

# CSC236

## Introduction to the Theory of Computation

Instructor: Vangelis Markakis

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Class website: <http://www.cs.toronto.edu/~vangelis/teaching/csc236/>

Office Hours: Wednesdays, 3-5, SE 2038E or by appointment

Tutor: Daniela Rosu ([drosu@cs.toronto.edu](mailto:drosu@cs.toronto.edu))

Tutorials: Fridays, 2-4, CC 3124

Textbook: “Course notes for CSC B36/236/240: **Introduction to the Theory of Computation**”, by Vassos Hadzilacos.

### Topics

- Induction
  - (a) The principle of mathematical induction and its variants
  - (b) Recursive definitions
  - (c) Structural induction
- Recurrences
  - (a) Solution of recurrence equations
  - (b) Application to the time complexity of divide-and-conquer algorithms
- Program correctness
  - (a) Preconditions and postconditions
  - (b) Correctness proofs of iterative programs
  - (c) Correctness proofs of recursive programs
- Propositional logic
  - (a) Syntax and semantics of the propositional calculus
  - (b) Propositional equivalences
  - (c) Applications to the design of digital circuits
  - (d) Complete sets of connectives
- Predicate logic
  - (a) Syntax and semantics of the predicate calculus
  - (b) First-order equivalences
  - (c) Applications to query languages for relational databases
- Regular expressions and finite state automata

- (a) Formal languages
- (b) Syntax and semantics of regular expressions
- (c) Finite state automata (FSA) as language recognisers
- (d) Equivalence of deterministic and nondeterministic FSA
- (e) Equivalence of FSA and regular expressions
- (f) The “Pumping Lemma” and its applications

## Evaluation and Related Policies

There will be 4 homework assignments, 1 midterm exam, 3 quizzes and a final exam. The weights of these components towards the final mark are as follows:

Item	Due date	Weight
Quiz 1	Sep 22	2%
Assignment 1	Oct 6	8%
Quiz 2	Oct 13	3%
Midterm	Oct 20	20%
Assignment 2	Oct 27	8%
Quiz 3	Nov 10	3%
Assignment 3	Nov 17	8%
Assignment 4	Dec 8	8%
Final exam	TBA	40%

**Note on tests and assignments:** Homeworks will be distributed electronically through the class website, collected in tutorial only, and returned in tutorial only. The midterm and the quizzes will also take place in tutorial. Please check the Announcements and Handouts sections of the class website regularly (at least once per week). No late homeworks will be accepted, except in case of documented medical or similar emergencies. The same applies for the case of a missed quiz or midterm. The Academic Regulations of the University are outlined in the Code of Behaviour on Academic Matters which can be found in the UTM Calendar or on the web at <http://www.utm.utoronto.ca/regcal/WEBGEN117.html>

**Grading of assignments:** All homeworks, midterms and quizzes will be graded by the tutor. If you believe your solution deserved a better grade, you should contact your tutor either in the tutorial hours or by emailing her and arranging a meeting. If you still cannot resolve your question, you should contact me.

**Policy on Collaboration:** Discussing homeworks is permitted only with other students in the class. Copying from others' homeworks is strictly prohibited - you must write up your solutions on your own. If challenged by either your tutor or the instructor, you must be able to reproduce and explain any solution you submit in an oral exam. Failure to observe this policy is an academic offense, carrying a penalty ranging from a zero on the homework to suspension from the university.