MA1101R Linear Algebra I
2018/2019 Semester 1

Lecture Groups

Group 1: (@ LT27): Mon 4.00-5.30pm/Wed 8.00-9.30am

Group 2: (@ LT27): Tues 8.00-9.30am/Thu 2.00-3.30pm

IVLE WEBPAGE: https://ivle.nus.edu.sg/

LUMINUS WEBPAGE: https://luminus.nus.edu.sg/

Lecturers:
Dr Ng Kah Loon (Group 2, Module Coordinator)
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Dr Zhang Lei (Group 1)
Email: matzhlei@nus.edu.sg; Office: S17, #06-05; Tel: 6516-2747

Lecture Webcast:

- Both lecture groups will have their lectures webcasted.
- Lecture webcast can **only** be accessed from LumiNUS (https://luminus.nus.edu.sg/). IVLE does not host the lecture webcasts.
- Please use IVLE to access all other module resources other than webcast recordings.

Assessment:

- Final examination 60% - 30th November (PM Session) (1 helpsheet)
- Mid-term test 20% - Week 7, date to be confirmed (1 helpsheet)
- Homework 10% (4 assignments to be submitted in Weeks 4,6,9 and 11)
- Lab Quiz 10% - Week 13

Aims and objectives:

This module serves as an introduction to the most basic concepts in linear algebra that are routinely applied in fields like science, engineering, statistics, economics and operations research. The vector spaces within which the general ideas are developed are all real vector spaces (actually R^n). The objective of the course is to inculcate a facility in both the algebraic and geometric viewpoints of linear algebra. The course will develop basic skills in computing with vectors and matrices.

Main topics:

Systems of linear equations. Matrices. Determinants. Euclidean n-space. Subspaces. Linear independence. Basis and dimension. Rank of a matrix. Orthogonality and orthonormal bases. Eigenvalues and eigenvectors. Diagonalization and orthogonal diagonalization. Linear transformations from R^n to R^m. Applications.

Textbook:

- The textbook *Linear Algebra-Concepts and Techniques on Euclidean Spaces – Second Edition* (by Ma S.L., V. Tan, Ng K.L. published by McGraw Hill) is available for purchase at Co-op (Science).
- The lectures will follow the textbook closely. All 7 chapters in the book will be covered.
- Students are expected to work through the exercise sets in the books. There is no need to hand in the answers of the exercises. Some of the exercise problems may be selected as tutorial problems.

Tutorial sessions:

- There are altogether 11 tutorial sessions, starting from week 3.
- Students are to prepare their solutions to the tutorial problems before attending a tutorial. They should be ready to discuss the solutions and not simply attend a tutorial to copy answers.
- Students may be asked by their tutor to present their solutions.

Homework Assignments

- There are all together 4 homework sets
- HW problems will be available in IVLE workbin.
- Hand in the HW in weeks 4, 6, 9 and 11 during Monday's (for Group 1) or Tuesday's (for Group 2) lectures
- Late submission will not be accepted without valid reason.
- After they are graded, homework assignments will be returned during lectures.

Lab sessions:

- There will be 5 lab worksheets in total. They will be distributed during weeks 4, 5, 9, 11 and 12.
- There will be one lab quiz in week 13.
- Students will be using MATLAB to complete their worksheets.

  How lab sessions/worksheets are administered:
  - There is no formal class structure for lab.
  - In weeks where there is a lab session (weeks 4, 5, 9, 11 and 12), students are allowed to go to the Computer lab (S17-03-02) anytime, during the stated times below:
    - Monday 8am – 10am
    - Tuesday 1pm – 3pm
    - Wednesday 1pm – 4pm
    - Thursday 12pm – 2pm and 4pm – 5pm
    - Friday 12pm – 1pm
  - Once a student completes the lab worksheet for that week, he/she will be allowed to leave the lab. No attendance will be taken. There is no need to submit any completed worksheets.
  - During the above time slots, there will be a Lab Assistant stationed in the lab to assist students who may have queries.
  - If a student is unable to go to the lab in any of the time slots given above (due to timetable clashes), he/she may go to the lab at a time convenient to them, provided the lab is not being used by another module. However, there will not be any Lab Assistant present during other time slots.
  - Availability of computers in the lab is on a first come first served basis. The Lab Assistant will resolve any disputes.
  - There **WILL** be formal class registration for the quiz in Week 13. More details will be available in due course.

Signing up for tutorial groups (tutorial starts week beginning 27th August):

- NUS students: Through CORS balloting: 17th – 21st August 2018
- NUS students: Manual registration (see module coordinator, if failure to obtain a group through CORS balloting): 22nd – 24th August 2018
- Exchange and all other non-graduating students: Contact module coordinator between 17th – 19th August 2018.
- Contact module coordinator (matngkl@nus.edu.sg) as soon as possible for any problem with tutorial group.

Online discussion forum

- An online forum has been opened for students to post anything (queries, thoughts, comments, suggestions…) about this module.
- Access through IVLE.

Consultation booking

- Lecturers are available for consultation on an ad-hoc basis. Prior appointment (via email) can be made to see either lecturer for consultation/clarification of concepts.
- All students are encouraged to seek help early if they have difficulty with the module and not wait till the last minute.

Reference Books:

Title/ Authors (Remarks)	Publisher
Elementary Linear Algebra / Howard Anton (For understanding basic concepts)	Wiley
Linear algebra with applications / Steven Leon (With MATLAB exercises)	Prentice Hall
Schaum's outline of theory and problems of linear algebra/ Seymour Lipschutz (Plenty of solved problems)	McGraw Hill
Linear Algebra/ Stephen H. Friedberg (Advanced reading)	Prentice Hall

Lecture plan – There will be a total of 22 lectures (excluding Lecture 0) delivered for this module. The content covered for each lecture is shown below (reference made according to the main textbook for the module).

Lecture 0 – Introduction to the module and administrative information.

Lecture 01 – till the end of Section 1.2 (Remark 1.2.9)
Lecture 02 – till Example 1.4.7
Lecture 03 – till the end of Chapter 1

Lecture 04 – till Example 2.2.18
Lecture 05 – till Example 2.4.5
Lecture 06 – till Example 2.5.13
Lecture 07 – till the end of Chapter 2

Lecture 08 – till Example 3.2.4
Lecture 09 – till the end of Section 3.2 (Discussion 3.2.15)
Lecture 10 – till Example 3.4.3
Lecture 11 – till Theorem 3.5.7
Lecture 12 – till Example 3.6.6
Lecture 13 – till the end of Chapter 3

Lecture 14 – till the end of Section 4.1
Lecture 15 – till the end of Chapter 4

Lecture 16 – till Remark 5.2.12
Lecture 17 – till Example 5.3.9
Lecture 18 – till the end of Chapter 5

Lecture 19 – till Example 6.2.2
Lecture 20 – till the end of Section 6.3

Lecture 21 – till the end of Section 7.1
Lecture 22 – till the end of Section 7.2