Tutorial letter 101/0/2025

LINEAR ALGEBRA III
MAT3701

Year module

Department of Mathematical Sciences

IMPORTANT INFORMATION:

Please activate your *my*Unisa and myLife e-mail account and make sure that you have regular access to the *my*Unisa module website MAT3701-25-Y, as well as your group website.

Note: This is a fully online module. It is therefore, only available on *my*Unisa.

Define tomorrow.

UNISA | university of south africa

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1   INTRODUCTION

Dear Students

Unisa is a comprehensive open distance e-learning (CODeL) higher education institution. The comprehensiveness of our curricula encapsulates a range of offerings, from strictly vocational to strictly academic certificates, diplomas and degrees. Unisa's "openness" and its distance eLearning character result in many students registering at Unisa who may not have had an opportunity to enrol in higher education. Our CODeL character implies that our programmes are carefully planned and structured to ensure success for students ranging from the under-prepared but with potential to the sufficiently prepared.

Teaching and learning in a CODeL context involves multiple modes of delivery ranging from blended learning to fully online. As a default position, all post graduate programmes are offered fully online with no printed study materials, while undergraduate programmes are offered in a blended mode of delivery where printed study materials are augmented with online teaching and learning via the learner management system - myUnisa. In some instances, undergraduate programmes are offered fully online as well.

Furthermore, our programmes are aligned with the vision, mission and values of the University. Unisa's commitment to serve humanity and shape futures combined with a clear appreciation of our location on the African continent, Unisa's graduates have distinctive graduate qualities which include

- independent, resilient, responsible and caring citizens who are able to fulfil and serve in multiple roles in their immediate and future local, national and global communities.

- having a critical understanding of their location on the African continent with its histories, challenges and potential in relation to globally diverse contexts.

- the ability to critically analyse and evaluate the credibility and usefulness of information and data from multiple sources in a globalised world with its ever-increasing information and data flows and competing worldviews

- how to apply their discipline-specific knowledges competently, ethically and creatively to solve real-life problems.

- an awareness of their own learning and developmental needs and future potential.

The module MAT3701 is offered online, meaning that all information is available via the internet, we use *myUnisa* platform as our virtual campus. This is an online system that is used to administer, document and deliver educational material to you and support engagement with you. Look out for information from your lecturer as well as other Unisa platforms to determine how to access the virtual *myUnisa* module site.

The website for your module is MAT3701-25-Y.

2 WELCOME TO MAT3701

Welcome to the MAT3701 module. We trust that you will find the content both interesting and rewarding.

This tutorial letter contains important information about the scheme of work and resources for the module as well as exam admission.

We urge you to read it carefully before working through the study material, preparing the assignment(s), preparing for the examination and addressing questions to your lecturers.

In this tutorial letter, you will find the instructions on the preparation and submission of the assignments. It also provides all the information you need with regard to the prescribed study material and other resources. Please study this information carefully and make sure that you obtain the prescribed material as soon as possible. You will access all files online, including a number of tutorial letters and solutions to assignments. These tutorial letters will be uploaded on myUnisa, under **Offical Study materials** or **Additional Resources** on the myUnisa platform.

Right from the start we would like to point out that you must read all the tutorial letters you access from the module site immediately and carefully, as they always contain important and, sometimes urgent information.

We wish you every success with your studies!

3 MODULE OVERVIEW

3.1 Purpose

In this module you continue your study of Linear Algebra started in previous modules like MAT2611. Here we go beyond looking at matrices as tools for solving systems of linear equations, and we consider sets of matrices as mathematical structures that can be studied for their own sake.

This module leads naturally to honours modules in Linear Algebra and Functional Analysis.

3.2 Outcomes

The outcomes of the module are based on the material in Chapters 1, 2, 4, 5, and 6 of the fourth edition of the prescribed textbook. The specific outcomes for this module are as follows.

- The student will demonstrate an understanding of the basic concepts of vector spaces by being able to explain them, use them in solving problems and answer questions about theorems that describe their relationships. These concepts include the notions of a vector space, subspace, systems of linear equations, linear dependence and independence and bases of vector spaces.

- The student will demonstrate an understanding of linear transformations between vector spaces and the related matrices that represent them. This includes the composition of linear transformations, as well as the notions of invertibility of linear transformations and isomorphisms between vector spaces.

- The student will demonstrate an understanding of properties of determinants of matrices.

- The student will demonstrate an understanding of the notions of eigenvectors and eigenvalues of linear operators and matrices, as well as the diagonalizability of matrices. The student will be able to solve problems related to invariant subspaces and the Cayley-Hamilton Theorem

- The student will demonstrate an understanding of the following concepts related to inner product spaces: norms, Gram-Schmidt orthogonalization, orthogonal complements, normal and self-adjoint operators, orthogonal projections, the Spectral Theorem, bilinear and quadratic forms, and the Rayleigh quotient.

4   CURRICULUM TRANSFORMATION

Unisa has implemented a transformation charter, in terms of which the university has placed curriculum transformation high on the teaching and learning agenda. Curriculum transformation includes student-centred scholarship, the pedagogical renewal of teaching and assessment practices, the scholarship of teaching and learning, and the infusion of African epistemologies and philosophies. All of these will be phased in at both programme and module levels, and as a result of this you will notice a marked change in the teaching and learning strategy implemented by Unisa, together with the way in which the content is conceptualised in your modules. We encourage you to embrace these changes during your studies at Unisa in a responsive way within the framework of transformation

5   LECTURER(S) AND CONTACT DETAILS

5.1   Lecturer(s)

The primary lecturer for this module is Dr. A. Swartz:

Department: Mathematical Sciences
E-mail: swartam@unisa.ac.za

A notice will be posted on *myUnisa* if there are any changes and/or an additional lecturer is appointed to this module.

Please do not hesitate to consult your lecturer whenever you experience difficulties with your studies. You may contact your lecturer by phone or through correspondence or by making a personal visit to his/her office. Please arrange an appointment in advance (by telephone or by e-mail) to ensure that your lecturer will be available when you arrive. Please come to these appointments well prepared with specific questions that indicate your own efforts to have understood the basic concepts involved. If these difficulties concern exercises which you are unable to solve, you must send us your attempts so that we can see where you are going wrong.

If you should experience any problems with the exercises in the study guide or prescribed book, your lecturer will gladly help you with them, provided that you send in your attempts. When sending in any queries or problems, please do so separately from your assignments and address them directly to your lecturer.

5.2   Department

You can contact the Department of Mathematical Sciences as follows:

> Department of Mathematical Sciences
> Departmental Secretary: 011 670 9147 (RSA)   +27 11 670 9147 (International)
> e-mails: mathsciences@unisa.ac.za   or   swanem@unisa.ac.za

5.3   University

To contact the University, follow the instructions on the Contact us page on the Unisa website.

Contact addresses of the various administrative departments appear on the Unisa website:
http://www.unisa.ac.za/sites/corporate/default/Contact-us/Student-enquiries
Please include the student number in all correspondence.
Whenever you contact a lecturer via e-mail, please include your student number in the subject line to enable the lecturer to help you more effectively.

6   RESOURCES

6.1   Prescribed book(s)

The prescribed book for this module is

Title:	Linear Algebra
Author:	Friedberg, Insel and Spence
Publishers:	PRENTICE HALL
Edition:	Fourth Edition
Year:	2003
ISBN:	0-13-008451-4

The above is the latest edition of the textbook. You are welcome to use the 2nd or 3rd edition of the book instead, they are similar enough to the latest edition.

Please buy the textbook as soon as possible since you have to study from it directly – you cannot do this module without the prescribed textbook.
Please refer to the list of official booksellers and their addresses in the *Study @ Unisa* brochure. Prescribed books can be obtained from the University's official booksellers. If you have difficulty in locating your book(s) at these booksellers, please contact the Prescribed Book Section at Tel: 012 429-4152 or e-mail vospresc@unisa.ac.za.

6.2   Recommended book(s)

The following books are also available at the Unisa Library and may be useful for background reading. However, there is a limited number of copies of these books.

- Ayres, Frank: *Schaum's Outline of Theory and Problems of Matrices*, McGraw-Hill, New York, 1974.

- Cullen, Charles G.: *Matrices and Linear Transformations*, Addison-Wesley, Reading, MASS., 1972.

- Johnson, Lee W.: *Introduction to Linear Algebra* (2nd or earlier editions), Addison-Wesley, Reading, MASS., 1989.

- Anton, Howard and Rorres, Chris:*Elementary Linear Algebra; Applications Version,*(10th edition, 2011), John Wiley & Sons, Inc.

NOTE: Do not feel that you **should** study from these books, simply because we have provided you with this list. Sometimes, however, if one really gets bogged down on a particular section or part of the work, a different presentation might just be what is needed to get going again.

Recommended books can be requested online, via the Library catalog.

6.3 Electronic reserves (e-reserves)

There are no e-reserves for this module.

7 STUDENT SUPPORT SERVICES

The *Study @ Unisa* brochure is available on *my*Unisa: www.unisa.ac.za/brochures/studies

This brochure contains important information and guidelines for successful studies through Unisa.

If you need assistance with regard to the myModules system, you are welcome to use the following contact details:

- Toll-free landline: 0800 00 1870 (Select option 07 for myModules)

- E-mail: mymodules22@unisa.ac.za or myUnisaHelp@unisa.ac.za
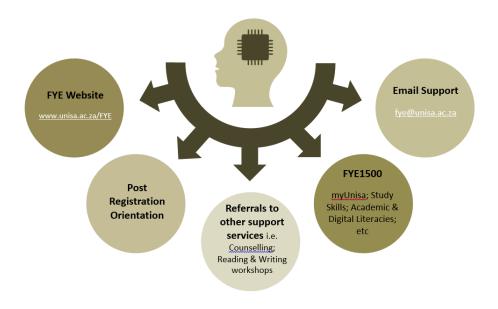
You can access and view short videos on topics such as how to view your calendar, how to access module content, how to view announcements for modules, how to submit an assessment and how to participate in forum activities via the following link:
https://dtls-qa.unisa.ac.za/course/view.php?id=32130

> Registered Unisa students get a free myLife e-mail account. Important information, notices and updates are sent exclusively to this account. Please note that it can take up to 24 hours for your account to be activated after you have claimed it. Please do this immediately after registering at Unisa, by following this link: myLifeHelp@unisa.ac.za
>
> Your myLife account is the **only** e-mail account recognised by Unisa for official correspondence with the university, and will remain the official primary e-mail address on record at Unisa. You remain responsible for the management of this e-mail account.
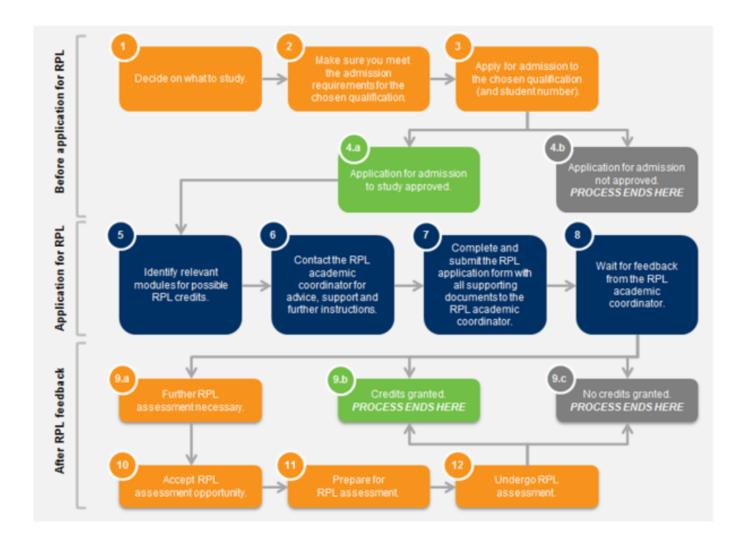
7.1   First-Year Experience Programme

Many students find the transition from school education to tertiary education stressful. This is also true in the case of students enrolling at Unisa for the first time. Unisa is a dedicated open distance and e-learning institution, and it is very different from face-to-face/contact institutions. It is a mega university, and all our programmes are offered through either blended learning or fully online learning. It is for this reason that we thought it necessary to offer first-time students additional/extended support to help them seamlessly navigate the Unisa teaching and learning journey with little difficulty and few barriers. We therefore offer a specialised student support programme to students enrolling at Unisa for the first time - this is Unisa's First-Year Experience (FYE) Programme, designed to provide you with prompt and helpful information about services that the institution offers and how you can access information. The following FYE services are currently offered:

To ensure that you do not miss out on important academic and support communication from the SRU, please check your myLife inbox regularly.

7.2   Using Recognition of Prior Learning (RPL) to apply for module credit within a qualification

Now that you are a registered student, you are advised to familiarise yourself with the learning outcomes of the module or modules you have chosen. If you have been exposed to those learning outcomes for three years or more - either through work experience or other involvement - you can apply to be exempted from completing assignments and writing examinations. As part of your application for this exemption, you will be required to compile a portfolio of evidence substantiating how your experience is equivalent to the learning outcomes. The diagram below shows the steps involved in obtaining recognition of prior learning (RPL) for module credit. For more information on the process, RPL fees, and the contact details of your college RPL coordinator, visit the Unisa website: www.unisa.ac.za/rpl

Before application for RPL

1. Decide on what to study.

2. Make sure you meet the admission requirements for the chosen qualification.

3. Apply for admission to the chosen qualification (and student number).

4.a Application for admission to study approved.

4.b Application for admission not approved. *PROCESS ENDS HERE*

Application for RPL

5. Identify relevant modules for possible RPL credits.

6. Contact the RPL academic coordinator for advice, support and further instructions.

7. Complete and submit the RPL application form with all supporting documents to the RPL academic coordinator.

8. Wait for feedback from the RPL academic coordinator.

After RPL feedback

9.a Further RPL assessment necessary.

9.b Credits granted. *PROCESS ENDS HERE*

9.c No credits granted. *PROCESS ENDS HERE*

10. Accept RPL assessment opportunity.

11. Prepare for RPL assessment.

12. Undergo RPL assessment.

8 STUDY PLAN

This is a year module and requires at least 120 hours of study time. It is important that you are intentional and disciplined about spending time on a regular basis working through the material in this module.

Also remember to schedule time for preparation of assignments and revision for exams. Remember that contact students have the option of attending lectures, while you do not. Hence the need to have a plan to make sure you interact with the material regularly.

Most people who study through UNISA work either full time or part time, and so your plan for studying the material will be unique to you, taking into consideration the details of your responsibilities. You are responsible for setting up the plan, and once done, making sure you follow the plan.

The following information should guide your planning and execution. The study material consists of the following sections in the 4th edition of the textbook:

- Chapter 1 – All sections, except section 1.7.

- Chapter 2 – All sections, except sections 2.6 and 2.7.

- Chapter 4 – Section 4.4 only.

- Chapter 5 – All sections.

- Chapter 6 – All sections except sections 6.7 and 6.9.

On the module website you will find video lectures that cover the material in the module. These videos are mostly between 15 minutes and 25 minutes long. In addition to the videos, you will also find a copy of notes. These are notes that are based on the textbook notes, but which have additional details added where the explanation from the textbook can be enhanced.

When reading the prescribed textbook and study guide you should have paper and pencil at hand. There will be steps left out by the author which you must fill in as you read – it is an excellent exercise to complete these gaps in explanation, and it should become a standard part of your process of studying the material.

Feel free to contact your lecturer for assistance whenever you are struggling to understand a particular point while studying. Make sure that you provide detail on what you have tried, and or what it is that does not seem to make sense. Generic statements like 'I don't understand diagonalization' is not likely to get you much help, because they are not specific enough. The more specific your question, the more likely it is that your lecturer will be able to help you quickly. Remember, before asking you must at least have read through the material, thought about it, and attempted a problem or two.

Be careful when using web based resources - there are good and bad resources on the internet. Your approach should be to make use of the resources on the myModule site most of the time, and to look for additional resources on the internet only when you cannot immediately get hold of your lecturer.

9   HOW TO STUDY ONLINE?

9.1   What does it mean to study fully online?

Studying fully online modules differs completely from studying some of your other modules at Unisa.

- **All your study material and learning activities for online modules are designed to be delivered online on *my*Unisa.**

- **All your assignments (assessments) must be submitted online**. This means that you will do all your activities and submit all your assignments on myUnisa. In other words, you do **NOT** post your assignments to Unisa using the South African Post Office. You do **NOT** send assignments by email as such will not be considered for marking or a zero mark will be awarded.

- **All communication between you and the University happens online.** Lecturers will communicate with you via e-mail and **Chats**, **Blogs**, and use the **Announcements**, the **FAQs**, the **Discussion Forums** and the **Questions and Answers** tools. You can also use all of these platforms to ask questions and contact your lecturers.

10 ASSESSMENT

10.1 Assessment criteria

There are four assignments and one examination for this module.

10.2 Examination admission.

Please note that lecturers are not responsible for examination admission, and ALL enquiries about examination admission should be directed by e-mail to exams@unisa.ac.za

Note that your marks for the assignments contribute 20**% to your final mark (the remaining** 80**% is contributed by the final examinations).**

10.3 Assessment plan

- To complete this module, you will be required to submit all four assessments.

- All information about when and where to submit your assessments will be made available to you via the myModules site for your module.

- Due dates for assessments, as well as the actual assessments are available on the myModules site for this module.

- You will receive examination information via the myModules sites. Please watch out for announcements on how examinations for the modules for which you are registered will be conducted.

The questions for the assignments are given online on the module site. For each assignment there is a fixed closing date - the date by which the assignment must reach the university (the student must submit the assignment online).

Solutions for each assignment as Tutorial Letter 202, $\cdots$, 204. will be uploaded on *myUnisa* under Additional Resources a few days after the closing date.

Late assignments will not be marked, and will be awarded 0%.

10.4 Written assignments

Not all the questions in the written assignment will be marked and you will also not be informed beforehand which questions will be marked. The reason for this is that Mathematics is learnt by "doing Mathematics", and it is therefore important to do as many problems as possible.

The Written assignments can only be submitted online electronically through myUnisa.

The assessments together with the contributions of assignments to the year mark are as follows (TBA = To Be Announced).

Assignment	Format	Weight (%)	Due date
1	Written	5	TBA
2	Written	5	TBA
3	Written	5	TBA
4	Written	5	TBA
Total		20	

10.5 Assessment/Assignment due dates

- There are no assignment due dates included in this tutorial letter.

- Assignment due dates will be made available to you on the myUnisa landing page for this module. We envisage that the due dates will be available to you upon registration.

- Please start working on your assessments as soon as you register for the module.

- Log on to the myUnisa site for this module to obtain more information on the due dates for the submission of the assessments.

10.6 Submission of assessments/assignments

For written assessments, please note the due date by which the assessment must be submitted. Ensure that you follow the guidelines given by your lecturer to complete the assessment. Click on the submission button on the relevant assessment shell on myModules. You will then be able to upload your written assessment on the myModules site of the relevant module. Before you finalise the upload, double check that you have selected the correct file for upload. Remember, no marks can be allocated for incorrectly submitted assessments.

You only submit your assignments electronically via *myUnisa*. Assignments can **not** be submitted by fax or e–mail nor by post as such will not be considered for marking.

10.7 Other assessment methods

There are no other assessment methods for this module.

10.8 The Examination

Examination information and details on the format of the examination will be made available to you online via the myUnisa site. Look out for information that will be shared with you by your lecturer and e-tutors (where relevant) and for communication from the university.

If you are registered for this module in 2025 then you will write the examination in **October/November 2025**.

Please note:

- The exam is a two hour examination.

- The use of a pocket calculator is not permitted during examination.

The examination questions will be similar to the questions asked in the study guide and in the assignments.

10.8.1 Invigilation/proctoring

Since 2020 Unisa conducts all its assessments online. Given stringent requirements from professional bodies and increased solicitations of Unisa's students by third parties to unlawfully assist them with the completion of assignments and examinations, the University is obliged to assure its assessment integrity through the utilisation of various proctoring tools: Turnitin, Moodle Proctoring, the Invigilator App and **Intelligent Remote Invigilation System (IRIS)**. These tools will authenticate the student's identity and flag suspicious behaviour to assure credibility of students' responses during assessments. The description below is for your benefit as you may encounter any or all of these in your registered modules:

Turnitin is a plagiarism software that facilitates checks for originality in students' submissions against internal and external sources. Turnitin assists in identifying academic fraud and ghost writing. Students are expected to submit **typed** responses for utilisation of the Turnitin software.

The **Moodle Proctoring** tool is a facial recognition software that authenticates students' identity during their Quiz assessments. This tool requires access to a student's **mobile or laptop camera**. Students must ensure their camera is activated in their browser settings prior to their assessments.

The Invigilator "mobile application-based service" does verification of the identity of an assessment participant. The Invigilator Mobile Application detects student dishonesty-by-proxy and ensures that the assessment participant is the registered student. This invigilation tool requires students to download the app from their Play Store (Google, Huawei and Apple) on their mobile devices (camera enabled) prior to their assessment.

IRIS Invigilation software verifies the identity of a student during assessment and provides for both manual and automated facial verification. It has the ability to record and review a student's assessment session. It flags suspicious behaviour by the students for review by an academic administrator. IRIS software requires installation on students' laptop devices that are enabled with a webcam.

Students who are identified and flagged for suspicious dishonest behaviour arising from the invigilation and proctoring reports are referred to the disciplinary office for formal proceeding.

Please note:

Students must refer to their module assessment information on their myModule sites to determine which proctoring or invigilation tool will be utilised for their formative and summative assessments.

10.9 The Supplementary Examination

If you are registered for this module in 2025 then you will write the supplementary examination in **January/February 2026**.

During the course of the year, the Examination Section will provide you with information regarding the examination in general, examination websites, examination dates and examination times ant that including the supplementary examination.

11 ACADEMIC DISHONESTY

11.1 Plagiarism

Plagiarism is the act of taking the words, ideas and thoughts of others and presenting them as your own. It is a form of theft. Plagiarism includes the following forms of academic dishonesty:

• Copying and pasting from any source without acknowledging the source.

• Not including references or deliberately inserting incorrect bibliographic information.

• Paraphrasing without acknowledging the original source of the information.

11.2 Cheating

Cheating includes, but is not limited to, the following:

• Completing assessments on behalf of another student, copying the work of another student during an assessment, or allowing another student to copy your work.

• Using social media (e.g. WhatsApp, Telegram) or other platforms to disseminate assessment information.

• Submitting corrupt or irrelevant files, this forms part of examination guidelines.

• Buying completed answers from so-called "tutors" or internet sites (contract cheating).

11.3 For more information about plagiarism, follow the link below:

https://www.unisa.ac.za/sites/myunisa/default/Study-@-Unisa/Student-values-and-rules

12 STUDENTS LIVING WITH DISABILITIES

The Advocacy and Resource Centre for Students with Disabilities (ARCSWiD) provides an opportunity for staff to interact with first-time and returning students with disabilities.

If you are a student with a disability and would like additional support or need additional time for assessments, you are invited to contact (name and e-mail address of the lecturer must be inserted) to discuss the assistance that you need.

13 FREQUENTLY ASKED QUESTIONS

The *Study @ Unisa* brochure contains an A-Z guide of the most relevant study information.

14 SOURCES CONSULTED

The Study Guide and the prescribed textbook were consulted in preparing this tutorial letter.

15 IN CLOSING

Do not hesitate to contact us by e-mail if you are experiencing problems with the content of this tutorial letter or with any academic aspect of the module.

We wish you a fascinating and satisfying journey through the learning material, and trust that you will complete the module successfully.

I trust you will enjoy the module.

Dr. A. Swartz – Lecturer for MAT3701

Department of Mathematical Sciences

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