COMP-330
Theory of Computation

Fall 2017 -- Prof. Claude Crépeau

COURSE OUTLINE

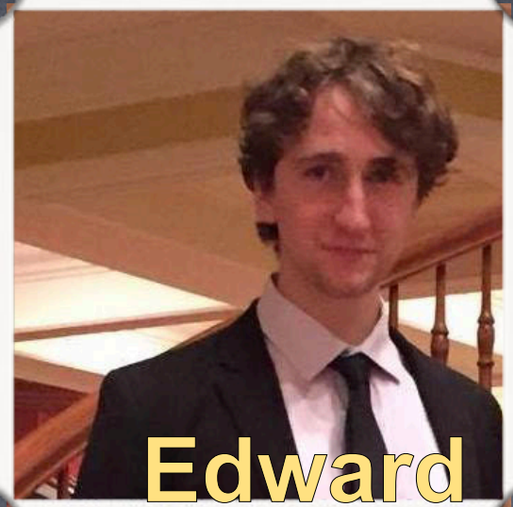
COMP 330 Fall 2017

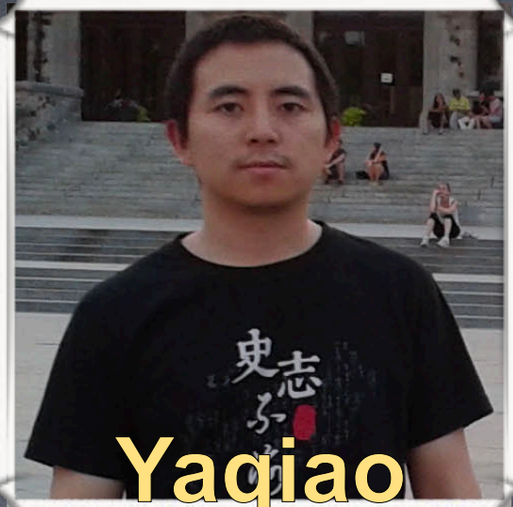
- **Class Schedule** :
  Tuesday-Thursday 13:00-14:30 ENGMC 304

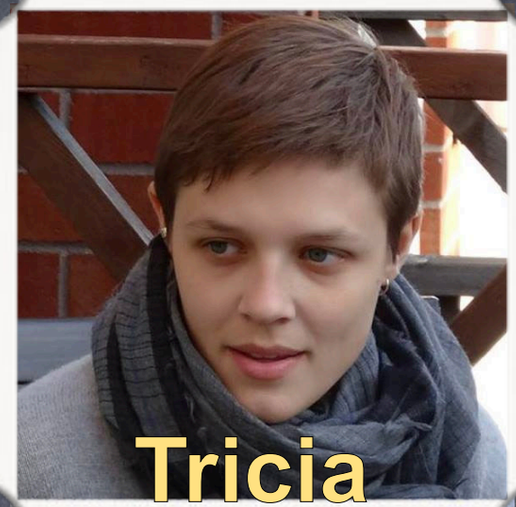
- **Instructor** : Prof. Claude Crépeau

- **Office** : Room 110N,
  McConnell Eng. Building
  3480 University Street
  phone: (514) 398-4716
  email: crepeau@cs.mcgill.ca


Shruti


Edward


Yaqiao


Tricia

- **2017 T.A.s** :

Shruti Bhanderi	shruti.bhanderi@mail.mcgill.ca
Edward Smith	edward.smith@mail.mcgill.ca
Yaqiao Li	yaqiao.li@mail.mcgill.ca
Patricia Olson	patricia.olson@mail.mcgill.ca

- **Office Hours** :

Claude : Wed 13:00-16:00 ENGMC 110N

Edward : Wed 10:00-11:00 ENGTR 3110

Shruti : Wed 12:00-13:00 ENGTR 3110

Yaqiao : Mon 12:30-13:30 ENGMC 303

Tricia : Mon 15:00-16:00 ENGTR 3110

COMMUNICATIONS

email:

cs330@cs.mcgill.ca

FaceBook:

COMP 330 Fall 2017

COMP-330 Fall 2017 — Weekly Schedule

Mon	Tue	Wed	Thu	Fri
10:00	10:00	Edward TR-3110	10:00	10:00
Yaqiao MC-303	10:30		10:30	10:30
	11:00	11:00	11:00	11:00
11:30	11:30	11:30	11:30	11:30
12:00	12:00	Shruti TR-3110	12:00	12:00
12:30	12:30		12:30	12:30
13:00	Claude MC-304	Claude MC-110N office hours	Claude MC-304	13:00
13:30				13:30
14:00				14:00
14:30	14:30		14:30	14:30
Tricia TR-3110	15:00		15:00	15:00
	15:30		15:30	15:30
16:00	16:00	16:00	16:00	16:00

MC = MCENG = McConnell • TR = ENGTR = Trottier

COMP-330 Fall 2017 — Extra help !

CSUS Helpdesk

HOURS: 12pm – 5pm (mon-fri)
LOCATION: Trottier 3090

WHO ARE WE? WHAT DO WE DO?

- **U2 and U3 students who have taken this course and want to help you!**
- **We are a FREE drop-in tutoring service, perfect for study help, and guidance on assignments.**
- **We provide review sessions for midterms and finals for intro courses!**

COMP-330 Fall 2017 — Weekly Schedule

Mon 10:00	**Tue** 10:00	Edward TR-3110	**Thu** 10:00	**Fri** 10:00
Yaqiao MC-303	**Tue** 10:30		**Thu** 10:30	**Fri** 10:30
	Tue 11:00	**Wed** 11:00	**Thu** 11:00	**Fri** 11:00
Mon 11:30	**Tue** 11:30	**Wed** 11:30	**Thu** 11:30	**Fri** 11:30
Mon 12:00	**Tue** 12:00	Shruti TR-3110	**Thu** 12:00	**Fri** 12:00
Mon 12:30	**Tue** 12:30		**Thu** 12:30	**Fri** 12:30
Mon 13:00 **CSUS Helpdesk TR-3090**	Claude MC-304	Claude MC-110N office hours	Claude MC-304	**Fri** 13:00 **CSUS Helpdesk TR-3090**
Mon 14:00				
Mon 14:30	**Tue** 14:30 **CSUS Helpdesk TR-3090**		**Thu** 14:30 **CSUS Helpdesk TR-3090**	
Tricia TR-3110	**Tue** 15:00		**Thu** 15:00	**Fri** 15:00
	Tue 15:30		**Thu** 15:30	**Fri** 15:30
Mon 16:00	**Tue** 16:00	**Wed** 16:00 **CSUS**	**Thu** 16:00	**Fri** 16:00

MC = MCENG = McConnell • TR = ENGTR = Trottier

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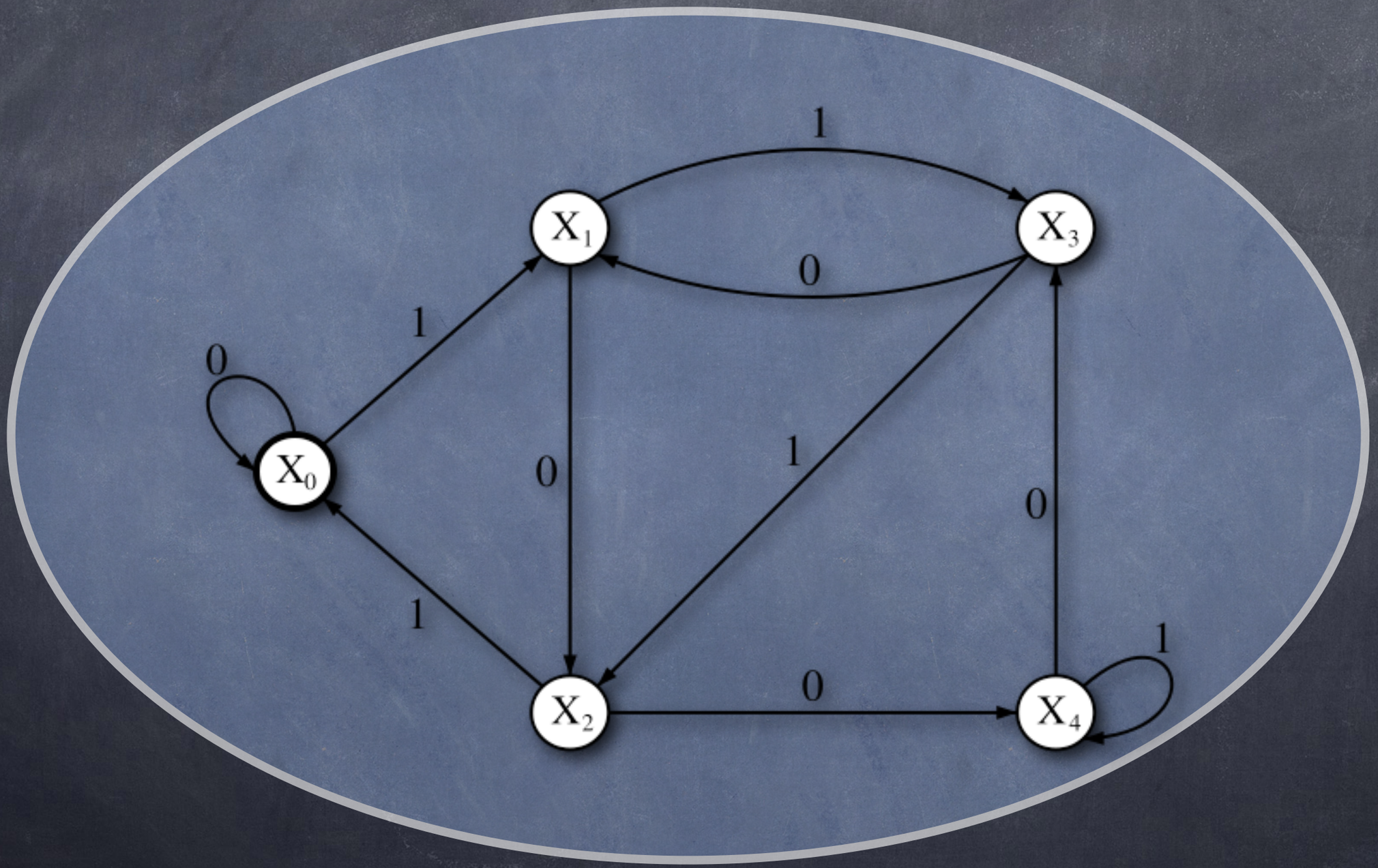
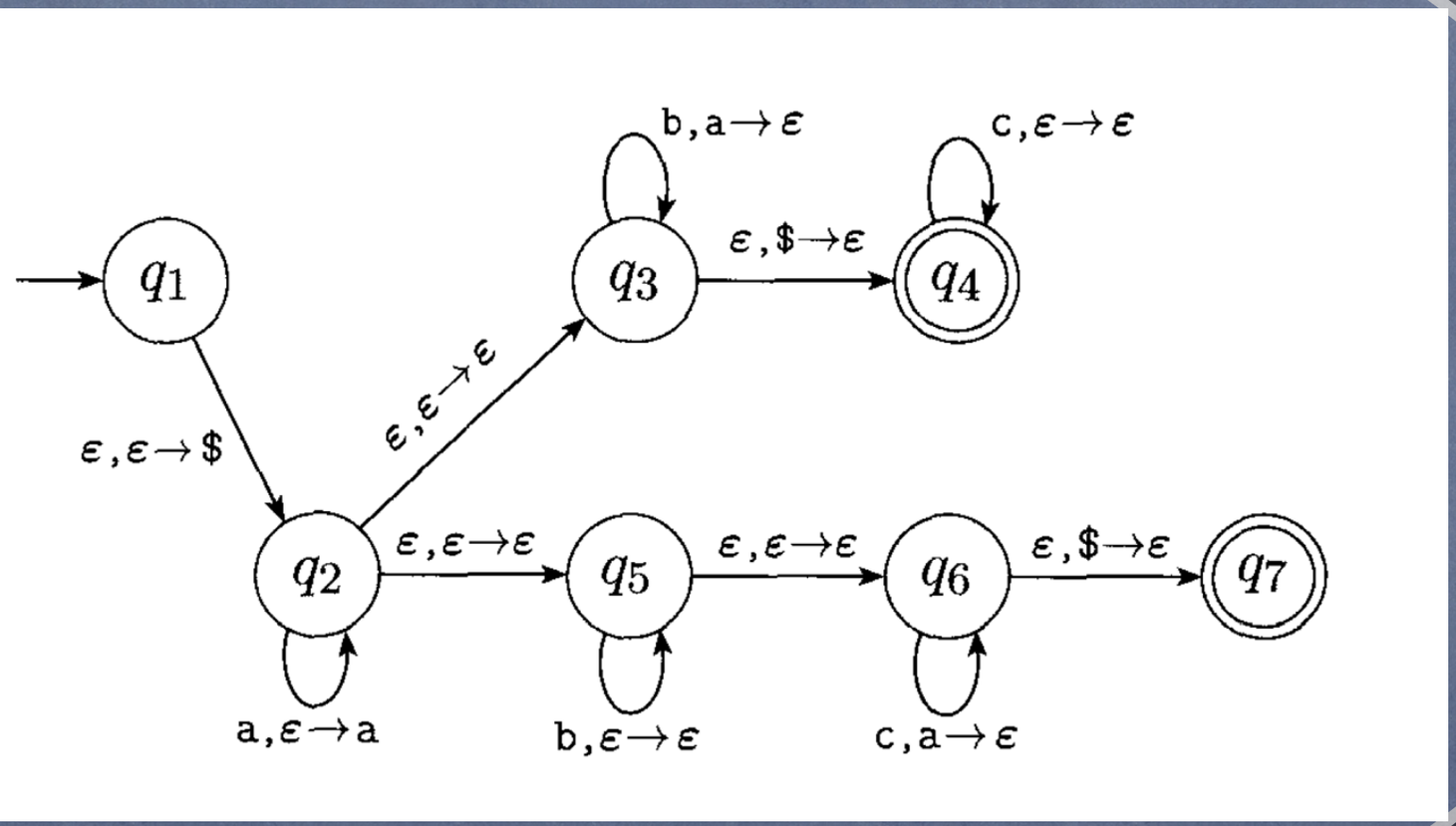
Description: (3 credits, 3 hours).

- We study models of computation of increasing power.
- We begin with finite automata and regular languages.
- The next phase deals with context-free languages invented by linguistics and now an essential aspect of every modern programming language.
- Finally we explore the limits of computability with the study of recursive sets, enumerable sets, self-reproducing programs and undecidability theory.

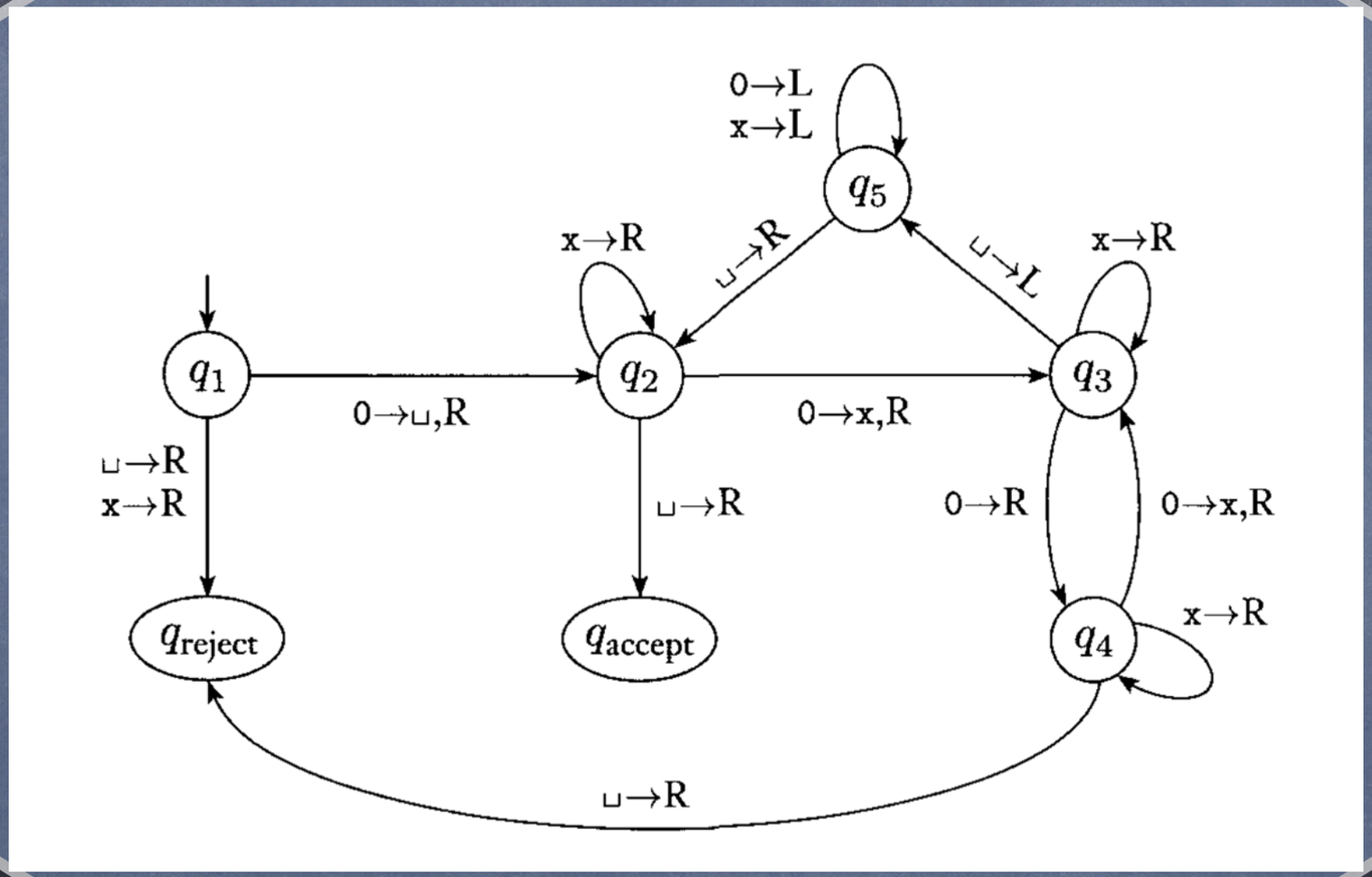
Part 1: Regular expressions & Deterministic Finite Automata



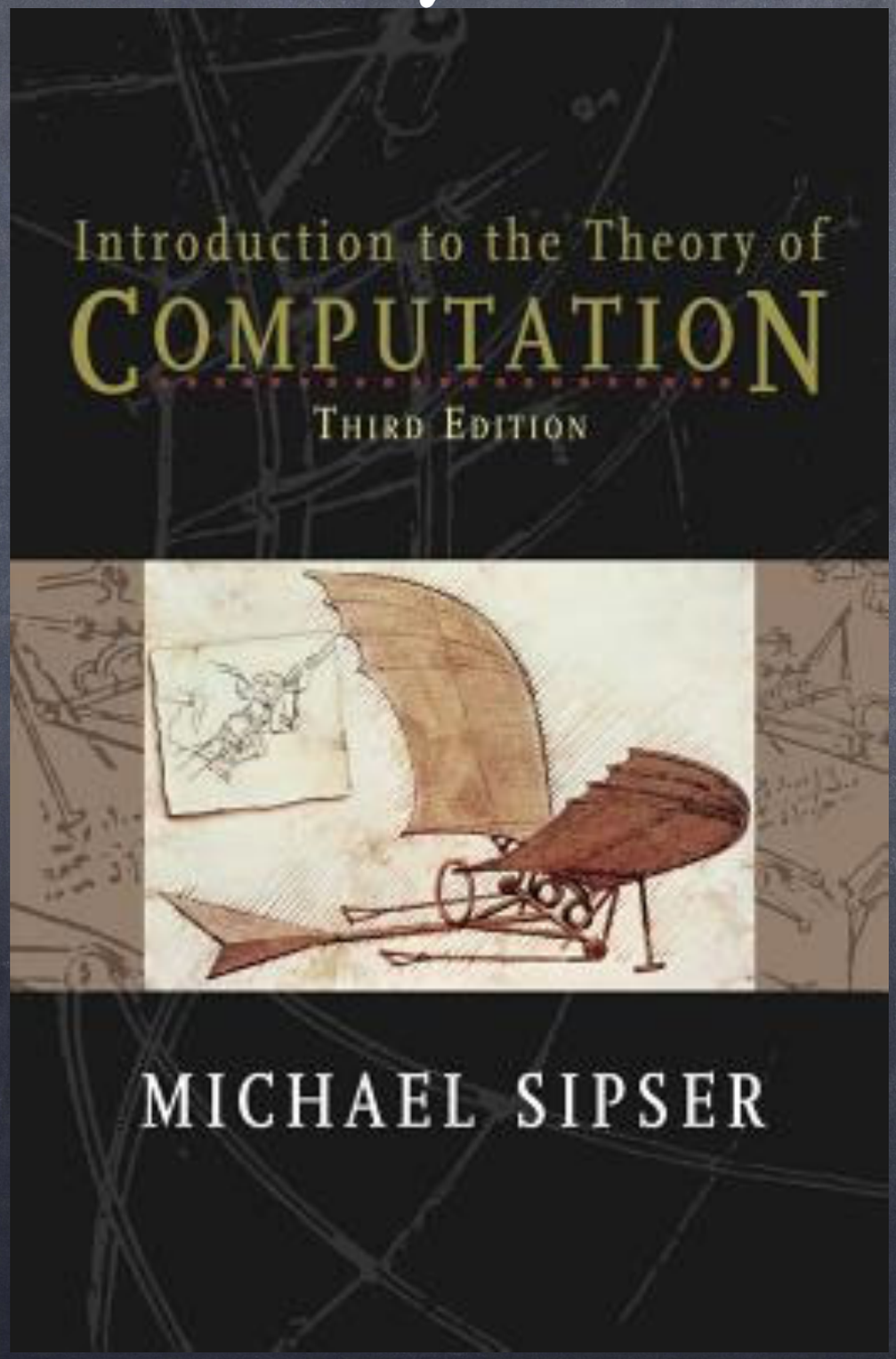
Part 2: Context-free Language & Pushdown Automata



Part 3: Turing Machines, Computability & Complexity



Mandatory Textbook



COMP 330 Fall 2017: Lectures Schedule

1. Introduction
   1.5. Some basic mathematics
2. Regular expressions, DFAs
3. Nondeterministic finite automata
4. Determinization
5. Closure properties, Kleene's theorem
6. The pumping lemma
7. The pumping lemma
8. Minimization
9. Lexical analysis
10. Duality
11. Myhill-Nerode theorem
12. Labelled transition systems
13. MIDTERM
14. Context-free languages
15. Pushdown automata
16. Parsing
17. The pumping lemma for CFLs
18. Introduction to computability
19. Models of computation

Basic computability theory

20. Reducibility, undecidability and Rice's theorem
21. Undecidable problems about CFGs
22. Post Correspondence Problem
23. *Validity of FOL is RE / Gödel's and Tarski's thms*
24. *Universality / The recursion theorem*
25. *Degrees of undecidability*
26. Introduction to complexity

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- **Evaluation**:
  There will be
  - 4 assigments worth 40%,
  - a midterm exam worth 10%, and
  - a final exam worth 50%

  of your final grade.

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- In accord 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.

- En vertue de la chartre des droits des étudiants de l'université McGill, les étudiants de ce cours ont le droit de soumettre leurs travaux écrits en anglais ou en français, à leur guise.

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- **Academic integrity** : McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see http://www.mcgill.ca/students/srr/honest for more info).

- **Honnêteté académique** : L'université McGill attache une grande importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, consultez http://www.mcgill.ca/students/srr/honest).

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