Course Description
Introduction to the theory of computability: Turing machines, Church's thesis, computable and non-computable functions, recursive and recursively enumerable sets, reducibility. Introduction to complexity theory: models of computation, P, NP, polynomial time reducibility, NP-completeness, further topics in complexity theory. [24L, 12T]

Prerequisite: (CSC290H5, 236H5/238H5)/MAT202H5
Exclusion: CSC373H1,375H1,CSCC63H3 (SCI)
Distribution Requirement: SCI

Students who lack a pre/co-requisite can be removed at any time unless received explicit waiver from department.

Textbooks and Other Materials

Assessment and Deadlines

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<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Due Date</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Term Test</td>
<td>Midterm</td>
<td>2016-02-22</td>
<td>15%</td>
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<tr>
<td>Final Exam</td>
<td>Final Exam</td>
<td>TBA</td>
<td>35%</td>
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<tr>
<td>Assignment</td>
<td>Assignment 1</td>
<td>2016-01-25</td>
<td>12.5%</td>
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<tr>
<td>Assignment</td>
<td>Assignment 2</td>
<td>2016-02-08</td>
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<td>Assignment</td>
<td>Assignment 3</td>
<td>2016-03-07</td>
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<td>Assignment</td>
<td>Assignment 4</td>
<td>2016-03-21</td>
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<td><strong>Total</strong></td>
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More Details for Assessment and Deadlines
Assignments are due on two week intervals, and the next assignment will be posted on the due date of the previous assignment. Assignments will be due at the beginning of class on the due date; the solutions will be reviewed in the following tutorial. Release and due dates are as follows:

Assignment 1: Out January 11th, due January 25th.
Assignment 2: Out January 25th, due February 8th.
Assignment 3: Out February 22nd, due March 7th.
Assignment 4: Out March 7th, due March 21st.

If possible, please typeset your assignment using LaTeX or some equivalent --- this is as much for clarity as it is for a "backup" in
case of unexpected accidents. If you do decide to submit a handwritten assignment, please ensure that it is as clearly written as possible! If the markers cannot read your assignment, then they cannot mark them.

**Penalties for Lateness**

Life is busy, and we realize that on a week-to-week basis that the absolute amount of homework can vary quite heavily. Because of this, we will allow **three grace days** for the submission of assignments. Use of grace days must obey the following rules:

- A single grace day is worth up to 24 hours of submission time from the original due date. For example, assignments are due at the beginning of class (11am on Monday) --- the use of a single grace day would give the student a 24 hour grace period until 11am Tuesday.
- Grace days may only be used once, and cannot be further subdivided (there are no "half grace days"). For example, if an assignment is submitted at 4pm on Monday, one grace day is still considered to have been used.
- Regardless of the use of grace days, assignments must be submitted before 1pm on the Wednesday following the due date as the assignment solutions will be reviewed in tutorial. Assignments received after this final deadline will not be accepted. (Note that this implies that at most 3 grace days can be expended on any single assignment: 11am Monday -> 11am Tuesday -> 11am Wednesday -> 1pm Wednesday, which would be a "waste" of the third grace day. Be organized!).
- If an assignment is submitted late through the use of one or a grace day, it must be typeset using LaTeX or some equivalent software (that is, no late handwritten assignments will be accepted). Furthermore, it must be submitted electronically to the instructor. Late assignments will not be accepted in tutorial.
- If an assignment is submitted late using a grace day, please record on the assignment how many grace days were used.
- Grace days are non-transferable, and there are no "refills".
- If all of the student's grade days have been used then late assignments will not be accepted.

**Procedures and Rules**

**Missed Term Work**

A medical certificate is required for missed work; the student should discuss the matter with me as soon as possible.

**Missed Final Exam**

Students who cannot write a final examination due to illness or other serious causes must file an **online petition within 72 hours of the missed examination**. Original supporting documentation must also be submitted to the Office of the Registrar within 72 hours of the missed exam. Late petitions will NOT be considered. If illness is cited as the reason for a deferred exam request, a U of T Medical Certificate must show that you were **examined and diagnosed at the time of illness and on the date of the exam, or by the day after at the latest**. Students must also record their absence on ROSI on the day of the missed exam or by the day after at the latest. Upon approval of a deferred exam request, a non-refundable fee of $70 is required for each examination approved.

**Academic Integrity**

Honesty and fairness are fundamental to the University of Toronto’s mission. Plagiarism is a form of academic fraud and is treated very seriously. The work that you submit must be your own and cannot contain anyone else's work or ideas without proper attribution. You are expected to read the handout How not to plagiarize (http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize) and to be familiar with the Code of behaviour on academic matters, which is linked from the UTM calendar under the link Codes and policies.

Students often learn a lot from working with one another, and you are encouraged to meet with other students from class for this purpose. For example, you might work through exercises in the text together or discuss any material you found confusing in lecture or in the readings. It is also legitimate (and encouraged!) to discuss homework problems with fellow students or to consult other texts.

However, any work that you submit must be, at the end of the day, your own. Assignments must be written entirely by yourself using your own notes. If you use any material in the course of your assignment other than the course textbook (e.g. websites, other textbooks), please cite the material used at the top of your assignment. Note that this is for your own protection --- plagiarism, even if accidental, is a serious academic offence.

**Final Exam Information**

Duration: 3 hours
Aids Permitted: None

**Additional Information**

Outline: I hope to cover all or most of the following:
Computability Theory (Chapters 3, 4, 5 in the textbook)
- Turing machines: definitions and examples (section 3.1)
- Other models of computation, the Church-Turing thesis (sections 3.2, 3.3)
- Diagonalization, the Halting problem (sections 4.1, 4.2)
- Decidability and recognizability, examples (sections 4.2, 5.1)
- Reducibility, examples (sections 5.1, 5.2)
- Mapping reducibility, examples (section 5.3)

Complexity Theory (Chapters 7, 8, and parts of 9, 10 in the textbook)
- Models of efficient computation (sections 7.1, 7.2)
- $P$, $NP$, $coNP$, examples (section 7.2, 7.3)
- Polytime reducibility, $NP$-completeness (section 7.4)
- Cook's theorem, more $NP$-completeness (section 7.5)
- Self-reducibility (not in textbook)
- Space complexity and other complexity classes (sections 8.1, 8.2, 8.3, 9.1, 10.1)

Last Date to drop course from Academic Record and GPA is March 6, 2016.