



國立交通大學電子工程學系

DEE1533
DISCRETE MATHEMATICS



EDA Courses in NCTUEE

2

IRIS H.-R. JIANG

Undergraduate

- **Foundation**
 - Logic design
 - Data structures
 - **Discrete mathematics**
 - Algorithms
- **Advanced**
 - Introduction to EDA

Graduate

- **Foundation**
 - Advanced algorithms
- **Advanced**
 - Special topics in CAD
 - Logic synthesis & verification
 - Physical design automation
 - High level synthesis
 - Testing

Administrative Matters

- **Time/location:** 2B@ED116、4EF@ED116
- **Instructor:** 趙家佐
 - Email: mango@faculty.nctu.edu.tw
 - Office: ED625, ext. 31671
 - Office hours: 4CD (made by appointment)
- **Teaching assistants:**
 - 張玟翔: o0000032@yahoo.com.tw
 - 黃子軒: sto10219@hotmail.com
 - 陳力德: mark920435@gmail.com
 - Lab: ED612, ext. 54178
- **Prerequisite:** None

- **Course webpage:**

- <http://tiger.ee.nctu.edu.tw/course/Discrete2015/index.htm>

- Required text:

- Kenneth H. Rosen, *Discrete Mathematics and Its Applications*, 7th ed., McGraw-Hill, 2013.

- **Reference:**

- C. L. Liu, *Elements of Discrete Mathematics*, 2nd ed., McGraw-Hill, 1998.

Grading Policy

- **Grading:**
 - ▣ Quizzes: 30%
 - 八次取六次最高
 - ▣ Midterms: 35%
 - ▣ Final: 35%

Acknowledgment

- **Prof. Iris H.-R. Jiang**
 - National Chiao Tung University
- **Prof. Juinn-Dar Huang**
 - ▣ National Chiao Tung University
- **Prof. Hung-Ming Chen**
 - ▣ National Chiao Tung University
- **Prof. Michael P. Frank**
 - ▣ University of Florida
- **Prof. Hsu-Chun Yen**
 - ▣ National Taiwan University

What is **Mathematics**, Really?

7

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- It's **not** just about numbers!
- Mathematics is much more than that:

Mathematics is, most generally, the study of
any and all absolutely certain truths about
any and all perfectly well-defined concepts

- But, the concepts can relate to numbers, symbols, visual patterns, or **anything!**

So, What's **This** Class About?

- **Discrete mathematics**: The study of discrete, mathematical objects and structures.

- **What are “discrete structures” anyway?**
 - **Discrete** (\neq discreet!): Composed of distinct, separable parts. (Opposite of continuous.)
discrete : continuous :: digital : analog
 - **Structures**: objects built up from simpler objects according to a definite pattern.

Why Study Discrete Math?

- The **basis** of all of digital information processing: Discrete manipulations of discrete structures represented in memory.
- It's the basic language and conceptual **foundation** of all of **computer science**.
- Discrete concepts are also widely used throughout math, science, engineering, economics, biology, etc., ...
- A generally useful tool for **rational** thought!

Course Objectives

- **The is basically a mathematics course:**
 - ▣ No programming
 - ▣ Lots of theorems to prove
- **Upon completion of this course, the student should be able to:**
 - ▣ Check validity of simple logical arguments (proofs).
 - ▣ Check the correctness of simple algorithms.
 - ▣ Creatively construct simple instances of valid logical arguments and correct algorithms.
 - ▣ Describe the definitions and properties of a variety of specific types of discrete structures.
 - ▣ Correctly read, represent and analyze various types of discrete structures using standard notations.

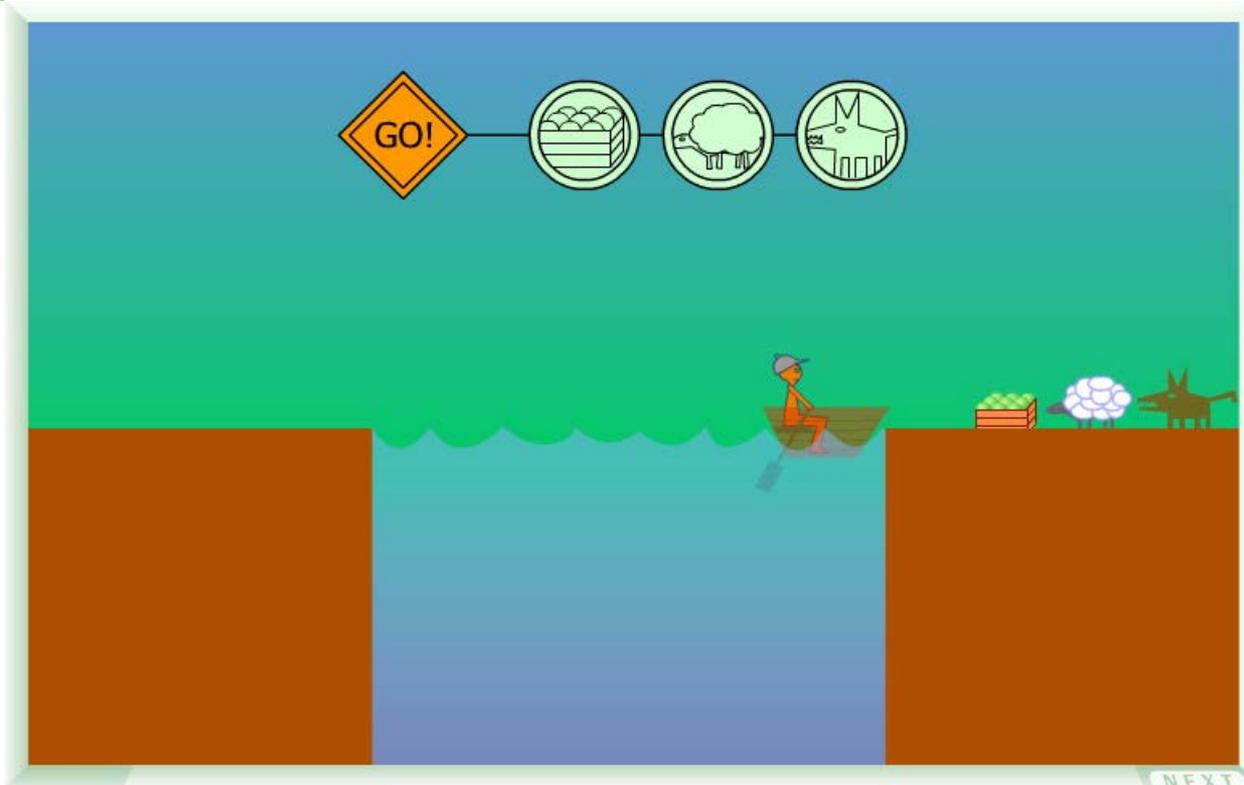
Course Outline

- **The Foundations: Logic and Proofs**
- **Basic Structures: Sets, Functions, Sequences, and Sums**
- **The Fundamentals: Algorithms and the Integers**
- **Induction and Recursion**
- **Counting**
- **Advanced Counting**
- **Relations**
- **Graphs**
- **Trees**

Wolf Sheep Cabbage

12

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Please help the man in the boat to move – the **wolf**, the **sheep** and a box of **cabbage** to the other side of the lake. **Notice that:** Wolves eat sheep & sheep eat cabbage when no man around.

Family Crisis

13

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Please help this family to cross to the other side of the bridge.

Notice that: It is night, so you must have a lamp. Each person cross the bridge at a different speed: 1, 3, 6, 8, and 12 sec.

The bridge can hold a maximum of 2 persons.

A pair must walk together at the rate of the slower person.

The lamp enough for 30 sec only!