

**Comp Sci 2MJ3
Theory of Computation
Fall 2010**

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Web page: <http://www.cas.mcmaster.ca/~soltys/cs2mj3-f10>

Lectures: Mo, We, Th, 10:30-11:20 in BSB/136

Tutorials: T01: We, 12:30-14:20, T13/105
T02: We, 14:30-16:20, BSB/B155

Textbook: *Introduction to the Theory of Computation*, 2nd edition
by Michael Sipser

Outline:

The main theme of this course is the equivalence between different models of computation; the goal is to convince ourselves that standard formalizations of the notion of "algorithm" captures completely the notion of "computability."

We start with the most intuitive notion of computation: automata and Turing machines, and define the notion of a formal language, as well as determinism & non-determinism. We continue with push-down automata, and define regular and context-free languages, and introduce the universal Turing machine, and discuss the halting problem.

We are also going to present lambda calculus, and its basics such as substitution, normal forms and reductions. We give examples of arithmetic functions, Booleans and recursion, and show how lambda calculus. This part of the course is not in Sipser; see, for example, *Models of Computation*, by Maribel Fernandez. (Supplementary course notes will be given when necessary.)

Finally, we present recursive functions: primitive recursion, partial recursive functions, and show that this third model of computation is also equivalent to the previous two. We move on to logic-based models of computation, and give some rudimentary propositional and predicate logic. Again, this part of the course is not in Sipser.

Marking Scheme: Six tests, worth 10% each, and a final exam worth 40%. Missed work, if properly documented (e.g., doctor's note presented to the Registrar's Office), will be moved to the final exam (for example, if test 1 is missed, the final exam will be worth 50%).

Please visit the course's web page to read the *McMaster Academic Integrity Statement*.

Important Note: The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.