



Department of Statistics

Student Handbook

Welcome

Welcome to the Department of Statistics. This handbook includes information about the department, the staff employed in the department, basic departmental rules and relevant course information. Please note that the rules and regulations in the Rhodes University Calendar¹, as per your first year of registration at Rhodes, supersede any and all rules stipulated in this handbook.



Department of Statistics Student Handbook, 2022. Authors: S.E. Radloff and J.S. Baxter

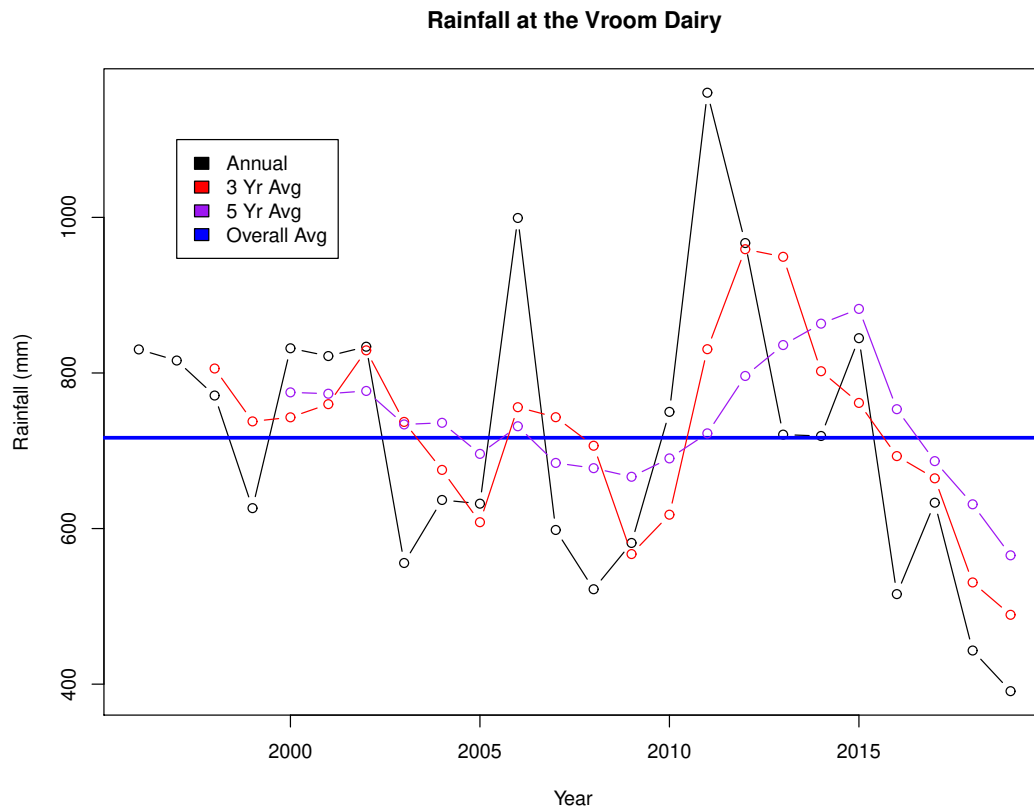
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¹The calendar can be found at <https://www.ru.ac.za/diaryanddates/>.

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The Thorn Farm dairy is located just outside of Makhanda. The average rainfall over the entire period is plotted in blue. The average over this and the previous 2 years is plotted in red, the average over this and the previous 4 years in purple.

Makhanda is located in a water scarce region. Please use water sparingly. Report leaks to your Hall Administrator, Sub-Warden, Warden, Departmental Secretary or Lecturer.



Professors Philip van der Watt, Sarah Radloff and Trevor Hastie.

Emeritus Professor P. van der Watt

Professor van der Watt followed a route into academia different to most academics. After passing Standard 8, he had to leave school and went to work at the Post Office. While working in the Post Office he completed his matric by correspondence followed by a National Diploma in Electrical Engineering at a Technikon. He obtained an MSc and a PhD through UNISA under the eminent Professor Cas Crouse.

Professor van der Watt lectured at the Witwatersrand Technikon (1962-1964) and UNISA (1965-1970). In 1971 he was appointed as the first Professor of Statistics at Rhodes University. He held the position of Head of the Department of Statistics until 1997. He was also appointed as the Dean of Commerce (1979-1999).

Professor van der Watt had extensive teaching and consulting experience in Mathematical Statistics having taught at all undergraduate and postgraduate levels in both Mathematical Statistics and Applied Statistics. His research interests were in statistical estimation and inference.

Professor van der Watt retired to Somerset West in 2001 and passed away on 24 December 2016 after an extended battle with cancer. Philip's contribution to the Rhodes Department of Statistics and to Rhodes University in general is remembered with great appreciation by his colleagues and students.

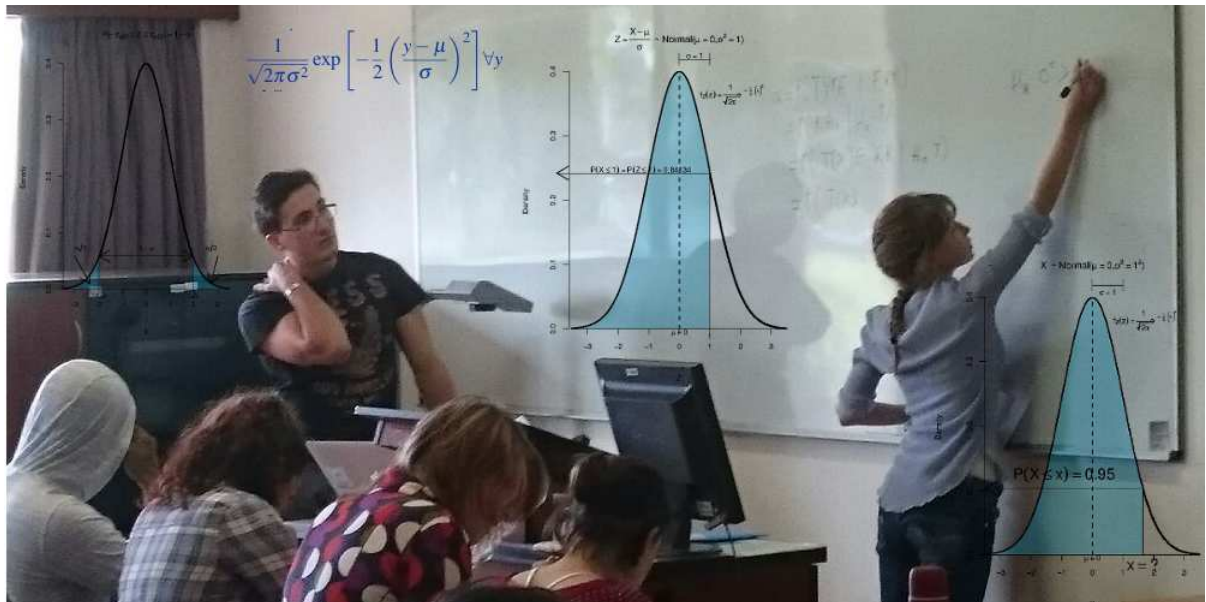


Emeritus Professor S. E. Radloff

The staff and students wish Professor Radloff all the best in her retirement. Emeriti Professor Radloff joined the staff of the department in 1972. During her distinguished career she taught extensively, published over 200 accredited publications and was awarded the Senior Vice-Chancellor's Distinguished Research Award (2005).

Sarah your optimism, fabulous sense of humour and enthusiasm motivated us. You made an immense contribution to the growth and development of all the students and staff in the department. Thank you.

Introduction



The Department offers a two-and-a-half year major courses in Mathematical Statistics and Applied Statistics which start in the second semester of first year. Credit in Mathematics and Applied Mathematics 1 is required for registration for Mathematical Statistics 2. These courses are aimed at providing both a sound foundation in statistical mathematics and competence in the practice of certain areas of statistics. To meet these objectives the Department has highly qualified teaching staff and a modern computer laboratory. The laboratory supports some of the major statistical packages in which user instruction is given. Student numbers in the second and third-year courses are small and classes, tutorials and practicals are conducted in a friendly and relaxed small group atmosphere.

1.1 Departmental Mission Statement

Our mission is:

- To produce graduates who have a sound knowledge of the major areas of statistical methodology, founded on rigorous theoretical principles which equip the graduate to acquire further knowledge and skills for the benefit of the country through own study.
- To promote the use and knowledge of Statistics in all fields in which Statistics can contribute to a better understanding of scientific and social phenomena, and enhance the quality of decisions and conclusions made on the strength of the statistical approach.
- To contribute to the body of fundamental statistical science through research.

In working towards fulfilling this mission, the Department of Statistics:

- Offers a three year sequence of courses in Statistics and Mathematical Statistics for students majoring in Mathematical Statistics, as well as courses towards coursework Honours and Masters degrees. The syllabuses for these courses and attendance practical work are state of the art at these levels.
- Teaches service courses in the Faculties of Commerce, Science and Pharmacy. The Department also offers a statistical consulting service to researchers in other Departments and Research Institutes within the University, and actively promotes collaborative research.
- Encourages members of staff to engage in basic research in the discipline.



Nonzaliseko Celebrating Heritage Day (2017)

1.2 History

The Department of Mathematical Statistics was established in 1973 under the headship of Professor P. van der Watt. The Department was formerly part of Rhodes' Department of Applied Mathematics and Statistics. At the time of its establishment the Department offered 3 undergraduate courses viz Statistics, Mathematical Statistics 2 and Mathematical Statistics 3, and postgraduate courses for Honours and Masters students.

In 1974 service courses for students in the Commerce Faculty were introduced, viz Elementary Theory of Finance and Statistics (ETFS) and Business Mathematics and Statistics (a more sophisticated version of ETFS for Accountancy students). Shortly afterwards, the Department offered an additional service course for students registered for a degree in Pharmacy, viz Mathematics 1P (Statistics module) which was subsequently called Statistics 1F and then Biostatistics (PC1BST). The service course for students in the Science Faculty was initially named Statistics 1F but was subsequently renamed Statistics 101 and most recently Statistics for Science (STA 1S). In 1987 the ETFS course was phased out and some years later, with the introduction of semesterisation at Rhodes, the Business Mathematics and Statistics course was renamed Mathematics 1D and Statistics 1D and, later still, Mathematics 1D was renamed Theory of Finance due to more emphasis being placed on the theory of finance in the syllabus. Statistics 1D was subsequently renamed Statistics for Commerce (STA 1C). A separate major subject stream for Commerce students was introduced in 1975 but was discontinued in 1988 because of staff shortages. The Department also offered the Business Mathematics and Statistics course for Commerce students in East London from 1984 until 2003.

Staff membership in the Department has grown from two (Professors van der Watt and Radloff) in 1973 to eight in 2021, with an enrolment of approximately 1 000 students. In 1996 the Department of Mathematical Statistics was renamed the Department of Statistics in line with most other South African Universities.

1.3 Statistics Departmental Plagiarism Policy

Plagiarism is considered a serious offence by Rhodes University and the Department of Statistics. Plagiarism, as defined in the University's policy on plagiarism, is "taking and using the ideas, writings, works or inventions of another as if they were one's own". Students are required to familiarise themselves with the university policy on plagiarism, which is displayed on the departmental notice board and can be found at <https://www.ru.ac.za/teachingandlearning/about/teachinglearningpolicies/>. In the Department of Statistics the most common plagiarism infringement is the copying of tutorial assignments from another student and submitting the assignment as one's own work. The Department considers this infringement and other types of plagiarism as totally unacceptable and disciplinary steps will be taken against any students found guilty of committing plagiarism in the Department.

Students will be required to sign a plagiarism declaration at the beginning of the course indicating that the assignments that they submit during the year will be their own work.

All cases of plagiarism in summative assessments, for example summative assessments that are written in lieu of traditional sit-down examinations, will normally be treated as category C level offences and referred by the HoD to the Senate Standing Committee on Plagiarism.

Disciplinary Procedures

All cases of plagiarism are subject to disciplinary procedures which are stipulated in the University's policy on plagiarism. Depending on the severity of the offence, the offender is disciplined either by the staff member who detects the offence, the Departmental Plagiarism Committee or the Senate Standing Committee on plagiarism.

The Departmental Plagiarism Committee comprises Mr Baxter, Professors Raubenheimer and Szyszkowski, and Dr Corrêa. If a student is found guilty of plagiarism by the Department's Plagiarism Committee the following penalties are normally applied:

- Minor infringement and first offenders: Verbal warning and a mark of 0% given for the assignment for all those students involved in the plagiarism.
- Second minor infringement: DP certificate for the course will normally be withdrawn.

The Department will keep a record of students who have plagiarised. This list of students will be reported to the Senate Standing Committee on plagiarism annually.

Citations, the Reference List and/or the Bibliography

The Department of Statistics requires that in-text citations and references are consistent. All in-text citations must be included in the reference list/bibliography which must be included at the end of the article/thesis. The reference list and or bibliography must be consistent. The department requires that the citations and reference list/bibliography be consistent with the American Statistical Association style guide, see <http://www.amstat.org/publications/index.cfm?fuseaction=style-guide>. All theses must conform to the University's Higher Degrees Guide. The department suggests that students utilise \LaTeX or \LyX to typeset their mathematical documents and hence utilise \BIBTeX to manage and typeset their references. Honours students will attend a short seminar series on typesetting mathematical documents at the start of their course.

1.4 Addresses

<i>Location:</i>	<i>Postal Address:</i>	<i>Other Contact Details:</i>
The Department of Statistics	The Department of Statistics	http://www.ru.ac.za/statistics/
Top Floor	Rhodes University	Phone: +27 (0) 46 603 8346
New Arts Block	P O Box 94	Email: stats@ru.ac.za
Artillery Road	Makhanda	
Makhanda	6140	

1.5 General

The members of staff of the Department of Statistics strive to render a high quality service to students in terms of:

- Well prepared lecture presentation;
- Well-structured workbooks/assignments;
- Small group activities;
- Continuous assessment;
- Active learning techniques for small, as well as large groups;
- Regular, timely feedback;
- Personal interest in students, both generally and academically.

Teaching and Learning Methods

The Department of Statistics is of the opinion that good teaching must be measured by successful learning. The structure of content presentation is such that it creates the maximum opportunity for active, successful learning.

Teaching Methods

- **Lectures:** The lecturer makes use of explanation and questioning techniques. The lecturer uses the chalk or white board and the data or overhead projector during lectures in order to explain the content of the course and encourages student participation by means of questions on an ongoing basis.
- **Tutorials:** The large classes are divided into small tutorial groups, each with their own tutor. Students work as individuals, in pairs or groups during the tutorial sessions under the supervision of their tutor and with the assistance of a staff member.

The emphasis in both lectures and tutorials is on active learning techniques for both the large and small groups.

To ensure the quality of teaching and tutoring, regular and systematic evaluation of lecturer and tutor performance is undertaken by means of surveys of student perception, peer reviews and self evaluation.

Methods of Assessing Student Attainment

Assessment is viewed as an integral part of teaching. Assessment criteria are clearly communicated to the students and are used by the students to monitor and develop their own learning. Assessment methods vary to accommodate the different learning styles of the students in order to assess the outcomes of the course. Formative assessment methods include weekly tutorial tests and class/term tests. Students are given immediate feedback each week on their tutorial tests to provide weekly guidance on their progress.

In order to make a summative assessment of the students' level of competence a three hour examination is written at the completion of each course. Reliability and validity of marking term tests and examinations in the Department have been addressed by the introduction of marking sessions where a single staff member marks particular questions across all the scripts ensuring consistency. This has resulted in a considerable improvement in both the morale of students and staff and ensures prompt feedback to students.

Class Representatives

During the first few weeks of the first and third terms, the class elects a class representative or a team of class representatives. The class representatives primary function is to liaise with the Department on issues of concern to the class as a whole or alternatively to individual students. Should you have any problem with your course discuss it with your class representative who will bring the matter to the attention of the lecturer or HoD. The class representatives have input at the faculty board level by means of the student faculty representatives as well as via the SRC academic representative. Please communicate with your class representative, but this does not mean you may not approach the staff of the Department directly.



Tutorials: Active and successful learning environments

Academic Awards

Academic awards are typically made annually for top performance in Mathematical Statistics 102, 2 and 3.

Communication in the Department

The staff of the Department of Statistics are friendly and accessible and you may seek help from them for your problems, academic or otherwise, no matter how large or small they may seem. Please interact with your lecturers; feel free to chat to them prior to or after a lecture or tutorial. Their office numbers as well as email addresses are provided in the Members of Staff section, section 1.7 on page 17.

The Department contacts students via email. All offered in the Department make use of RUConnected, an online course management system available at <https://ruconnected.ru.ac.za/>. This portal hosts the relevant course materials and is used to contact students via email. Use your Rhodes email user name and password to log onto RUConnected. If you are having problems accessing your email please contact the student help desk located at the library.

Checking your email daily. In addition to announcements in lectures, your Lecturers will email important announcements via RUConnected. If you wish to consult with your lecturer outside of “class” time, please contact your lecturers via email to book an appointment.

The Statistics notice board is located in the Department. Mathematical Statistics 2 and 3 students should check the notice board regularly for information about academic and administrative matters.

- For academic help, please contact your lecturer, course coordinator or the Head of the Department (HoD);
- For administrative help, please contact the Secretary, Mrs Zimmerman (Room 2029);
- For information regarding the use of the Statistics PC Lab, please contact Mrs Zimmerman (Room 2029);
- For help with personal problems you can contact:
 - Psychological Emergency crisis: 082 803 0177;
 - Counselling Centre (wellness manager): 046 603 8187/7070;
 - Health Care Centre: 046 603 85236 emergency only: 082 801 1409;
 - SRC Advisor’s Office: 046 603 7080, email: president@src.ru.ac.za.
- For help with financial problems, bursaries etc. you can contact the Financial Aid Office: (Tel: 046 603 8175).

If, in your opinion, your concerns have not been adequately addressed by your lecturer or the course coordinator please contact the Head of the Department (HoD). The HoD should generally be approached only when the other avenues have not solved your problem, or when referred by a lecturer. Please ask Mrs Zimmerman to make an appointment to see the HoD. If, in your opinion, your concerns have not been adequately addressed by the HoD please contact your Dean for academic matters or the Director of Student Services for nonacademic matters.

The Statistics Departmental PC Laboratory

The Department of Statistics PC Laboratory is equipped with appropriate computers and a printer. The lab is primarily for use of the postgraduate students to conduct their simulations. Under absolutely no circumstances may any student interrupt or in any way interfere with these simulations. DO NOT DISTURB means exactly that. Disciplinary action will be taken against students who fail to comply with this instruction.

Access is granted, at appropriate times of the year, to the undergraduate Mathematical Statistics students, that is for registered MST 102, MST 2, MST 3, AST 3 students. Conditions of use of the Rhodes University equipment are laid down by the IT Division and the onus is on you to familiarise yourself with them and adhere fully to them. You are required to adhere to the Rhodes University acceptable use policy at all times. There is controlled access to the lab using student cards, please contact to Mrs Zimmerman for access. No eating or drinking is permitted in the lab.

The lab is in essence the postgraduates research work area, but it is also your lab. You are very definitely entitled to ask anyone who is not a Mathematical Statistics student, or is doing something that is clearly not part of their MST assignments or course, to vacate a workstation so that you can make use of it to do your MST assignment.

Please feel free to report any issues to Mrs Zimmerman.

Smoking

There is a no smoking policy at Rhodes and smoking is not allowed anywhere in the Department.

Career Opportunities in Statistics

‘Somewhere, someone, be it a businessman, administrator, scientist or engineer, is making an important decision. On the strength of conclusions based on limited information, people with responsibility are deciding to expand a business, buy or sell shares, reallocate resources, publish scientific breakthroughs, or undertake engineering constructions - vital decisions that depend on reliable statistical conclusions. The statistician, using statistical theory, logic and computer technology, is well qualified to draw these conclusions in the face of uncertainty’

(My Career, p 203).

Statisticians find employment in commerce and industry, research institutes and government departments where they are in demand not only for their specialised training, but also for their logical approach to diverse scientific and technical problems. Practical statisticians are employed as actuaries, econometricians, market research statisticians, statistical analysts, risk analysts, statistical systems managers, statistical programmers, biostatisticians, epidemiologists, biometricians, psychometricians, geostatisticians etc. and command high salaries. Other statisticians operate as independent consultants who offer statistical assistance to organisations that do not employ an in-house statistician or require specialised help. Statisticians that are academically inclined are in high demand as lecturers at universities.

Further information can be found on the departmental website, <https://www.ru.ac.za/statistics/>, or alternatively on the Quantify your Future website, <https://www.quantifyyourfuture.co.za/>.



1.6 Frequently Asked Questions and Standard Operating Procedures

Please note that the rules in this handbook are in line with the various University policies. They protect the academic integrity of our courses and you, our students.

1.6.1 Leave of Absence (LOA)

As per the University's policy with regards leave of absence (LOA), LOA's will only be granted for medical, psychological, compassionate, traditional or extramural grounds. Please note that in the event of an emergency, for example a death in your immediate family, you may ask your Warden to email the department to let us know you are away from campus and that you will submit the relevant LOA application and associated documentation upon your return.

LOA forms can be found on the Rhodes University website or on the relevant RUConnected course page. They are to be submitted to Mrs Zimmerman. Please note that the Department typically follows up on the supporting documentation that is submitted, for example the Department checks with the Doctor that you did in fact have an appointment. All fraudulent and or altered documentation is submitted to the Rhodes University Proctors for investigation.

Typically if you are granted an LOA for a test, you will receive the average of all your tests for the semester. In some instances make-up-tests may be scheduled, as per the course descriptions below.

1.6.2 Computation of the Course Record

The department presumes that students check their marks on the weekly formative assessments are correctly captured on ROSS, weekly. While we strive to minimise errors, we do make mistakes. If there are errors or omissions in your formative assessment marks on ROSS please contact Mrs Zimmerman. This must be done prior to the end of the relevant SWOT week; changes will not be made after the end of the relevant SWOT week.

The weights of the various components for each course are given in the course sections below. Consider for example a course whose class record is

	Term Tests	Tutorial Tests	Class Work
Class Record	60%	30%	10%

In this case the class record mark is 0.6 times the average of the term tests plus 0.3 times the average of the tutorial tests plus 0.1 times the average of the class work. The departmental system, which students view via ROSS, weights each assignment in each category (Term Tests, Tutorial Tests, Class Work etc.) and then applies the weightings to compute a students class record mark. The weightings of the class record mark may be slightly different to the mark computed using the weighted average as described above due to rounding. For example if there are two tests the weights are 0.5 and 0.5, which is equivalent of the average of two assessments. However if there are three tests the weights would be 0.33, 0.33 and 0.34, approximately the average of three assessments. The weightings for each assessment are shown on ROSS.

Class records as reported by the Mark System/ROSS are adjusted when a student does not have any marks for a particular component, for example if they had LOA's for all the term tests. In these cases the class record is manually adjusted when final results are submitted to the Registrar's Division.

Final class records are usually available during SWOT week, but this may be delayed if for example assessments are submitted in the last week of term.

1.6.3 Computation of the Course Mark

The weights of the various components for each course given in the course sections below. Consider for example a course whose class record counts 40%, that is

	Class Record	Examination
Final Mark	40%	60%

In this case the final mark for the course is computed as 0.4 times the class record plus 0.6 times the examination mark. For those courses which have more than one examination or paper, the average of the papers is used.

Extended DP, Supplementary and Aegrotat Final Marks

The course mark for supplementary and aegrotat concessions use the same formulae as above to compute the course mark. If a student is granted an extended DP and has a previous class record, that class record is used. Where a student has not previously complete the course and they are granted an extended DP where the Dean indicates that they are not required to complete any formative assessments (tutorials, tutorial tests, term tests etc), only the examination mark is used to compute the course mark.

1.6.4 Aggregated Credits, Non-Continuing Aggregation and Distinctions

MST 2 and MST 3 are semesterized. Credit may be obtained in each semester course separately, for example MST 301 and MST 302, resulting in a pass for that year course, MST 3 in this case. An aggregated credit (ACR) is a credit awarded to a student who fails one of the semester credits but pass the year on average, subject to certain course specific criteria. Not all courses can be aggregated: Mathematical Statistics 201 and 202 can be aggregated; Mathematical Statistics 301 and 302 can be aggregated. In MST 2 and MST 3, an aggregate mark of at least 50% will be deemed to be equivalent to a two-credit course, provided that a student obtains the sub-minimum of at least 40% in each component.

For example if a student passed both MST 301 and MST 302, then they have passed MST 3. However if the student failed one of MST 301 or 302 where they attained at least 40% (40 or more) AND if their average MST 301 and 302

marks are above 50% they are awarded an aggregated credit (ACR) for MST 3. A comment to this effect is made on their academic record indicating that they have passed MST 3.

A non-continuing aggregation, denoted by NCR on the academic record, indicates that a student has passed the course on average but they are not permitted to register for the next level of study.

The Department is required to provide the Registrar with a list of students that have obtained:

- an averaged/overall pass;
- an averaged/overall pass where the student may not continue to the next level of study;
- an averaged/overall distinction for their major, MST 3.

This information is added as a comments to the relevant student's records. These records are extracted to the graduation programme as well as the student's degree parchments. When results are released to students, please check the aggregation and distinction comments have been captured in the comments section on ROSS.

If a supplementary or last outstanding credit or aerogratum examination is granted (as per section 1.6.6) the maximum of the original and supplementary exam are used as the exam mark to compute the final course mark. This final mark is then used to apply the rules for aggregation and distinction.

1.6.5 Duly Performed

At the start of each course, all students are awarded a Duly Performed (DP) certificate. What is expected of you is clearly stipulated in the relevant course sections below. Basically you are expected to attend all class lectures, tutorials, and where relevant practical sessions. The requirement that you submit all assignments and tests is **strictly** enforced. If you are ill at the time of a particular class, tutorial or practical, you are expected to make up the work in your own time. See the section on Leave of Absences. Please feel free to ask for assistance from your tutor or lecturer.

Students who do not meet the minimum attendance and academic standards "loose" this certificate, that is their DP is removed (DPR) and are notified of this via email. Note that the Department is not required to warn students of this; we assume you are monitoring your academic performance by reflecting on your weekly assessment results. Students who have DPR'ed themselves are not permitted to write the final examination for the subject in which they have been DPR'ed.

The DP rules are particularly lenient in that the minimum standard is low. These rules are based on the data. Note that if you don't make one of the DP sub-minima, even if you are "close", you have not met the (very low) minimum of what is expected of you and you are not performing adequately.

DP decisions are usually made prior to SWOT week; but this may be delayed if for example assessments are submitted in the last week of term.

How do I Appeal a DPR

Any appeal against the withdrawal of a DP for any course must be accompanied by grounds for appeal. It is **not** sufficient merely to request that the DP be restored. The DP was withdrawn for a reason. You need to provide grounds/reasons why the DP should not be withdrawn. For example, you were hospitalised and were unable to submit the work; you had a bereavement in the family and returned home and were unable to write certain assessments. All grounds submitted must be supported by some form of documentary evidence, for example, a medical practitioner's certificate. The appeal and relevant documentation should be submitted to the Head of Department for their consideration. Should you wish to appeal the HoD's decision please contact your Dean and or the Director of Student Services.

Should I Continue the Course After a DPR

If you have received notification of a DPR and you have not appealed and/or your appeal was not successful then you are no longer “registered” for the course. The department can not capture your marks on ROSS. There is no point continuing attending lectures, submitting tutorials or writing the examination. A DPR means that the data suggest there is little point in you continuing the course; please concentrate on your other subjects.

Extended DP's

As per rule G.20.1.3 of the University's General rules for Degrees, Diplomas and Certificates, students who **do not return** to the University may apply for an extended DP for courses they had attained a DP for but failed in the previous year. What does not seem to reflect in the rules is that students who **return** to the University may apply for an extended DP to be excused from some of (or all) lectures and tutorials/practicals. All applications for extended DP's are carefully considered by the HoD in consultation with the relevant Dean. Applicants will typically only be granted an extended DP for the component of the course for which they have a direct clash, for example the relevant lecture(s) or tutorial (where these can not be scheduled in a different tutorial session). Typically extended DP students are required to attend and submit the relevant tutorials and write the term tests and projects. In the cases where a tutorial session can not be scheduled, these students will be required to write the term tests.

Past data suggest that students granted extended DP's unfortunately do not pass the relevant course and hence this practice is (very strongly!) **not supported**. Applications for extended DP's are made via ROSS and or the Registrar's Division within two weeks of the start of the course.



He uses statistics as a drunken man uses lamp posts- for support rather than illumination.
Andrew Lang (1844-1912)

1.6.6 Tests and Examinations

Tests and examinations in the Department are, “normally”, set as per the Faculty of Science standard operating procedures (SOPs) for tests and examinations. Course Work Masters, Honours and Mathematical Statistics 3 examinations are sent to an external examiner for assessment and moderation. The Statistics for Science, Statistics for Commerce, Statistics for Pharmacy, Mathematical Statistics 102 and Mathematical Statistics 2 papers are internally examined and moderated in line with the Faculty SOPs.

Undergraduate examination questions are similar to material covered in lectures and tutorials. Past papers are made available via the Rhodes Library past examination paper service and/or on the relevant RUCOnnected pages. Model answers to examinations are seldom set and seldom typed in L^AT_EX. The department does not provide solutions to exam papers since there is no need (see course material/tutorial solutions etc.). This should ensure that students engage with all the course content and material, and ensure students do not just look at the solutions and presume they understand (when they do not). If you are not confident, redo the tutorials. Students may discuss their solutions to past papers with their lecturer/tutor or alternatively submit these to the staff to review.

Lecturers utilise marking solutions, a reflection of the ‘uncountably infinite’ variations to the questions students compose, to try and ensure consistency while marking.

It is in the candidate’s interest to write legibly; if we can not read it, we can not award marks for it (and we neither presume nor guess when marking). Candidates may use a pencil; but if we can not read it we can not mark it. Those candidates who use a pencil will not have an assessment mark adjusted subsequent to the assessment being handed back to the candidate.

Term Test Dates

Test dates for each course can be found in the relevant sections below. These dates are discussed and scheduled with the relevant persons in the Departments of Pharmacy, Science and Commerce (as appropriate).

Answer Books

Statistical tables and answer books are provided for test and examinations; you need a pen, your calculator and an appropriate form of identification. Please ensure you write your student number and, very importantly, the **TOTAL** number of answer books you are submitting for marking during tests and examinations. This is to ensure we mark all of your submission. Prior to marking we check that we have all your answer books. Once we have finished marking we check that all the answer books and all the questions have been marked.

Checks, Balances and Reviews

The lecturer will add up the marks that have been awarded; the marks reflected inside the answer book and the question totals that are reflected on the answer book cover will be computed to ensure consistency. For tests, the tutors are typically requested to double check the adding up by checking the inside and outside mark allocations and totals. The secretary and/or internal/external examiner will double check this addition. All borderline scripts are reviewed inline with the SOP’s and in discussion with the HoD prior to submission of results to the Registrar.

Students may request access to review their script; please email Mrs Zimmerman to schedule a meeting.

Make-up Tests/Assessments

In certain circumstances, make-up assessments may be scheduled for students who have been granted LOA’s for term tests. These are either traditional tests or an oral assessment. When scheduled, make-up tests are for those students

with valid LOA's. These assessments are not rewrite tests and hence only students who have been granted LOA's may sit these assessments. In the interests of fairness, students who have written the assessment are typically not allowed to sit the make-up assessment to improve their class records.

Supplementary Examinations

Supplementary examinations for STA 1S1, STA 1P1, STA 1C2 and MST 102 are awarded for specific ranges of marks as per the university calendar. These ranges of marks are reflected in the course descriptions below and are as specified by the relevant Faculty. Depending on the supplementary mark criteria, the qualifying students course marks are denoted as F1S, F2S, or F3S. In this context the mark indicator ends with S which denotes a supplementary examination is allowed. The university and department presume that if you are granted a supplementary exam then you are writing the paper, that is there are no additional administrative requirements to write the supplementary examination. To be clear you do not need to "register" to write the supplementary exam.

The final course mark for students who write the supplementary examination is based on the higher of the examination or supplementary examination marks. The usual course computation is used to weight the class record and examination mark. Following the supplementary examination session the S falls away and hence those students who do not write the supplementary examination(s) or whose supplementary examination marks are lower than the original examination mark, the final course mark indicator changes from F1S to F1, etc.

As an example, Statistics 1C2 students who obtain a mark of between 45% and 49% for their final course mark based on the November examination are eligible to write the supplementary examination. This examination is typically scheduled in late January or early February of the following year. These qualifying students November course marks should be denoted as a F1S; the S denotes that the student may write the next scheduled supplementary examination. Marks below 44% are not awarded a supplementary examination and the course mark will be denoted as a F2 or F3; the lack of a S clearly indicates that no supplementary examination has been awarded.

The personalised ROSS examination timetable often gets this wrong and includes the date of the supplementary examination for all students who failed the course. This does NOT mean that all students qualify to write the exam.

There is no official release date for supplementary examinations, the Registrar's Division work on the 'live' system. As a result, after being marked, added up, the adding up has been checked, the papers internally (or externally) examined, the department submits the results to the Registrar. The results are then loaded onto the records of the students, the Dean then reviews them. Following this they are available on ROSS.

Aegrotat Examinations

Aegrotat (AEG) exams are for those students who were ill or had some valid reason to not write the examination. Aegrotat applications are made via ROSS and processed by the Registrar's Division. AEG applicants receive an email indicating the outcome of their application from the Registrar. Those students awarded an aegrotat examination will have an AEG on their class record until such time as the examination is written. Unfortunately the personal time table software does not currently pick up who does or does not write the AEG exam. Thus the AEG examinations may appear on the examination time table for all students. However these assessments are only for those students with a AEG. The university/department presumes that if you were granted a AEG then you are writing the paper and hence there are no additional administrative requirements. To be clear you do not need to "register" to write the aegrotat exam.

Last Outstanding Credit (LOC) Examinations

Where a student passes all their other credits and is "missing" a semester credit, for example Mathematical Statistics 301, for their degree they will usually be granted a Last Outstanding Credit (LOC) examination for that missing

credit, as per the relevant faculties rules and regulations of the faculty in which the student is registered. Neither the Department nor the HoD grant LOC examinations. LOC's are awarded at the final faculty meetings that take place at the end of semester two as per the relevant faculties rules and regulations. In the, highly unlikely, event that you have not been granted a LOC please contact the Dean of your Faculty.

Examination Timetable

As per the Rhodes rules and regulations with regards examinations, examinations for subjects on the same day but at different times do not constitute a clash. HoD's are not consulted with regards the examination time table.

The scheduling of examinations is not a trivial task! The examination time table is set by the Registrar's Division. Neither the Department nor the HoD can change the examination timetable. Where students feel the timetable is unfair they should discuss this with the entire class; the class representative will typically call a class meeting. It is a good idea to compile a time table for all subjects taken by students in the class. The affected students or the class representative may make a request to reschedule/move examinations in the draft examination timetable; minutes of the class meeting and the schedule of all papers for all students in the class will support the argument to move the examination. These requests should be directed to the Registrar's Division via ROSS or via email to AcademicAdmin@ru.ac.za.

MCQ Version or Task Number

Multiple choice assessments (MCQ's) are typically randomised; this may involve the random selection of similar questions and/or the order of the questions and/or the order of the responses are randomised. A tracking number, called the version or task number, is assigned to each student so that their submissions can be marked. Student submissions will be marked according to the task number or version that is assigned to them. It is **imperative** that students check they are completing the correct version of the question paper. In most cases students will download a question paper, in pdf format, that has been named using their student number. As an additional check, please note that the file name (typically a student number) is displayed in the top header of the pdf viewer, for example in Adobe PDF Reader.

Show your Working/Argument

If a candidate provides just a numerical value to a question and it is correct, full marks are normally awarded; unless an instruction in the question has not been followed. If a candidate provides just a numerical value to a question and it is incorrect, no marks are awarded. It is in a candidates best interest to show their working as errors are carried when marking. It is in a candidates best interest that their work be legible. Marks are not awarded for 'Yes' or 'No'; justifications are required.

Second, Third and Honours Year Supplementary Examinations

Supplementary examinations are not typically awarded for second year, third year or postgraduate examinations in the Faculty of Science. There are typically no supplementary examinations scheduled for MST 2, MST 3 or MSTH. Neither the Department nor the HoD grant supplementary examinations for these courses. Under special circumstances the Faculty of Science may grant these examinations.

Releasing Results

Please note that results are released by the Registrar. The Department does not and will not tell students their marks.

1.6.7 Academic Development Programmes (ADP)

In addition to the weekly tutorials, academic development programmes (ADP) are organised for the Statistics for Science, Pharmacy and Commerce courses (STA 1S1, 1P1, 1C2). Senior postgraduate students are appointed to these positions. Formal programmes are not organised for the Mathematical Statistics courses; there is ample time for these smaller groups to interact with the tutors and or lecturers.

1.6.8 Tutor and Graduate Assistant Positions

Postgraduate, third and second year Mathematical Statistics students are strongly encouraged to tutor. Tutors are required to review material prior to tutorials; this enhances students understanding of their chosen field of study.

Tutors in the department are appointed based on year of registration, academic achievement and social considerations. The department invites undergraduate students to apply for tutor positions, typically after the December examinations. After the postgraduate students have registered, the HoD in consultation with the course coordinators, selects the tutors. This typically occurs in the first week of undergraduate lectures, after the ADP positions have been confirmed. Tutors for the Mathematical Statistics 3, 2 and 102 courses are, ideally, postgraduate students. In the event that there are not sufficient tutors amongst the postgraduate students, senior undergraduate mathematical statistics students are appointed to tutor Mathematical Statistics 2 and 102, Statistics for Science, Pharmacy and Commerce. Additional tutors, that is students who are not Mathematical Statistics students, are considered for the Statistics for Science, Pharmacy and Commerce courses based on these students academic performance in those courses.

1.6.9 Software

Statistica is utilised in the Statistics for Science and Pharmacy courses. R, and Rstudio, is the primary computational software used and supported in the Department of Statistics at Rhodes University. The Department wishes to thank and acknowledge the R community for their extensive support of the R project. Students should utilise rseek.org when searching for R assistance.

1.6.10 DataCamp.Com

Mathematical Statistics students are assigned a project in each semester. The R components required to complete these projects are covered in lectures; the Department does not offer a stand alone R course but develops the requisite R skills throughout the undergraduate curricula. Appropriate supplemental online courses are made available as part of these projects. The Department is very grateful that the DataCamp.com team assist our students learning by providing open access to their excellent courses. Former students in the department have reported recognition from companies/potential employers based on the certificates they have attained from DataCamp.com. Students are strongly encouraged to complete the assigned DataCamp.com courses and encouraged to consider completing courses outside the curriculum that have not been assigned as part of the projects, particularly those in which the student might be interested, for example in text mining which is discussed in the Statistical Learning Honours course. Unfortunately courses that are not assigned within the curricula, will require payment from the student.

1.6.11 Postgraduate Funding

Information with regards postgraduate funding can be found on the Research Gateway, under Postgraduate Funding <http://www.ru.ac.za/research/postgraduates/funding/>. Please contact the Postgraduate Funding Office for further information. Take careful note of the dates that postgraduate applications are due.

Note that NRF application forms must be completed on the NRF Online Submission System at <https://nrfsubmission.nrf.ac.za/>.

1.6.12 South African Statistical Association

Students are strongly encouraged to register with the South African Statistical Association, <https://www.sastat.org/>. Student membership is free. The association provides various resources with regards career guidance and advice, events and webinars, bursaries and student competitions as well as job listings (typically of an academic nature).

1.6.13 Honours Applications

Honours Entry/Admittance Criteria

The staff of the department, and where necessary in consultation with the external examiner, consider and discuss the Honours applications. To be eligible to read towards the Honours degree, students are required to attain at least 65% on average, where no module/paper/component is less than 60%, in their undergraduate third year Mathematical Statistics course(s). To be clear that means applicants from Rhodes University require at least 60% for:

- MST 301 paper 1, An Introduction to Distribution Theory and Multivariate Statistics;
- MST 301 paper 2, Generalized Linear Models;
- MST 302 paper 1, Financial Statistics;
- MST 302 paper 2, Bayesian Statistics.

Mathematical Statistics Honours students are required to register for the Multivariate and Generalized Linear Models Honours papers which are a continuation of the third year courses. The Bayesian Honours paper is also a continuation of the third year course.

The staff of the department will typically not support requests for special examinations for Mathematical Statistics 3; either for an opportunity to pass MST 3 or to "get into honours". The staff will not set examinations until such time as your spots come up.

Honours and Masters Rewrites

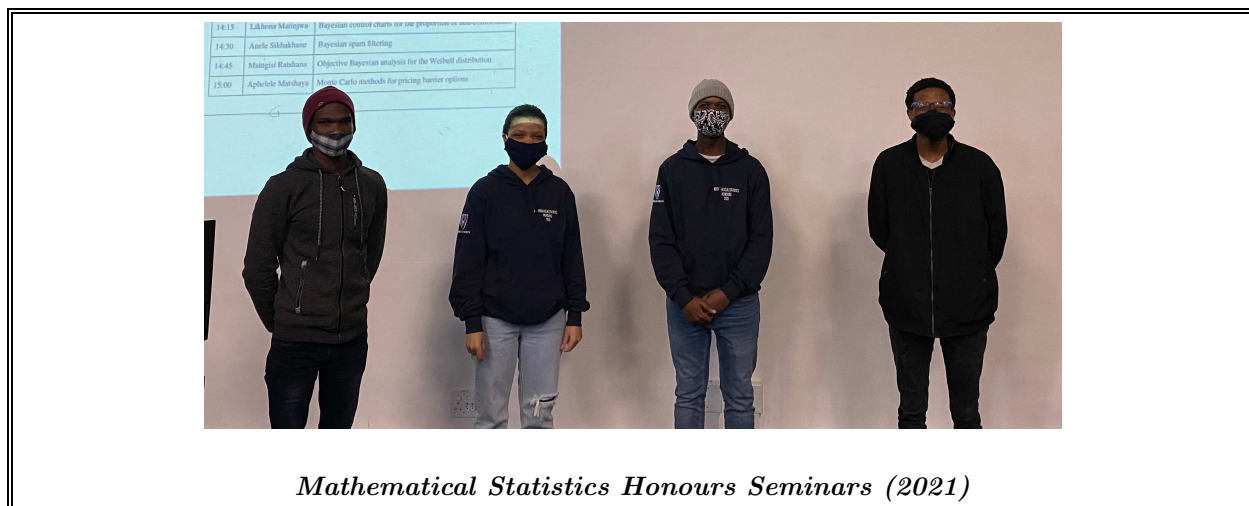
Please note that the Honours and Masters by course work degrees are not semesterized. As a result there are no rewrites/supplementary examinations etc. for particular papers.

1.6.14 Masters and PhD Applications

Please refer to the Rhodes University Higher Degrees Guide (HDG). As per the HDG, the closing date for applications is 1 May and 1 June for registration.

Students who have completed an Honours/Masters in this department should discuss their intention to read towards a Masters/PhD with the member of staff they have identified to supervise their studies, or alternatively with the HoD. Students who completed their Honours/Masters at an institution other than Rhodes University should submit a draft research note that outlines your area of interest, your academic record and a current curriculum vitae to stats@ru.ac.za. Based on this, the Head of the Department of Statistics will identify an appropriate supervisor.

Once an appropriate supervisor has been identified, they will assist you compose an appropriate research note. This note is submitted to the relevant faculty for their consideration prior to admission to read towards the degree. Applications that are not supported by appropriate research notes will be rejected by the HoD and will not be sent to faculty for their consideration.



1.7 Members of Staff



Mr J. S. Baxter

Head of Department

BSc, PGDHE, BScH, MSc (Rhodes University).

Studied at Rhodes University and obtained a BSc (1996), PGDHE (2006), BScH (1998), MSc (1999). Appointed as Junior Lecturer in the Department of Statistics in 1998, as Lecturer in 1999 and as Senior Lecturer in 2008. Teaches at all undergraduate levels in Mathematical Statistics and Honours and Master courses in Multivariate Analysis, Generalized Linear Models and Statistical Learning.

E-mail: J.Baxter@ru.ac.za

Room 2023. Tel: 046 603 7031 / 8346

**Professor I. Szyszkowski**

MSc, PhD (Maria Curie-Sklodowska University)

Studied at Maria Curie-Sklodowska University where he attained a MSc (1983) and PhD (1987). Appointed to various academic positions in the Institute of Mathematics, Marie Curie-Sklodowska University (1983-1990) and in the Department of Mathematics at the University of Swaziland (1990-1991). Appointed as Senior Lecturer in the Department of Statistics at Rhodes University in 1991 and promoted to Associate Professor in 1999. Specialises in Probability and Stochastic Processes with main research interest in Limit Theorems. Qualified and experienced to teach most of the courses in Pure Mathematics and Mathematical Statistics at all university levels. Teaches second and third year level courses in Mathematical Statistics, and Honours and Masters level courses in Stochastic Processes, Financial Statistics and Queueing Theory.

E-mail: I.Szyszkowski@ru.ac.za

Room 2012. Tel: 046 603 8348

**Professor L. Raubenheimer**

BCom, BComH, MCom, PhD (University of the Free State)

Studied at the University of the Free State and obtained a BCom (Actuarial Science) in 2005, BCom (Hons) (Actuarial Science) in 2006, MCom degree in Mathematical Statistics in 2007 and a PhD in Mathematical Statistics in 2011. Appointed as a Lecturer in the Department of Statistics at Rhodes University in 2008, promoted to Senior Lecturer in 2013 and Associate Professor in 2017. Worked at North-West University as an Associate Professor from September 2017 to 2020. Joined the Department of Statistics at Rhodes University as an Associate Professor again in 2021. Teaches at all undergraduate levels in Mathematical Statistics and a postgraduate course in Bayesian Statistics.

E-mail: L.Raubenheimer@ru.ac.za

Room 2025. Tel: 046 603 8680



Dr. A. Chinomona

BSc (University of Zimbabwe), BScH, MSc, PhD (University of KwaZulu-Natal)

Studied at the University of Zimbabwe where he obtained a BSc. Following this he studies at the University of KwaZulu-Natal and obtained a BSc (Hons) in 2007, a MSc degree in Statistics in 2009 and a PhD degree in Statistics in 2017. Appointed as a Lecturer in the Department of Statistics at Rhodes University in 2010. Promoted to Senior Lecturer in 2020. Teaches first and second year undergraduate courses in Statistics and Honours and Masters level courses in Sampling Methods (Survey Methods).

E-mail: A.Chinomona@ru.ac.za

Room 2007. Tel: 046 603 8681



Dr F. Corrêa

BSc, MSc (Universidade Federal Rural do Rio de Janeiro), PhD (Universidade Federal de Lavra)

Studied at Universidade Federal Rural do Rio de Janeiro obtaining a B.Sc in Engineer Agronomy and M.Sc in Fitotecnia. Concluded a PhD in Statistics and Agricultural Experimentation at Universidade Federal de Lavras (2012). Appointed as a Lecturer in 2010, as Senior Lecturer in 2013 at Universidade Estadual de Santa Cruz, Brazil. Appointed as a Senior Lecturer in the Department of Statistics at Rhodes University in 2019. Specialises in computational statistics, complex experimental design, generalized Bayesian mixed models and multivariate data analysis. Teaches undergraduate and postgraduate courses in statistical computation and multivariate statistics.

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Room 2011. Tel: 046 603 8650

**Mr S. R. Izally**

BSc, BScH, MSc (Rhodes University)

Studied at Rhodes University and obtained a BSc in Mathematical Statistics and Mathematics in 2012, a BSc (Hons) in Mathematical Statistics in 2013 and an MSc degree in 2016. Appointed as Junior Lecturer in the Department of Statistics in 2015 and Lecturer in 2016. Teaches first and third year undergraduate Mathematical Statistics courses and supervises postgraduate students.

E-mail: S.Izally@ru.ac.za

Room 2022. Tel: 046 603 8682

**Ms A. Langston**

BSc, BScH (Rhodes University), MRes (University of Glasgow)

Studied at Rhodes University and obtained a BSc in Mathematical Statistics and Mathematics in 2017, a BSc (Hons) in Mathematical Statistics in 2018 and an MRes in Advanced Statistics from the University of Glasgow, Scotland (2020). Appointed as Lecturer in the Department of Statistics in 2021. Teaches first and second year undergraduate Statistics and Mathematical Statistics courses and supervises postgraduate students.

E-mail: A.Langston@ru.ac.za

Room 2006. Tel: 046 603 8347

**Mrs R. Zimmerman**

The friendly Departmental Secretary joined the Department in October 2000.

Runs the administrative office and gives general administrative help to students.

Room 2029

E-mail: R.Zimmerman@ru.ac.za

Tel: 046 603 8346

Undergraduate Courses



Ms Lulama Gcakasi, Mr Ezintle Baba and Ms Olwethu Dlangamandla (BScH 2018)

2.1 Statistics for Commerce (STA 1C2)

This first year introductory Statistics course for Commerce Faculty student is offered in the second semester. This course was formerly known as Statistics 1D (STA 1D).

15 credits at NQF level 5; 5 lectures and 2-period tutorial per week for 13 weeks.

Who should do the course?

Statistics 1C2 is a service course for BCom, BBusSc, BAcc, BEcon and BSc (InfSys) degrees. The content of this course is in accordance to the requirements set out by the South African Institute of Chartered Accountants (SAICA) and is approved by the Departments of Accounting, Economics and Management.

Course Coordinator: Mr J Baxter. Please contact your course coordinator with any queries or comments concerning the course.

Course Lecturers: Mr J Baxter and Dr F Corrêa.

Course Objectives

The aims of this course are:

- To acquaint the student with those basic concepts and techniques of statistics that are most useful in the commercial disciplines;
- To produce students who are data managers, statistical thinkers, analysers and decision makers;
- To provide the necessary background to quantitative techniques that will be used in core courses such as Accounting, Economics, Management, Finance, Auditing and Financial Management that will subsequently lead to career opportunities as Actuarial Scientists, Management Accountants, Cost Accountants, Investment Analysts and others.

Areas of Learning

The student will have a knowledge of those fundamental concepts and techniques of statistics that are encountered in business.

Embedded Knowledge

The student will know the concepts of:

- Organising and Summarising Data:
 - Numerical Descriptive Statistics: Populations and samples; quantitative and qualitative data; collection and tabulation of data; frequency, relative frequency; measures of location for grouped and ungrouped data: mean, median, mode; measures of variability: range, variance, standard deviation, interquartile range, coefficient of variation.
 - Graphical Descriptive Statistics: Bar charts; frequency distributions; histograms, ogives, frequency polygons; box-and-whisker plots; scatter diagrams; time series plots.
- Probability:
 - Elementary probability, conditional probability; basic properties of probability, addition and multiplication rules; independent and dependent events; tree diagrams, two-way frequency tables.
 - Random variables; discrete probability distributions: binomial and Poisson; expected values; continuous probability distributions: normal, Student t, chi-square and F.

- Sampling, Estimation and Hypothesis Testing:
 - Different sampling methods; distribution of the sample mean, Central limit theorem.
 - Point and interval estimation: population mean (large and small samples); population variance; difference between two means for independent and dependent populations; difference between two population proportions.
 - Hypothesis testing: null and alternative hypotheses, test statistics, rejection regions, type I and II errors, level of significance, conclusions and decision making; tests for single and two population means, proportions and variances.
 - Categorical data analysis: chi-square tests.
- Correlation and Regression:
 - Simple linear regression: estimating the regression line, method of least squares, point and interval estimation of the intercept and slope, coefficient of determination; forecasting the value and expected value of the dependent variable for particular values of the independent variable.
 - Correlation: calculation and interpretation of Pearson's correlation coefficient; tests of significance.
- Time Series Analysis:
 - Components of a classical time series; computation of the trend in a time series; exponential smoothing and moving average methods; computation of the seasonal influences in a time series; deseasonalising a time series; forecasting.

Specific Outcomes

On completion of the course students should, inter alia, be able to:

- Explain the differences between a population and a sample;
- Collect, summarise and describe data using numerical and graphical techniques;
- Describe different methods to graph and present data using bar graphs, frequency tables, histograms, ogives, frequency polygons, box-and-whisker plots, scatter diagrams, time plots. Determine the presence of outliers in the data;
- Explain the concepts of probability, how to interpret probabilities and how to use the addition and multiplication rules to calculate simple and conditional probabilities;
- Determine whether events are independent or dependent. Identify discrete and continuous probability distributions, viz: binomial, Poisson, normal;
- Demonstrate the use of the binomial, Poisson, normal, Student t, chi-square and F distributions;
- Calculate point and interval estimates for the population mean, proportion and variance and interpret the meaning of each;
- Perform tests of hypotheses for one- and two-sample analyses and draw meaningful conclusions and decisions;
- Determine the best straight line through a set of data points and interpret its meaning. Calculate point and interval estimates for the slope and intercept of the regression line. Explain the meaning of the coefficient of determination. Test the significance of the regression line.
- Compute point and interval forecasts for the value and expected value of the dependent variable for particular values of the independent variable. Calculate the correlation between two variables and test for its significance.

- Identify and understand trend, seasonal, cyclical and irregular components in a time series. Determine the trend of a time series by fitting a least square regression line or by the method of moving averages, viz: 3-point, 4-point and 5-point moving averages. Use exponential smoothing techniques. Compute the seasonal indices in a time series and use these to deseasonalise the time series. Calculate a forecast for the value of the dependent variable and explain how reliable the forecast is.

Textbooks, Handouts and Calculators

The prescribed text is Introductory Business Statistics by Holmes, Illowsky and Dean, OpenStax, Rice University. This text is an open access resource and the url to the text can be found on RUConnected. You will receive a set of tutorial problems at the beginning of each term and comprehensive solutions to the tutorials at the end of each week. Solutions to test questions will be given to you at the end of each term test. The printing costs of the course handouts, statistical tables, tutorial and associated solutions is incorporated into the course charge and charged to your student account.

You will need a scientific calculator with statistical functions. You may purchase more sophisticated calculators if you wish, but programmable calculators may not be used in tests or examinations.

Lectures

Lecture Venues	Barratt 1		Chemistry Major	Barratt 2	
Lecture Times	Monday	Tuesday	Wednesday	Thursday	Friday
	3	4	1	1	2
	4	5	2	2	3

Please confirm lecture times and venues via ROSS.

Tutorials

The large class is divided into small tutorial groups of approximately 15 students, each with its own tutor. Students work as individuals, pairs or groups during the tutorial sessions under the supervision of their group tutor and members of staff. You must attend one double period tutorial session a week. These tutorials are held on Thursdays and Fridays during periods 7 and 8 in the Great Hall and Great Hall Veranda. You will be assigned to one of these tutorial sessions.

Term Tests

There will be two class/term tests during the semester, one per term. Each test is 90 minutes long and covers approximately 75% of the content of the term's work. These tests are marked by lecturers. Students get their marked test and solutions within at most two weeks of writing the test. You will be supplied with statistical tables for the test; please return these and do not write in them. You are required to bring your own calculator.

	Term Test Dates
Test Venues	Great Hall, Great Hall Veranda, Barratt 1
Test Dates	15th August, 10th October
Test Times	18h45 - 20h30

Dates and venues are subject to change.

If you miss a term test for health reasons, or some other legitimate reason, a leave of absence form must be submitted to the secretary, typically within 48 hours. You may be required to write a make-up test or take an oral test, typically in the last week of term four. It is your responsibility to ensure that you know when and where the test will be held.

Tutorial Tests

These 'mini tests' are 10 to 15 minutes each and are written each week during the tutorial session on the content of the previous week's tutorial problems. They are marked by the tutors, moderated by the lecturer and recorded by the

secretary as part of the class record. You will receive feedback during the tutorial of the following week. This is part of the continuous assessment and feedback system.

Class Record and Course Mark

Marks received for work completed during the course will be incorporated into your class record according to the following criteria:

	Term Tests	Tutorial Tests	Class Work
Class Record	60%	30%	10%

Examinations

Statistics 1C2 is a semester course and the final three-hour examination is written during the November examination period. The content of the examination comprises the entire course. The final course mark is computed as:

	Class Record	Examination
Final Mark	40%	60%

Supplementary Examinations

If you obtain a mark of between 45% and 49% in the November examination, you will be eligible to write a supplementary examination. This examination is normally written in the January/February examination period.

Leave of Absences

It is in your own interest to attend all the lectures and tutorials. If you have a legitimate reason to be absent from a tutorial, discuss it with your course coordinator so that alternative arrangements may be made. If an alternative arrangement is not possible submit a leave of absence form to the secretary.

DP Requirements

The Department maintains that attendance at lectures, tutorials, tutorial tests and term tests is mandatory (100% attendance). Students who do not attain leave of absence certificates for tests and tutorial tests will be deemed to not have duly performed or completed the course. Students who do not attain at least 30% in each term test will be deemed to not have duly performed. Students who do not attain at least 35% for their class record will be deemed to not have duly performed.

Student Support

The student support system comprises:

- Academic development workshops – 2 x 1½ hours per week;
- Assistance by tutors and lecturers during the tutorial sessions;
- Individual consultations with the lecturer or AD lecturer.

Course, Lecturer and Tutor Evaluation

Student, peer and self evaluation methods are used. You may be asked to complete course, lecturer and tutor evaluation questionnaires. Feedback is given to the students regarding the outcome of the evaluations. Peer evaluation is done by colleagues in the Department, who are aware of the challenges of this course, with regards to both the curriculum and the student body.

2.2 Statistics for Science (STA 1S1) and Statistics for Pharmacy (STA 1P1)

These first year, introductory Statistics courses are offered in the first semester of the year. These courses were formerly known as Statistics 101 (STA 101) and Biostatistics (PC1BST).

STA 1S1: 15 credits at NQF level 5; 5 lectures and 2-period tutorial per week for 13 weeks.

STA 1P1: 15 credits at NQF level 5; 5 lectures and 2-period tutorial per week for 13 weeks.

STA 1S1:

- Who should do the course? Anyone who wishes to have an introduction to the subject of statistics. Some Departments within the Faculty of Science recommend or prescribe that their students attend at least one first year statistics course. Students doing a BSc in the life sciences will find this course useful. The Statistics Department advises that BSc students wanting an introductory course to statistics should consider doing Statistics 1S1. Prospective social and biological scientists are well-advised to include at least one course in Statistics in their curriculum.

STA 1P1:

- Who should do the course? Statistics 1P1 is a pre-requisite course for third-year students taking a Bachelor of Pharmacy degree.

Course Coordinator: Mr Izally. Please contact your course coordinator with any queries or comments concerning the course.

Lecturers: Mr Izally and Dr Chinomona.

Course Objectives

The course aims to provide the student with an understanding of the rationale and methodology which underpins the use of modern statistical techniques. These techniques are developed to empower the student to describe, summarise and analyse data thus allowing the development of a statistically sound problem solving technique. This approach emphasises the problem solving and inferential nature of statistical analysis, while also covering the basic theory of Statistics. The reasoning and philosophy that make statistics an exciting and effective problem-solving skill is covered in sufficient depth to provide the understanding required for good analysis and interpretation.

Areas of Learning

The student will have a knowledge of those basic concepts and techniques of statistics most useful in the health and life sciences.

Embedded Knowledge

The student will know the concepts of:

- Numerical Descriptive Statistics:
 - Measures of Central Tendency: mean, median, mode;
 - Measures of Variability: variance, standard deviation, interquartile range.
- Graphical Descriptive Statistics: Histograms, box-and-whisker plots, bar graphs.

- Probability:
 - Rules of probability: basic properties of probability, addition and multiplication rules;
 - Independent and dependent events and probability calculations pertaining to these, including conditional probability;
 - Tool for calculating probability: contingency tables.
- Probability Distribution(s):
 - Random variables and construction of discrete probability distributions. Particular discrete probability distributions and all calculations pertaining to these: Binomial, Poisson;
 - Particular continuous probability distributions and all calculations pertaining to these: Normal, Student t, chi-square and F.
- Sampling and Estimation:
 - Distribution of the sample mean, including Central Limit Theorem;
 - Confidence intervals: single sample mean (large and small samples), difference between two means for independent and dependent populations, single proportion, difference between two proportions, variance (single sample and two samples);
 - Hypothesis Testing, including all the hypothesis tests corresponding to the confidence intervals already covered. Specific concepts covered include: null and alternative hypotheses, test statistics, rejection regions, p-value, power of the test, conclusions and decision making in light of conclusions.
- Regression and Correlation:
 - Estimating the regression line: method of least squares;
 - Significance of the regression: testing the slope (confidence intervals and hypothesis test), ANOVA approach to regression;
 - Estimation from the regression line: interpolation and extrapolation, prediction including point estimates and confidence intervals for predicted y -values and the mean for particular values of x ;
 - Correlation: calculations and interpretation, hypothesis testing;
 - Multiple regression techniques.
- Design and analysis of questionnaires and categorical data analysis.
- Non-parametric procedures.
- Factorial design ANOVA procedures.
- Introduction to Survival Curves; Kaplan-Meier Estimator; Log-Rank Test; Proportional-Hazards Model.

Specific Outcomes

On completion of the course the students will, inter alia, be able to:

- Collect, summarise and describe data using numerical and graphical techniques;
- Explain the concepts of probability, how to interpret probabilities and how to do calculations involving probabilities;
- Describe the most important probability distributions and how to apply them to statistical problems and analyses of data;

- Perform tests of hypotheses for one- and two-sample analyses, draw conclusions and make decisions based on the outcome of such hypothesis tests;
- Explain the difference between parametric and non-parametric test procedures;
- Describe the concepts and use the methods of regression and correlation;
- Use statistical tables;
- Carry out multi-sample inference, in particular, how to interpret the results of various designs of analysis of variance;
- Summarise categorical data using frequency tables and be able to analyse the data using chi-square tests;
- Perform Sign, Kruskal-Wallis, Friedman, Spearman's rank correlation and Wilcoxon non-parametric procedures; understand when and why they are used; how to calculate the relevant statistics;
- Perform factorial ANOVA procedures; understand why and when to use factorial ANOVA; define the relevant hypothesis; how to calculate and compute the sums of squares; how to formulate a decision rule and make a conclusion; how to test the assumptions of the relevant model.
- Design and layout questions for a questionnaire; understand sampling methodologies; perform the analysis of questionnaire type data using the Chi-squared, Fishers exact and McNemar methodologies;
- Analyse and interpret survival curves using the Kaplan-Meier Estimator; Log-Rank Test; Proportional-Hazards Model.

Textbooks, Handouts and Calculators

The prescribed text is Fundamentals of Biostatistics, 8th edition by Bernard Rosner. You will receive a set of tutorial problems at the beginning of each term and comprehensive solutions to the tutorials at the end of each week. Solutions to tests will be given to you at the end of each term test. The printing costs of the course handouts, statistical tables, tutorial and associated solutions is incorporated into the course charge and charged to your student account.

A scientific calculator, preferably with statistical functions, is required. You may purchase more sophisticated calculators if you wish, but programmable calculators may **not** be used in tests or examinations!

Lectures:

STA 1S1	Lecture Venue	Chemistry Minor				
	Lecture Times	Monday	Tuesday	Wednesday	Thursday	Friday
		4	5	1	2	3

STA 1P1	Lecture Venue	General Lecture Theatre		Biology Major	General Lecture Theatre	
	Lecture Times	Monday	Tuesday	Wednesday	Thursday	Friday
		8	6	3	8	9

Please confirm lecture times and venues via ROSS.

Tutorials and Practicals

The large class is divided into small tutorial groups of approximately 15 students, each with its own tutor. Students work as individuals, pairs or groups during the tutorial sessions under the supervision of their group tutor and with the assistance of a staff member. Practicals using *Statistica* will be run as part of the STA 1S1 and STA 1P1 courses. Details will be provided at the beginning of the course.

STA 1S1 Tutorials: Tuesday periods 7 & 8 in the Great Hall.

STA 1P1 Tutorials: Wednesday periods 4 & 5 in the Great Hall.

Term Tests

There will be two class/term tests during the first semester, one per term. They will be held in the Great Hall (STA 1P1) and Great Hall Veranda (STA 1S1) at 19h00 and will be 90 minutes in duration. You will be supplied with statistical tables for the test; please return these and do not write in them. You are required to bring your own calculator.

	Term Test Dates
Test Venues	Great Hall and Great Hall Veranda
Test Dates	22nd March, 16th May
Test Times	18h45 - 20h30

Dates and venues are subject to change.

If you miss a term test for health reasons, or some other legitimate reason, a leave of absence form must be submitted to the secretary, typically within 48 hours. You may be required to write a make-up test or take an oral test, typically in the last week of term two. It is your responsibility to ensure that you know when and where the test will be held.

Tutorial Tests

These ‘mini tests’ are 10 to 15 minutes each and are written each week during the tutorial session on the content of the previous week’s tutorial problems. They are marked by the tutors, moderated by the lecturer and recorded by the secretary as part of the class record. You will receive feedback during the tutorial of the following week.

Class Record and Course Mark

Marks received for work completed during the course will be incorporated into your class record according to the following criteria:

	Term Tests	Tutorial Tests	Practical Projects	Class Work
Class Record	60%	15%	15%	10%

Should the lecturer decide not to assess the practical projects the tutorial tests will count 30%.

Examinations

Statistics 1S1 and 1P1 are semester courses. The final three-hour examination is written during the June examination period. The content of the examination comprises the entire course. The final course mark is computed as:

	Class Record	Examination
Final Mark	40%	60%

Supplementary Examinations

If you obtain a mark of between 35% and 49% in the STA 1S1 June examination or STA 1P1 June examination, you will be eligible to write a rewrite examination. This examination is normally written in the August supplementary examination period.

DP requirements

The Department maintains that attendance at lectures, tutorials, tutorial tests and term tests is mandatory (100% attendance). Students who do not attain leave of absence certificates for tests and tutorial tests will be deemed to not have duly performed or completed the course. Students who do not attain at least 30% in each term test will be deemed to not have duly performed. Students who do not attain at least 35% for their class record will be deemed to not have duly performed.

Leave of Absences

It is in your own interest to attend all the lectures and tutorials. If you have a legitimate reason to be absent from a tutorial, discuss it with your course coordinator so that alternative arrangements may be made. If an alternative arrangement is not possible submit a leave of absence form to the secretary.

Student Support Attendance

The student support system comprises:

- Individual consultations with the lecturer or AD lecturer;
- Assistance by tutors and lecturers during the tutorial sessions;
- Academic development workshops – 2 x 1½ hours per week.

Course, Lecturer and Tutor Evaluation

Student, peer and self evaluation methods are used. You may be asked to complete course, lecturer and tutor evaluation questionnaires for each semester. Feedback is given to the students regarding the outcome of the evaluations. Peer evaluation is done by colleagues in the Department, who are aware of the challenges of this course, with regards to both the curriculum and the student body.



The Honours Class of 2018: Motivational Notes?

2.3 Mathematical Statistics 102 (MST 102)

This first year introduction to Mathematical Statistics course is offered in second semester. This course was formerly known as Statistics 102 (STA 102).

15 credits at NQF level 5; 5 lectures and 2-period tutorial/practical per week for 13 weeks.

Who should do the course?

This course may be taken as a major subject for BSc, BSc(InfSys), BCom, BEcon, BBusSc, BA or BSocSc degrees. Training in Mathematical Statistics is essential for would be actuarial scientists, market research statisticians, econometricians, risk analysts, statistical analysts to name but a few. *This course is a pre-requisite for all students who register for Mathematical Statistics 2.* Credit in MAM 1, that is in MAM 101 **and** MAM 102, **and** credit in MST 102 are required before a student may register for MST 201 or MST 202.

Course Coordinator: Ms Langston. Please contact your course coordinator with any queries or comments concerning the course.

Lecturers: Ms Langston and Dr F Corrêa.

Regulations: MST 102 is a one-credit first year course. It is offered in the second semester. Students **cannot** obtain an aggregated pass in STA 1S1 and MST 102. Students **cannot** obtain an aggregated pass in STA 1P1 and MST 102.

Prerequisites: At least 40% for Mathematics 1C1.

Course Content

- Combinatorial analysis: the basic counting principles; permutations and combinations.
- Random phenomena: sample spaces and events; the probability axioms; the probability of an event; random selection; probability rules; conditional probability; law of total probability and the theorem of Bayes; stochastic independence.
- Discrete stochastic variables: expected value; variance and moment generating function of a stochastic variable.
- Important discrete distributions: binomial; Poisson, geometric; hypergeometric; negative binomial.
- Joint probability mass functions; Marginal probability functions; Conditional discrete probability functions; Independent random variables.

Textbook and Handouts

The prescribed text is Mathematical Statistics with Applications, 7th edition by Wackerly, Mendenhall and Scheaffer. You will receive a set of tutorial problems at the beginning of each week and comprehensive solutions to the tutorials at the end of each week. Solutions to tests will be given to you at the end of each term test. The printing costs of the course handouts, statistical tables, tutorial and associated solutions is incorporated into the course charge and charged to your student account.

A scientific calculator, preferably with statistical functions, is required. You may purchase more sophisticated calculators if you wish, but programmable calculators may **not** be used in tests or examinations!

Lectures

Lecture Venue	Chemistry Minor				
Lecture Times	Monday	Tuesday	Wednesday	Thursday	Friday
	4	5	1	2	3

Please confirm lecture times and venues via ROSS.

Tutorials

The large class is divided into small tutorial groups of approximately 13 students, each with its own tutor. Students work as individuals, pairs or groups during the tutorial sessions under the supervision of their group tutor and with the assistance of a staff member.

Day	Venues	Periods
Tuesday	Great Hall	7 and 8

Term Tests

You will be supplied with statistical tables for the test; please return these and do not write in them. You are required to bring your own calculator.

	Test Dates
Test Venues	Arts Major
Test Dates	10th August, 3rd October
Test Times	18h45 - 20h30

Dates and venues are subject to change.

If you miss a term test for health reasons, or some other legitimate reason, a leave of absence form must be submitted to the secretary, typically within 48 hours. You may be required to write a make-up test or take an oral test, typically in the last week of term four. It is your responsibility to ensure that you know when and where the test will be held.

Tutorial Tests

These ‘mini tests’ are 10 to 15 minutes each and are written each week during the tutorial session on the content of the previous week’s tutorial problems. They are marked by the tutors, moderated by the lecturer and recorded by the secretary as part of the class record. You will receive feedback during the tutorial of the following week.

Class Record and Course Mark

Marks received for work completed during the course will be incorporated into your class record according to the following criteria:

	Term Tests	Tutorial Tests	Practical Projects	Class Work
Class Record	60%	15%	15%	10%

Should the lecturer(s) decide not to assess the practical projects the tutorial tests will count 20% and the class work 20%.

Examinations

Mathematical Statistics 102 is a semester course and the final three-hour examination is written during the November examination period. The content of the examination comprises the entire course. The final course mark is computed as:

	Class Record	Examination
Final Mark	40%	60%

Supplementary Examinations

If you obtain a mark of between 45% and 49% in the November examination, you will be eligible to write a supplementary examination. This examination is normally written in January/February examination period.

DP requirements

The Department maintains that attendance at lectures, tutorials, tutorial tests and term tests is mandatory (100% attendance). Students who do not attain leave of absence certificates for tests and tutorial tests will be deemed to not have duly performed or completed the course. Students who do not attain at least 30% in each term test will be deemed to not have duly performed. Students who do not attain at least 35% for their class record will be deemed to not have duly performed.

Leave of Absences

It is in your own interest to attend all the lectures and tutorials. If you have a legitimate reason to be absent from a tutorial, discuss it with your course coordinator so that alternative arrangements may be made. If an alternative arrangement is not possible submit a leave of absence form to the secretary.

Student Support

The student support system comprises:

- Assistance by tutors and lecturers during the tutorial sessions;
- Individual consultations with the lecturer.

Course, Lecturer and Tutor Evaluation

Student, peer and self evaluation methods are used. You may be asked to complete course, lecturer and tutor evaluation questionnaires. Feedback is given to the students regarding the outcome of the evaluations. Peer evaluation is done by colleagues in the Department, who are aware of the challenges of this course, with regards to both the curriculum and the student body.



Mr Ezintle Baba (BScH 2018), Dr Chinomona and Ms Lulama Gcakasi (BScH 2018)

2.4 Mathematical Statistics 2 (MST 201 & MST 202)

The second year Mathematical Statistics courses offered in the Department of Statistics.

MST 201: 20 credits at NQF level 6; 6 lectures and 3-period tutorial per week for 13 weeks.

MST 202: 20 credits at NQF level 6; 6 lectures and 3-period tutorial per week for 13 weeks.

Who should do the course?

This course may be taken as a major subject for BSc, BSc(InfSys), BCom, BEcon, BBusSc, BA or BSocSc degrees. Training in Mathematical Statistics is essential for would be actuarial scientists, market research statisticians, econometricians, risk analysts, statistical analysts to name but a few.

Course Coordinators: Professor L Raubenheimer and Dr Chinomona (MST 202).

MST 201 Lecturers: Professor L Raubenheimer and Professor Szyszkowski.

MST 202 Lecturers: Dr Chinomona and Ms A Langston.

Regulations: MST 2 is a two-credit second year course in Mathematical Statistics. MST 2 comprises two one semester courses MST 201 and MST 202 which are held in the first and second semesters, respectively. Credit may be obtained in each course separately and an aggregate mark of at least 50% will be deemed to be equivalent to a two-credit course MST 2, provided that a student obtains the sub-minimum of at least 40% in each component. If a student obtains a pass in a semester course, but fails to gain an aggregate pass for the full course in the following examination, then that student will be required to pass the semester course failed in order to gain the full credit.

Prerequisites: Credit in MAM 1, that is in MAM 101 **and** MAM 102, **and** credit in MST 102 are required before a student may register for MST 201 or MST 202. A mark of at least 40% in MST 201 is required before a student may register for MST 202.

Course Objectives and Content

The aim of the course is to present a solid calculus based background in statistical theory together with its applications to solving practical real world problems. This course puts special emphasis on a clear understanding of the nature of statistics and on its importance in scientific investigations. Anyone who has a credit in Mathematics and Applied Mathematics 1 and Mathematical Statistics 102 can benefit from this inspiring and useful course. Most MST 2 students choose to major in Mathematical Statistics. Students intending to major in Mathematical Statistics should note that an average of at least 60% for MST 2 is strongly suggested to register for MST 3 or AST 3. Students intending to major in statistics are strongly encouraged to take Mathematics and Applied Mathematics 2 (MAM 2).

Mathematical Statistics 201 and 202

MST 201: The student will, inter alia, know the concepts of:

- Axiomatic probability theory; conditional probabilities;
- Random variables; standard univariate distributions;
- Expected values and moments; moment generating functions;
- Jointly distributed variates;
- Distributions of functions of random variables;
- A selection of topics from decision theory, risk theory and simulation.

MST 202: A selection of topics from:

- Sampling distributions;
- Point and interval estimation;
- Tests of hypotheses;
- Correlation and linear regression;
- A selection of topics from design and analysis of questionnaires, time series analysis, econometrics and non-parametric methods.

Textbook and Handouts

The prescribed text is Mathematical Statistics with Applications, 7th edition by Wackerly, Mendenhall and Scheaffer. You will receive a set of tutorial problems at the beginning of each week and comprehensive solutions to the tutorials at the end of each week. Solutions to tests will be given to you at the end of each term test. The printing costs of the course handouts, statistical tables, tutorial and associated solutions is incorporated into the course charge and charged to your student account.

A scientific calculator, preferably with statistical functions, is required. You may purchase more sophisticated calculators if you wish, but programmable calculators may **not** be used in tests or examinations!

Lectures and Tutorials

Please confirm lecture times and venues via ROSS.

Lecture Venue	Physics Lower				
Lecture Times	Monday	Tuesday	Wednesday	Thursday	Friday
	2	3	4	5 & 6	1

Thursday period 6 is presented in the Statistics PC Lab. Tutorials will be held on Thursday afternoons during periods 7, 8 and 9 in the Sociology seminar rooms A and B.

Term Tests

There will be two class/term tests in each semester, one per term. They will be held at 19h00 and will be 90 minutes in duration. You will be supplied with statistical tables for the test; please return these and do not write in them. You are required to bring your own calculator.

Term Test Dates		
Test Venue: Arts Minor		
	MST 201	MST 202
Test Dates	23rd March	8th August
	18th May	4th October
Test Times	18h45 - 20h30	

Dates and venues are subject to change.

If you miss a test for health reasons, a leave of absence form must be submitted to Mrs R. Zimmerman, ideally within 48 hours. You may be required to write a test or take an oral test and it is your responsibility to ensure that you know when and where the test will be written.

Practical Project

Practical projects, using R, are run as part of the MST 201 and 202 courses. Details will be provided at the beginning of the course.

Class Record and Course Mark

Marks received for work completed during the course will be incorporated into your class record according to the following criteria:

	Term Tests	Tutorial Tests	Practical Projects	Class Work
Class Record	60%	15%	15%	10%

Should the lecturer(s) decide not to assess the practical projects the tutorial tests will count 20% and the class work 20%.

Examinations

Two three-hour examinations will be written: one during the June examination period (MST 201) and the other during the November examination period (MST 202). The final course mark is computed as:

	Class Record	Examination
Final Mark	30%	70%

Supplementary Examinations

There are no supplementary examinations for MST 201 and 202.

DP requirements

The Department maintains that attendance at lectures, tutorials, tutorial tests and term tests is mandatory (100% attendance). Students who do not attain leave of absence certificates for tests and tutorial tests will be deemed to not have duly performed or completed the course. Students who do not attain at least 30% in each term test will be deemed to not have duly performed. Students who do not attain at least 35% for their class record will be deemed to not have duly performed.

Leave of Absences

These should be submitted to the Mrs R. Zimmerman should you be unable to attend a lecture, tutorial or practical.

Student Support

The student support system comprises:

- Assistance by tutors and lecturers during the tutorial sessions;
- Individual consultations with the lecturer.

Course, Lecturer and Tutor Evaluation

Student, peer and self evaluation methods are used. You may be asked to complete course, lecturer and tutor evaluation questionnaires for each semester. Feedback is given to the students regarding the outcome of the evaluations. Peer evaluation is done by colleagues in the Department, who are aware of the challenges of this course, with regards to both the curriculum and the student body.



Honours Examinations; 2021.

2.5 Mathematical Statistics 3 (MST 301, MST 302) and Applied Statistics 3 (AST 302)

Welcome back! We look forward to having you in our third-year course. The third year Mathematical Statistics courses offered in the Department of Statistics.

MST 301: 30 credits at NQF level 7. 6 lectures and 3-period tutorial/practical per week for 13 weeks.

MST 302: 30 credits at NQF level 7. 6 lectures and 3-period tutorial/practical per week for 13 weeks.

AST 302: 30 credits at NQF level 7. 6 lectures and 3-period tutorial/practical per week for 13 weeks.

Course Coordinators: Mr Baxter (MST 301) and Prof Szyszkowski (MST 302). Please contact your course coordinator with any queries or comments concerning the course.

Lecturers: Mr Baxter, Professor Raubenheimer, Professor Szyszkowski and Mr Izally.

Regulations

Mathematical Statistics 3 (MST 3) is a two-credit third-year course in Mathematical Statistics. It comprises two one semester courses MST 301 and MST 302 which are held in the first and second semesters, respectively. Credit may be obtained in each course separately and an aggregate mark of at least 50% will be deemed to be equivalent to a two-credit course MST 3, provided that a student obtains the sub-minimum of at least 40% in each component.

Applied Statistics 3 (AST 3) is a two-credit third-year course in Applied Statistics. It comprises two one semester courses MST 301 and AST 302 which are held in the first and second semesters, respectively. Credit may be obtained in each course separately and an aggregate mark of at least 50% will be deemed to be equivalent to a two-credit course AST 3, provided that a candidate obtains the required sub-minimum in each component. Due to staffing constraints AST 302 will not be offered in the foreseeable future.

Prerequisites

Credit in Mathematical Statistics 2 (MST 2), Mathematical Statistics 102 (MST 102) and Mathematics and Applied Mathematics 1 (MAM 1) are required before a student may register for MST 301, MST 302 or AST 302. An aggregated mark of at least 60% for MST 2 is **strongly suggested** for students registering for MST 3. Students are encouraged to take Mathematics and Applied Mathematics 2 (MAM 2) prior to registering for MST 3.

Adequate performance in MST 301 is required before a student may register for MST 302, that is a mark of at least 40% in MST 301 is required before a student may register for MST 302. If a student obtains a pass in a semester course, but fails to gain an aggregate pass for the full course in the following examination, then that student will be required to pass the semester course failed in order to gain the full credit.

Course Objectives and Content

MST 3 is an advanced undergraduate course in Mathematical Statistics which covers the theoretical underpinnings of the major branches of Mathematical Statistics. The course includes a paper in applied theoretical statistics and the use of the statistical package R.

The student will, inter alia, know the concepts of:

Mathematical Statistics 301:

- Distribution theory;
- Normal sampling theory;

- Multivariate normal distribution;
- The general linear model;
- Nonlinear regression;
- Analysis of variance;
- Multivariate statistical procedures.

Mathematical Statistics 302:

- Stochastic processes and financial statistics;
- Bayesian statistics.

Textbooks and Handouts

The prescribed textbook for MST 301 is Linear Models in R, 2nd edition by J. J. Faraway, Chapman & Hall CRC, 2015. The prescribed textbook for MST 302 is An Elementary Introduction to Mathematical Finance, 3rd edition by Sheldon M. Ross. Cambridge University Press, 2011.

You will be supplied with notes which cover the contents of the MST 301 Introduction to Distribution Theory and MST 302 Bayesian Statistics courses. You will receive a set of tutorial problems at the beginning of each week and comprehensive solutions to the tutorials at the end of each week. Solutions to tests will be given to you at the end of each term test. The printing costs of the course handouts, statistical tables, tutorial and associated solutions is incorporated into the course charge and charged to your student account.

A scientific calculator, preferably with statistical functions, is required. You may purchase more sophisticated calculators if you wish, but programmable calculators may **not** be used in tests or examinations!

Lectures and Tutorials

Please confirm lecture times and venues via ROSS.

Lecture Venue	Department of Statistics Seminar Room 1				
Lecture Times	Monday	Tuesday	Wednesday	Thursday	Friday
	1	2	3	4	5 & 6

Tutorials will be held on Friday afternoons during periods 7, 8 and 9 in the Statistics Seminar Room.

Term Tests

There will be two class/term tests during each semester, one per term, which will take place in the **Statistics Seminar room**. You will be supplied with statistical tables for the test; please return these and do not write in them. You are required to bring your own calculator.

Term Test Dates		
	MST 301	MST 302
Test Dates	23rd March	8th August
	18th May	4th October
Test Times	18h45 - 20h30	

Dates and venues are subject to change.

If you miss a test for health reasons, a leave of absence form must be submitted to Mrs R. Zimmerman, ideally within 48 hours. You may be required to write a test or take an oral test and it is your responsibility to ensure that you know when and where the test will be written.

Practical Project(s)

Practical projects will be run as part of the MST 301 and MST 302 courses. Details will be provided at the beginning of the course.

DP Requirements

The Department maintains that attendance at lectures, tutorials, tutorial tests and term tests is mandatory (100% attendance). Students who do not attain leave of absence certificates for tests and tutorial tests will be deemed to not have duly performed or completed the course. Students who do not attain at least 30% in each term test will be deemed to not have duly performed. Students who do not attain at least 35% for their class record will be deemed to not have duly performed.

Class Record and Course Mark

Marks received for work completed during the course will be incorporated into your class record according to the following criteria:

Course/Paper	Tests	Tutorial Tests	Tutorials	Practical Projects
MST 301: Multivariate	50%	10%	20%	20%
MST 301: GLM	50%	10%	20%	20%
MST 302: Finance	60%	20%	50%	
MST 302: Bayesian	70%		20%	10%

Information with regards the course assessment structure will be made clear in lectures at the start of each module or term.

Examinations

Two three hour examinations will be written for each semester course: two during the June examination period (MST 301) and the other two during the November examination period (MST 302). The final course mark for each course is computed as:

	Class Record	Examination
Final Mark	30%	70%

Supplementary Examinations

No supplementary examinations will be offered for MST 3 or AST 3.

Leave of Absences

These should be submitted to the secretary (Mrs R. Zimmerman) should you be unable to attend a lecture, tutorial or practical.

Student Support

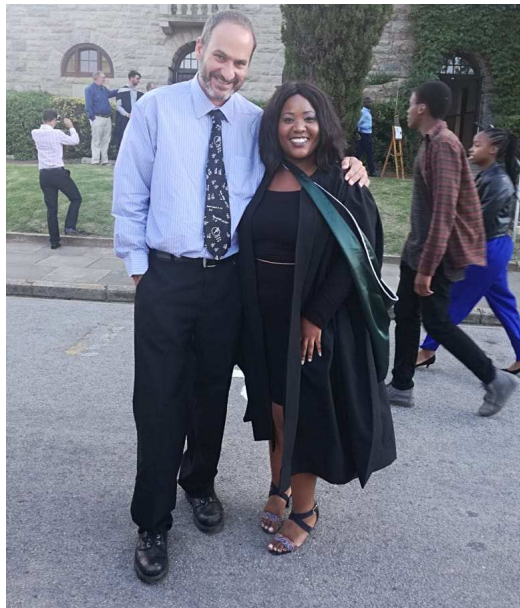
The student support system comprises:

- Assistance by tutors and lecturers during the tutorial sessions;
- Individual consultations with the lecturer.

Course, Lecturer and Tutor Evaluation

Student, peer and self evaluation methods are used. You may be asked to complete course, lecturer and tutor evaluation questionnaires for each semester. Feedback is given to the students regarding the outcome of the evaluations. Peer evaluation is done by colleagues in the Department, who are aware of the challenges of this course, with regards to both the curriculum and the student body.

Postgraduate Courses



Ms Lulama Gcakasi (BScH 2018) and Mr Jeremy Baxter

3.1 Mathematical Statistics Honours

The Statistics Department offers Mathematical Statistics Honours as well as Joint Mathematical Statistics Honours in the Faculties of Science (BScH) or Commerce (BComH).

MSTH : 120 credits at NQF level 8.

To be eligible to read towards the degree, students are required to attain at least 65% on average, where no module or paper or component is less than 60%, in their undergraduate third year Mathematical Statistics course(s). Students are strongly encouraged to take at least Mathematics and Applied Mathematics 2 in their undergraduate studies.

Mathematical Statistics Honours students are required to complete five modules to the total value of 84 credits (70%) and complete a research project to the value of 36 credits (30%). The Multivariate Analysis, Generalized Linear Models and Computation, Applied Statistics and Consulting modules (or papers) are compulsory for students registered for the BScH or BComH Mathematical Statistics degrees, that is the non-joint registrations. All students whose projects are supervised in the Department of Statistics are required to attend a short seminar series on typesetting mathematical documents. Subject to staff availability, students may choose modules from the various statistics modules/papers listed below. The research project includes an oral presentation to the staff, postgraduate and senior undergraduate statistics students in the Department of Statistics. Students may choose a research topic from the list of suggested topics provided at the start of each year by the staff. Alternatively students may suggest and subsequently discuss a topic/project with a member of staff; subject to the HoD's approval. These are individual research projects; to be clear they are not group work. Due to staff constraints, the department balances the staff work loads. As a result not all staff may be available to supervise Honours projects each year and students are not guaranteed their first choice research project.

At the discretion of the Head of Department of Statistics, a student may include modules from Pure or Applied Mathematics, Economics, Computer Science or any other approved subject to read towards the honours or the joint honours degree. For the honours degree, at most 16.8 credits (7.2%) of the final mark may be obtained from another department. For the joint honours degree where the primary registration is in the Department of Statistics, the research component of the degree must be supervised by a member of staff in the Department of Statistics and at least two modules, comprising 33.6 credits, must be taken from modules offered by the Department of Statistics. At the discretion of the Head of Department in which the student is primarily registered and in consultation with the Head of Department of Statistics, students may take modules offered by the Department of Statistics towards their BScH or BComH degree.

Mathematical Statistics Honours students will be charged R480,00 for handouts and for the use of textbooks for the year. Should these texts not be returned after the relevant examinations the cost of replacing the text will be charged to your students account.

	Research Project	Module					Total
		1	2	3	4	5	Credits
Honours Degree	36	16.8	16.8	16.8	16.8	16.8	120
Joint Honours Degree	36	16.8	16.8	At least 50.4 credits			120

Course Coordinator: Professor Raubenheimer. Please contact your course coordinator with any queries or comments concerning the course.

Modules: Depending on staff availability, the department offers the following modules (not all each year). Each module is worth 16.8 credits (14%).

1. **Generalized Linear Models:** A study of the general procedures of estimation and hypothesis testing for linear statistical models with specific applications for unbalanced data that often arise in research and survey work.

2. **Multivariate Analysis:** A study of statistical models suitable for describing and analysing multivariate data.
3. **Survey Methods and Sampling Techniques:** The course is a study of the theory of sample survey procedures and their application in practice.
4. **Stochastic Processes:** A study of mathematical models of systems that change in ‘time’ according to probabilistic laws. Examples of such systems are birth and death processes, storage and inventory systems, renewal and point processes.
5. **Computation, Applied Statistics and Consulting (CASC):** A weekly seminar series comprised of topics on statistical computation using R, the general principles of statistical consulting and statistical report writing, including but not limited to the preparation of statistical reports, presentations and communication. This course is typically assessed via a portfolio.
6. **Bayesian Statistics:** A study of the methods of decision making where prior beliefs and relevant data enable one to arrive at posterior beliefs.
7. **Risk Analysis:** A process of characterising, managing, and informing others about the existence, nature, magnitude, prevalence, contributing factors, and uncertainties that pertain to the potential losses. A proper risk analysis will adequately model the system, demonstrate the effect of mitigating measures, and communicate these to the public. Probabilistic risk analysis attempts to model events that almost never occur.
8. **Econometrics:** A study of statistical methods of obtaining estimates of parameters of economic theory. Econometric methods take into account random like disturbances which create deviations from the exact behavioural patterns suggested by economic theory and mathematical economics.
9. **Simulation and Bootstrap Methods:** A computer intensive course on simulating real world processes.
10. **Probability Theory:** A study of the mathematical entities which are used in constructing statistical theories.
11. **Queueing Theory and Simulation:** A study of models in which customers arrive in some random manner at a service facility.
12. **Stochastic Calculus in Finance:** A study of the mathematics of financial derivatives.

Degree Structure

Students choices of modules and research project must be submitted to the Honours course coordinator as per the Honours Booklet. The course coordinator, in consultation with the HoD, will confirm the degree structure and appoint a research project supervisor. Any changes to the agreed degree structure must be discussed with the course coordinator prior and confirmed with the HoD.

Class Record, Course Mark and Examinations

Examinations for some of the modules are written in June and others in November. Each examination is normally three hours long. No supplementary examinations are offered. The class mark for each module counts 30%. There is a sub-minimum of 40% for each module.

Tutors

It is hoped that postgraduate students will be appointed, at the discretion of the Head of Department, as tutors in the Department of Statistics.

DP requirements

The Department maintains that attendance at lectures, seminars, tutorials, practicals and term tests is mandatory (100% attendance). Students who do not attain leave of absence certificates for tests will be deemed to not have duly performed or completed the course. Students who do not attain at least 30% in each test will be deemed to not

have duly performed. Students who do not attain at least 35% for their class record will be deemed to not have duly performed. Students who do not attain at least 35% for their applied statistics and consulting portfolio will be deemed to not have duly performed.



Honours Seminars 2018.



Honours Class of 2021: Post assessment meeting.

3.2 Mathematical Statistics Masters

The Statistics Department offers Mathematical Statistics Masters in the Faculties of Science (MSc) or Commerce (MCom).

MSTM : 180 credits at NQF level 9.

Students who attain at least 65% in their Honours degree are encouraged to proceed to research degrees under the direction of the staff of the Department. The Master's degree may be taken by thesis (100%) or by a combination of coursework and a thesis, where the thesis counts at least 50% of the final mark. A student may also be required to take an oral examination.

Students who have completed an Honours in this department should discuss their intention to read towards a Masters with the member of staff they have identified to supervise their studies, or alternatively with the HoD. Students who completed their Masters at an institution other than Rhodes University should submit a draft research note that outlines your area of interest, your academic record and a current curriculum vitae to stats@ru.ac.za. Based on this, the Head of the Department of Statistics will identify an appropriate supervisor. They will work with you on appropriate research proposal that is submitted for consideration by faculty for admission to read towards the degree.

Information with regard to student funding and financial aid can be found on the postgraduate funding opportunities web page, <https://www.ru.ac.za/researchgateway/postgraduates/funding/>. This page provides prospective postgraduate students with further information, application forms and the contact details of the Rhodes University Postgraduate Financial Aid Administrator, Mr John Gillam.

It is hoped that postgraduate students will be appointed, at the discretion of the Head of Department, as tutors or graduate assistants in the Department of Statistics. Please discuss any queries or concerns you might have with your supervisor prior to contacting the Head of Department.

Students who have chosen to do their Master's degree by coursework and thesis are required to select modules (that they have not taken before) to read towards their degree. The modules are listed under the Honours course information. At the discretion of the Head of Department of Statistics, a student may include modules from Pure or Applied Mathematics, Economics, Computer Science or any other approved subject to read towards the Master's by coursework degree. Examinations for some of the modules are written off in June and others in November. The coursework component contributes at most 50% towards the final year mark. The class mark contributes 30% for each module. There is a sub-minimum of 40% for each module. Students will be expected to present a thesis which contributes at least 50% towards the final mark. Depending on staff availability the Master's by coursework degree may not be offered.

3.3 Doctoral Degrees

Staff in the Department of Statistics supervise students reading towards a Doctorate in Philosophy in the Faculties of Science or Commerce.

MSTPhD : 360 credits at NQF level 10.

Suitably qualified students are encouraged to proceed to research degrees under the direction of the staff of the Department.

Students who have completed a Masters in this department should discuss their intention to read towards a PhD with the member of staff they have identified to supervise their studies, or alternatively with the HoD. Students who completed their Masters at an institution other than Rhodes University should submit a draft research note that outlines your area of interest, your academic record and a current curriculum vitae to stats@ru.ac.za. Based on this, the Head of the Department of Statistics will identify an appropriate supervisor. They will work with you on appropriate research proposal that is submitted for consideration by faculty for admission to read towards the degree.

3.4 Postgraduates and Publishing

If students are publishing their own work, that is a single author publication which is not related or included in their thesis, they may not use Rhodes University as their affiliation unless their supervisor has reviewed the publication.

Publications in predatory¹ journals do not count towards the research funding provided to the university by the Department of Higher Education and Training (DHET). As a result such publications do not count when academics apply for appointment, tenure or promotion². As a result postgraduate students are strongly encouraged to avoid predatory journals. The DHET provides a list of accredited and hence subsidy earning journals which is available from your supervisor. Further reading and resources can be found at <https://libguides.wits.ac.za/ScholarlyCommunication/PredatoryPublishing>. A reasonably comprehensive list³ of predatory journals can be found at <https://predatoryjournals.com/journals/>.

¹See for example https://en.wikipedia.org/wiki/Predatory_publishing

²The link for the Rhodes University published DHET accredited journal list is available at <https://my.ru.ac.za/imbizo/researchresources/researchoutputscreativeoutputsandinnovations/>.

³Which for the record is not particularly comprehensive!

Postgraduate Profiles



Honours and Masters Students and Supervisors (2017)

Mtwa Sithayanda (Masters Student, 2017/2018):

I came to Rhodes University in 2012 and enrolled under the Science Foundation program. From a very young age I've had a keen interest in all things mathematical. I am fascinated by the structure and beauty in the mathematical sciences and how mathematics and statistics can be applied to solve problems in science and commerce. Even without the applications of maths and stats in various disciplines, their study in and of themselves is a journey worth undertaking. In 2013 I joined the Statistics department and one of the things that I noticed was how friendly the staff was, they had a genuine interest in students and would go out of their way to help whenever they could. This is a culture I also adopted when I was appointed as a tutor and thereafter as a student assistant. Rhodes University has groomed me into the young responsible adult I am today, it has offered me numerous opportunities to grow, to learn and to invest to the development of both myself and others. In this process, the department of Statistics has been instrumental, thanks largely to my mentor and friend, Mr. Sharkay Izally. I've been encouraged a great deal by the faith that the department has in me, and this more than anything has been the highlight of my time at Rhodes; having been selected to tutor Mathematical Statistics 3 two consecutive years. I consider the department of Statistics a home away from home, the academics are welcoming and highly competent. Their passion for teaching Statistics and being actively involved in research has inspired me to pursue post graduate studies in the department. I am grateful to both the staff and students who have helped me to do my best and strive for excellence in everything I do.

Bonelwa Sidumo and Hassan Mazengera (Masters students, 2016/2017):

Being in this department keeps reminding us that we live in a world of uncertainty and probability is at the heart. You cannot tell what will happen in the next time interval. Rhodes is in Makhanda and the weather is very dynamic, on the same day extremely high and low temperature may be experienced and as if it's not enough rain may spice it up. This dynamism in weather makes us appreciate statistical models and in particular stochastic models. This appreciation is only unique to Rhodes. I always think of weather derivatives as a research discipline and how unique Makhanda models will be from the rest of world. Researchers and prospective students with interest in these and more areas should consider Rhodes.

Statistical models make our life better by predicting the future with accuracy (Bonelwa Sidumo, 2016).

We are living in a world where models can only predict the future with accuracy but not with precision let alone beyond the future. Statistical models are at test (Hassan Mazengera, 2016).



Mr Richard Southey and Ms Bonelwa Sidumo (MSc 2018)

Work hard and have fun!