

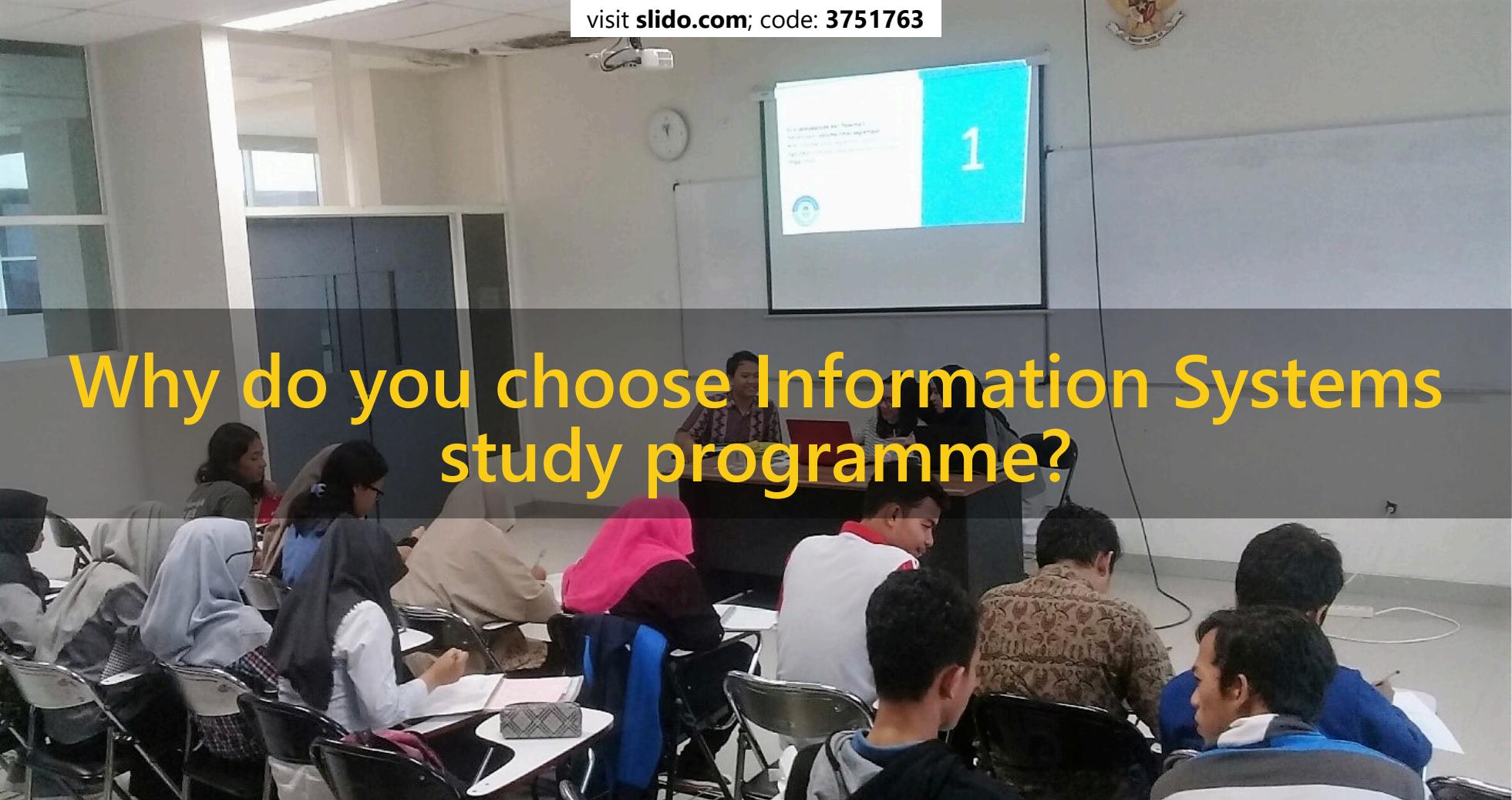


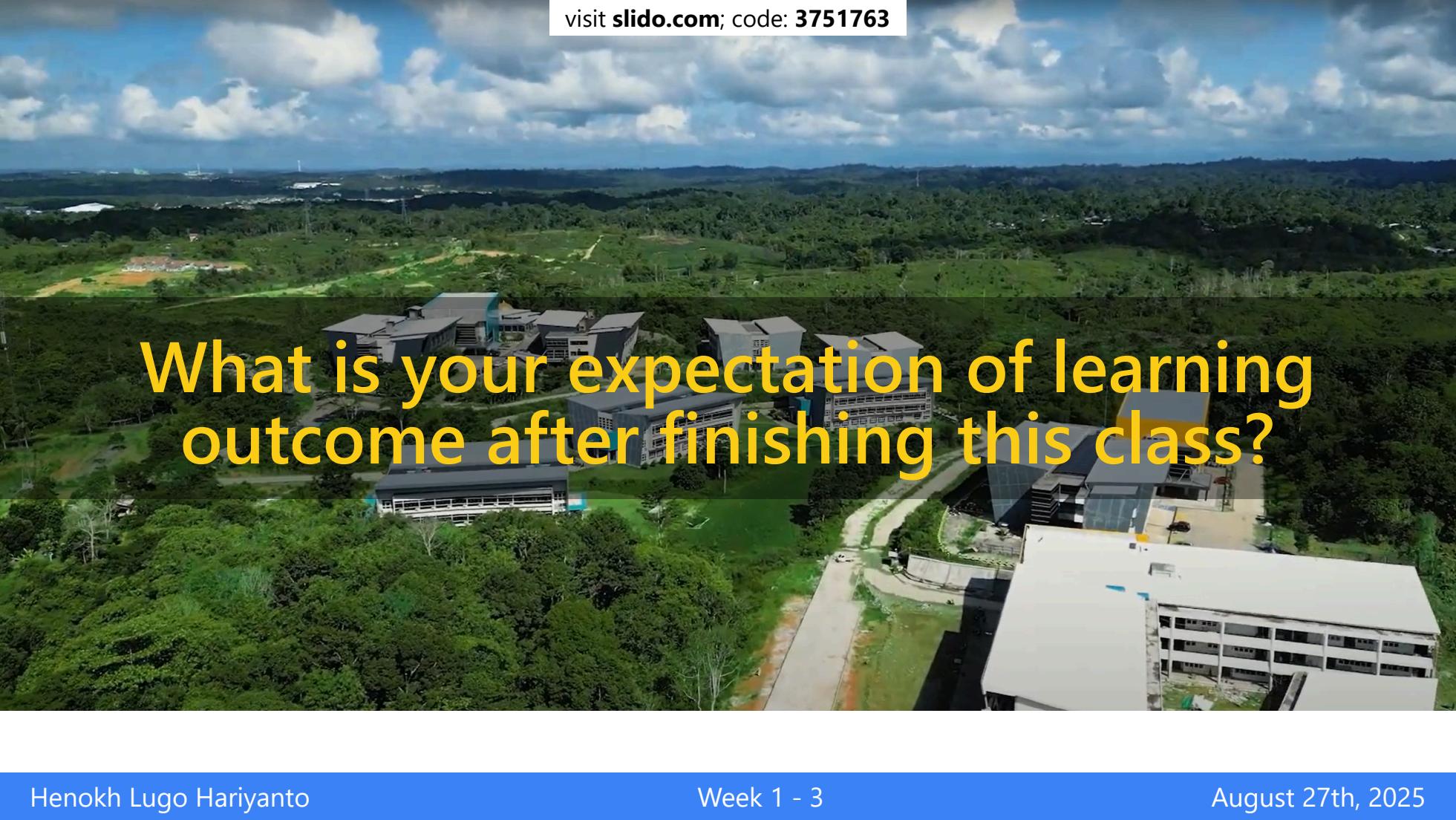
SI 251 4004 - Discrete Mathematics 1

Week 1: Introduction



Why do you choose Information Systems study programme?





What is your expectation of learning outcome after finishing this class?



How is your past experience with mathematics?

IN-CLASS POLICY

- Please **fill in** the list of attendance in LMS (**kuliah.itk.ac.id**) between 07:30 - 10:00 WITA. All the attendances are recorded through LMS.
- Most of the lectures are **Show**, **Tell**, and **Demonstration**. Please feel free to ask if you have any question. Do not wait until the end of the lecture.
- I intend to have more discussion than to give a passive lecture. Ask anything as long as it is related to the topic that we discuss.
- Feel free to go to the restroom without asking my permission.
- Having **less than 70%** of the total attendance will result in a maximum grade of C or fail
- Slides will be available in GitHub repository the day after the class:
<https://github.com/LugoBlogger/SI-251-4004-discrete-mathematics-1>

GRADING

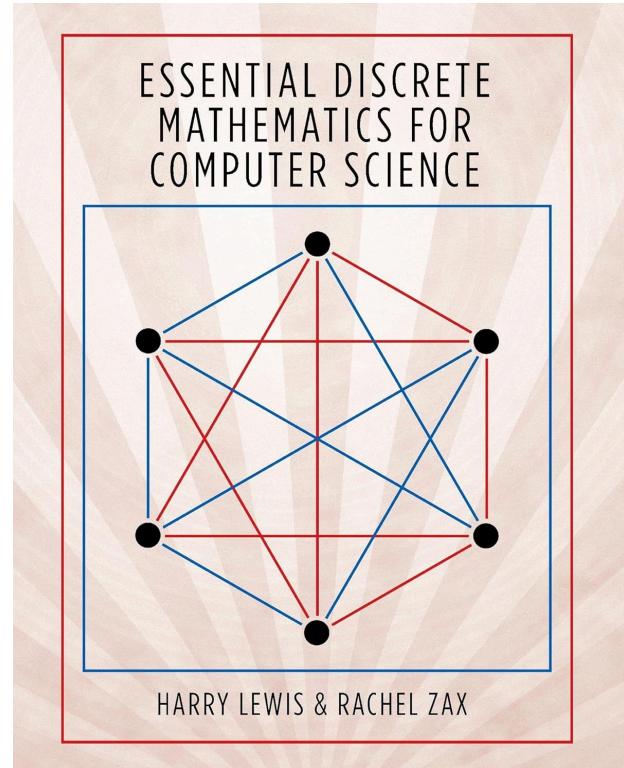
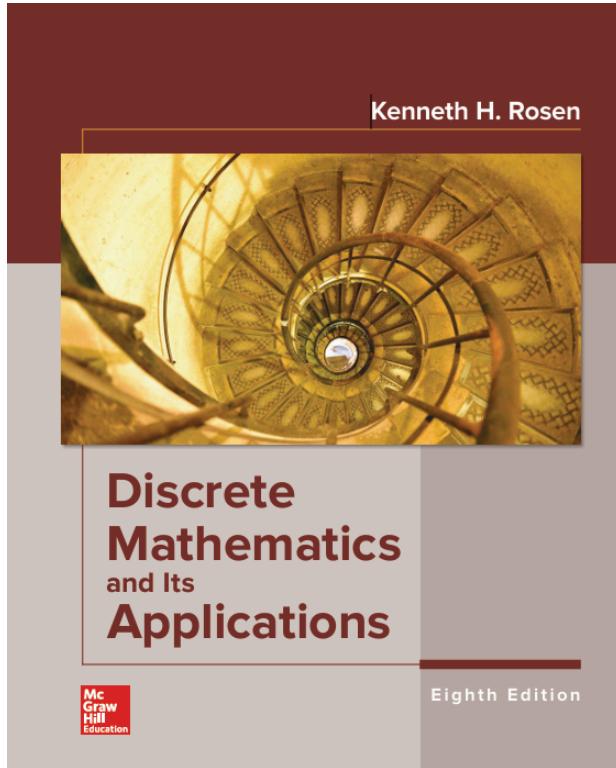
- Student participation: **5%**
- 4 assignments: **$5\% + 5\% + 5\% + 5\% = 20\%$**
- Paper-based midterm exam and final exam: **25% + 40%**
- 8 sessions of recitations: **10%**
- Late policy: **maximum one day late for all assignments**
- Copying other students' works automatically results in a grade of C or less.

Live scoring: in Google Sheet (TBA)

SYLLABUS

- History and Motivation of Learning Mathematics
- Logic
- Sets
- Functions
- Matrices
- Number theory
- Cryptography
- Induction
- Recursion

REFERENCES



Types of problems that can be answered

- How many ways are there to choose a valid password on a computer system?
- What is the probability of winning a lottery?
- Is there a link between two computers in a network?
- How can I identify spam e-mail messages?
- How can I encrypt a message so that no unintended recipient can read it
- What is the shortest path between two cities using a transporation system?
- How many steps are required to do such a sorting?
- How can it be proved that a sorting algorithm correctly sorts a list?
- How can a circuit that adds two integers be designed?
- How many valid Internet addresses are there?

AI assistant, is it the ending of our cognitive process?



A long term exposure in misuse of AI assistant

Your Brain on ChatGPT: Accumulation of Cognitive Debt when Using an AI Assistant for Essay Writing Task[△]

Nataliya Kosmyna ¹
MIT Media Lab
Cambridge, MA

Eugene Hauptmann
MIT
Cambridge, MA

Ye Tong Yuan
Wellesley College
Wellesley, MA

Jessica Situ
MIT
Cambridge, MA

Xian-Hao Liao
Mass. College of Art
and Design (MassArt)
Boston, MA

Ashly Vivian Beresnitzky
MIT
Cambridge, MA

Iris Braunstein
MIT
Cambridge, MA

Pattie Maes
MIT Media Lab
Cambridge, MA

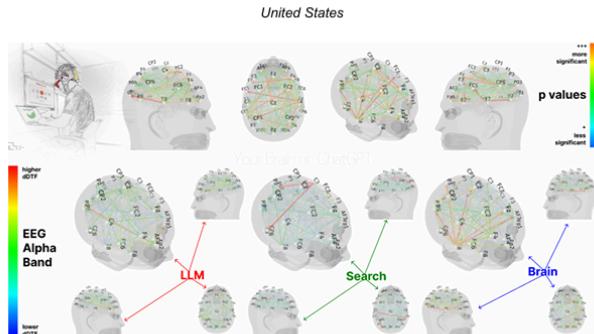
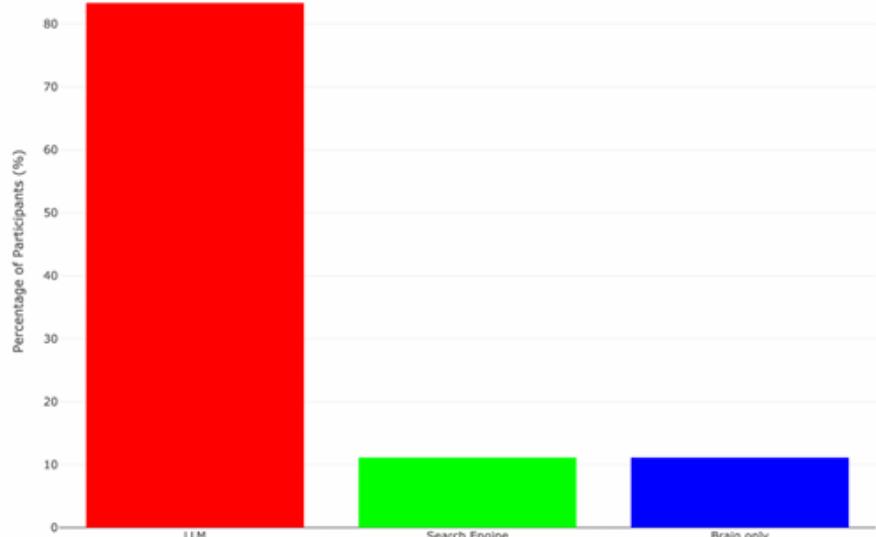


Figure 1. The dynamic Direct Transfer Function (dDTF) EEG analysis of Alpha Band for groups: LLM, Search Engine, Brain-only, including p-values to show significance from moderately significant (*) to highly significant (**).



Mathematics helps you understand complicated things

Myth 7 from Ferrie's book

Life is complicated

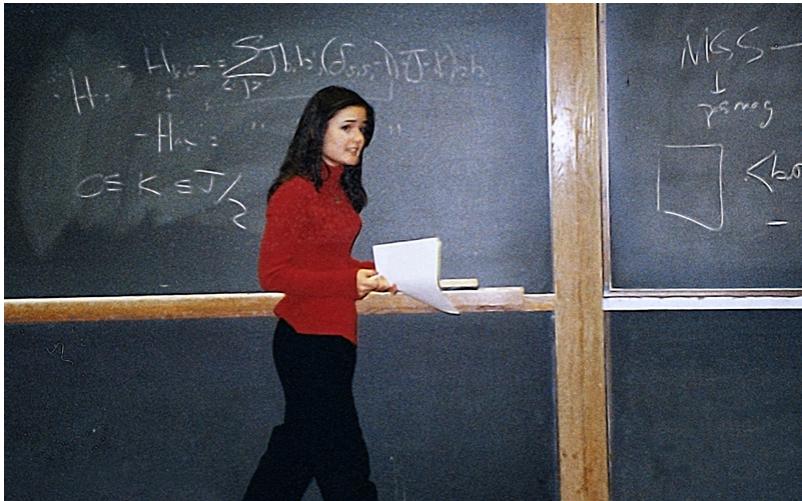
Computer is complicated

But tracking all of the sequence of flipping a coin 266 times
is much much much harder and almost impossible

Show to the students using the illustration from Ferrie's book
by calculating how long it takes to count it.

Provide with an illustration about universe, milky way, earth, human, and computer.

When mathematician turns into actress



Math is like going to the gym for your brain. it sharpens your mind.

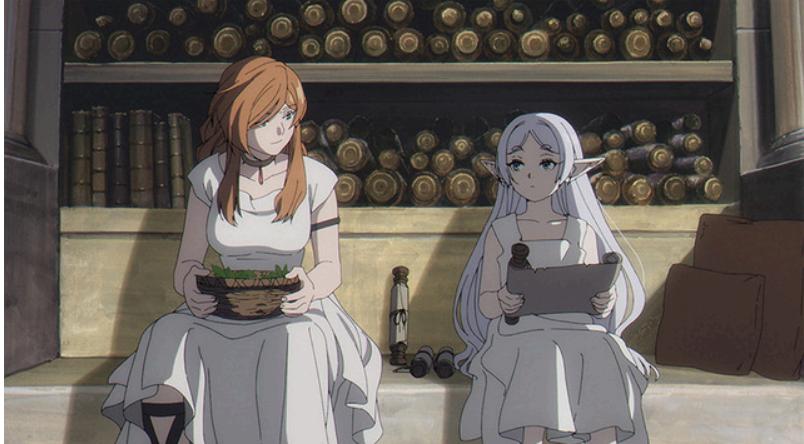
Danica **McKellar**

actress, mathematician, writer, and education advocate.

(McLaughlin, 2010) - 'Wonder Years' stars insist smart is sexy.

<https://edition.cnn.com/2010/SHOWBIZ/celebrity.news.gossip/08/16/danica.mckellar.hot.x/index.html>. (Accessed 23 July 2024)

Mathematics is a sort kind of **magic** of this world

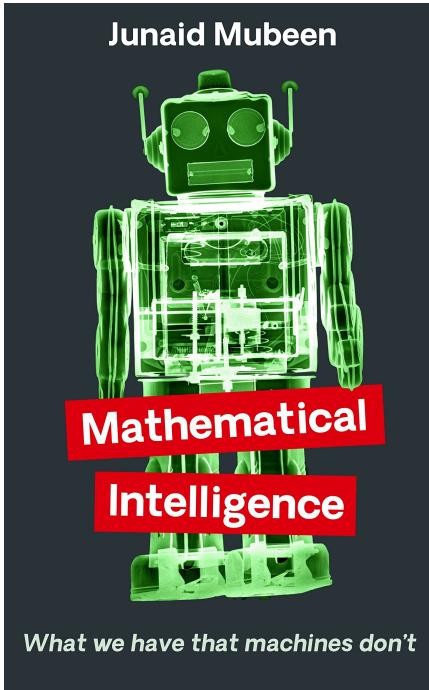


Flamme and Freiren the mages who live their lives to study any magic.



grimoire (/grɪm'wa:r/) = a book of spells

Mathematical concepts help you competing with machine



In that book Dr. Junaid Mubeen (PhD in Mathematics from University of Oxford) says that mathematical reasoning ... does not rely on patterns or probabilities (like AI does)—only on the surest of logical leaps.

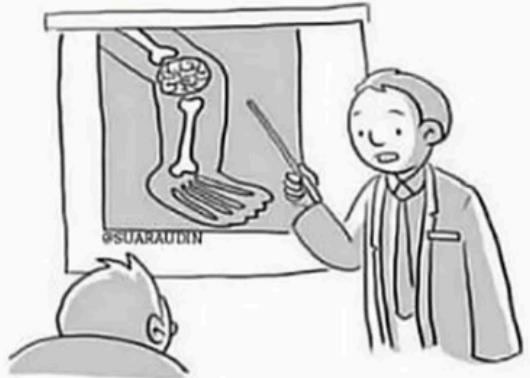
Why do you need to learn?



juraganbanyol

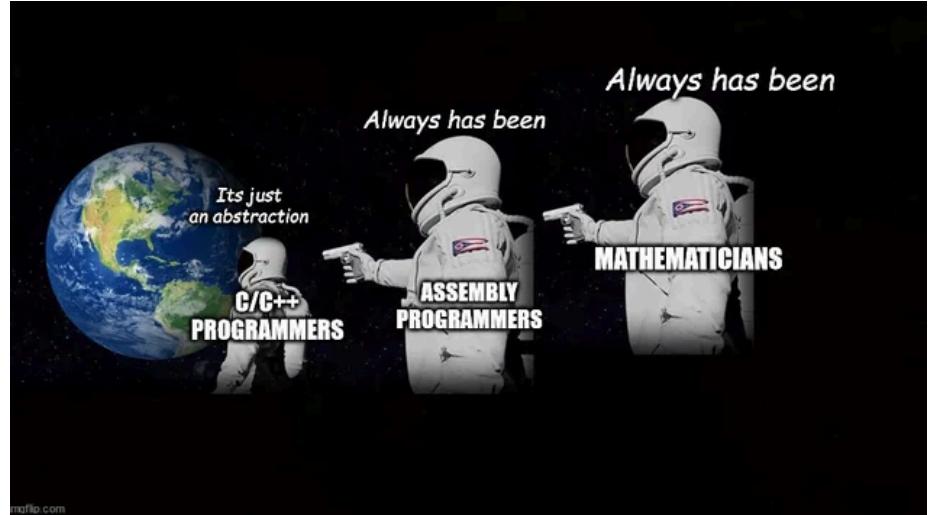
⋮

INI ADALAH LETAK OTAK



**ORANG YANG NGE KLAKSON
DI LAMPU MERAH PADAHAL
LAMPU HIJAU NYA BARU AJA NYALA**

(Liputan 6, 2019) - Meme Otomotif Pekan Ini: Posisi Otak Pengendara yang Hobi Klakson
<https://www.reddit.com/r/ProgrammerHumor/comments/14n6sr7/itsjustanabstraction/>



After you have been graduated, you still need to learn more things

MARK H. McCORMACK

What They DON'T Teach You at Harvard Business School

Notes from a
Street-Smart Executive

WITH A NEW FOREWORD BY ARIEL EMANUEL
AND PATRICK WHITESELL



Even though you have been studied at Harvard University, you still need to read and explore many things. A university is not the end of your learning journey.

Our biggest distraction in 21st century



(Lammers, 2024) - 'Alien: Romulus' Star On Her Scary Facehugger Xenomorph Scene

(studiostoks, 2019) - face id smartphone parasite, woman and Internet addiction. Pop art retro vector vintage illustrations

Brain Rot

Examples of Brain Rot Behavior

Brain rot behavior comes in various forms, including:

Video gaming: While it's possible to game without getting addicted, some gamers play compulsively and develop gaming disorder. They become so entranced by video games' alternate worlds, fanciful characters, and complicated plots that they can have difficulty functioning in other areas of life.

Zombie scrolling: This brain rot behavior refers to mindless habitual scrolling with no destination in mind or benefit derived. When **zombie scrolling**, you vacantly stare at your smart phone as you flit from one feed to another.

Doomscrolling: Doomscrolling involves searching for distressing information and negative news. Doomscrollers feel an overwhelming desire to be up to date on the latest information, even when it's disturbing.

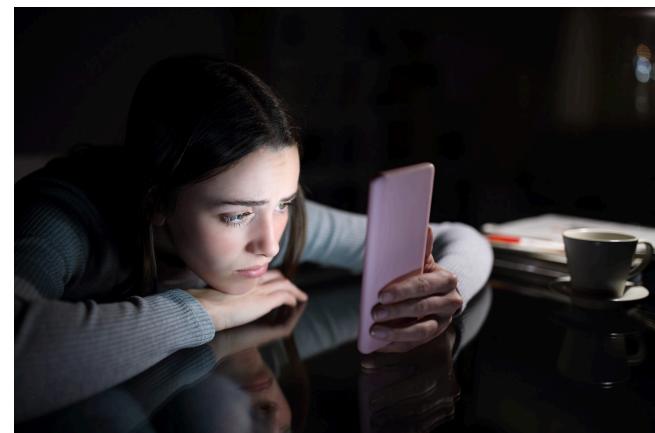
Social media addiction: **Social media addiction** is characterized by a persistent urge to check social media and a feeling of restlessness when you try to break the habit. Users can't stop checking platforms like YouTube, Instagram, and TikTok. Constant notifications, bright colors, and stimulating sounds can literally mesmerize them, causing them to stop thinking clearly.

(Roy, 2024) - If You Know What 'Brainrot' Means, You Might Already Have It
(Newport Institute, 2024) - Brain Rot: The Impact on Young Adult Mental Health

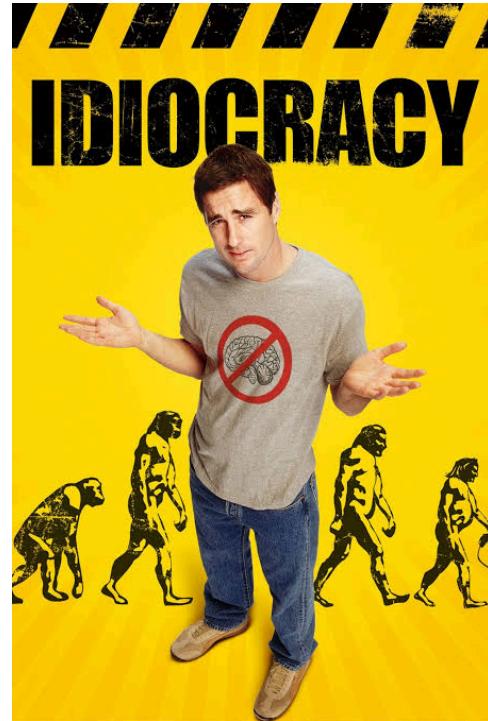
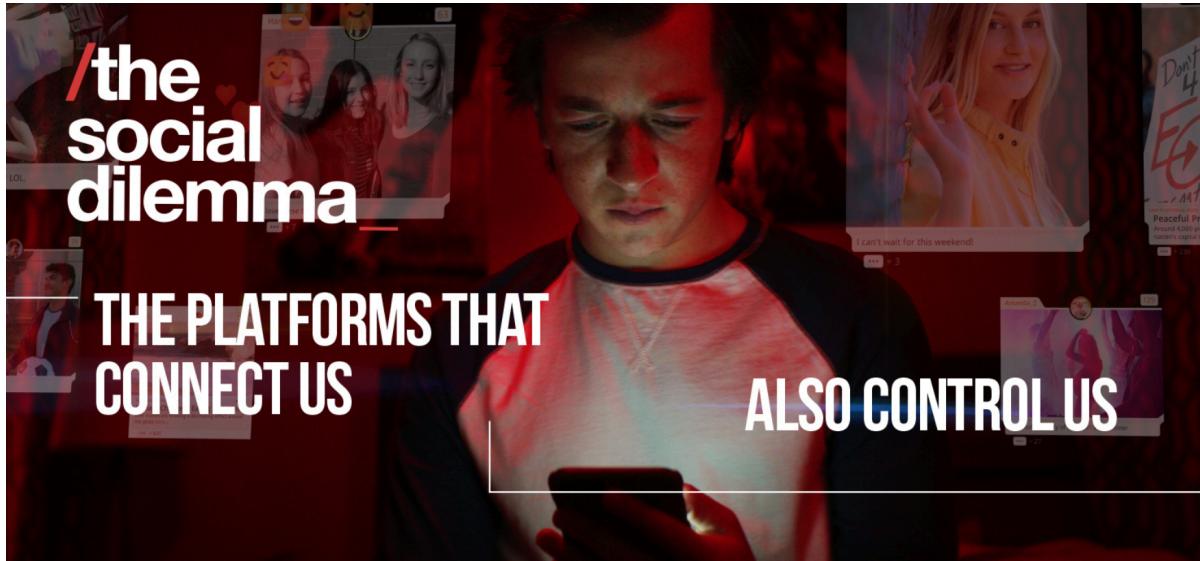
It is a term related to low-value internet content and the effects caused by spending too much time consuming it.



Pathos an element in experience or in artistic representation evoking pity or compassion.



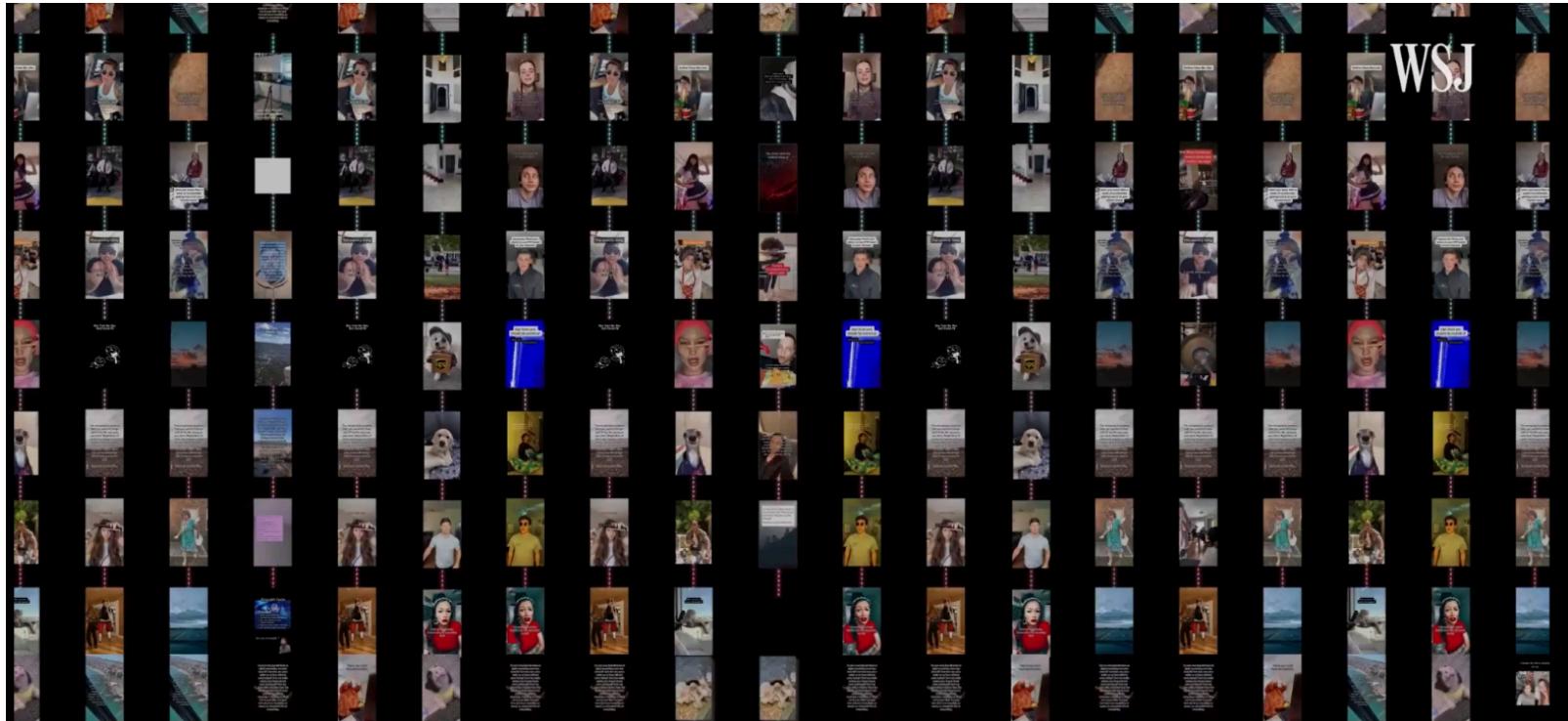
Some possible scenarios of the consequence of Brain Rot



<https://www.netflix.com/id-en/title/81254224>

<https://www.imdb.com/title/tt0387808/>

Behind the machine that entices you



(Wall Street Journal, 2021) - Investigation: How TikTok's Algorithm Figures Out Your Deepest Desires

What is the solution?

Time and **effort**
is one of the cornerstones of learning



The cognitive perspective on learning: ten cornerstone findings

Michael Schneider and Elsbeth Stern
ETH Zurich, Institute for Behavioural Research

Michael Schneider and Elsbeth Stern place knowledge acquisition at the very heart of the learning process, albeit that the quality of the knowledge is as necessary as the quantity and that “knowledge” should be understood much more broadly than (but including) knowing facts. They summarise the cognitive perspective through ten “cornerstones”. Learning: i) is essentially carried out by the learner; ii) should take prior knowledge importantly into account; iii) requires the integration of knowledge structures; iv) balances the acquisition of concepts, skills and meta-cognitive competence; v) builds complex knowledge structures by hierarchically organising more basic pieces of knowledge; vi) can valuably use structures in the external world for organising knowledge structures in the mind; vii) is constrained by the capacity limitations of human information-processing; viii) results from a dynamic interplay of emotion motivation and cognition; ix) should develop transferable knowledge structures; x) requires time and effort.



Useful topics

HOW TO STUDY (1)

1. "Studying" is not the same thing as "doing homework"



William J. **Rapaport**¹

(Rapaport, 2024) - How to Study; A Brief Guide. <https://cse.buffalo.edu/~rapaport/howtostudy.html>

¹ Check his personal website for wonderful things to read. All of them in my opinion are gems of knowledge

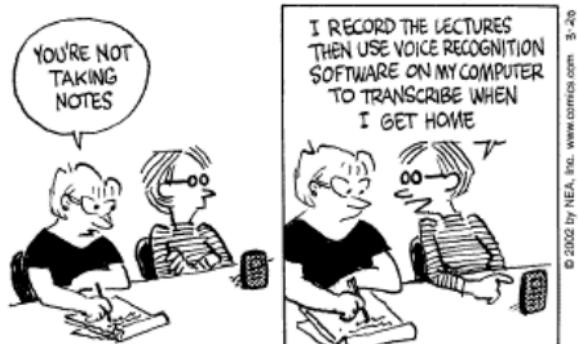
HOW TO STUDY (2)

2. Manage Your Time

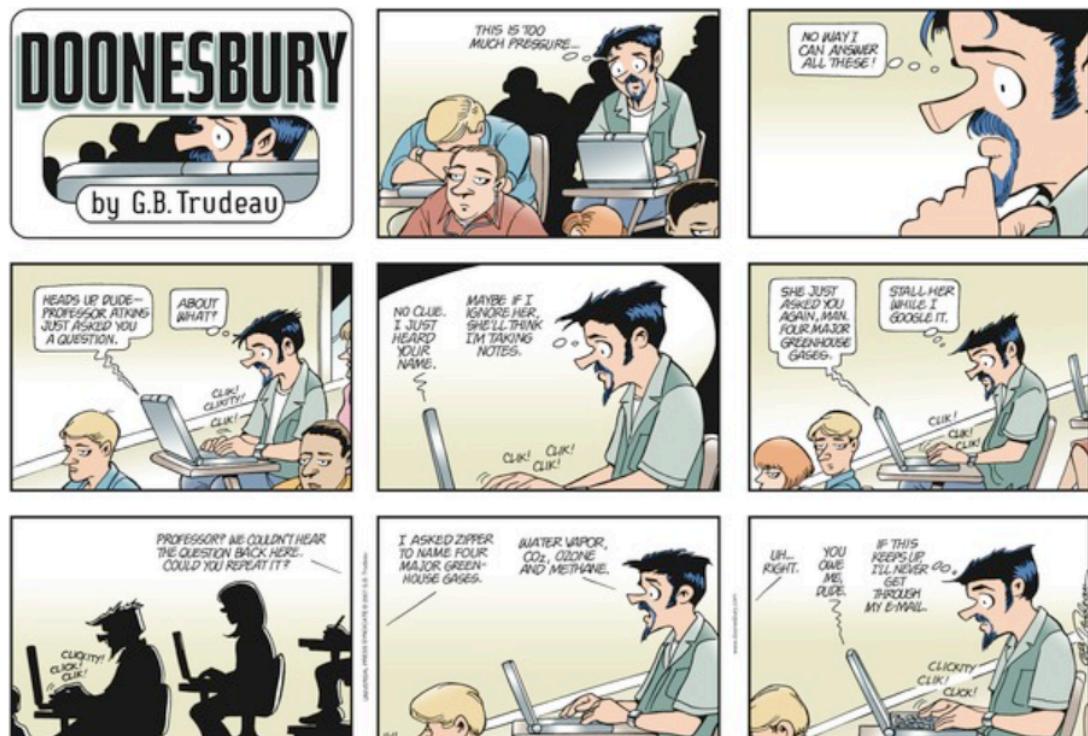
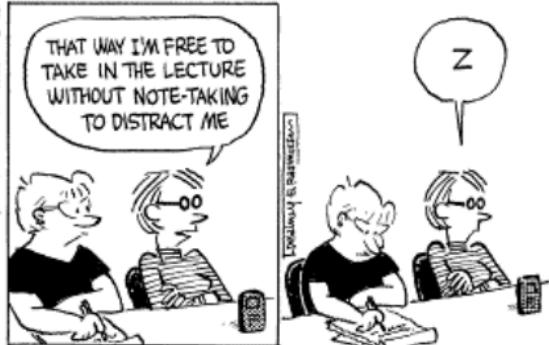


HOW TO STUDY (3)

3. Take Notes in Class Rewrite Them at Home



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HOW TO STUDY (4)

4. Study Hard Subjects First and Study in a Quiet Place



HOW TO STUDY (5)

5. Read Actively and Slowly, before and after Class.



HOW TO STUDY (6)

6. Do Your Homework



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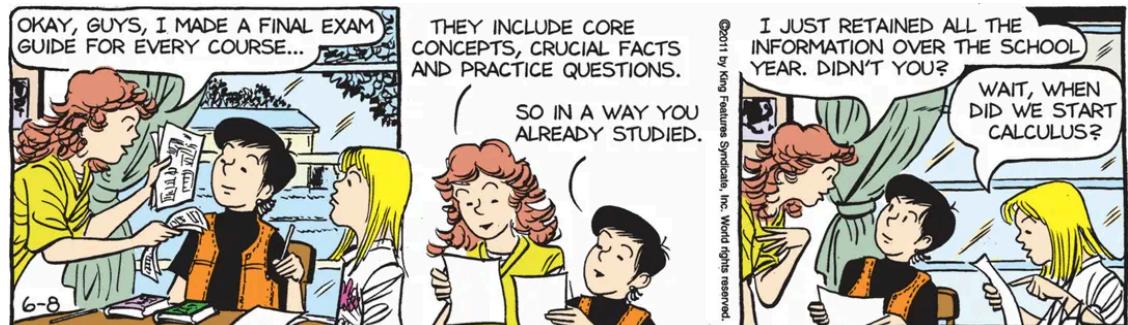
HOW TO STUDY (7)

7. Study for Exams

Actually don't study for exams.

You should study for **learning** and **understanding**

In case you do want to study for exams, **manage your time** carefully.



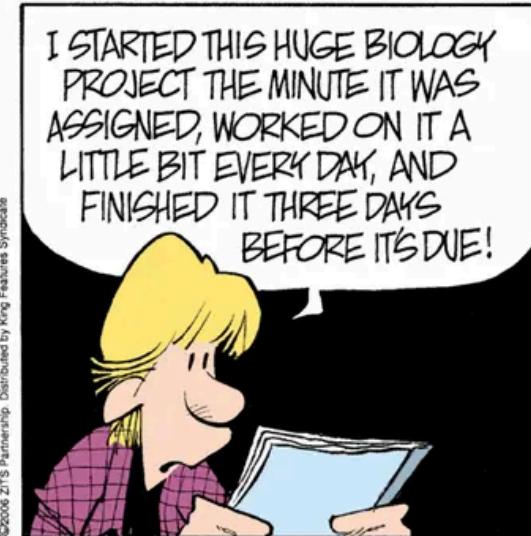
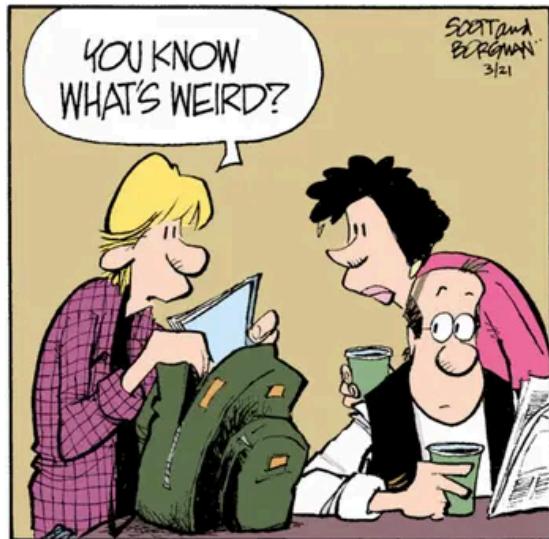
HOW TO STUDY (8)

8. Take Exams



HOW TO STUDY (9)

9. Do Research and Write Essays



HOW TO STUDY (10)

Some comments from students

"...this is the way you taught me to study years ago and it finally paid off last year!" (a college sophomore who went from high-school grades in the 70s to a 3.00 average in college)

"Thank you for the guide. It has some great tips! I'm surprised that I use some of the techniques myself (E.g., I abbrev. and condense my notes.) I have one suggestion, though: when reviewing for a text/exam, only study what you aren't familiar with. It reduces studying time and is helpful if you're a last minute person like me. :) Well, that may not work for you, but who knows?"

<https://www.buffalo.edu/news/releases/2009/12/10747.html>

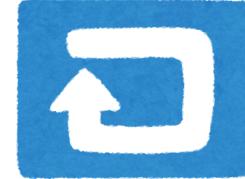
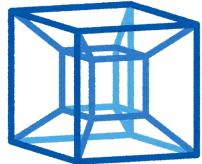
UB Professor's Online Study Guide Makes a Great Gift That Keeps On Giving

Students around the world have found the tips help improve their grades

By Ellen Goldbaum

Release Date: December 17, 2009

This content is archived.



See you next week

