

Department of Computer Science, University of Toronto

CSC410: Computer Testing and Verification, Fall 2018 Information Sheet

ADMINISTRATIVE DETAILS:

Instructor: Prof. Marsha Chechik chechik@cs.toronto.edu Office: BA3248, 416-978-3820
Office hours: Thursdays and Fridays 10-11 in BA3248 and by appointment

Course times: Lecture 0101: Thursdays 11:00-1:00 (L) in SS1085, Mondays 11-12 (T) in SS 1085
Lecture 0201: Fridays 11:00-1:00 (L) in SS 2105, Mondays 12-1 (T) in SS 2105

Teaching assistants:

Federico Mora, fmora@cs.toronto.edu(Head TA)
Nick Feng, nick.feng@mail.utoronto.ca
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Piazza link: <http://piazza.com/utoronto.ca/fall2018/csc410/home>

ABOUT THIS COURSE:

In any sufficiently complicated piece of software, errors occur during the development phase. A program may not initially meet its own specifications or run at all. To address these issues, we can test programs to see that they execute properly on a well chosen set of inputs (testing) and/or go into the code itself and prove that the program will work (verification). In this course, you will be introduced to a number of methods and tools for accomplishing both.

By the end of this course, you should:

- have a sense of various methods included in “testing” and “verification”.
- be able to identify a method as static, dynamic, or a combination of both
- be able to use a selection of algorithms and tools to test and verify tractable programs.
- gain an understanding of the types of methods and tools for testing and verification in order to decide which to use/learn in the future

PREREQUISITES:

Data structures
Discrete mathematics, e.g., Graph theory, set theory
Logic (predicate logic, 1st order logic)
Programming experience
Good knowledge of Java

FLAVOR OF THE COURSE:

Combination of practical and theoretical approaches
We start with a quick review of logic and program analysis foundations (and a quiz in tutorial in Week 3!)
Then: Testing and other forms of dynamic analysis:

- Testing and test coverage
- Symbolic Execution

- Concolic testing (concrete + symbolic)

Verification and analysis methods:

- SAT / SMT reasoning (using Z3)
- Program correctness via Hoare Logic
- Analysis tool Dafny

Other topics:

- Delta debugging
- Automatic invariance generation (Daikon)
- Current trends in testing and verification, including work done in Toronto

MARKING SCHEME:

Your final mark in this course will be comprised of:

- 5% course participation (that includes answering Piazza questions). I expect you to come to class. Be prepared with your readings ahead of time.
- 5% first quiz (on logic)
- 15% midterm
- 30% final exam. You need to pass the final (i.e., get over 50%) to pass this course.
- 45% for four assignments.
 - Assignment 1 - 8%
 - Assignment 2 - part 1 is 5%, part 2 is 10%
 - Assignment 3 - 10%
 - Assignment 4 - 12%

ASSIGNMENTS:

- Unless otherwise specified, assignments are to be done in groups of two. We will specify if some of the more theoretical parts of the assignment are to be done individually.
- Assignments are due on Wednesdays before midnight.
- A late assignment incurs a 10% per day lateness penalty for the maximum lateness of one week at 50% off. Assignments are not accepted after they are late by one week since we will be releasing solutions.
- No questions about the assignment (on email or piazza) are to be answered by the TAs or the instructor during the last 24 hours before it is due. Plan your time accordingly!
- Submit your assignment solutions through MarkUs. Specific instructions on how to do so will be provided on piazza.
- If you have having a technical difficulty submitting your assignment on the day it is due, you can email it (before the deadline!) to 410admin@cs.toronto.edu to prove that it was finished on time and to avoid penalties.

EMAIL POLICY:

The instructors and the TAs are here to help you with the material and to enhance your learning experience. Please take full advantage of their office hours! Piazza discussion forums will be monitored throughout the semester by the TAs and the instructors, and of course, fellow students are an excellent resource for answering many technical questions (do not forget, helpful answers will give you participation marks!!!).

Reading Piazza discussion forums is MANDATORY!. If you send one of the instructors an email, please note that we are using a very aggressive SPAM filter. Also, please note that some servers, such as hotmail, can be unreliable in both sending and receiving messages. So, we ask you to abide by the following rules:

1. Please do not send email from hotmail accounts. Use your course or UTORmail accounts instead. You can easily forward mail received by these accounts to the email account that you use regularly.
2. Each email message must include in the Subject line the course identifier and a concise and clear statement of purpose [e.g., CSC410: I have a conflict with the next midterm]; otherwise, it is likely to be deleted, along with spam messages and messages potentially containing viruses.
3. Avoid sending attachments (an exception is sending assignments that you were unable to submit through MarkUs see above)
4. The instructor will reply to legitimate email inquiries from students within 2 days (you may get a delay if your message is sent over the weekend). If you do not receive a reply within this period, please resubmit your question(s). You may want to call or come to office hours instead.
5. Please make sure you consult the course outline/syllabus, other handouts, the piazza Announcements page and the discussion forum BEFORE submitting inquiries by email.
6. When a question cannot be easily or briefly answered with a reply email, the instructor will simply indicate to the student that he/she should see some of the course staff during the announced office hours.
7. Email should NOT be seen as an alternative to meeting with the instructor (or the TAs) during office hours. Nor should email be used as a mechanism to receive private tutorials (especially prior to midterm/final) or to explain the material that was covered in lectures you missed.

PLAGIARISM:

Do not write someone else's words or symbols without giving them credit. This is called plagiarism and it is a form of cheating. Don't do it! Please see the following website to find out what else is considered to be "cheating": <http://www.artsci.utoronto.ca/newstudents/transition/academic/plagiarism>

REFERENCES AND READINGS:

This course has no official textbook. However, notes, links, names of texts, and/or papers will be posted on piazza (and on the course website), with clear indication whether the reading is required or optional.

PREPARING FOR LECTURES/TUTORIALS:

There will be certain tutorials that require advance preparation. They would be announced in class. Be prepared with your readings before the lecture. Finalized lecture slides are posted after the lecture.

IMPORTANT DATES:

- September 17: quiz on logic, in tutorial
- Assignment 1 is out on Sept. 19, due on Oct. 3
- Assignment 2 is out on Oct. 3, part 1 due on Oct. 17, part 2 due on Oct. 31
- Thanksgiving is on October 8
- Midterm in tutorial on Oct. 22 (at 11 a.m., both sections!)
- Assignment 3 is out on (or before) Oct. 31, due on Nov. 14
- Last day to drop the course is November 5
- No classes the week of November 5. Study break
- Assignment 4 is out on Nov. 14, due on December 5
- Last day of classes is on December 5
- Final Exam – the exact day is to be announced – but on or before Dec. 21