ICMA 223: Linear Algebra A

Trimester III, Academic Year 2024-2025

Mahidol University International College

Syllabus

Some useful links: Academic Catalog and Academic Calendar.

Course Number: ICMA 223.
Course Name: Linear Algebra A.
Credits: 2 (2-0-4).
Course Description: Linear equations, systems of linear equations, matrices, traces, determinants, Euclidean spaces, and vector geometry.
Instructor: Pakawut "Pro" Jiradilok.
Instructor's Email: 

Please note. When you send an email to me about this class, please add "[ICMA223]" in the title (subject line) of the email.

Office Hours: Mondays 4 - 5 pm and Thursdays 6 - 7 pm. We can also do appointments by email. Students are encouraged to come talk to me about mathematics and about the class.

Iteration: Trimester III Academic Year 2024–2025 (April 21, 2025 - July 20, 2025).

Sections: There are 2 sections:

- Section 1 meets on Thursdays, 2 pm - 4 pm.
- Section 2 meets on Thursdays, 4 pm - 6 pm.

Both sections meet in Room 1407.

Textbooks: There are no required textbooks for this class. Recommended textbooks include: Anton–Rorres book [AR14] and Nicholson's book [Nic19]. (See "References" at the bottom of this syllabus.)

[1]**Syllabus Version:** Friday, May 9, 2025.

Grading: There are two (2) in-class quizzes, one (1) midterm, one (1) final exam, and several approximately weekly problem sets (homework assignments). The final grade of this class is calculated as follows.

- The final exam is worth 20%.
- The midterm exam is worth 15%.
- Each quiz is worth 10%.
- The problem sets are worth 45%.

$$100\% = 10\% + 15\% + 10\% + 20\% + 45\%.$$

Each (graded) problem set is weighted equally. For instance, if there are a total of 9 (graded) problem sets, then each (graded) problem set is worth 5% of the final grade.

The letter grade is determined as follows.

- If the final grade is $\geq 90\%$, then the letter grade is **A**.
- If the final grade is $\geq 85\%$ but is $< 90\%$, then the letter grade is **B+**.
- If the final grade is $\geq 80\%$ but is $< 85\%$, then the letter grade is **B**.
- If the final grade is $\geq 75\%$ but is $< 80\%$, then the letter grade is **C+**.
- If the final grade is $\geq 70\%$ but is $< 75\%$, then the letter grade is **C**.
- If the final grade is $\geq 65\%$ but is $< 70\%$, then the letter grade is **D+**.
- If the final grade is $\geq 60\%$ but is $< 65\%$, then the letter grade is **D**.
- If the final grade is $< 60\%$, then the letter grade is **F**.

Class Website: We use Canvas. Please let me know if you are unable to access the class website. Homework assignments are to be turned in on Canvas. By default, assignments submitted by other means (such as by email or as a hard copy) are not accepted.

(Tentative) Exam Dates: The following exam dates and times are tentative. They are subject to change.

- In-class Quiz 1. Thursday, May 22, 2025. (Week 5.)
- Midterm Exam. Saturday, June 7, 2025. (4 pm - 5:50 pm.) (Week 7.)
- In-class Quiz 2. Thursday, June 26, 2025. (Week 10.)
- Final Exam. Thursday, July 17, 2025. (4 pm - 5:50 pm.)

Some Information about Exams:

(i) All the exams in the class are *cumulative*. This means that the questions on them might ask you about material covered in a previous exam as well. Therefore, for every exam, you should review materials from the first lecture!

(ii) By default, if you miss an exam, you get zero (0) points for the exam. However, if there is a valid reason to miss an exam, you must inform me by email *at least* 48 *hours before* the start of the exam. (But sending a timely email does not guarantee that you can miss an exam.) Please also refer to MUIC's student policies on missing exams.

(iii) Each student needs to bring a valid (MUIC-issued or government-issued) ID to each test.

(iv) Each student is allowed to bring two (2) sheets of A4 paper with handwritten notes written by themselves to each test. The notes need to be handwritten *only*: computer-printed notes are not allowed. Writing on both sides of the paper is allowed. This 2-sheet rule applies for every exam in this class.

(v) Calculators and other electronic devices are not allowed in the exams.

(vi) Books (even handwritten ones!) are not allowed in the exams.

(vii) Collaboration with your peers is not allowed in the exams.

(viii) According to MUIC Student Handbook, "PENALTY FOR CHEATING INCLUDES BUT IS NOT LIMITED TO: Grade F for the subject or grade F for all subjects registered in the trimester with "Academic suspension for not more than one academic year" or maximum penalty "Dismissal"." Please review the student handbook before the exam.

(ix) Please use only pencils, blue pens, or black pens to write on the exam. If an examination booklet is provided, please write your solutions on the exam papers. Please use the booklet only for scratch work.

Some Information about Homework Assignments:

(i) On homework assignments, collaboration is *allowed*, and is in fact *encouraged*!

(ii) Please write a list of your collaborators and sources you consult in your homework.

(iii) By default, late homework submissions are not accepted, and are given a score of zero (0). However, if there is a valid reason to miss the deadline, you must inform me by email *before* the due time. (But sending a timely email does not guarantee that you can miss the deadline.)

(iv) If for a certain week, you feel like you do not have enough time to submit the homework assignment by the deadline, you are encouraged to send me an email *before* the homework's due time to ask for an extension to submit the homework. You are strongly encouraged to ask for an extension, instead of simply missing the deadline and receiving a score of zero (0) for the assignment!

(v) Use of artificial intelligence (AI) tools is *not prohibited* on homework assignments. However, please note that if you do obtain help from an AI tool, you have to state explicitly which AI tool you use as a source consulted (see Item (ii) above). You ***must not*** simply copy the output generated from the AI tool and submit what the AI tool says as your homework submission. The final write-up of your homework submission must strictly be your own sentences.

Here is an example of sentences you can write in your declaration: "I use (NAME OF AI TOOL) to help me with Problem 2. The (NAME OF AI TOOL) guides me through the steps of how to solve the problem. The final write-up of the solution is in my own sentences."

By default, if you simply copy the output from an AI tool and do not write the solution in your own sentences, you get zero (0) points for the work.

(Tentative) Schedule: Note that the following schedule is subject to change. (Normally, we are going to have a make-up class if some scheduled class falls on a holiday.)

- Lecture 1. Thursday, April 24, 2025.
  - preliminaries.
  - linear equations.
  - systems of linear equations.
  - solutions to linear systems.
- Lecture 2. Thursday, May 1, 2025.

  - elementary row operations.
  - Gaussian elimination.
  - solving linear systems.

- Lecture 3. Thursday, May 8, 2025.
  - rank and nullity.
  - matrices.
  - matrix operations.
  - transposes.
  - traces.

- Lecture 4. Thursday, May 15, 2025.
  - algebraic properties of matrices.
  - matrix inverses.

- Lecture 5. Thursday, May 22, 2025.
  - in-class QUIZ 1.
  - elementary matrices.
  - computing matrix inverses.
  - determinants.

- Lecture 6. Thursday, May 29, 2025.
  - computing matrix inverses and determinants.
  - the rule of Sarrus.

- Lecture 7. Thursday, June 5, 2025.
  - linear transformations.

- Saturday, June 7, 2025.
  - MIDTERM

- Lecture 8. Thursday, June 12, 2025.
  - Laplace expansion.

- Lecture 9. Thursday, June 19, 2025.
  - Cramer's rule.
  - Euclidean spaces.
- Lecture 10. Thursday, June 26, 2025.
  - in-class QUIZ 2.
  - vector geometry.
  - hyperplanes.
  - parallelotopes.
- Lecture 11. Thursday, July 3, 2025.
  - linear transformations in low dimensions.
- Lecture 12. Friday, July 4, 2025. (???)
  - review.
- Thursday, July 17, 2025.
  - FINAL

References

[AR14] Howard Anton and Chris Rorres. *Elementary linear algebra with supplemental applications, international student version*. Hoboken, NJ: John Wiley & Sons, 11th ed. edition, 2014.

[Nic19] W. Keith Nicholson. *Linear Algebra with Applications*. Lyryx, 2019.