Discrete Mathematics and Its Applications
Lecture 0: Course introduction

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Outline

1. Textbooks and References
2. Requirements and Assessment
3. Office Hour and Contact Information
4. Overview of This Course
   - Course Schedule
5. Take-aways
Important Dates for COVID-19 outbreak

- Original plan for school opens: Feb 24
- Actual time for school opens: Mar 2
- Return to school time: ...
- Resume normal teaching: ...

Online Teaching
Normal teaching
Required sources


References


Requirements

1. Slides will be posted 1-2 days before lecture, but
2. Students are expected to
   - prepare lessons before class, including lecture content previewing, laptop, cell phone, and notebook, etc.
   - take notes during lecture (no lecture note will be provided)
   - read the assigned readings before and after the lecture
   - address homework assignments individually
   - think through the answers of tutorial (a set of questions) after every lecture
3. Examinations: monthly quiz, midterm, and final term (honestly and independently)

Chaoxing Platform: http://ecnu.fanya.chaoxing.com/portal
Grading policy

- Mid exam: 20%
- Final exam: 60%
- Tutorial & Attendance: 20%
Contact information

Lecturer: GAO Ming—- 高明
- Office: Rm. East 115, Math. Building
- Phone: 6223 2061
- Mobile: 189 1694 3299
- Email: mgao@dase.ecnu.edu.cn
- Research focus:
  - Computational education
  - Knowledge graph and knowledge engineering
  - Data mining and machine learning

Teaching assistant: Shu Zheng—- 郑舒
- Office: Rm. East 110, Math. Building
- Email: shzheng@stu.ecnu.edu.cn
It’s like learning a new language

\[ E_0 = M_0 C^2. \]

- Do you remember the time when you start learning English?
- There are a few things you have to learn and get used to.
- They might not make so much sense in the beginning, but over time, you will get comfortable with how the language is used.
- As your knowledge of the language gets better, everything becomes more natural. Learning a new language sometimes expands your view of the world.
- I hope it is also true with this course.
The goals of this course

There are three goals:

- To learn how to make mathematical arguments.
- To learn various fundamental mathematical concepts that are very useful in computer science.
- To learn how to model a real problem in mathematical manner.
Why care about discrete mathematics?

- Digital computers are based on discrete atoms (bits)
- Therefore, both a computer’s
  1. structure (circuits)
  2. operations (execution of algorithms)
  can be described by discrete mathematics.
Discrete mathematics

Study of mathematics structures and objects that are fundamentally discrete rather than continuous.

Examples of objects with discrete values are integers, graphs, or statements in logic.

Discrete mathematics and computer science

Concepts from discrete mathematics are useful for describing objects and problems in computer algorithms and programming languages. It can be applied to many applications, such as cryptography, automated theorem proving, and software development, etc.
Examples

Initialization:

```java
while (condition)
{
    Statement 1;
    Statement 2;
    Statement 3;
    ...........
    if (If Condition)
        break;
    Statement N-1;
    Statement N;
    Increment;
}

Outside Statement 1:
```
Examples Cont’d
Tentative topics

1. Logic and proofs
2. Sets
3. Functions
4. Sequences
5. Counting
6. Probability
7. Relations
8. Graphs
Take-aways

Advices to learning DM

- Not a reading course.
- More than a mathematics course, it is therefore workload-heavy.

Course homepage