

DISMATH

Discrete Mathematics and Its Applications
Welcome to DISMATH!

Melvin Kong Cabatuan

De La Salle University
Manila, Philippines

September 2014



Self Introduction

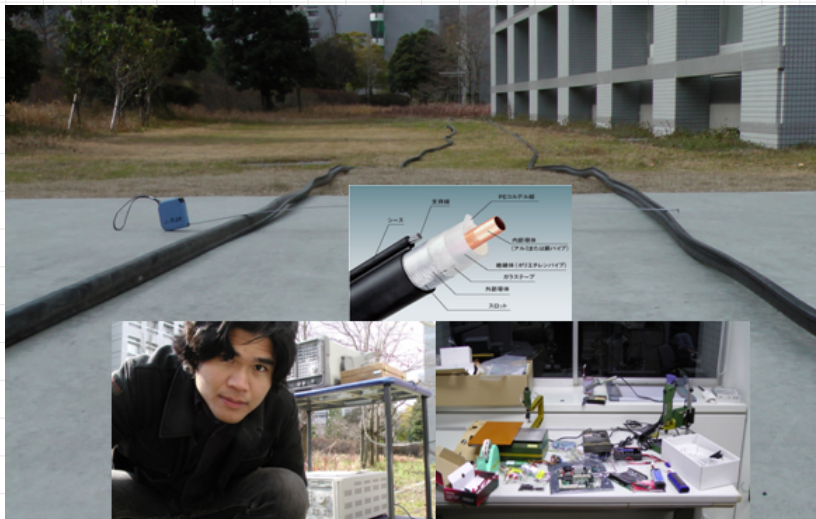


MELVIN K. CABATUAN, ECE

- Masters of Engineering, NAIST (Japan)
- Thesis: Cognitive Radio (Wireless Communication)
 - IEEE Philippine Section Secretary (2012)
 - ECE Reviewer/Mentor (Since 2005)
 - 2nd Place, Nov. 2004 ECE Board Exam
- Test Engineering Cadet, ON Semiconductors
- DOST Academic Excellence Awardee 2004
 - Mathematician of the Year 2003
 - DOST Scholar (1999-2004)
- Panasonic Scholar, Japan (2007-2010)









- ① Introduction
- ② Course Contents
 - Evaluation Criteria
 - Pre-requisite
 - References
- ③ Discrete Mathematics
 - Example



Course Contents - Part I

① Logic, Sets, and Functions



- ② Methods of Proof, Algorithms, Integers
- ③ Mathematical Reasoning, Induction, and Recursion



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Course Contents - Part II

1 Relations

$\{(\text{⌘}, \text{👤}), (\text{👤}, \text{👤}), (\text{👤}, \text{🚲}), (\text{?}, \text{❤️}), (\text{🚲}, \text{🚌}), (\text{🏭}, \text{🏭}), (\text{🌴}, \text{🏭})\}$

2 Graph Theory

3 Planar Graphs, Graph Coloration, and Trees

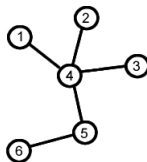


Course Contents - Part II

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$\{(\lambda, \text{love}), (\text{love}, \text{love}), (\text{love}, \text{love}), (\text{love}, \text{love}), (\text{love}, \text{love}), (\text{love}, \text{love}), (\text{love}, \text{love})\}$

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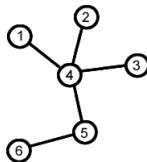


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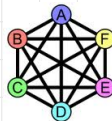
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2 Graph Theory



3 Planar Graphs, Graph Coloration, and Trees



Course Contents - Part III

① Counting Techniques and Probability Theory



② Advance Counting Techniques



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① Counting Techniques and Probability Theory

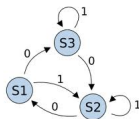


② Advance Counting Techniques



Course Contents - Part IV

1 Modeling Computation, Finite State Machines and Automata

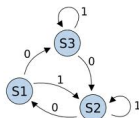


2 Algebraic Systems and Formal Languages

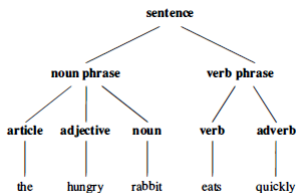


Course Contents - Part IV

1 Modeling Computation, Finite State Machines and Automata



2 Algebraic Systems and Formal Languages



Evaluation Criteria

Quiz Average:	35%
Final Exam:	35%
Project:	25 %
Teacher's Evaluation:	5%

Total:	100%
PASSING GRADE:	65%



Pre-requisite

- 1 ENGALG1 (Hard)
- 2 Mathematical Background (High-school mathematics should be enough if ...)
- 3 A curious mind!



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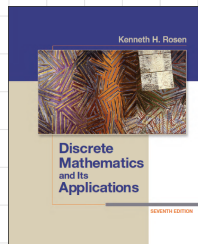
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References

- 1 Rosen, K.H. (2012). *Discrete Mathematics and Its Applications* (7 ed.), New York, McGraw-Hill

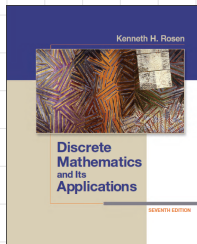


- 2 Online Resources



References

- 1 Rosen, K.H. (2012). *Discrete Mathematics and Its Applications* (7 ed.), New York, McGraw-Hill



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Discrete Mathematics

Definition

“ *Study of distinct & countable objects.* ”



Discrete Mathematics

Purpose

To provides the mathematical foundation for many computer engineering/science courses including data structures, algorithms, database theory, automata theory, formal languages, etc ...



Discrete Mathematics

Insight

“ It excludes 'continuous mathematics' such as Calculus. ”



Logic Example: Knights and Knaves

An island is inhabited only by knights and knaves. Knights always tell the truth, and knaves always lie. You meet two inhabitants: Mel and Vin. Determine what Mel and Vin is, if they say:

Mel: “*Vin is a knight*”

Vin: “*The two of us are opposite types*”



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∴ Both Mel and Vin are Knaves!



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Mel: “ *We are both knaves* ”

Vin: “ ... ”

\therefore Mel is a Knave and Vin is a Knight!



Example: Mathematical Reasoning/ Counting

A pyramid scheme promises participants payment, services, primarily for enrolling other people into the scheme or training them to take part, rather than supplying any real investment or sale of products.



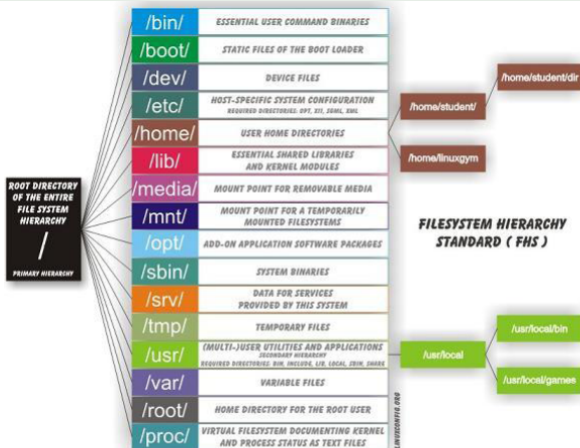
Example: Graph Theory/ Mapping

Facebook Map of the World.



Example: Trees

Linux Directory.



Example: Modeling Computation

Kasparov vs. Deep Blue.



IBM's Deep Blue vs. Kasparov (1997)



IBM's Deep Blue Junior vs. Kasparov (2003)



Key Insights



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It provides the mathematical foundation for many computer engineering/science courses including data structures, algorithms, database theory, automata theory, formal languages, etc ...

“ It finds its application in our everyday lives. ”



Shall we begin!

“ Thank you for your attention ”

