# CS 375 Logic & Theory of Computing

## Syllabus

**(Spring 2025)**

Required/Elective: required

Prerequisites: MA113, CS215, CS275

# Syllabus (Spring 2025)

General Information

Topics Covered

Policies

Course Summary & Program Outcomes

Plagiarism & Cheating

Important Links

Important Dates

# General Information

You don’t need to wear a mask to attend this class.

But for your own sake, please do.

# General Information

Location: T.H. Morgan Bio Sci, Rm 116 LEC

Time: MWF 10:00 – 10:50am

Instructor: Dr. Fuhua (Frank) Cheng

OFFICE: DMB 303

OFFICE HOURS: MWF 11:00am-12:00pm

PHONE: (859) 257-6760

E-MAIL: cheng@cs.uky.edu

# General Information

CLASS WEBSITE:

https://www.cs.uky.edu/~cheng/cs375/CS375-HomePage-2025s.htm

Or, go to my personal WEBSITE:
http://www.cs.uky.edu/~cheng/

Then scroll down to 'Teaching' and click on 'CS375'

# Class website:

UNIVERSITY OF KENTUCKY

**CS375: Logic and Theory of Computing (Spring 2025)**

## Lecture Notes

Will be followed in the following order.

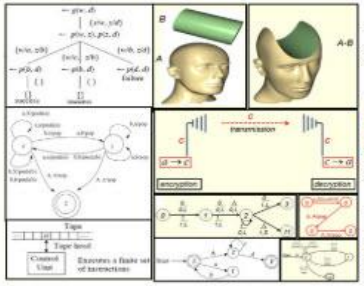
- Preliminaries
- Regular Languages and Finite Automata-I
- Regular Languages and Finite Automata-II
- Regular Languages and Finite Automata-III
- Regular Languages and Finite Automata-IV

- Context-free Languages and Pushdown Automata-I
- Context-free Languages and Pushdown Automata-II
- Context-free Languages and Pushdown Automata-III
- Context-free Languages and Pushdown Automata-IV
- Context-free Languages and Pushdown Automata-V

- Turing Machines & Equivalent Models-I
- Turing Machines & Equivalent Models-II
- Turing Machines & Equivalent Models-III

(if time permits, then)

- Propositional Logic I II
- Predicate Logic I II III
- Computational Logic I II
- Algebraic Structure



This is the home page of CS375: Logic and Theory of Computing.

**Instructor:**
Dr. Fuhua (Frank) Cheng
cheng@cs.uky.edu

In this course, the students will develop knowledge of a variety of mathematical tools for the design and analysis of algorithms and computer programs. They will learn about basic models of computation based on finite automata, grammars and Turing machines. Specific skills as outcomes of the course include: (1) A fluency in the elements of automata theory, regular grammars and regular expressions, and their uses; (2) An understanding of the relationship between formal models of computation and modern computers; (3) An understanding of the relationship of the relevance of theory of computation to the computer science curriculum (4) An ability to apply knowledge of computing and mathematics appropriate to the discipline (5) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

The course syllabus is available in ppt format and HTML format.

Campus resources, including engineering tutoring, UK Counseling Center and Center for Support and Intervention, you can use (for free).

See Title IV Regulation here.

## Homework Assignments

## Homework Solution Sets

## Exam dates:

- Midterm date: March 12, 2025 (Wednesday)
- Final Exam date & time: 10:30am-12:30pm, May 7, 2025 (Wednesday)

## Link to UK Canvas

## Review sheet for Midterm

## Review sheet for Final

## Midterm Exam Solution Set

## Final Exam Solution Set

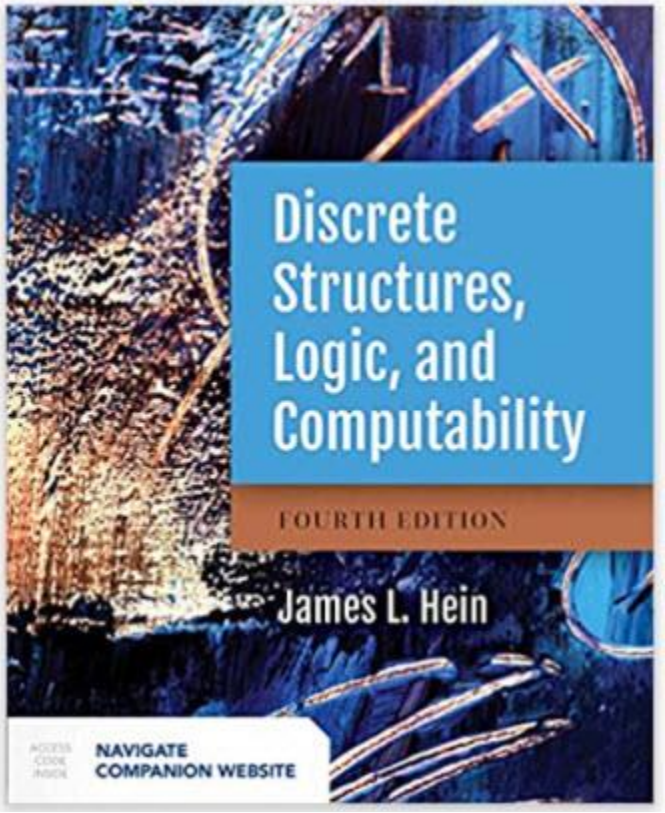
CS Dept, UK

# General Information

TEXTBOOK: Discrete Structures, Logic and Computability (4th Edition)

by James L Hein

and my notes (can be downloaded from the class website)



# General Information

GRADER:

Kalista Smiley
(Kalista.Smiley@uky.edu,
klsm245@uky.edu)

# List of Topics:

Week 1:

**Preliminaries:** set algebra, relations, functions

read Chapters 1 - 4

Weeks 2-5:

**Regular languages, finite automata**

Chapter 11

Week 6-8:

**Context-free languages, pushdown automata**

Chapter 12

# List of Topics:

Weeks 9-11:

**Turing machines** – Chapter 13

Week 12:

**Propositional logic & predicate logic**

Chapters 6-7

Weeks 13:

**Computing with logic & algebraic structures**

Chapters 9-10

# Policies:

8-10 Homework Assignments (posted on class website)

HW should be submitted to Canvas both as a pdf file and a doc file on or before the due date

Late work will not be accepted.

Worst HW grade will be dropped when we compute your final grade for this class.

# Policies:

All class materials will be available on class website

Send me an email on Friday if you did not receive any emails from me by then.

# Policies:

Homeworks---- 40%

Midterm ----- 30%

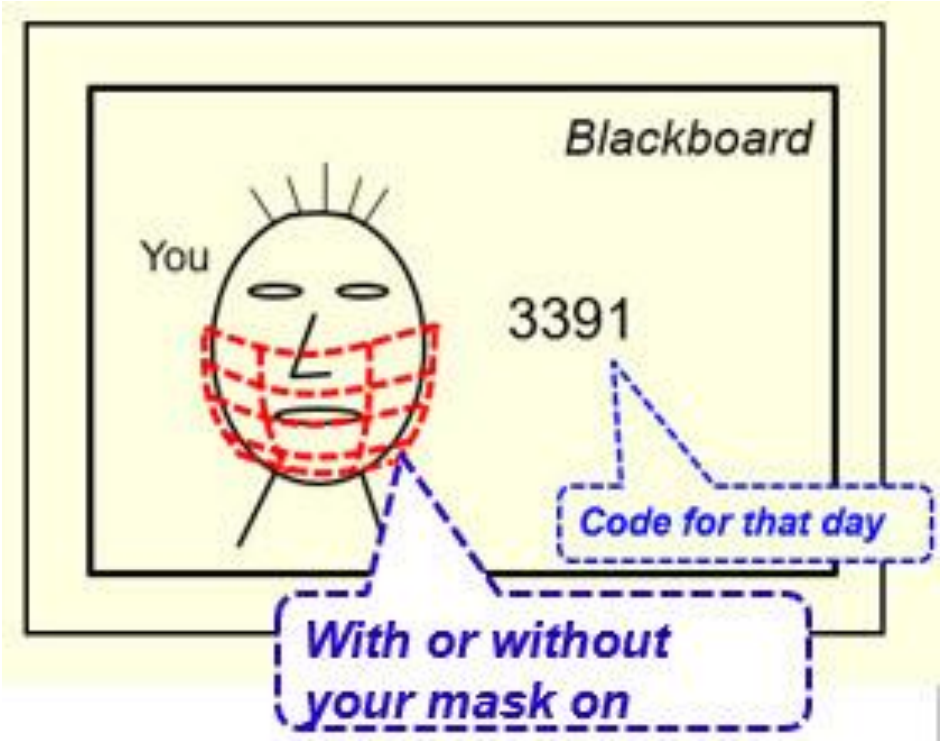
Final (not comprehensive) ----- 30%

Class attendance (extra credit) ----- 5%

- You get the attendance credit (5 points) if you miss at most two lectures the entire semester

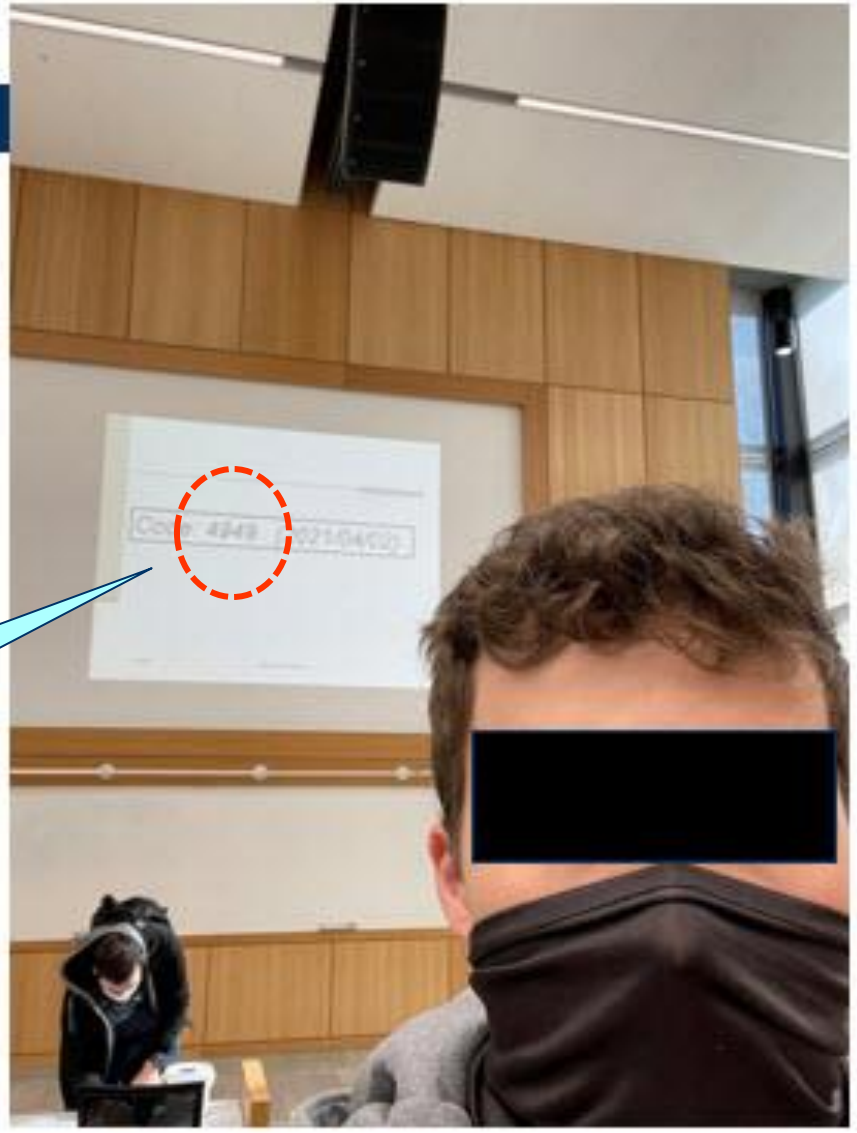
# Attendance checking:

- At the end of each class, a 4-bit special code will be displayed on the board
- Use your cell phone to take a picture of yourself and the code



# Attendance checking:

- A real example

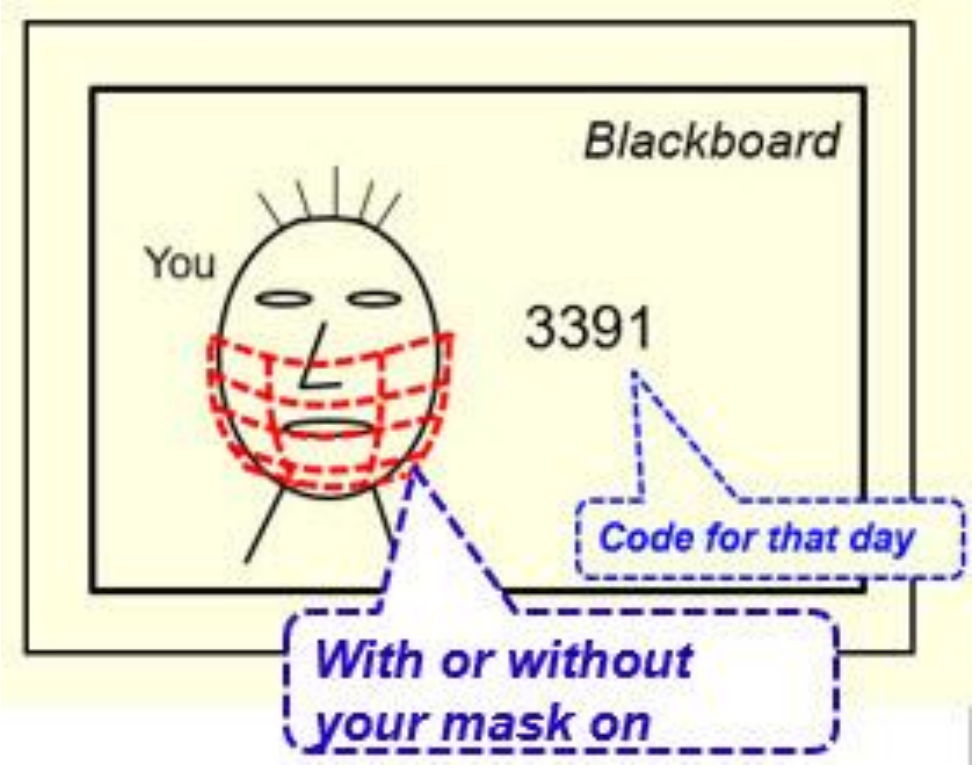


# Attendance checking:

- When you take the picture of the code and yourself, be careful not to include other people in the photo

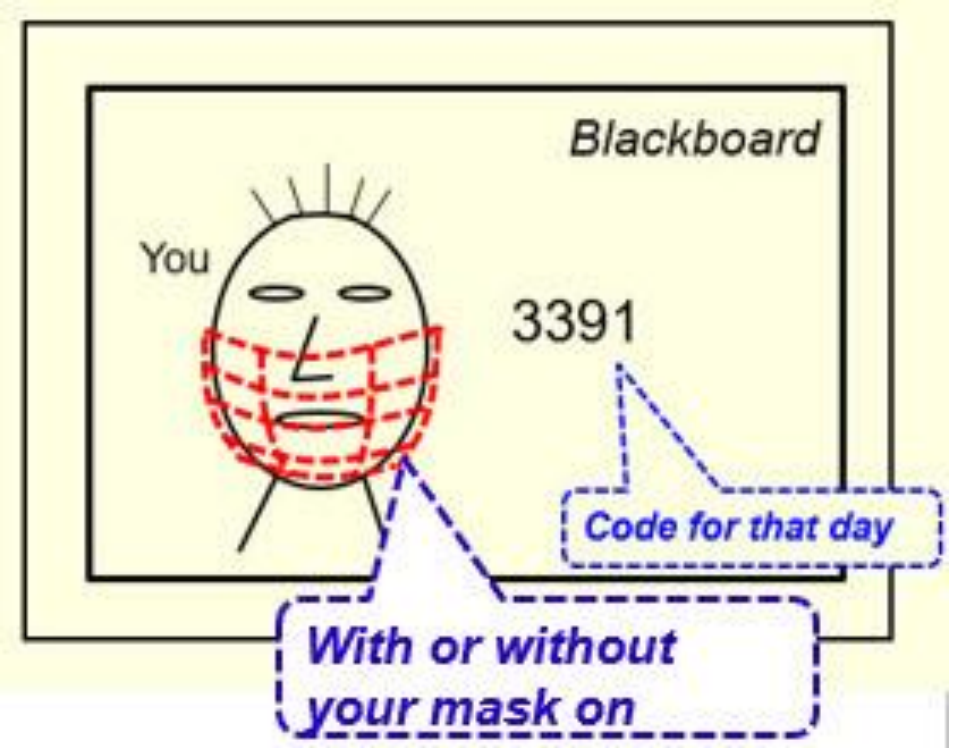
# Attendance checking:

- Then submit your photo to Canvas as a proof of your attendance for that day
- Submit your photo to the ‘class attendance’ assignment for that day, not a homework assignment



# Attendance checking:

- When you submit your photo, choose the ‘small’ option for the photo size
- This will scale the size down from 2-3 MB to 20-40 KB only



# Attendance checking:

- Another option is to come to the podium to sign the sign-in sheet if you did not bring your cell phone that day

**Sign the sign-in sheet if forget to bring cell phone**

# Scale (after rounding):

90 -105 .... A

80 - 89 ..... B

70 - 79 ..... C

60 - 69 ..... D

0 - 59 ..... E

# Course Summary & Program Outcomes:

Specific skills to be developed in this class:

- A fluency in automata theory, regular grammars and regular expressions and their uses
- An understanding of the relationship between formal models of computation and modern computers
- An understanding of the relevance of logic and theory of computation to the computer science curriculum

# Plagiarism & Cheating:

You are allowed to discuss ideas and to help others by explaining concepts and possible solutions.

You may use online tools such as ChatGPT to help your work if you find it helpful.

However, all work that is submitted must be prepared by yourself.

# Plagiarism & Cheating:

Consult the following links for information on what constitutes an academic offense and on applicable penalties:

http://www.uky.edu/Ombud/

http://www.uky.edu/Ombud/Plagiarism.pdf

# Important Links:

- UK Academic Policy Statement
- UK Resources Available to Students
- Accommodations for Students with Disabilities
- Accommodations for Religious Observances

# Important Dates:

First day of class - 01/13/2025 (Monday)

Last day to withdraw without a W or change grading option – 02/02/2025 (Sunday)

Midterm - 03/14/2025 (Friday)

Spring break - 03/17/2025 - 03/22/2025 (Monday - Saturday)

Last day of class - 04/30/2025 (Wednesday)

Final Exam – 05/07/2025 (Wednesday 10:30a – 12:30p)

# End