

St. Francis Xavier University  
Department of Computer Science  
CSCI 356: Theory of Computing  
Midterm Examination Review  
Fall 2022

## 1 Topics Covered

The following list gives an overview of every topic covered in CSCI 356 up to the midterm examination. You should ensure you have a good understanding of each topic. All midterm examination questions will test some topic on this list, but not all topics will be tested on the midterm examination.

- **Mathematical Preliminaries**

- Sets and sequences
- Relations and functions
- Graphs
- ★ *Math content won't specifically be tested*

- **Regular Languages**

- Regular operations
  - Union
  - Concatenation
  - Kleene Star
- Def'n of regular languages (language-theoretic)
  - Defining reg. lang. using operations
- Finite automata
- Computations/inputs/acceptance
- Def'n of regular languages (automata-theoretic)
- Nondeterminism
- $\epsilon$ -NFA = NFA = DFA
- Closure properties
  - Union
  - Concatenation
  - Kleene Star
- Regular expressions
- RE = DFA
- Pumping lemma for regular languages

- **Context-Free Languages**

- Context-free grammars
- Ambiguity
- Normal forms of context-free grammars
  - Chomsky normal form
- Def'n of context-free languages
  - Defining CF lang. using grammar
- ★ *Pushdown automata won't be tested*

## 2 Format

The midterm examination is fifty minutes long. It consists of 4 questions worth a total of 25 marks.

The first question is divided into 5 multiple-choice style questions. The second, third, and fourth questions are short-answer style questions.

## 3 Tips and Tricks

- Double-check the date, time, and room of the midterm examination. You will not get extra time to write if you arrive late.
- Use your time wisely. Short answer questions will likely take more time than multiple choice questions, so make sure you allocate the appropriate amount of time for each question.
- Use the resources you are given. The lecture notes contain everything you need to know. The assignment questions are similar in content and difficulty to the midterm examination questions. The course textbook serves as great supplementary material.
- Don't leave your questions until the last minute. Seek help before the midterm examination if you have questions. Attend office hours or send an email.
- Don't try to memorize concepts. Instead, focus on understanding the meaning behind a concept and how it is applied.
- Don't panic!