Stellenbosch
UNIVERSITY
IYUNIVESITHI
UNIVERSITEIT

SCIENCE
EYENZULULWAZI NGEZENDALO
NATUURWETENSKAPPE

BDE 212 Statistics and Other Tools for Biologists

Short description of the module

BDE 212 **Statistics and Other Tools for Biologists**

This module is a thorough introduction to the key numerical skills and processes underpinning the good practice of biological sciences. It covers experimental design, statistical analyses, the concept of null and alternative hypotheses, data handling and logical interpretation, data presentation and scientific communication, advanced use of Microsoft Excel, PowerPoint and R Statistical Computing free software. Hands-on statistical exercises cover a range of descriptive statistics, parametric and non-parametric analyses, basic data manipulation, plots, linear regression and analysis of variance. Applied scientific investigatory principles to biology are explored using experimental planning (controls, replication, randomisation), ethics, scientific and popular publication processes, and the use of scientific literature

BDE 212 Statistiek en Ander Instrumente vir Bioloë

Kort beskrywing van die module

BDE 212 **Statistiek en Ander Instrumente vir Bioloë**

Hierdie module is 'n deeglike inleiding tot die sleutel numeriese vaardighede en prosesse onderliggend aan goeie praktyk in die biologiese wetenskappe. Dit dek eksperimentele ontwerp, statistiese analises, die konsepte van nul- en alternatiewe hipoteses, die hantering en logiese interpretasie van data, data-aanbieding en wetenskaplike kommunikasie, die gevorderde gebruik van Microsoft Excel, PowerPoint en kostevrye R Statistiese Berekeningsagteware. Praktykgerigte statistiese oefeninge dek 'n reeks van beskrywende statistiek, parametriese, nie-parametriese analises, basiese data-manipulering, stippings, lineêre regressie en analise van variansie. Toegepaste wetenskaplike ondersoekbeginsels in die biologie word ondersoek deur gebruik te maak van eksperimentele beplanning (kontroles, replisering, ewekansig-making), etiek, wetenskaplike en populêre publikasieprosesse, en die gebruik van wetenskaplike literatuur.

Module summary

Name	BDE 212 **Statistics and Other Tools for Biologists**
Duration	1st semester
Type	
Academic commitment*	16 credits = 160 notional hours
Scheduled learning opportunities	3 Lectures per week 1 practical per week
Assessment option	Option 5
Language option	Option 3
Mode of offering	Face-2-Face
Corequisites / Prerequisites / Pass prerequisites**	Science in context 178 or Computer skills 171

Notional hours are the learning time that it would take an average learner to meet the outcomes of the module.
****The onus is on the students to ensure that they meet the prerequisites of the module.***

Module-oorsig

Naam	BDE 212 **Statistiek en Ander Instrumente vir Bioloë**
Duur	1ste semester
Tipe	
Akademiese verbintenis*	16 krediete = 160 veronderstelde ure
Geskeduleerde leergeleenthede	
Assesseringsopsie	Opsie 5
Taalopsie	Opsie 3
Modus van aanbieding	In persoon
Newevereistes / Voorvereistes / Slaagvoorvereistes**	Wetenskap in Konteks178 of Rekenaarvaardigheid 171

Veronderstelde leerure is die tyd wat die gemiddelde leerder aan die module sal moet spandeer om aan die uitkomste van die module te voldoen.
****Die onus rus op die studente om te verseker dat hulle aan die voorvereistes van die module voldoen.***

Outcomes

This course aims to introduce you to the nature of science, and how science is done by properly designing a study and analysing your data. It also gives you generic skills in data presentation and writing that you can apply as undergraduates and as postgraduates in your chosen direction.

Doing Science: on completion of this component of the course, you should understand the following about the practise of science, and be able to apply it to biology:

» Searching the literature

» The publication process

» Ethics of publication and research

» The interface between science and the public through popular science
» Use of Microsoft PowerPoint for data presentation for both written presentations and verbal seminars;

» Experimental design, replication, pseudoreplication

Data Analyses: this large section includes the exploration of the scientific method and hypothesis testing, parametric and nonparametric statistics, comparisons between two or more groups of values using analysis of variance-based techniques, and correlation and regression. By the end of the module, you should be able to do the following with your own data sets:

» identify different data types;

» set up null and alternative hypotheses;
» use Microsoft Excel for data entering and handling;

» use of R free software: the R Project for Statistical Computing (https://www.rproject.org) for statistical analyses;
» organize data frames for statistical analyses;
» exploration of original data (tables and plots): e.g. histograms, density plots, scatter plots, boxplots;
»

» describe data statistically using means, medians, standard deviations, and ranges;
» assess whether or not data are normally distributed;
» choose and perform the appropriate statistical tests to:

Uitkomste

• Hierdie kursus mik om jou bekend te stel aan die aard van wetenskap en hoe dit beoefenword deur die deeglike beplanning van 'n studie en die analise van jou data. Dit verskaf ook aan jou generiese vaardighede in data- aanbieding en skryfwerk wat jy sal kan toepas as 'n voorgraadse en nagraadse student in jou gekose veld van studie.

Wetenskapsbeoefening: na voltooiing van hierdie komponent van die kursus, behoort jy die volgende te verstaan rakende die beoefening van wetenskap, en dit te kan toepas binne biologie:

» Soek na literatuur

» Die publikasie proses

» Etiek van publikasie en navorsing

» Die koppelvlak tussen wetenskap en die publiek deur populêre wetenskap
» Die gebruik van Microsoft PowerPoint vir data aanbieding vir beide geskrewe en verbale seminare;

» Eksperimentele ontwerp, replikasie en pseudo-replikasie.

Data analise: hierdie groot afdeling sluit die verkenning van die wetenskaplike metode en hipotese toetsing, parametriese en nie- parametriese statistiek, vergelyking tussen twee of meer groepe waardes deur van

variansie-gebaseerde tegnieke gebruik te maak,en korrelasie en regressie in. Aan die einde vandie module behoort jy in staat te wees om die volgende met jou eie datastel te doen,

» identifiseer verskillende tipes data;

» s t e l 'n nul en alternatiewe hipotese ;
» Microsoft Excel te gebruik om data te hanteer en aan te bied;
» gebruik van R kostelose sagteware: die R Projek vir Statistiese Berekening (https://www.r-project.org) vir statistiese analises;

» organiseer dataraamwerke vir statistiese ontledings;

» oorspronklike data te verken (tabelle en grafieke): bv.histogram, digtheidsdiagramme, verspreidings-diagramme en boksplotte

» data statisties te beskryf deur gebruik te maak van gemiddeldes, mediane, standaardafwykings en reikwydtes;

○ compare a single variable between two, three or more groups using *t*-tests and ANOVAs or their non-parametric equivalents, ○ relate two variables to one another using correlation and linear regression; ○ perform analyses of covariance (ANCOVAs) where appropriate; » perform power analyses to choose sample sizes, and assess effect sizes; » relate the results of statistical analyses back to original research hypotheses or questions; and, » combine all of these skills to write a scientific report in the format of a manuscript for submission to a scientific journal, with appropriate reporting of analysed data and statistics.	» te kan assesseer of data normaal versprei is of nie; » die toepaslike statistiese toetse te kan kies en uitvoer om: ○ 'n enkele veranderlike te vergelyk tussen twee , drie of meer groepe deur van t-toetse en ANOVAs of hulle nie-parametriese ekwivalente gebruik te kan maak, ○ twee veranderlikes met mekaar in verbandte bring deur gebruik te maak van korrelasies of liniêre regressie; ○ analises van ko-variansie (ANCOVAs) te kan uitvoer waar toepaslik; » krag analises uit te voer om steekproefgroottes te kies, en om effek groottes te bepaal; » die resultate van statistiese analises terug in verband te bring met die oorspronklike navorsingshipotese of vrae; en » al hierdie vaardighede te kombineer om 'n wetenskaplike verslag te skryf in die formaat van 'n manuskrip vir voorlegging aan 'n wetenskaplike joernaal, met die toepaslike rapportering van geanaliseerde data enstatistiek.

Scheduled learning opportunities

The official timetable indicating all scheduled learning opportunities and their allocated venues can be accessed via My.SUN.

Lectures

The course comprises 38 lectures, three per week, on Mondays (12h00-12h50), Wednesdays (08h0-08h50) and Fridays (09h00-09h50). Lectures will be in the Annex (Rm 1030), Natural Sciences Building.

Practicals

There are 12 three-hour practical/tutorial sessions, one per week for each student, Tuesdays, 10:00 – 13:00 (venues: Narga G and H). Microsoft Excel and PowerPoint will be used in these tutorials, and we assume a basic knowledge of these programmes. We will also introduce you to the R Project for Statistical Computing free software and give you extensive opportunities to familiarize yourself with this programme and write some code to run statistical analyses.

Geskeduleerde leergeleenthede

Die amptelike rooster wat al die geskeduleerde leergeleenthede en die toegewysde lokale aandui, is beskikbaar by My.SUN.

Lesings

Die kursus bestaan uit 38 lesings, drie per week, op Maandae (12h00- 12h50), Woensdae (08h0-08h50) en Vrydae (09h00-09h50). Lesings sal in die Annex (kamer 1030), Natuurwetenskappe gebou wees.

Praktika

Daar is 12 drie-uur lange praktika / tutoriale sessies, een per week vir elke student, Dinsdae, 10:00 – 13:00 (Lokale: Narga G and H). Microsoft Excel en PowerPoint sal in hierdie tutoriale gebruik word, en ons aanvaar dat 'n basiese kennis van hierdie programme in plek is. Ons sal julle ook bekend stel aan R Projek vir Statistiese Berekening kostevrye sagteware en aan julle baie geleentheid bied julself aan hierdie program gewppnd te maak program, en om kode te skryf en statistiese analises uit te voer.

Study material

The statistical component of the course is based on:

McKillup, S. (2012) Statistics Explained: an Introductory Guide for Life Scientists (2nd Edition). Cambridge University Press, Cambridge, UK.

Additional material will be made available on SunLearn.

SUNLearn is the official learning management platform of Stellenbosch University. Each module has a dedicated page on this platform which can be accessed via this link: https://learn.sun.ac.za/

Studiemateriaal

Die statistiese komponent van die kursus is baseer op:

McKillup, S. (2012) Statistics Explained: an Introductory Guide for Life Scientists (2ndEdition). Cambridge University Press, Cambridge, UK.

Addisionele materiaal sal op SunLearn beskikbaar gestel word.

SUNLearn is die amptelike leerbestuursplatform van die Universiteit Stellenbosch. Elke module het 'n toegewysde blad op hierdie platform met toegang via hierdie skakel: https://learn.sun.ac.za/

Lecturers

Course coordinator: Prof. Susana Clusella-Trullas (SCT) Room 3071

Lecturers:
Prof. Michael Cherry (MC) Room 2037
Prof. Conrad Matthee (CM) Room 2031

Technical assistant: Shula Johnson (shulaj@sun.ac.za)

Details regarding peer-to-peer facilitators will be announced on SUNLearn.

Dosente

Kursus koordineerder: Prof. Susana Clusella-Trullas (SCT) Room 3071

Dosente:
Prof. Michael Cherry (MC) Room 2037
Prof. Conrad Matthee (CM) Room 2031

Tegniese-assistent: Shula Johnson (shulaj@sun.ac.za)

Besonderhede rakende eweknie-fasiliteerders sal op SUNLearn aangekondig word.

Assessment

This module follows assessment option 5. Please see the Faculty of Science's assessment guidelines for more details.

Method of assessment	Description	#	Allocated marks	Criteria	Dates
A1	Prac exercises	1	20%		
A1	Oral presentation	1	10%		
A1	Report AMOVA	1	10%		
A1	Class test	1	20%		23 March 2023
A1	*Exam mark*	1	40%		22 May 2023

Please see the assessments and promotion chapter in the SU Calendar Part 1 (General) for institutional rules regarding assessments.

Class test: 23 March 2023; 17h00
Prac Assignments in venue
Report (AMOVA): tba.
Examination: 22 May 2023; 14h00
Exam 2nd opportunity: 12 June 2023; 14h00* :
Semester test and exams held in NARGA, exact venue will be announced on SunLearn and in class.

Assesserings

Hierdie module volg assesseringsopsie 5. Raadpleeg die Fakulteit Natuurwetenskappe se assesseringsriglyne vir meer besonderhede.

Metode van assessering	Beskrywing	#	Punte toegeken	Kriteria	Datums
A1	Praktiese oefeninge	1	20%		
A1	Mondelinge voordrag	1	10%		
A1	AMOVA verslag	1	10%		
A1	Klastoets	1	20%		23 Maart 2023
A1	*Eksamen*	1	40%		22 Mei 2023

Raadpleeg die hoofstuk oor assessering en promovering in Deel 1 (Algemeen) van die US Jaarboek vir institusionele reëls oor assesserings.

Klastoets: 23 Maart 2023; 17h00
Praktiese Opdrag lokaal
verslag (AMOVA): Datum sal verskaf word.
Eksamen: 22 Mei 2023; 14h00
Tweede eksamen geleentheid: 12 Junie 2023; 14h00
Klastoets en eksamens sal in NARGA geskryf word, presiese lokale sal op SunLearnen in die klas verskaf word.

Calculation of final marks

Practical exercises.....20%
Oral presentation 10%
Report AMOVA 10%
Class test 20%
Class mark (all of the above): 60%
Exam mark: June exam 40%
Final mark* *100%

To qualify for the examination, you are required to obtain a subminimum of 40% for the *Class mark*. You are required to obtain an *Exam mark* of at least 40% to be allocated a *Final mark* of 50% or higher. In order to pass the module, you need to achieve a *Final Mark* of at least 50%.

Berekening van finale punte

Praktiese oefeninge 20%
Mondelinge voordrag.....10%
AMOVA verslag 10%
Klastoets.....20%
Klaspunt (al die bostaande).....60%
Eksamenpunt: Junie eksamen.....40%
Finale punt *100%*

Om te kwalifiseer vir die eksamen, word daar van jou verwag om 'n subminimum van 40% vir die Klaspunt te verwerf. Daar word van jou verwag om 'n Eksamenpunt van ten minste 40% te verwerf, en om 'n finale punt van 50% of hoër te behaal. Om hierdie module te slaag, moet jy 'n Finale punt van ten minste 50% verwerf.

Absenteeism (Missed opportunities)

Please see the section 11 of the SU Calendar Part 1 (General) for the institutional rules regarding absence from classes and or tests.
Take note that for any absence from the university *for more than one* teaching, learning or assessment opportunity, for whatever reason, students need to apply for leave of absence from the Registrar's office.
If you are absent for exactly one teaching, learning or assessment opportunity you need to consult your lecturer immediately and provide the appropriate evidence as stipulated in the calendar.

When you miss a test or deadline, you must hand in a valid original medical certificate to Shula Johnson (shulaj@sun.ac.za) ***within one week of the test or hand-in date***. In special circumstances (e.g. participation in provincial or national sporting events) a letter is required from the sporting body. ***In these instances, granting of permission to miss tests or deadlines is at the discretion of the course co-ordinator, and is not automatic***. It is your own responsibility to make sure that you know the time and place of each test and exam.

Reports handed in late will have marks deducted at a rate of 5% per day. Reports handed in a week or more after the deadline will not be marked.
If a practical is missed for medical reasons, the student needs to complete the practical on his/her own time and valid original medical certificate presented within 2 days from absence.

Afwesigheid (die misloop van 'n leergeleentheid)

Raadpleeg asseblief afdeling 11 in Deel 1 (Algemeen) van die US Jaarboek vir die institusionele reëls met betrekking tot afwesigheid van klasse en of toetse.
Neem kennis dat studente by die Registrateur moet aansoek doen vir verlof tot afwesigheid, vir watter rede ook al, van *meer as een* onderrig-, leer-, of assesseringsgeleentheid,
Indien jy afwesig is van presies een onderrig-, leer-, of assesseringsgeleentheid, moet jy die betrokke dosent onmiddellik kontak en die toepaslike bewys van rede tot afwesigheid inhandig, soos uiteengesit in die Jaarboek.

Wanneer jy 'n toets of sperdatum mis, moet jy 'n oorspronklike geldige mediese sertifikaat aan Shula Johnson (shulaj@sun.ac.za) oorhandig ***binne een week van die toets of inhandigingsdatum***. Onder spesieal omstandighede (bv. deelname aan provinsiale of nasionale sportbyeenkonste) word 'n brief verlang van die sportbeheerliggaam. ***In hierdie gevalle is die toestaan van vergunning om 'n toets of sperdatum te mis mag word onderhewig aan die goeddenke van die kursuskoordineerder, en gebeur dit nie automaties nie***. Dit is jou verantwoordelikheid om seker te maak dat jy weet waar en wanneer elke toets en eksamen geskryf word.

Verslae wat laat ingehandig word sal onderhewig wees aan aftrekking van punte teen 'n tempo van 5% per dag. Verslae wat 'n week of meer na die sperdatum ingehandig word sal nie gemerk word nie. Indien 'n prakties vir mediese redes gemis word, word daar van die student verwag om die prakties in sy/haar eie tyd te voltooi en 'n geldige, oorspronklike mediese sertifikaat moet binne 2 dae na die afwesigheid ingehandig word.

Communication

The **announcement forum on the SUNLearn module page** is the only official platform that will be used to make announcements relevant to this module. Please check this regularly.

For communication with individual students, lecturers, support staff and peer-to-peer facilitators will only use students' official SUN email addresses.

Students are also requested to use their official **SUN email addresses** for all academic related communication to: Clusella-Trullas, S, Prof [sct333@sun.ac.za]

Kommunikasie

Die **aankondigingsforum op die SUNLearn moduleblad** is die enigste amptelike platform wat gebruik sal word om aankondigings, wat relevant is vir hierdie module, te maak. Kontroleer dit asseblief gereeld.

Vir kommunikasie met individuele studente, sal dosente, steunpersoneel en eweknie-fasiliteerders slegs studente se amptelike SUN-e-posadresse gebruik.

Studente word ook versoek om hul amptelike **SUN-e-posadresse** vir alle akademiese verwante kommunikasie te gebruik na: Clusella-Trullas, S, Prof [sct333@sun.ac.za]

Addressing challenges

For any complaints, the first port of call is the class representative or the lecturer. If not satisfactorily resolved, it can be escalated to the Head of Department or Coordinator: Academic and Student Affairs.

Hantering van uitdagings

Vir enige klagtes, is die klasverteenwoordiger of dosent die eerste plek om hulp te soek. Indien die probleem nie bevredigend opgelos word nie, kan dit na die Departementshoof of Koördineerder: Akademiese- en Studentesake verwys word.

Academic Misconduct

Academic misconduct includes plagiarism, collusion, cheating and fabrication as stipulated in the Disciplinary code for students of Stellenbosch University.

Plagiarism is regarded as a serious offence. More serious cases are handled as set out in the Stellenbosch University procedure for the investigation and management of allegations of plagiarism document. Less serious cases are dealt with by the module coordinator and respective department as set out by the procedures of the faculty.

Akademiese Wangedrag

Akademiese wangedrag sluit plagiaat samespanning, bedrog en versinsel in, soos bepaal in die Dissiplinêre kode vir studente van die Universiteit Stellenbosch.

Plagiaat word as 'n ernstige oortreding beskou. Ernstiger gevalle word hanteer soos uiteengesit in die Universiteit Stellenbosch se dokument oor die prosedure vir die ondersoek en bestuur van bewerings van plagiaat. Minder ernstige gevalle word deur die modulekoördineerder en betrokke departement hanteer soos uiteengesit in die fakulteitsprosedures.

Repeaters	Herhalers

Lectures: Mondays (12h0012h50), Wednesdays (08h0-08h50) and Fridays (09h00-09h50) - Annex

Lect #	Date	Topic	Lecturer
38 lectures			
1	13/02	Introduction to the course; lecturers	SCT
2	15/02	The scientific method; Descriptive versus inferential statistics	SCT
3	17/02	Defining a research question; and designing a research study	MC
4	20/02	Basic descriptive statistics; How to report statistics & Plotting	SCT
5	22/02	Recap lecture if needed /prac revision	SCT
6	24/02	Writing research articles and proposals. Ethical clearance, permits, collaborations	MC

7	27/02	Normal distribution and null hypothesis testing	SCT
8	01/03	Prac revisions & Experimental design (power)	SCT
9	03/03	Scientific referencing and how to cite others' wo	MC
10	06/03	Comparing two population means: two samples *t*-test	SCT
11	08/03	Experimental design principles & Revisions prac /	SCT
12	10/03	The publication process: journal impact factors, metrics, peer review, open access	MC
13	13/03	Comparing two means: nonparametric tests	SCT
14	15/03	Prac revisions	SCT
15	17/03	self-study	SCT
16	20/03	self-study	SCT

17	22/03	Analysis of variance ANOVA	SCT
18	24/03	ANOVA, multiple comparisons	SCT
19	27/03	Checking of mid-term test with students	SCT
20	29/03	Revisions ANOVA prac	SCT
21	31/03	Correlation	SCT
3 April – 10 April: Recess			
22	10/04	Public Holiday	
23	12/04	prac revisions correlation	SCT
24	14/04	Follow Monday time table Linear regression	SCT
25	17/04	ANCOVA	SCT
26	19/04	AMOVA	CM
27	21/04	AMOVA	CM
28	24/04	AMOVA	CM
29	26/04	AMOVA	CM
30	28/04	Data collection	CM
31	01/05	Public holiday	
32	03/05	Record keeping data entry	CM
33	05/05	Data presentation tool kit (tables & figures)	CM
34	08/05	Data presentations guidelines: verbal & poster	CM

35	10/05	Popular science reporting and media interactions	CM
36	12/05	Revisions for exam / online questions	SCT/CM
37	17/05	Self-study revision /online questions	SCT/CM
38	19/05		

Practicals: Tuesdays, 10:00 – 13:00 (venues: Narga H).

Prac #	Date	Topic	Lecturer
1	14/02	Introduction to R, data handling	SCT
2	21/02	More data handling in R, basic statistics	SCT
3	28/02	Normality test and confidence limits	SCT
4	07/03	Power test and two sample test	SCT
5	14/03	Paired designs and non-parametric two sample test	SCT

6	21/03	PUBLIC HOLIDAY	
7	28/03	Analysis of variance	SCT
3 April – 10 April: Recess			
8	11/04	Correlations	SCT
9	18/04	Linear regression and analysis of covariance	SCT
10	25/04	AMOVA prac	CM
11	02/05		
12	9/05	Student presentations (posters)	CM
13	16/05		

Lesings: Maandae (12h00112h50), Woensdae (08h0-08h50) en Vrydae (09h00-09h50).

Lesing #	Datum	Onderwerp	Dosent
38 lesings			
1	13/02	Inleiding tot die kursus; dosente	SCT

2	15/02	Die wetenskaplike metode; Beskrywende versus afgeleide statistiek	SCT
3	17/02	Definieer ‘n navorsingsvraag; en ontwerp ‘n navorsingstudie	MC
4	20/02	Baisiese beskrywende statistiek; Hoe om verslag te doen oor statistiek & Stippeling	SCT
5	22/02	Opsom lesing indien benodig / praktiese hersiening	SCT
6	24/02	Skryf van wetenskaplike artikesl. Etiese klaring, permitte, samewerkings	MC
7	27/02	Normaalverspreiding en nul hipotese toetsing	SCT
8	01/03	Praktiese hersiening & Eksperimentele ontwerp (krag)	SCT
9	03/03	Wetenskaplike sitering en hoe om ander se werk aan te haal	MC
10	06/03	Vergelyking van twee populasie	SCT

		gemiddelde: twee voorbeelde *t*-toets	
11	08/03	Eksperimentele ontwerp beginsels & hersiening van prakties	SCT
12	10/03	Die publikasie proses: joernaal impakfaktore, metings, eweknie beoordeling, vrye toegang	MC
13	13/03	Vergelyk twee gemiddeldes: nie-parametriese toetse	SCT
14	15/03	Praktiese hersiening	SCT
15	17/03	Selfstudie	SCT
16	20/03	Selfstudie	SCT

17	22/03	Analise van variansie ANOVA	SCT
18	24/03	ANOVA, veelvoudige vergelykings	SCT
19	27/03	Nagaan van midkwartaal toets met studente	SCT
20	29/03	Hersiening ANOVA prakties	SCT
21	31/03	Korrelasies	SCT
3 April – 10 April: Vakansie			
22	10/04	Publieke vakansiedag	
23	12/04	Praktiese hersiening korrelasies	SCT
24	14/04	Maandag rooster Linîere regressie	SCT
25	17/04	ANCOVA	SCT
26	19/04	AMOVA	CM
27	21/04	AMOVA	CM
28	24/04	AMOVA	CM
29	26/04	AMOVA	CM
30	28/04	Data insameling	CM
31	01/05	Publieke vakansiedag	
32	03/05	Rekord houding en data invoer	CM
33	05/05	Data voordrag gereedskapskas t (tabelle & figure)	CM

34	08/05	Data aanbieding riglyne: verbaal en plakkaat	CM
35	10/05	Populêre wetenskap en media interaksie	CM
36	12/05	Hersiening vir eksamen / aanlyn vrae	SCT/CM
37	17/05	Selfstudie hersiening / aanlyn vrae	CM
38	19/05		

Praktiese: Tuesdays, 10:00 – 13:00 (venues: Narga H).

Prakties #	Datum	Onderwerp	Dosent
1	14/02	Inleiding tot R, data hantering	SCT
2	21/02	Nog data hantering in R, basiese statistiek	SCT
3	28/02	Normaaltoetsing en vertrouens-limiete	SCT

4	07/03	Kragtoets en twee monster toets	SCT
5	14/03	Gepaarde ontwerp en nie-parametriese twee monster toets	SCT
6	21/03	PUBLIEKE VAKANSIE	
7	28/03	Analise van variansie	SCT
3 April – 10 April: Vakansie			
8	11/04	Korrelasies	SCT
9	18/04	Liniêre regressive en analise van kovariansie	SCT
10	25/04	AMOVA prakties	CM
11	02/05		
12	9/05	Studente aanbiedings (plakkate)	CM
13	16/05		