral students with their research and training (see page 16).

Also, we would like to bring the following initiatives to your attention:
In 2008, the IOF[2] valorization consortium Stat-Gent CRESCENDO was launched at Ghent University, in collaboration with the Center for Statistics. Stat-Gent's mission is to valorize UGent statistical expertise through applications in government and industry. For more information about this consortium, about short courses in statistics organized by the Center for Statistics and on the Masters program in Statistical Data-Analysis, which offers a more thorough training in the methods of practical statistics to scientists in diverse areas, visit www.cvstat.ugent.be and www.statgent.be.

Hoping the new program meets your expectations, we look forward to meeting you and wish you an enjoyable and productive learning experience!

[2] Industrial Research Fund

MODULE 1 – **Inleiding tot SPSS**

Kris Erauw (UGent)

Beschrijving

We leven in een kennismaatschappij. Heel veel mensen verzamelen gegevens of willen bepaalde ideeën met onderzoeksbevindingen ondersteunen. Denk aan de jongeren in een stedelijke jeugdraad die in hun jeugdwerkbeleidsplan de geformuleerde beleidslijnen moeten ondersteunen met onderzoeksbevindingen; of aan de voorzitter van een oudercomité die de standpunten van ouders op een wetenschappelijk verantwoorde manier wil bevragen. Het inzamelen en opslaan van al die gegevens is vaak niet zo evident als het lijkt. Zeker niet als het de bedoeling is de gegevens later op een professionele manier te verwerken

Deze lessenreeks is er op gericht data in een bruikbare vorm te verzamelen, de ingezamelde data in SPSS op te slaan en met SPSS de eerste beschrijvende statistieken te produceren. De verschillende lessen in de reeks zijn ervaringsgericht opgevat. De deelnemers worden met een aantal problemen geconfronteerd waarna mogelijke oplossingen besproken en gedemonstreerd worden.

Les 1

Data en dataverzameling: data in SPSS invoeren en definiëren, data uit andere programma's importeren en gebruiken.

Les 2

Elementaire bewerkingen: samenvattende statistieken en voorstellingen genereren, variabelen herschrijven en combineren, databestanden bewerken en combineren.

Les 3

Gemiddelden vergelijken: grafische voorstelling van gemiddelden, t-toetsen en one-way variantie-analyse.

Les 4

Meer uit je databestand halen: de eerste stappen in lineaire regressie.

Data

3, 4, 6 en 7 oktober 2011 telkens van 17u tot 20u.

Plaats

PC-klas 1 van de Faculteit Psychologische en Pedagogische Wetenschappen, Henri Dunantlaan 1, Gent.

Doelpubliek

Deze practica zijn bedoeld voor alle personen die gegevens inzamelen en/of opslaan, met de bedoeling deze statistisch te analyseren en te interpreteren.

Toelatingsvoorwaarden

Geen

Lesmateriaal

Documentatie- en oefeningenbundel.

Prijs

Gereduceerde prijzen gelden voor studenten en personeel van non-profit, social profit en overheid. Deze vindt u op de IPVW-website. De deelnameprijs bedraagt 325 EUR voor deelnemers uit de private sector.

MODULE 2 – Introduction to SAS

Geert Silversmit (Stat-Gent CRESCENDO) en Alain Visscher (Stat-Gent CRESCENDO)

Course description

The amount of data collected and stored in industry as in society grows exponentially. Data collections range in size from small datasets as seen in preclinical trials to high-dimensional data gathered in data warehouses. Raw data are typically not suitable for immediate analysis. They may be noisy, stored across different tables or require transformation before richer information is readily extracted. Hence, the first task typically involves manipulation of the data: combining tables, selecting relevant data, addressing missing values, modifying and creating variables. Once an adequate analysis dataset is obtained, it becomes possible to apply subsequent statistical analyses (such as linear regression models or survival analysis techniques).

This course aims to empower participants to manipulate data by learning the SAS programming language. SAS offers a unique combination of a complete set of database capabilities, advanced statistical techniques and a powerful programming language. Compared to the interactive SAS Enterprise Guide, using the SAS syntax directly allows total control of data manipulation, more flexibility to define model parameters and easier replication of analyses. In addition to data manipulation, we will illustrate by hands-on practice how you can use SAS statistical procedures to subsequently analyze/model your data. Upon finishing this course, you should have a solid foundation for performing data manipulation and basic statistical analyses using the SAS programming language.

Dates and venue

October 17, 19, 24 and 26, 2011 from 5.30 pm to 9 pm, at the Faculty of Science, Building S9, Campus Sterre, Krijgslaan 281, Ghent.

Target audience

This course will benefit participants from diverse backgrounds, ranging from investigators working with clinical trial data to data analysts working on high-dimensional data stored in data warehouses. It is suited for those who have not used SAS or any other statistical software before, but equally for those who have already worked with SAS but want a better understanding of the capabilities of the SAS programming language.

Course prerequisites

The course is open to all interested persons. Knowledge of basic statistical concepts is considered an advantage, but not required for learning the SAS programming language.

Course material

Copies of lecture notes.
Optional but highly recommended programming manual:
"The Little SAS Book: A Primer", L. D. Delwiche, S. J. Slaughter (2008), 4th ed., ISBN 978-1599947259

Fees

Reduced prices apply to students and participants of non-profit and public services. These prices are available at the ICES website. The registration fee amounts to 325 EUR for participants of the private sector.
The book is optional but recommended and can be bought at the additional cost of 40 EUR. Please indicate this clearly on the registration form.

MODULE 3 – Introductory Statistics Basics of Statistical Inference

Maria Ysebaert (Center for Statistics)

Course description

This course aims to provide insight into basic statistical concepts with emphasis on practical applications. Mathematical formulae will be kept to a minimum. The theory and the methods of analysis will be extensively illustrated with examples relating to a wide variety of different fields.

We start with concise graphical and numerical descriptions of data obtained from observational or experimental studies. The most common and frequently used probability distributions of discrete and continuous variables will be presented. Statistical inference draws conclusions about a population based on sampled data. Chance variations are taken into account such that a level of confidence is attached to these conclusions. We present the reasoning behind significance tests for the comparison of observed data with a hypothesis, the validity of which we want to assess. We apply this procedure to data obtained either from one or from two populations. The correct use of the t-test will be discussed. Nonparametric methods are considered as a possible alternative in case the requirements of the t-test are not met. We cover the basic concepts of hypothesis testing for categorical data, including the chi-square test. Quite often the relationship between two variables, where the outcome of one variable is seen as depending on the value of the other, is the focus of scientific interest. We will give an introduction to linear regression analysis, where a regression line based on observations obtained in a sample describes this relation.

Dates and venue

November 8, 17, 22 and 29, December 6, 13 and 20, 2011 from 5.30 pm till 9.30 pm (each lecture is followed by a hands-on practical session) at the Faculty of Science, Building S9, Campus Sterre, Krijgslaan 281, Ghent. Please note that November 17 is a Thursday.

Target audience

This course will benefit investigators from diverse areas, research scientists, clinical research associates, and, in general, anyone who comes in contact with data handling and who wants to acquire insight into basic statistical methods or who feels that his/her knowledge and practice of statistics needs refreshing. No extensive background in mathematics is required.

Exam

Participants can, if they wish, take part in an exam. A certificate from Ghent University will be issued to participants with a university degree at the bachelors level or an equivalent degree upon succeeding on this test. As such this course can be incorporated in a doctoral training program.

Course prerequisites

The course is open to all interested persons.

Course material

Copies of lecture notes.
Recommended handbooks are:

Book 1: "Fundamentals of Biostatistics", B. Rosner, 7th ed. (2010), Thomson Brooks/Cole, ISBN 978-0538735896. The examples used in this book are restricted to the field of bioscience. The book is therefore recommended if you have a background in a related research area, such as (veterinary) medicine, biotechnology, biology, pharmacy, a.s.o.

Book 2: "Introduction to the Practice of Statistics", D.S. Moore, G.P. McCabe and B. Craig, 7th ed. (2010), W.H. Freeman, ISBN 978-1429240321. This book uses examples from a wide range of research areas and is therefore recommended if you have no background in the research areas mentioned for book 1.

Fees

Reduced prices apply to students and participants of non-profit and public services. These prices are available at the ICES website. The registration fee amounts to 800 EUR for participants of the private sector.
Both books are optional and can be bought at the additional cost of 65 EUR per book. Please indicate this clearly on the registration form.
The examination fee is 30 EUR.

MODULE 4 – **Analysis of Variance**

Maria Ysebaert (Center for Statistics)

Course description

Analysis of variance (ANOVA) is a statistical tool used in the comparison of means of a random variable in populations that differ in a characteristic (factor), e.g. treatment, age, sex, subject, etc. First, we cover one-way ANOVA, where only one factor is of concern. Depending on the type of the factor, the conclusions pertain to just those factor levels included in the study (fixed factor model), or the conclusions extend to a population of factor levels of which the levels in the study are a sample (random effects model). In two-way and multi-way ANOVA (populations differ in more than one characteristic), the effects of factors are studied simultaneously to obtain information about the main effects of each of the factors as well as about any special joint effects (factorial design). In nested designs, where each level of a second factor (mostly a random factor) occurs in conjunction with only one level of the first factor, analysis of variance enables us to extract the variability induced by the nested factor from the effects of the main factor. For correct analysis of the data in multi-way ANOVA, not only the linear model and the type of factor have to be considered but, also, the assumptions that must be satisfied.

In this course we will focus on correct execution of data analysis and understanding the results of this analysis. We will provide insight into the conclusions and pay attention to expressing these conclusions in a correct and understandable way. The different methods will be extensively illustrated with examples from scientific studies in a variety of fields.

Dates and venue

January 10, 17, 24 and 31, February 7, 14 and 21, 2012, from 5.30 pm to 9.30 pm (each lecture, except on January 10, is followed by a hands-on practical session) at the Faculty of Science, Building S9, Campus Sterre, Krijgslaan 281, Ghent.

Target audience

This course will benefit investigators from a diversity of areas, who need to use statistical methods in the collection and handling of data in their research, in particular for assessing the effect of e.g. different treatments.

Exam

Participants can, if they wish, take part in an exam. A certificate from Ghent University will be issued to participants with a university degree at the bachelor level or an equivalent degree upon succeeding on this test. As such this course can be incorporated in a doctoral training program.

Course prerequisites

Participants are expected to have an active knowledge of the basic principles underlying statistical strategies, at a level equivalent to the "Introductory Statistics" course of this program. In the first session, on January 10, 2012, these principles will be briefly reviewed. This review session is open to interested participants of subsequent modules. Participants who have recently followed the introductory course are exempt from that first session.

Course material

Copies of lecture notes.
Recommended handbook: "Applied Linear Statistical Models", M.H. Kutner, C.J. Nachtsheim, J. Neter and W. Li, 5th ed. (2004), McGraw-Hill, ISBN 978-0071122214.

Fees

Reduced prices apply to students and participants of non-profit and public services. These prices are available at the ICES website. The registration fee amounts to 800 EUR for participants of the private sector.
The book is optional and can be bought at the additional cost of 65 EUR. Please indicate this clearly on the registration form. The examination fee is 30 EUR.

MODULE 5 – **Multivariate Statistics**

Stefan Van Aelst (UGent)

Course description
This course focuses on exploratory techniques to analyze multivariate data sets. The goal is to get insight in the structure of the data and the relations among the variables. Often one aims to reduce the dimensionality of the data. A standard technique is principal components analysis that tries to find important combinations of variables. More elaborate techniques such as factor analysis and multidimensional scaling will be discussed as well. Discriminant analysis and classification techniques will be discussed to get insight in data that consists of several (known) groups and can be used to assign new observations to one of the possible groups. If a data set (possibly) consists of more than one group, but the group labels are unknown, then cluster analysis techniques can be used to identify groups in the data set. We will discuss both hierarchical and partitioning approaches to cluster analysis. Canonical correlation analysis aims to understand the relation between two different multivariate data sets. The course will mainly focus on data sets with measurements of continuous random variables. However, some extensions to other variable types will be discussed as well. The course will also pay attention to graphical techniques that can be used to visualize the structure in multivariate data.

Dates and venue
January 23, 25 and 27, 2012, from 10 am to 1 pm and from 2 pm to 5 pm, at the Faculty of Science, Building S9, Campus Sterre, Krijgslaan 281, Ghent.

Target audience
This course targets researchers from all areas who are confronted with exploratory analysis of multivariate data sets.

Exam
Participants can, if they wish, take part in an exam. A certificate from Ghent University will be issued to participants with a university degree at the bachelor level or an equivalent degree upon succeeding on this test. As such this course can be incorporated in a doctoral training program.

Course prerequisites
Participants are expected to be familiar with basic statistics concepts, such as sample mean and variance, and t-test.

Course material
Copies of slides.
Parts of the course will be based on "An R and S-Plus® Companion to Multivariate Analysis", B.S. Everitt, 2nd ed., (2007), Springer, ISBN 978-1852338824. This book also contains a lot of information regarding the use of R/S-Plus software.

Fees
Reduced prices apply to students and participants of non-profit and public services. These prices are available at the ICES website. The registration fee amounts to 700 EUR for participants of the private sector.
The book is optional and can be bought at the additional cost of 75 EUR. Please indicate this clearly on the registration form. The examination fee is 30 EUR.

MODULE 6 – **Applied Linear Regression**

Tom Loeys (UGent)

Course description

Linear regression addresses how a continuous dependent variable is affected by one or more continuous predictors. The fact that many practical problems deal with continuous variables (e.g. income, blood pressure, temperature) makes linear regression a popular tool, and most of us will be familiar with the concept of drawing a line through a cloud of data points.

The first two sessions of this module introduce the conceptual framework of this method using the simple case of a single predictor. Formulas and technicalities are kept to a minimum and main focus will be on interpretation of results and assessing model validity. This includes confidence statements on the predictor effect (hypothesis tests and confidence intervals), using the regression model to predict future results, and verification of model assumptions.

In session 3 and 4 the conceptual framework will be expanded to accommodate more than one predictor leading to the multiple linear regression model. How to deal with these complex models in general and how to come to the most simple model starting from a large number of predictors will be discussed in detail. In these complex linear models special attention will be given to interpreting individual predictor effects, as these can be complicated by underlying relations between predictors (confounding).

In the last session a real world data example will be discussed at length and will be used to illustrate all the concepts from the previous sessions. Finally we will briefly touch on problems where the linear regression model is not appropriate and needs to be replaced by related approaches such as generalized linear models and mixed models. Different aspects will be illustrated with case examples from the instructors practical experience, and students are encouraged to bring examples from their work.

Dates and venue

February 29, March 7, 14, 21 and 28, 2012 from 5.30 pm to 9.30 pm (each lecture is followed by a hands-on practical session) at the Faculty of Psychology and Educational Sciences, Dunantlaan 1, Ghent.

Exam

Participants can, if they wish, take part in an exam. A certificate from Ghent University will be issued to participants with a university degree at the bachelor level or an equivalent degree upon succeeding on this test. As such this course can be incorporated in a doctoral training program.

Course prerequisites

Participants are expected to have an active knowledge of the basic principles underlying statistical strategies, at a level equivalent to the "Introductory Statistics" course of this program. In the first session of module 4, "Analysis of Variance", on January 10, 2012, these principles will be briefly reviewed. This session is free and open to interested participants of this year's program.

Course material

Copies of lecture notes.
Recommended handbook: "Applied Linear Statistical Models", M.H. Kutner, C.J. Nachtsheim, J. Neter and W. Li, 5th ed. (2004), McGraw-Hill, ISBN 978-0071122214. Please note that this is the same book as recommended for Module 4 'Analysis of Variance'.

Fees

Reduced prices apply to students and participants of non-profit and public services. These prices are available at the ICES website. The registration fee amounts to 800 EUR for participants of the private sector.
The book is optional and can be bought at the additional cost of 65 EUR. Please indicate this clearly on the registration form. The examination fee is 30 EUR.

Leoniek Wijngaards-de Meij (University of Utrecht, NL)

Course description

Social research often concerns relationships between individuals and the social contexts to which they belong. Individuals and their social contexts can be conceptualized as a hierarchical structure, with individuals nested within groups. Classical examples are educational research, with pupils nested within schools, and cross-national research, with individuals nested within their national units. Such systems can be observed at two levels, and as a result we have data with group level variables and individual level variables. To analyze such hierarchical structures, we need multilevel modeling, which allows us to study the relationships between variables observed at different levels in the hierarchical structure.

Multilevel modeling can also be used to analyze data from longitudinal research, by viewing measurement occasions as being nested within respondents. This has several advantages compared to more classical approaches to longitudinal data. In addition, multilevel models have been generalized to cover situations where data do not have a simple multilevel structure, such as cross-classified data or multiple-membership models.

This short course is intended as a basic and nontechnical introduction to multilevel analysis. It starts with a description of some examples, and shows why multilevel models are necessary if the data have a hierarchical structure. It then covers the basic theory of two- and three-level models. Next it explains how multilevel models can be applied to analyzing longitudinal data, and why and when this may be an attractive analysis approach, as compared to more classical analysis methods such as multivariate analysis of variance (Manova). Multilevel logistic models to analyze data where the outcome variable is dichotomous or a proportion, and multilevel multivariate modeling to analyze where there are multiple outcome variables will be shortly introduced.

The course includes three computer labs, where multigroup and longitudinal data are analyzed. The computer labs in the course use the multilevel program HLM and the SPSS Mixed procedure, which is available in SPSS starting with version 11.5.

Dates and venue

April 2, 3 and 4, 2012, from 9 am till 4 pm at the Faculty of Psychology and Educational Sciences, Dunantlaan 1, Ghent.

Target audience

This course will not only benefit applied researchers in the behavioral and social sciences, but whoever deals with data with a hierarchical or multilevel structure.

Exam

Participants can, if they wish, take part in an exam. A certificate from Ghent University will be issued to participants with a university degree at the bachelor level or an equivalent degree upon succeeding on this test. As such this course can be incorporated in a doctoral training program.

Course prerequisites

The course assumes reasonable familiarity with analysis of variance and multiple regression analysis, but prior knowledge of multilevel modeling is not assumed.

Course material

Course material: Copies of course notes.
The course is based on: "Multilevel Analysis. Techniques and Applications", J.J. Hox (2010), 2nd ed., New York: Routledge, ISBN 978-1848728462.

Fees

Reduced prices apply to students and participants of non-profit and public services. These prices are available at the ICES website. The registration fee amounts to 900 EUR for participants of the private sector.
The book is optional and can be bought at the additional cost of 40 EUR. Please indicate this clearly on the registration form. The examination fee is 30 EUR.

MODULE 8 – **Structural Equation Modeling**

Anne Boomsma (University of Groningen, NL)

Course description

The purpose of this course is to provide a theoretical introduction to the analysis of covariance structures, or structural equation modeling as it is called, and to gain practical experience with this type of modeling using LISREL software.

For the description and analysis of theory-based directed relationships between several variables simultaneously, it is possible to construct models that can be visualized as path diagrams. The first aim of the researcher is to formulate an underlying structure of relations between variables (latent variables or hypothetical constructs) on the basis of theoretical considerations. By means of a random sample of covariances between observed variables, the next step is to examine the discrepancy between the postulated model and these sample data. The set of directed relations between the variables in a structural equation model, also known as a covariance structure, may be regarded as a complex 'regression model'. The observed variables, being indicators of latent variables in such models, may be subject to measurement error, however. Social scientists use these types of models more and more frequently, whether justified from a statistical point of view or not. The LISREL (LInear Structural RELations) program, together with its preprocessor PRELIS, supports these analyses. Occasionally, reference will be made to the R-based software package 'lavaan'.

The course offers an introduction to the theoretical backgrounds of the statistical analysis of structural equation models. By means of practical assignments participants may learn how to construct covariance structure models, how to work with the LISREL and PRELIS program, and how to interpret the results of such analyses.

Dates and venue

April 10 and 11, 2012 from 9 am to 5 pm at the Faculty of Psychology and Educational Sciences, H. Dunantlaan 1, Ghent.

Target audience

This course targets everyone with an interest in testing theories or models that involve relationships between both observed and latent variables. Our target audience includes novices with little or no previous experience, as well as existing users who wish to refresh or update their theoretical and practical understanding of structural equation modeling

Exam

Participants can, if they wish, take part in an exam. A certificate from Ghent University will be issued to participants with a university degree at the bachelor level or an equivalent degree upon succeeding on this test. As such this course can be incorporated in a doctoral training program.

Course prerequisites

Participants are expected to be familiar with the basic principles of statistical inference and to have knowledge of multiple regression analysis. Some familiarity with factor analysis might be beneficial too.

Course material

Copies of lecture notes.
Recommended handbooks are:
   Book 1: "Covariantiestructuuranalyse", Boomsma, A. (2008). Ongepubliceerd manuscript, Rijksuniversiteit Groningen, Vakgroep Statistiek & Meettheorie. Highly recommended to all Dutch-speaking participants.
   Book 2: "Structural equations with latent variables", Bollen, K.A. (1989), 1st ed., New York: Wiley, ISBN 978-0471011712. This high-quality book is more complex and therefore recommended if you plan to study this topic more in depth.
   Book 3: "Confirmatory factor analysis for applied research", Brown, T.A. (2006), 1st ed., New York: The Guilford Press, ISBN 978-1593852740. This book is recommended if you are a non-Dutch speaking participant.

Fees

Reduced prices apply to students and participants of non-profit and public services. These prices are available at the ICES website. The registration fee amounts to 700 EUR for participants of the private sector.
The books are optional and can be bought at the additional cost of 15 EUR (book 1), 140 EUR (book 2) and 45 EUR (book 3). Please indicate this clearly on the registration form.
The examination fee is 30 EUR.

MODULE 9 – **Logistic Regression**

Els Goetghebeur (UGent)

Course description

For those familiar with linear regression and the analysis of tabulated discrete data, it is natural to move to the regression analysis of binary outcomes. This course shows how binary data can be modeled in terms of both categorical and continuous predictors. We start from 2x2 tables, which have been stratified to account for confounders and/or effect modifiers. We demonstrate how their analysis can be based on the more general logistic regression model. Not only cohort studies, but also case control studies fit into this framework. We continue with more complex models which may involve continuous predictors. We focus on interpretation of the parameters, adequacy of the model, inspection of unduly influencing observations and stepwise model building. We point to extensions of the methods to analyze outcomes with more than two discrete levels, and correlated outcomes such as matched pairs. Standard software assumes that a sufficiently large sample has been obtained. When rare outcomes are being modeled and cells in tables are sparsely populated, we must fall back on exact methods which are more computer intensive. We will demonstrate specialized software that allows to perform such analysis. Topics are illustrated with studies stemming mostly from the biological and/or medical research field. In practical sessions behind the PC participants will gain hands-on experience.

Dates and venue

April 24, May 8, 22 and 29, 2012, from 5.30 pm to 9.30 pm at the Faculty of Science, Building S9, Campus Sterre, Krijgslaan 281, Ghent.

Target audience

The course targets researchers, especially in the (bio)medical field, who need to analyze discrete data in the course of their investigations.

Exam

Participants can, if they wish, take part in an exam at a date which will be specified later. A certificate from Ghent University will be issued to participants with a university degree at the bachelors level or an equivalent degree upon succeeding on this test. As such this course can be incorporated in a doctoral training program.

Course prerequisites

Participants should have an active knowledge of the basic principles of statistics and of linear regression as taught in the modules 3 and 6 of this program. They should be familiar with the analysis of 2x2 tables. Some experience with statistical software such as SPSS, SAS or STATA is assumed.

Course material

Copies of lecture notes.
Recommended textbook: "Applied logistic regression", D.W. Hoshmer, Jr. and S. Lemeshow (2000), 2nd ed., Wiley, ISBN 978-0471356325.

Fees

Reduced prices apply to students and participants of non-profit and public services. These prices are available at the ICES website. The registration fee amounts to 600 EUR for participants of the private sector.
The book is optional and can be bought at the additional cost of 130 EUR. Please indicate this clearly on the registration form.
The examination fee is 30 EUR.

MODULE 10 – Applied Longitudinal Analysis

Stijn Vansteelandt (UGent)

Course description

Longitudinal studies, employing repeated measurement of subjects over time, play a prominent role in the biomedical and pharmaceutical sciences. They provide valuable insights into both the development and persistence of disease and those factors that can alter the course of disease development. In this course, we will offer a systematic presentation of modern methods for the analysis of such studies, with an emphasis on practical applications in biomedical research.

The course will begin with a discussion of the usefulness of longitudinal studies over cross-sectional studies and the limitations of standard regression methods for analyzing longitudinal studies. The course will then cover the general linear mixed model for the analysis of continuous responses. A wide range of examples drawn from real-world studies will be used to illustrate the methods for estimating models in SAS and R and for interpreting model coefficients. The regression modeling will cover model building for the mean and covariance structure to choose parsimonious models, predictions of patient-specific profiles and verification of goodness-of-fit of the model.

In the final lecture, we will discuss specialized topics, including the problem of missing data in longitudinal studies, adjustment for baseline responses and evaluation of the effect of time-varying exposures.

All methods will be illustrated with annotated computer output from SAS and R. Six hands-on computer sessions will help practice the principles to which one is exposed in this course.

Dates and venue

September 5, 6 and 7, 2012 from 9 am to 12.15 pm and from 1.15 pm to 4.30 pm at the Faculty of Science, Building S9, Campus Sterre, Krijgslaan 281, Ghent.

Target audience

This course will benefit medical investigators, research scientists, clinical research associates, … who need to use statistical methods for analyzing data that are collected over time, in particular for assessing the effect of different treatments on the evolution in (health) outcomes over time.

Exam

Participants can, if they wish, take part in an exam. A certificate from Ghent University will be issued to participants with a university degree at the bachelor level or an equivalent degree upon succeeding on this test. As such this course can be incorporated in a doctoral training program.

Course prerequisites

Participants are expected to be familiar with the basic principles of statistical inference and of linear regression analysis.

Course material

Copies of lecture notes.
Recommended handbook: "Applied Longitudinal Analysis", G.M. Fitzmaurice, N.M. Laird and J.H. Ware, 2nd ed. (2011), John Wiley and Sons, ISBN 978-0470380277.

Fees

Reduced prices apply to students and participants of non-profit and public services. These prices are available at the ICES website. The registration fee amounts to 700 EUR for participants of the private sector.
The book is optional and can be bought at the additional cost of 100 EUR. Please indicate this clearly on the registration form.
The examination fee is 30 EUR.

The teachers

Prof. dr. Anne Boomsma is Professor in statistics and measurement theory at the University of Groningen, the Netherlands. The last three years he has lectured probability theory, causal inference, applied statistics and structural equation modeling. His current research interests focus on causal inference in observational studies. He has been a member of the editorial board of the Structural Equation Modeling journal since 1999.

De heer Kris Erauw is stafmedewerker bij de dienst onderwijsondersteuning van de Faculteit Psychologie en Pedagogische Wetenschappen aan de Universiteit Gent. Hij stond jarenlang mee in voor de begeleiding van studenten bij de vakken statistiek en methodologie, en bij het schrijven van hun scriptie. Daarnaast ondersteunt hij onderzoekers bij het ontwikkelen van een gepast onderzoeksopzet en bij het verwerken van hun data.

Prof.dr. Els Goetghebeur chairs the Center for Statistics and co-chairs the curriculum committee for the Advanced Master of Statistical Data Analysis at Ghent University, where she is Professor in the Department of Applied Mathematics and Computer Science. She co-ordinates the valorization consortium Stat-Gent CRESCENDO, launched to foster application of UGent statistical expertise for industry and government. She taught at Harvard, Stanford and the London School of Hygiene and Tropical Medicine. Her research focuses on methodological problems encountered in the biomedical sciences. She has a special fondness for causal inference, survival analysis and a newly acquired taste for health care quality measurement and for the analysis of genetic data.

Dr. Tom Loeys received the M.S. degree in mathematics (1996) from Ghent University, the M.S. in biostatistics (2001) from the Limburgs Universitair Centrum, and earned a PhD in biostatistics (2002) from Ghent University. He worked as a biometrician at Merck, Sharp and Dohme (Brussels) till 2009 where he was involved in the design, analysis and reporting of phase-2 and phase-3 clinical trials in a wide range of therapeutic areas. Since June 2009 he is working at the Department of Data Analysis of the Faculty of Psychology and Educational Sciences at Ghent University.

Dr. Geert Silversmit has a PhD in Physics from Ghent University, post-doctoral experience in analytical chemistry and a training in Statistical Data Analysis. He is currently working at Stat-Gent CRESCENDO, the Industrial Research Fund (IOF) valorization consortium with the mission to valorize UGent statistical expertise.

Prof. dr. Stefan Van Aelst is Professor at Ghent University, Department of Applied Mathematics and Computer Science, Faculty of Sciences. He is responsible for statistics courses in Bachelor and/or Master programs in Mathematics, Computer Science and Geography. He also teaches courses in the Master of Statistical Data Analysis. His research focuses on the development of robust methods for statistical models.

Prof. dr. Stijn Vansteelandt is Professor at Ghent University, Department of Applied Mathematics and Computer Sciences, Faculty of Science. He teaches courses in statistics to students in the Faculty of Science, the Faculty of Pharmaceutical Science and the Masters program in Statistical Data-Analysis. He did post-doctoral research at the Harvard School of Public Health and Ghent University. His current research focuses mainly on missing data and causal inference in clustered sampling designs and longitudinal studies.

Alain Visscher studied Biology and Environmental Sciences at the University of Antwerp, and Statistical Data Analysis at Ghent University. His scientific interests include biodiversity, environmental statistics and a wide range of other topics. He is currently working at Stat-Gent CRESCENDO, the Industrial Research Fund (IOF) valorization consortium with the mission to valorize UGent statistical expertise. At Stat-Gent, he has worked on a variety of data analysis projects, many of which involved the use of SAS software.

Prof. dr. Leoniek Wijngaards-de Meij is Professor in Applied Statistics at the Department of Methodology and Statistics of the Faculty of Social Sciences at Utrecht University, the Netherlands. She received a MSc in Clinical Psychology and a PhD in Dyadic processes of parents grieving their child in Clinical Psychology at Utrecht University. She has worked as statistical consultant on multilevel analysis for numerous social science research projects, and is member of the organization of the Multilevel Conference 2011. She has been teaching courses on Multilevel Analysis on both Graduate and Undergraduate level. These courses include Multilevel for Research Masters, ML Minor courses and a Multilevel Summer school at Utrecht University, and PhD-courses for several institutes including the KLI (Research Institute for Social Psychology), the EPP (Research Institute for PsychoPathology) and the Erasmus University.

Prof. dr. Maria Ysebaert is an honorary Professor of Ghent University. She studied biochemistry at Ghent University, the University of Oregon Medical School and the Nobel Institute in Stockholm. Apart from biochemistry, she also taught biostatistics at Undergraduate and Postgraduate level at the Faculty of Veterinary Science at Ghent University. Currently, her scientific interests concerns statistical analysis in research on molecular structure of proteins.

Practical information

Registration

Please use the registration form in this brochure or on our website: www.ipvw-ices.UGent.be.
Your registration is valid from the moment you receive an e-mail confirmation from ICES. If you have not received this mail within a week, please contact ICES to double check.
The registration fee covers tuition, some or all of the course materials, use of auditoria and PCs, drinks and sandwiches. Reduced prices apply to students and participants of non-profit and public services. These prices are available at the ICES website. The examination fee for each module that has an exam connected to it is 30 EUR.

Payment

The registration fee is due within 30 days following receipt of the invoice. Payment is possible through bank transfer with clear statement of the structured message on the invoice. All mentioned amounts are free from VAT.

Additional reduction

When 3 or more participants from the same company or institute register simultaneously for the same module(s), an additional overall reduction of 20% is granted, books and exam fees not included. Therefore, please check before enrolling if anyone else at your institute or company is interested to participate. This reduction does not apply to (doctoral) students.

Cancellation

• Participants can cancel their registration in writing only and until 5 working days before the start of the module concerned, in which case 25% of the registration fee will be retained. In case of cancellation within 5 working days before the start of the module, the full registration fee is due.
• ICES reserves the right to cancel or postpone one or more modules for organizational reasons, in which case participants are given the option of a full refund of the registration fee.

The complete cancellation conditions are available on our website: **www.ipvw-ices.UGent.be**

Financial support from the government: training vouchers and the KMO-portfolio

• **The training vouchers** (opleidingscheques) are an initiative of the Flemish community and can be ordered online (www.vdab.be/opleidingscheques) by any employee living in the Flemish or Brussels Region. Please order them well in advance and send them to ICES as soon as you receive them. Please do not write anything on the vouchers. The invoice for your registration for the course is drawn up by ICES áfter you've sent us your training vouchers.
• **Employers** on the other hand can make use of the **KMO-portfolio**. Please read through the whole procedure before opening an account on www.kmo-portefeuille.be.

Doctoral schools

The five doctoral schools at Ghent University are concentrated around the following domains of research:
- Arts, Humanities and Law
  (Director: prof. Dominique Willems)
- Social and Behavioural Sciences
  (Director: prof. André Vandierendonck)
- Natural Sciences
  (Director: prof. Frank Witlox)
- (Bioscience) Engineering
  (Director: prof. Yvan Houbaert)
- Life Sciences and Medicine
  (Director: prof. Jozef Vercruysse)

These institutions, in close consultation with the faculties, support doctorandi: on the one hand they organize specialized training and workshops in research skills and "transferable skills", on the other hand they set up guest lectures and information sessions, and invest in promotional tasks and contacts with the industry.

To check if one of our courses is eligible for a refund from your UGent doctoral school, please visit the training pages on the website of your DS
(www.ugent.be/en/research/doctoralschools/courses).
In all cases **initial payment stays with your department**. Your DS will only refund the registration fee (books excluded) to your department after you passed the exam connected to the course. For further information please contact your DS.

Inschrijvingsformulier Statistiek 2011-2012

Dit formulier vindt u ook terug op onze website: **www.ipvw-ices.UGent.be**

Stuur dit formulier ten minste 5 werkdagen voor de start van de eerste geselecteerde module via post, fax of e-mail naar het IPVW. Plaatsen worden toegekend volgens chronologie van inschrijven.

Adres: IPVW – Krijgslaan 281, S3 - 9000 Gent   Fax: +32 (0)9 264 85 90   E-mail: ipvw-ices@UGent.be

Uw inschrijving is niet geldig zolang u geen bevestigingsmail van het IPVW hebt ontvangen.

Naam: ....   Voornaam: ....

Functie: ....

Bedrijf of instelling: ....

Adres[1]: ....   Postcode: ....   Gemeente: ....

Tel.: ....   Fax: ....   E-mail: ....

Geboortedatum[2]:   /   / 19   Geboorteplaats[2]: ....   Geslacht[2]: ☐ M ☐ V

Ja, ik schrijf me in voor de volgende module(s) van de cursus Statistiek 2011-2012, georganiseerd door het Centrum voor Statistiek i.s.m. het Instituut voor Permanente Vorming in de Wetenschappen:

☐ **M1: Inleiding tot SPSS**

☐ **M2: Inleiding tot SAS**[3]   ◯ Boek (Delwiche & Slaughter)

☐ **M3: Inleidende Statistiek. Basis van Statistische Gevolgtrekking**[3] ◯ Examen ◯ Boek 1 (Rosner)
   ◯ Boek 2 (Moore et al.)

☐ **M4: Variantie-Analyse**[3] ◯ Examen ◯ Boek (Kutner et al.)

☐ **M5: Multivariate Statistiek**[3] ◯ Examen ◯ Boek (Everitt)

☐ **M6: Toegepaste Lineaire Regressie**[3] ◯ Examen ◯ Boek (Kutner et al.)

☐ **M7: Multilevel Analyse voor Gegroepeerde en Longitudinale Data**[3] ◯ Examen ◯ Boek (Hox)

☐ **M8: Structurele Vergelijkingsmodellen**[3] ◯ Examen ◯ Boek 1 (Boomsma)
   ◯ Boek 2 (Bollen) ◯ Boek 3 (Brown)

☐ **M9: Logistische Regressie**[3] ◯ Examen ◯ Boek (Hoshmer & Lemeshow)

☐ **M10: Toegepaste Longitudinale Analyse**[3] ◯ Examen ◯ Boek (Fitzmaurice et al.)

Het totale bedrag van mijn inschrijving (incl. boeken en examengeld) komt op: .... **EUR.**
Alle bedragen zijn vrijgesteld van BTW.

Betalingswijze[4]:

◯ **Ik ben UGent-student of -personeelslid en betaal d.m.v. een SAP interne bestelbon: 4 3** . . . . [5]

◯ **Ik betaal als privé-persoon en** ◯ **maak géén gebruik van opleidingscheques.**

   ◯ **heb opleidingscheques aangevraagd voor een bedrag van** .... **EUR.**

◯ **Mijn bedrijf betaalt en** ◯ **maakt géén gebruik van steunmaatregelen.**

   ◯ **maakt gebruik van de KMO-portefeuille. Hiertoe werd een portefeuille geopend**

   op . . / . . / 20 . . **voor een bedrag van** .... **EUR,**

   met projectnummer: 20 . . **/KMO/** . . . . . .

FACTURATIEGEGEVENS   Naam: ....

Adres: ....   Postcode: ....   Gemeente: ....

BTW nr: BE . . . / . . . / . . .

Vereist: ☐ Door me in te schrijven verklaar ik me akkoord met de betalings- en annuleringsvoorwaarden [6].

Datum: ....   Handtekening: ....

---

1 Aanwezigheidscertificaten en getuigschriften worden naar dit adres opgestuurd.
2 Deze informatie wordt vermeld op de certificaten.
3 Deze cursussen worden in het Engels gedoceerd.
4 Slechts één mogelijkheid kan worden gekozen.
   Opleidingscheques: elke werknemer in Vlaanderen en Brussel heeft jaarlijks recht op 250 EUR aan opleidingscheques. Deze kunnen worden aangevraagd op de website van de VDAB: www.vdab.be/opleidingscheques. De factuur wordt dan per definitie op naam en adres van de deelnemer opgemaakt.
   KMO-portefeuille: alle informatie over deze steunmaatregel vindt u op www.KMO-portefeuille.be
5 Gelieve ook de goedgekeurde bestelbon zelf, met dit formulier mee te sturen. Op onze website vindt u de gereduceerde tarieven.
6 De volledige voorwaarden vindt u op de IPVW-website. Betaling gebeurt binnen 30 dagen na ontvangst van de factuur met vermelding van de gestructureerde mededeling. Deelnemers kunnen hun inschrijving schriftelijk annuleren tot 5 werkdagen voor de startdatum van de module, in welk geval 25% van het inschrijvingsgeld wordt aangerekend. In geval van annulering minder dan 5 werkdagen voor de startdatum van de module, wordt het volledige inschrijvingsbedrag aangerekend. Een deelnemer kan zich, indien vooraf schriftelijk gemeld aan het IPVW, wel kosteloos laten vervangen door een collega voor een volledige module.

Registration form Statistics　　　　　　　　2011-2012

This form can also be found on our website: **www.ipvw-ices.UGent.be**

Please send, fax or e-mail this form to ICES no later than 5 working days before the start of the first selected module. Acceptance is on a first-come, first-serve basis.

Address: ICES – Krijgslaan 281, S3 – 9000 Ghent　　Fax: +32 (0)9 264 85 90　　E-mail: ipvw-ices@UGent.be

Your registration is not valid until you receive an e-mail confirmation from ICES.

Last name:　　　　　　　　　　　　　　First name:

Function:

Company or institute:

Address[1]:　　　　　　　　　　　　　　Postal code:　　　City:

Phone:　　　　　　　Fax:　　　　　　　E-mail:

Date of birth[2]:　　/　　/ 19　　Place of birth[2]:　　　　　　　　　　Gender[2]:　☐ M　　☐ F

Yes, I register for the following module(s) of the course in Statistics 2011-2012, organized by the Center for Statistics, in co-operation with the Institute for Continuing Education in Science:

☐ **M1: Introduction to SPSS** [3]

☐ **M2: Introduction to SAS**　　　　　　　　　　　　○ Book 1 (Delwiche & Slaughter)

☐ **M3: Introductory Statistics. Basics of Statistical Inference**　○ Exam　○ Book 1 (Rosner)

　　　　　　　　　　　　　　　　　　　　　　　　　○ Book 2 (Moore et al.)

☐ **M4: Analysis of Variance**　　　　　　　　　○ Exam　○ Book (Kutner et al.)

☐ **M5: Multivariate Statistics**　　　　　　　　○ Exam　○ Book (Everitt)

☐ **M6: Applied Linear Regression**　　　　　　○ Exam　○ Book (Kutner et al.)

☐ **M7: Multilevel Analysis for Grouped and Longitudinal Data**　○ Exam　○ Book (Hox)

☐ **M8: Structural Equation Modeling**　　　　　○ Exam　○ Book 1 (Boomsma)

　　　　　　　　　　　　　　　　　　　　　　　　　○ Book 2 (Bollen)　○ Book 3 (Brown)

☐ **M9: Logistic Regression**　　　　　　　　　　○ Exam　○ Book (Hoshmer & Lemeshow)

☐ **M10: Applied Longitudinal Analysis**　　　　○ Exam　○ Book (Fitzmaurice et al.)

The total amount for my registration, including books and exam fees, adds up to .... **EUR.**
All amounts are free from VAT.

Payment[4]:

○ **I am UGent-student or staff and will pay with an SAP internal order: 4 3** . . . . [5]

○ **I am registering as a private person and**　　○ **will not make use of training vouchers.**

　　　　　　　　　　　　　　　　　　　　　○ **have requested training vouchers for the amount of** .... **EUR.**

○ **My company will pay and**　　○ **will not make use of support measures.**

　　　　　　　　　　　　　○ **will make use of the KMO-portfolio. A portfolio was opened on** . . / . . / 20 . .
　　　　　　　　　　　　　for an amount of .... **EUR, with project number: 20** . . **/KMO/** . . . . . .

INVOICE ADDRESS　Name: ....

　　　　　　　　Address: .... Postal code: .... City: ....

　　　　　　　　VAT-n°: BE . . . / . . . . / . . .

　　Mandatory:　☐ By registering I agree with the payment and cancellation conditions [6].

　　　　　　　　Date: ....　Signature:

　　　　　　　　　　　　　　　　　　　　　...

Stay informed of other ICES activities

In addition to the course in Statistics, ICES also organizes a variety of other courses on statistics and broader scientific subjects in the framework of continuing education. To stay informed of our activities on a regular basis you can subscribe to one or more of our mailing lists.

I want to   ◯ receive more information about the following ICES-activities

                    ◯ make changes to my subscription

PERSONAL INFORMATION

Title: ◯ Mr   ◯ Mrs   ◯ Miss

Last Name: .... First name: ....

Address: Street: .... N°: .... Bus: ....

                Postal Code: .... City: .... Country: ....

Phone: .... Fax: .... E-mail: ....

CORPORATE INFORMATION

Company: ....

Function: ....

Address: Street: .... N°: .... Bus: ....

                Postal Code: .... City: .... Country: ....

Phone: .... Fax: .... E-mail: ....

Where and how do you wish to be informed?   Where?   ☐ at home   ☐ at work

                                                How?   ☐ through e-mail   ☐ through post

of the following ICES courses:

☐ Biological Basis of Our Behaviour*

☐ Continuing Education for Surveyors*

☐ Crystalline Rocks and Plate Tectonics*

☐ Environmental Sciences*

☐ Introduction to Bio-informatics

☐ Introduction to Biotechnology*

☐ Statistics

     And/or more specifically about the short courses:

     ☐ Numerical Literacy

     ☐ Meta-Analysis

☐ Synthetics: from 'plastic' to high tech materials*

   * These courses are taught in Dutch.

of future ICES courses within these fields of research:

☐ Analytical chemistry

☐ Applied mathematics and computer science

☐ Biochemistry, physiolgy and microbiology

☐ Biology

☐ Geography

☐ Geology and soil science

☐ Inorganic and physical chemistry

☐ Molecular biology

☐ Molecular genetics

☐ Organic chemistry

☐ Pure mathematics and computer algebra

☐ Solid state sciences

☐ Subatomic physics and radiation physics

Course locations
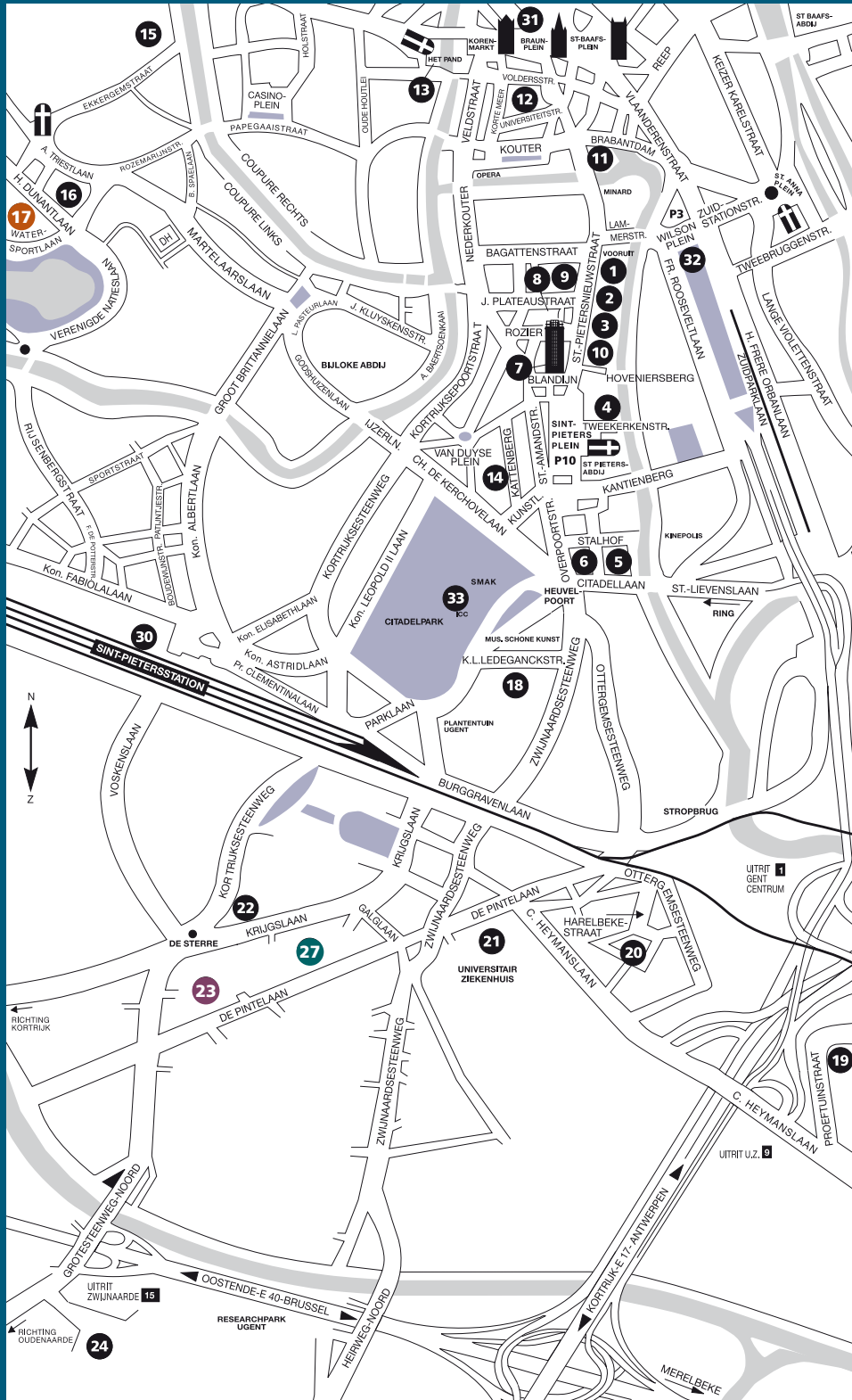
17 **Fac. of Psychology and Educational Sciences (PP)** H. Dunantlaan 1
23 **Fac. of Sciences (WE)** Campus Sterre, Krijgslaan 281, building S9
27 **Fac. of Sciences (WE)** IPVW-ICES, Campus Sterre, Krijgslaan 281, building S3

2 Adviescentrum voor studenten   **30** Station Gent Sint-Pieters