AI TUTOR-ENABLED SELF-PACED PROFESSIONAL COURSE BOOK

Discrete Mathematics

Learn to think like a mathematician and a computer scientist: logic, proofs and structures.



NoteStore Academy

Level: Beginner → Intermediate | Estimated study time: 35 hours

Discrete Mathematics

AI Tutor-Enabled Self-Paced Professional Course Book

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How to use this course book

Discrete Mathematics is a self-paced course book covering logic, proof techniques, sets, functions, relations, induction, counting, recurrences and graph theory. It is designed for computer science, mathematics and engineering students who need both computation and rigorous reasoning.

A simple study routine

- Study one module at a time. Read the overview and objectives first.
- Work through each key concept, using the TEACH ME prompt whenever an idea is unclear.
- Attempt every practice problem yourself before asking for help.
- Use CHECK MY WORK to review your solutions and CHALLENGE ME to test yourself.
- Finish each module by writing a five-line summary in your own words.

Suggested pace

Most learners complete this course in about 35 hours. Studying four to five hours a week, that is roughly 8 to 10 weeks. Go faster through topics you already know and slower where you need more practice.

Your AI Tutor: five learning modes

This course book is designed to be used with an AI assistant such as ChatGPT, Microsoft Copilot or Gemini. The goal is not to get answers from AI, but to use it as a patient tutor that explains, guides, checks and challenges you. Copy a prompt, replace the text in brackets and keep the conversation going.

TEACH ME

Explain [topic from this module] to me step by step at a [beginner / intermediate / advanced] level. Use a simple example first, then a harder one. Stop and ask me a question to check I understood before moving on.

GUIDE ME

I am working on this problem: [paste problem]. Do not give me the answer. Give me one hint at a time and wait for my next step.

CHECK MY WORK

Here is my solution: [paste working]. Check each step, tell me exactly where any mistake is and why, but let me correct it myself.

CHALLENGE ME

Give me three exam-style questions on [topic from this module], getting harder each time. Wait for my answers, then mark them and explain what I missed.

HELP ME APPLY IT

Show me how [topic from this module] is used in a real situation such as work, research or everyday decisions, then give me a small task to try it myself.

Verify before you trust

AI tools can make mistakes, especially with calculations. Use this five-step check every time:

- ASK: write a clear, specific prompt that includes your level and what you have tried.
- SOLVE: work the problem yourself first, even if you are unsure.
- TEST: substitute values, estimate or graph to see if the answer is reasonable.
- CHECK: compare with the worked examples in this book and your class notes.
- VALIDATE: if the AI and the book disagree, trust the book and your teacher, and ask the AI to explain the difference.

MODULE 1

Propositional Logic

Reason precisely with statements.

Learning objectives

- Explain connectives and truth tables in your own words and recognise when it applies.
- Explain logical equivalence in your own words and recognise when it applies.
- Solve problems involving implications and converses accurately.

Key concepts

Connectives and truth tables

Write a one-sentence definition in your own words, then work one example by hand. Use the prompt below if any step is unclear.

> TEACH ME: Explain connectives and truth tables in Discrete Mathematics step by step at my level. Start with a simple example, then a harder one, and ask me a question to check my understanding.

Logical equivalence

Find where this appears in your class notes or textbook. Note the key formula or rule, one worked example and one mistake students often make.

> TEACH ME: Explain logical equivalence in Discrete Mathematics step by step at my level. Start with a simple example, then a harder one, and ask me a question to check my understanding.

Implications and converses

Explain this idea out loud as if teaching a friend. Where you hesitate, ask your AI Tutor for a simpler explanation and a second example.

> TEACH ME: Explain implications and converses in Discrete Mathematics step by step at my level. Start with a simple example, then a harder one, and ask me a question to check my understanding.

Practice problems

1. Build a truth table for $(p \rightarrow q) \wedge \neg q$
2. Show $p \rightarrow q \equiv \neg p \vee q$

After attempting each problem, paste your working into the CHECK MY WORK prompt. Then use CHALLENGE ME to get three more problems on the same topic.

Before moving on: write a five-line summary of this module in your own words, then ask your AI Tutor to point out anything you missed.

Continue in the full course book

The full course book continues with:

- Module 2: Predicate Logic
- Module 3: Proof Techniques
- Module 4: Sets and Functions
- Module 5: Mathematical Induction
- Module 6: Relations
- Module 7: Counting
- Module 8: Recurrence Relations
- Module 9: Graph Theory
- Module 10: Trees and Algorithms
- Four practical projects and a capstone
- Portfolio guide, assessment rubric and completion checklist