

Linear Algebra

[KOMS119602] - 2022/2023

1 - Introduction to Linear Algebra

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Computer Science Study Program
Universitas Pendidikan Ganesha

Week 1 (September 2022)

Dewi Sintiari

B.A.Ed. in **Math Education** Univ. Pendidikan Ganesha (2010 - 2014)

M.Sc. in **Computer Science** ENS de Lyon, France (2016 - 2018)

Ph.D. in **Computer Science** ENS de Lyon, France (2018 - 2021)

Interest:

- Theoretical Computer Science
- Discrete Mathematics
- Graph Theory and Algorithms

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Practical matters

- **Credit:** 3 SKS
- **Lecturer:** Dewi Sintiari
 - email: luh.dewi.sintiari@undiksha.ac.id
 - webpage: <https://dewisintiari.github.io/>
- **Assessment:**
 - Presence ($\geq 75\%$) + attitude + quiz: 20%
 - Assignments: 40%
 - Midterm exam (written/project): 15%
 - Final exam (written): 25%
 - Bonus: writing a wikipedia article/scribe

**Grade = 20% Attitude + 40% Assignments + 15% Midterm
+ 25% Final + Bonus**

What is your responsibility?

1 SKS equivalence:

- 50 minutes class activities
- 60 minutes independent learning
- 60 minutes structured assignment

$$3 \text{ SKS} \equiv 150 + 180 + 180 = 510 \text{ minutes} = 8.5 \text{ hours/week}$$

Grade rule :

20% Attitude + 40% Assignments + 15% Midterm + 25% Final

- **MIDTERM & FINAL EVALUATION MANDATORY !**

What grade that you expect?

Grade rule :

20% Attitude + 40% Assignments + 15% Midterm + 25% Final

Example

Suppose that your grade:

- Attitude: 100
 - Assignment: 100
 - \Rightarrow Your grade = $(20\% * 100) + (40\% * 100) = 60 \rightarrow \text{C}$
- You cannot get 100 in Attitude if you do not attend the exams!

Agreement

Integrity



Doing what is right
even when it is
difficult.

Agreement

Integrity



Doing what is right
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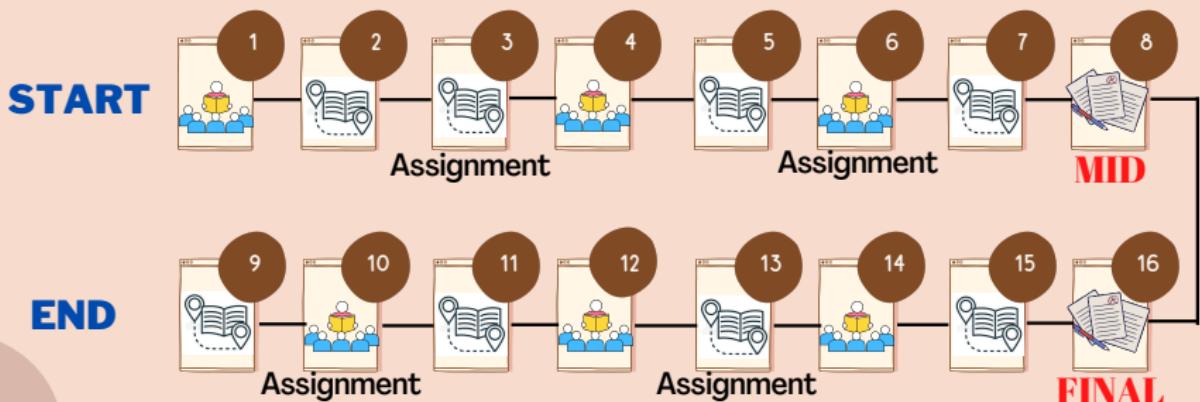
- I'm not dictating you to study. I'm helping to direct you to stay in the learning path.
- You study not for grades, but to gain competencies that you can use to support your study, and after you graduate.

My job is to assess **your seriousness** in learning and **how much competencies** you gain during this course.

Undiksha study guideline

- k. Mahasiswa yang terbukti melakukan kegiatan yang tercela dalam kegiatan akademik.
 - 1) Mahasiswa yang terbukti melakukan *kegiatan menyontek*, yaitu perbuatan curang yang dilakukan oleh mahasiswa ketika mengikuti ujian seperti bekerjasama saat ujian dan berusaha menggunakan bahan informasi atau alat bantu lainnya tanpa seizin pengawas diberi sanksi berupa: (a) Peringatan secara lisan atau tulisan dan peringatan dengan percobaan; atau (b) Tidak lulus dalam mata kuliah atau kegiatan akademik yang bersangkutan.
 - 2) Mahasiswa yang terbukti melakukan praktek *perjokian*, yaitu perbuatan yang dilakukan oleh mahasiswa untuk menggantikan kedudukan atau melakukan tugas atau kegiatan baik untuk kepentingan diri sendiri maupun orang lain dalam kegiatan akademik diberi sanksi oleh Dekan atau Rektor atas usul

Lesson plan



Self-paced / collaborative learning
synchronous/asynchronous
via e-learning Undiksha



Class activities on-site

→ Students learn independently/cooperatively through teaching materials (slides, videos) and assignments prepared in e-learning

→ Face-to-face lectures with group discussions, etc.
according to the learning model used

Introduction to Linear Algebra

What do you know about Linear Algebra?

Fill the blank with as much information as possible that you can think of.

- ...
- ...
- ...
- ...
- ...
- ...
- ...

Why do you have to take Linear Algebra course?

Fill the blank with as much information as possible that you can think of.

- ...
- ...
- ...
- ...
- ...
- ...
- ...

Refreshment

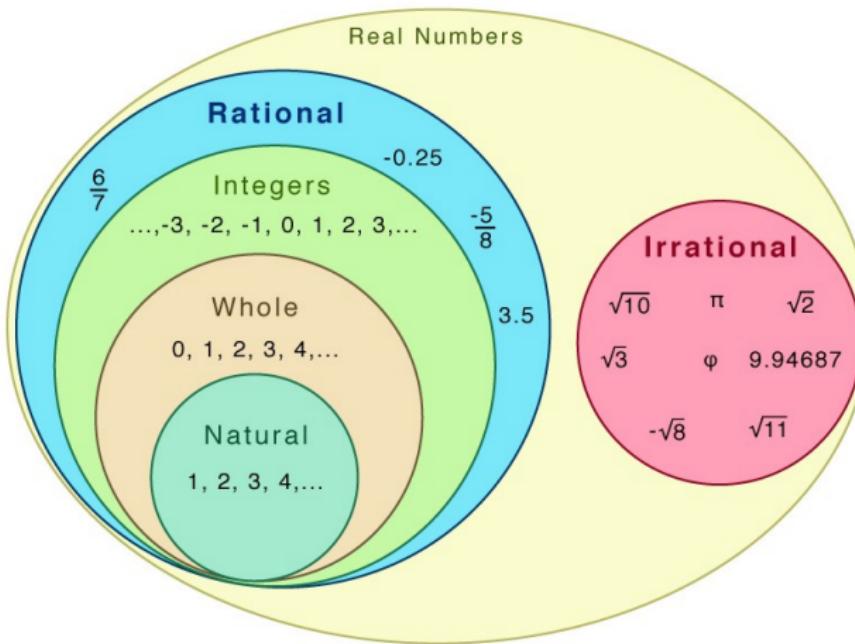


Take time to review the following subjects!

- **Number set hierarchy**

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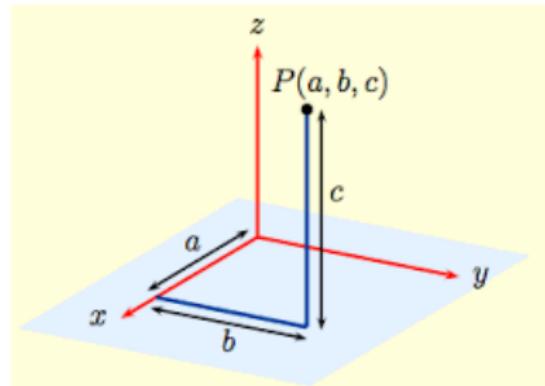
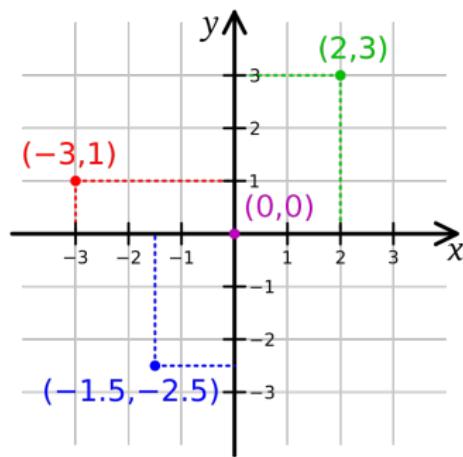


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- **Cartesian coordinate**

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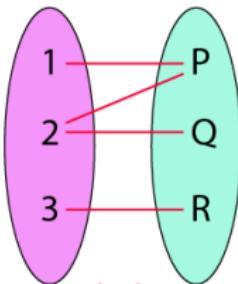
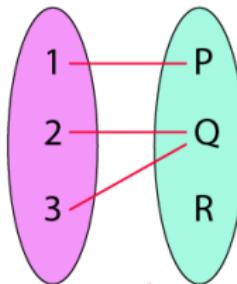


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- **Function**

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- **Function**



Polynomial expression

$$a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \cdots + a_1 x + a_0$$

- $ax + b$
- $ax^2 + bx + c$
- ...

**START
HERE**

Learning flow Linear ALgebra



Assignment: inquiry/exploratory learning **(deadline 1 week, September 13th, 2022, 23:59)**

- Divide yourselves into 12 groups, each group discusses one topic

Guide for the exploratory activities

1. Describe the definition and fundamental concept of the topic **as simple as possible**, so that your fellows can understand it.
2. Draw the scheme of the learning path of the topic (sub-topics, what you need to learn, etc...)
3. Describe why the topic is important in Computer Science

Submission

- The summary is about 1-2 pages (A4, font TNR 12, space 1.15, margin 3cm left 2.5cm right-bottom-top) + 1 page for the scheme
- Make a short presentation video (5-7 minutes) to explain your exploratory result (everyone in the group must speak).
- Upload your video on Youtube, and include the link in your report.
- Submit the report on e-learning.

List of topics

1. Matrices
2. Linear system of equations
3. Gaussian elimination & Gauss-Jordan
4. Matrix determinant
5. Matrix invers
6. Vectors in \mathbb{R}^2 , \mathbb{R}^3 , \mathbb{R}^n
7. Euclidean space, general linear space, and subspace
8. Spanning set, linear combination
9. Change of basis, column/row/null space
10. Linear transformation
11. Eigenvalues & eigenvectors
12. Inner product spaces & diagonalization, Singular value decomposition

References

Main:

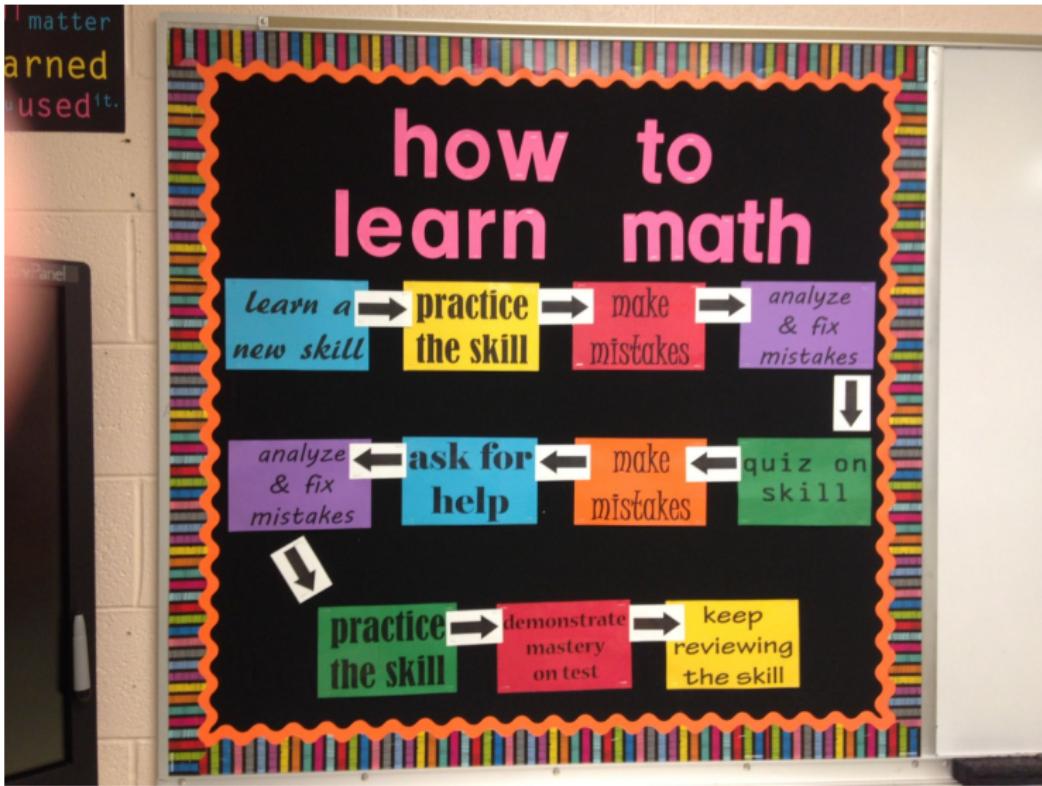
1. Elementary Linear Algebra Applicatios Version - Howard Anton, Shris Rorres (2013)

Supporting:

1. Schaum's outlines of Linear Algebra, 4th ed (Seymour Lipschutz & Marc Lars Lipson)
2. Lecture slides (Dewi Sintiari)

Related Youtube videos are available in the e-learning.

How to learn MATHEMATICS ???



Love it first, then you will love it more!



*The hard work puts you where
the **GOOD LUCK** can find you...*

-anonymous