

**MATH212 Advanced Calculus and Linear Algebra
Semester 1, 2025 Pietermaritzburg**

Lecturer and Co-ordinator: Dr H Sithole Mthethwa
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Aims and Objectives:

At the end of the course the student must be able to give a coherent treatment of basic theories and problem-solving techniques from Advanced Calculus and Linear Algebra and their Applications

Course outline:

- **Advanced Calculus (Dr H Sithole Mthethwa):** Functions of several variables. Partial derivatives, differentiability, chain rules, implicit differentiation. Extrema and Lagrange multipliers. Multiple integrals, change of variables.
- **Linear Algebra (Mr N Khuzwayo):** Axioms for vector spaces. Linear independence, bases and dimension. Matrices and linear transformations. Change of basis. Eigenvectors and eigenvalues, diagonalization and its applications (including linear differential equations). Orthogonality, Gram-Schmidt process.

DP(Duly performed): 35% class mark and 80% attendance of both tutorials and lectures

Final Mark Calculation: Class mark (33%)

3 Tests + Average of
Tutorial quizzes

Exam (67%)

Lectures and Tutorials: All tutorials are compulsory and they will be a tutorial test after each tutorial, these will form test 4.

Time Table: Lectures: Tue (12:20 - 13:05), Thurs (08:40 - 10:20), Fri (07:45 - 08:30 and 11:25 - 12:10); Tutorials: Mon (14:10 - 16:45)
- Venue: MSB F15.

Calculators: Not allowed

Test Dates: To be announced

Recommended Text

- James Stewart, Calculus, 8th Edition, 2014
- Howard Anton, Elementary Linear Algebra: Application Version, Howard Anton, 11th ed, 2013.
- John B. Fraleigh, Linear Algebra, 3rd ed, 1995.

Extra Reading:

Any Advanced Calculus and Linear Algebra book from the library.

NOTE:

- (i) If you have problems contact your lecturer without delay. To be helped, evidence of your effort shall be required.
- (ii) Tests are mainly based on the tutorial questions, the questions asked require the concepts learnt doing the problems and are not necessarily those in the tutorials.
- (iii) Failure to write a test will result in a zero mark unless a supporting document, e.g. medical certificate, is submitted within two working days of the test date to the school's administrator, Ms Zibuyile Shangase shangasez@ukzn.ac.za Please copy the lecturer when sending this email.
- (iv) Announcements will be made in class, and/or posted under notices on the website, or emailed to registered students. It is the student's responsibility to make a note of all announcements. We need to select a class rep. Please follow the communication protocol for addressing student grievances relating to academic matters.