

COMP 531, Winter 2021

Course Information:

Session: Winter 2021	Time: Tuesday-Thursday 11:35am - 12:55pm
Room: ENGMC 304	Web: http://www.cs.mcgill.ca/~hatami/comp531-W2021

Instructor:

Instructor: Hamed Hatami	Email: hatami@cs.mcgill.ca
Office: McConnell 308	Phone:
Office Hours: Tuesday-Thursday 14:00 - 15:00 on zoom	

Teaching Assistants: lianna.hambarzumyan@mail.mcgill.ca

Evaluation:

- Homework (80% = 4 × 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 until 96 hours after the deadline. There will be a penalty of -10 (out of 100) points for a two-day delay, and -20 points for four-day delays on late homeworks unless a valid reason is provided by the student. Some personal circumstances for which accommodation may be warranted include, but are not limited to: Student illness (mental/physical), Family/partner illness, Death in the immediate family or of a person with whom the student has a similarly close relationship, Religious Observances, Pregnancy, Delivery of a child, Parenting issues.

The following are reasons for which an extension request will normally *NOT* be granted: Employment reasons, Travel/vacation/social plans, Airline flights and schedules, Other assignments and exams due on or about the due date.

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.
- Counting classes, sharp P, Toda's theorem.
- Interactive proofs, MA, AM.
- PCP theorem. Hardness of approximation.

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.