

COMP 531, Fall 2021

Course Information:

Session: Winter 2021	Time: Tuesday-Thursday 8:35am - 9:55pm
Room: ENGTR 2120	Web: http://www.cs.mcgill.ca/~hatami/comp531-F2021

Instructor:

Instructor: Hamed Hatami	Email: hatami@cs.mcgill.ca
Office: McConnell 308	Phone:
Office Hours:	Tuesday 10:05 - 10:55

Teaching Assistants: Ran Tao (ran.tao6@mail.mcgill.ca)

Evaluation:

- Homework (80% = $4 \times 20\%$): There will be four assignments. The due dates are going to be announced. The homeworks will be graded based on correctness rather than effort alone. Each assignment will be posted on the course web page. Your grades will be posted on mycourses.
- Group project: 20%

Late homeworks can be submitted for valid reasons.

1 Course Description

We will cover the following topics.

- Hierarchy Theorems: Time and Space. Polynomial Hierarchy.
- Space complexity: L, NL, Immerman-Szelepcsenyi, Savitch's Theorem, NL=coNL, Branching programs.
- Circuits: Relativization, Basic Circuit Complexity, P/poly, Karp-Lipton, Shannon's theorem.
- Circuits: Depth, NC, AC, Razborov-Smolenski, Hastad's switching lemma. Parity not in AC₀.
- Monotone Circuits: CLIQUE not in monotone P.
- Randomness: BPP, RP, ZPP, BPP in PH, BPP in P/poly.
- Natural proof barrier to solving P vs NP.
- Margin and dimension in Machine Learning.
- Communication complexity

2 Textbook

See the course webpage for recommended reading.

3 Prerequisite:

COMP 330

4 Academic Integrity

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offenses under the Code of Student Conduct and Disciplinary Procedures (see <http://www.mcgill.ca/integrity> for more information). Most importantly, work submitted for this course must represent your own efforts. Copying assignments or tests from any source, completely or partially, allowing others to copy your work, will not be tolerated.

5 Submission of written work in French

In accord [sic] with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.