



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

<b>Name</b>	BDE 212 <b>Statistics and Other Tools for Biologists</b>
<b>Duration</b>	1 <sup>st</sup> semester
<b>Type</b>	
<b>Academic commitment*</b>	16 credits = 160 notional hours
<b>Scheduled learning opportunities</b>	3 Lectures per week 1 Practical per week
<b>Assessment option</b>	Option 5
<b>Language option</b>	Option 3
<b>Mode of offering</b>	Face-2-Face
<b>Corequisites / Prerequisites / Pass prerequisites**</b>	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

<b>Naam</b>	BDE 212 <b>Statistiek en Ander Instrumente vir Bioloë</b>
<b>Duur</b>	1 <sup>ste</sup> semester
<b>Tipe</b>	
<b>Akademiese verbintenis*</b>	16 krediete = 160 veronderstelde ure
<b>Geskeduleerde leergeleenthede</b>	3 Lesings per week 1 Prakties per week
<b>Assesseringsopsie</b>	Opsie 5
<b>Taalopsie</b>	Opsie 3
<b>Modus van aanbieding</b>	In persoon
<b>Newevereistes / Voorvereistes / Slaagvoorvereistes**</b>	Wetenskap in Konteks 178 of Rekenaarvaardigheid 171

*\*Veronderstelde leerure is die tyd wat die gemiddelde leerder aan die module sal moet spandeer om aan die uitkomst 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:

## Uitkomst

Hierdie kursus mik om jou bekend te stel aan die aard van wetenskap en hoe dit beoefen word 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 van die module behoort jy in staat te wees om die volgende met jou eie datastel te doen:

- » identifiseer verskillende tipes data;
- » stel '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 data raamwerke vir statistiese ontledings;
- » oorspronklike data te verken (tabelle en grafieke): bv. histogramme, digtheidsdiagramme, verspreidings-diagramme en boksplotte
- » data statisties te beskryf deur gebruik te maak van gemiddeldes, mediane, standaardafwykings en reikwydtes;
- » te kan assesseeer of data normaal versprei is of nie;
- » die toepaslike statistiese toetse te kan kies en uitvoer om:

<ul style="list-style-type: none"> <li>○ compare a single variable between two, three or more groups using <i>t</i>-tests and ANOVAs or their non-parametric equivalents,</li> <li>○ relate two variables to one another using correlation and linear regression;</li> <li>○ perform analyses of covariance (ANCOVAs) where appropriate;</li> <li>» perform power analyses to choose sample sizes, and assess effect sizes;</li> <li>» relate the results of statistical analyses back to original research hypotheses or questions; and,</li> <li>» 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.</li> </ul>	<ul style="list-style-type: none"> <li>○ '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,</li> <li>○ twee veranderlikes met mekaar in verbandte bring deur gebruik te maak van korrelasies of liniêre regressie;</li> <li>○ analises van ko-variensie (ANCOVAs) te kan uitvoer waar toepaslik;</li> <li>» krag analises uit te voer om steekproefgroottes te kies, en om effek groottes te bepaal;</li> <li>» die resultate van statistiese analises terug in verband te bring met die oorspronklike navorsingshipotese of vrae; en</li> <li>» 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 en statistiek.</li> </ul>
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## 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 37 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 (venue: Narga 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.

## Study material

The statistical component of the course is based on:

McKillup, S. (2012) Statistics Explained: an Introductory Guide for Life Scientists (2<sup>nd</sup> 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/>

## 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 37 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 (Lokaal: Narga 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 juisself aan hierdie program gewoon te maak program, en om kode te skryf om statistiese analises uit te voer.

## Studiemateriaal

Die statistiese komponent van die kursus is baseer op:

McKillup, S. (2012) Statistics Explained: an Introductory Guide for Life Scientists (2<sup>nd</sup> Edition). 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 coordinators: Prof. Conrad Matthee and Dr. Katie Watson

### Lecturers:

Dr. Katie Watson (KW) Room 3038 (kwatson@sun.ac.za)

Dr. Kelvin Hull (KH) Room 3040 (klhull@sun.ac.za)

Ms Courtney Gardiner (CG) Room 3038 (cecgardiner@sun.ac.za)

Prof. Conrad Matthee (CM) Room 4007 (cam@sun.ac.za)

Dr. Refilwe Mofokeng (RM) Room 3040 (refilwemofokeng@sun.ac.za)

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

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

## Dosente

Kursus koördineerders: Prof. Conrad Matthee en Dr. Katie Watson

### Dosente:

Dr. Katie Watson (KW) Kamer 3038 (kwatson@sun.ac.za)

Dr. Kelvin Hull (KH) Kamer 3040 (klhull@sun.ac.za)

Ms Courtney Gardiner (CG) Kamer 3038 (cecgardiner@sun.ac.za)

Prof. Conrad Matthee (CM) Kamer 4007 (cam@sun.ac.za)

Dr. Refilwe Mofokeng (RM) Kamer 3040 (refilwemofokeng@sun.ac.za)

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

Besonderhede rakende eweknie-fasiliteerders sal op SUNLearn aangekondig word of tydens prakties.

## 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%		
A2	Final test	1	40%		

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

*Class test: 19 March 2024; 17h00-19h00 (NARGA G)*

*Prac Assignments in venue*

*Report (AMOVA): 30 April 2024; 17:00 (submit online).*

*Final test: 24 May 2024; 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%		
A1	Final test	1	40%		

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

*Klastoets: 19 Maart 2024; 17h00-19h00 (NARGA G)*

*Praktiese Opdrag lokaal*

*Verslag (AMOVA): 30 April 2024; 17:00 (handig in aanlyn).*

*Toets: 24 Mei 2024; 14h00*

Klastoets en eksamens sal in NARGA geskryf word, presiese lokale sal op SunLearn in die klas verskaf word.

## Calculation of final marks

Practical exercises.....	20%
Oral presentation .....	10%
Report AMOVA .....	10%
Class test .....	20%
Final test.....	40%
<b>Final mark .....</b>	<b>100%</b>

All assessments are compulsory and 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%
Finale Toets.....	40%
<b>Finale punt .....</b>	<b>100%</b>

Alle assesserings is verpligtend en 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 spesiaal omstandighede (bv. deelname aan provinsiale of nasionale sportbyeenkomste) 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 kursuskoördineerder, 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: Conrad Matthee, Prof [cam@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: Conrad Matthee, Prof [cam@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 klasvertegenwoordiger 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](#).

The [SU Policy on Plagiarism](#) defines plagiarism as: "The use of the ideas or material of others [including AI generative tools, such as ChatGPT or Bing] without [appropriate] acknowledgement, or the re-use of one's own previously evaluated or published material without acknowledgement (self-plagiarism)." Such acknowledgement would include referencing the source of previously expressed ideas or published materials, or acknowledging the contribution of e.g. the AI tool, as stipulated for a specific assessment or assignment.

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](#).

Die [US Plagiaatbeleid](#) definieer plagiaat as: "Die gebruik van ander se idees of materiaal [insluitend KI generatiewe instrumente, soos ChatGPT of Bing] sonder [toepaslike] erkenning, of die hergebruik van 'n persoon se eie voorheen geëvalueerde werk of gepubliseerde materiaal sonder erkenning (selfplagiaat)." Sodanige erkenning sal insluit die verwysing na die bron van voorheen uitgedrukte idees of gepubliseerde materiaal, of die erkenning van die bydrae van bv. die KI-instrument, soos gestipuleer vir 'n spesifieke assessering of opdrag.

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.



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NATUURWETENSKAPPE

Lectures (Annex (Rm 1030), Natural Sciences Building: Mondays (12h00-12h50), Wednesdays (08h0-08h50) and Fridays (09h00-09h50).

Lecture	Date	Topic	Lecturer
1	12/02	Introduction to the course; lecturers	KW
2	14/02	The scientific method; Descriptive versus inferential statistics	KW
3	16/02	Basic descriptive statistics; How to report statistics & Plotting	KW
4	19/02	The power of AI: Opportunity and pitfalls	KW
5	21/02	The power of AI: Opportunity and pitfalls	KW
6	23/02	Normal distribution and null hypothesis testing	KW
7	26/02	Experimental design (power) & Practical revision	KW
8	28/02	Applying statistics: Case study	RM
9	01/03	Comparing two population means: Two samples <i>t</i> -test	KW
10	04/03	Experimental design principles & Practical revision	KW
11	06/03	Applying statistics: Case study	RM
12	08/03	Comparing two means: Non-parametric tests	KW
13	11/03	Practical revision	KW
14	13/03	Analysis of variance ANOVA	KW
15	15/03	Analysis of variance ANOVA	KW

Lesings (Annex (Mamer 1030), Natuurwetenskappe gebou: Maandae (12h00-12h50), Woensdae (08h0-08h50) en Vrydae (09h00-09h50).

Lesing	Datum	Onderwerp	Dosent
1	12/02	Inleiding tot die kursus; dosente	KW
2	14/02	Die wetenskaplike metode; Beskrywende versus inferensiële statistiek	KW
3	16/02	Basiese beskrywende statistiek; Hoe om statistieke en plotte aan te meld	KW
4	19/02	Die krag van KI: Geleentheid en slaggate	KW
5	21/02	Die krag van KI: Geleentheid en slaggate	KW
6	23/02	Normale verspreiding en nulhipotesetoetsing	KW
7	26/02	Eksperimentele ontwerp (krag) & Praktiese hersiening	KW
8	28/02	Toepassing van statistiek: Gevallestudie	RM
9	01/03	Om twee populasies te vergelyk beteken: Twee steekproewe <i>t</i> -toets	KW
10	04/03	Eksperimentele ontwerpbeginsels & Praktiese hersiening	KW
11	06/03	Toepassing van statistiek: Gevallestudie	RM
12	08/03	Om twee gemiddelde te vergelyk : Nie-parametriese toetse	KW
13	11/03	Praktiese hersiening	KW
14	13/03	Variansie-analise ANOVA	KW
15	15/03	Variansie-analise ANOVA	KW

Lecture	Date	Topic	Lecturer
16	18/03	Practical revision: ANOVA	KW
17	20/03	Applying statistics: Case study	RM
18	22/03	Defining a research question; and designing a research study	KH
19	25/03	Writing research articles and proposals. Ethical clearance, permits, collaborations	KH
20	27/03	Scientific referencing and how to cite others' work	KH
<b>29 March – 7 April: Recess</b>			
21	08/04	Correlation	KW
22	10/04	Practical revision: Correlation	KW
23	12/04	Linear regression	KW
24	15/04	AMOVA	CM
25	17/04	AMOVA	CM
26	19/04	AMOVA	CM
27	22/04	AMOVA	CM
28	24/04	ANCOVA	KW
29	26/04	Revisions prac ANCOVA	KW
30	29/04	Data presentation tool kit (tables & figures)	CG
	01/05	<b>Public holiday</b>	
31	03/05	Data presentations guidelines: verbal & poster	CG
32	06/05	Popular science reporting and media interactions	CG
33	08/05	The publication process: journal impact factors, metrics, peer review, open access	KH
34	10/05	Data collection	KH
35	13/05	Record keeping data entry	KH
36	15/05	Revision for second test	KW/CM
37	17/05	Revision for second test	KW/CM

Lecture	Date	Topic	Lecturer
16	18/03	Praktiese hersiening: ANOVA	KW
17	20/03	Toepassing van statistiek: Gevallestudie	RM
18	22/03	Definieer 'n navorsingsvraag; en die ontwerp van 'n navorsingstudie	KH
19	25/03	Die skryf van navorsingsartikels en voorstelle. Etiese klaring, permitte, samewerking	KH
20	27/03	Wetenskaplike verwysings en hoe om ander se werk aan te haal	KH
<b>29 March – 7 April: Recess</b>			
21	08/04	Korrelasie	KW
22	10/04	Praktiese hersiening: Korrelasie	KW
23	12/04	Lineêre regressie	KW
24	15/04	AMOVA	CM
25	17/04	AMOVA	CM
26	19/04	AMOVA	CM
27	22/04	AMOVA	CM
28	24/04	ANCOVA	KW
29	26/04	Hersienings prakties ANCOVA	KW
30	29/04	Gereedskapstel vir dataaanbieding (tabelle en figure)	CG
	01/05	<b>Publieke vakansie dag</b>	
31	03/05	Data-aanbiedingsriglyne: verbaal en plakkaat	CG
32	06/05	Populêre wetenskaplike verslaggewing en media-interaksies	CG
33	08/05	Die publikasieproses: joernaalimpakfaktore, maatstawwe, portuurbeoordeling, oop toegang	KH
34	10/05	Data-insameling	KH
35	13/05	Rekordhouding van data-invoer	KH
36	15/05	Hersiening vir tweede toets	KW/CM
37	17/05	Hersiening vir tweede toets	KW/CM

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

Practical #	Date	Topic	Lecturer
1	13/02	Introduction to R, data handling	KW
2	20/02	More data handling in R, basic statistics	KW
3	27/02	Normality test and confidence limits	KW
4	05/03	Power test and two sample test	KW
5	12/03	Paired designs and non-parametric two sample test	KW
6	19/03	<b>TEST</b>	KW
7	26/03	Applying statistics: Case study	RM
<b>3 April – 10 April: Recess</b>			
8	09/04	Analysis of variance	KW
9	16/04	Correlations	KW
10	23/04	AMOVA prac	CM
11	30/04	Linear regression and analysis of covariance	KW
12	7/05	Student presentations (oral/poster)	CG
13	14/05	Student presentations (oral/poster)	CG

Prakties: Dinsdae, 10:00 – 13:00 (plek: Narga H)

Practical #	Date	Topic	Lecturer
1	13/02	Inleiding tot R, datahantering	KW
2	20/02	Meer data hantering in R, basiese statistieke	KW
3	27/02	Normaliteitstoets en vertrouensgrense	KW
4	05/03	Kragtoets en twee monster toets	KW
5	12/03	Gepaarde ontwerpe en nie-parametriese twee steekproefstoets	KW
6	19/03	<b>TOETS</b>	KW
7	26/03	Toepassing van statistiek: Gevallestudie	RM
<b>3 April – 10 April: Reses</b>			
8	09/04	Variansie-analise	KW
9	16/04	Korrelasies	KW
10	23/04	AMOVA prakties	CM
11	30/04	Lineêre regressie en analise van kovariansie	KW
12	7/05	Studentaanbiedings (mondeling/plakkaat)	CG
13	14/05	Studentaanbiedings (mondeling/plakkaat)	CG