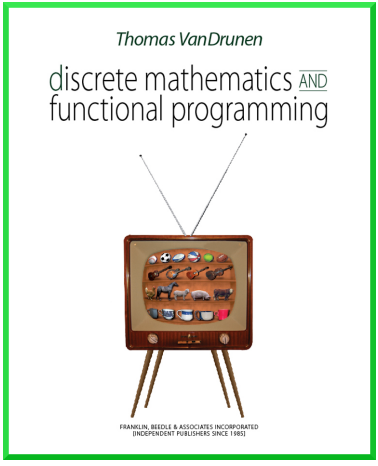
Welcome

CSCI 243
Wheaton College
Thomas VanDrunen
Spring 2025

Please keep phones and other devices silenced and put away—not seen or heard (or used) any time during class.



Discrete Mathematics and Functional Programming.
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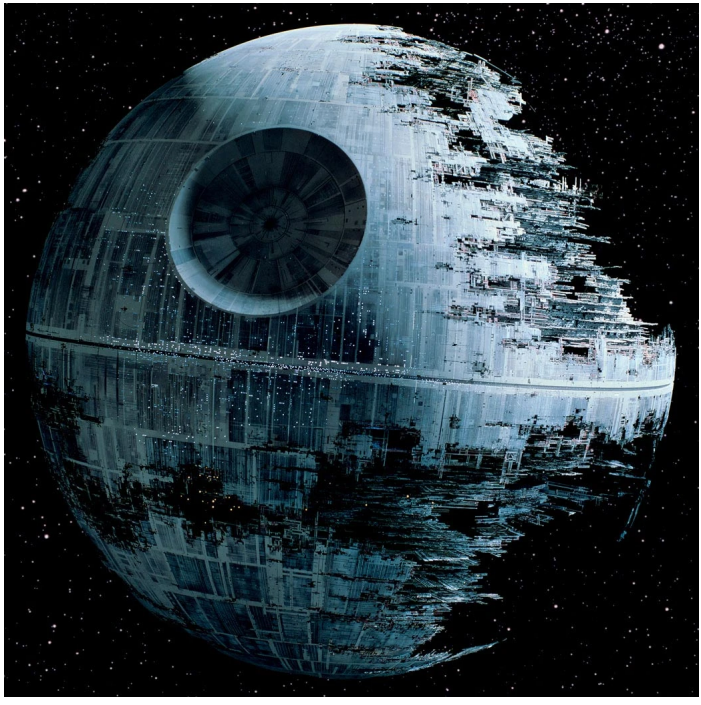
Discrete Mathematics and Functional Programming with Python.
Under contract with Taylor & Francis.
Expected 2026.



What is this course about?

Proof-based **discrete mathematics**
and
programming in the **functional style**

. . . with three audiences in mind:

- Computer science majors
- Math majors
- Everyone else

Goals and themes

At the end of this course you should be able to

- Manipulate symbolic logical forms
- Write mathematical proofs, especially for results from basic set theory
- Write programs in the functional style using the Python programming language

Throughout this course, we will see these recurring themes:

- Formal definitions
- Recursive thinking
- Analysis and synthesis

Course outline

Ch 1. Set. (Jan 13–Jan 24)

Ch 2. Sequence. (Jan 27 – Feb 5)

Test 1. Feb 7

Ch 3. Proposition. (Feb 10–Feb 19)

Ch 4. Proof. (Feb 21–Feb 28)

Test 2. Mar 5

Ch 5. Relation. (Mar 7–Mar 24)

Ch 6. Function. (Mar 26–Apr 7)

Test 3. Apr 11

Ch 7. Self reference (Apr 14–Apr 28)

Final exam. Thurs, May 8, 10:30 am

5 is a natural number (*or* the collection of natural numbers contains 5).	$5 \in \mathbb{N}$
All integers are rational numbers.	$\mathbb{Z} \subseteq \mathbb{Q}$
Merging the algebraic numbers and the transcendental numbers makes the real numbers.	$\mathbb{R} = \mathbb{A} \cup \mathbb{T}$
Negative integers are both negative and integers.	$\mathbb{Z}^- = \mathbb{R}^- \cap \mathbb{Z}$
Transcendental numbers are those real numbers that are not algebraic numbers.	$\mathbb{T} = \mathbb{R} - \mathbb{A}$
Nothing is both transcendental and algebraic, *or* the collection of things both transcendental and algebraic is empty.	$\mathbb{T} \cap \mathbb{A} = \emptyset$
Adding 0 to the collection of natural numbers makes the collection of whole numbers.	$\mathbb{W} = \{0\} \cup \mathbb{N}$
Since all rational numbers are algebraic numbers and all algebraic numbers are real numbers, it follows that all rational numbers are real numbers.	$\begin{array}{r} \mathbb{Q} \subseteq \mathbb{A} \\ \mathbb{A} \subseteq \mathbb{R} \\ \therefore \quad \mathbb{Q} \subseteq \mathbb{R} \end{array}$

For next time:

Read Sections 1.(1 & 2)

Take quiz on Canvas (covering the reading)

Meet in the CSCI lab (MEY 154) on Wednesday (This Wednesday, Jan 15, only)
(Make sure you know your username and password for the Wheaton network.)