

Department of Computer Science, University of Toronto

CSC410: Computer Testing and Verification, Fall 2016

Information Sheet

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, predicate logic, set theory

Programming experience

Good knowledge of Java (e.g., from CSC407)

FLAVOR OF THE COURSE:

Combination of practical and theoretical approaches

First half of course focuses on JML-based approaches

- Design by contract
- Runtime verification of correctness of JML specifications
- Static verification of correctness of Java programs against JML specifications
- Other approaches to determining static correctness (Dafny)

Second half of class focuses on other testing and verification approaches

- Introduction to testing (coverage, testcase generation, concolic testing)
- Symbolic execution
- Automatic debugging
- Current trends in testing and verification

## ADMINISTRATIVE DETAILS:

**Instructors:** Prof. Marsha Chechik [chechik@cs.toronto.edu](mailto:chechik@cs.toronto.edu) Office: BA3248, 416-978-3820

Office hours: Mondays 1-2, Thursdays 10-11 and by appointment

Dr. Cynthia Disenfeld [cdisenfeld@cs.toronto.edu](mailto:cdisenfeld@cs.toronto.edu) Office: BA3242, 416-978-5239

Office hours: Tuesdays 5-6, Fridays 2-3 and by appointment

**TAs:** Yi Li (Head) [liyili@cs.toronto.edu](mailto:liyili@cs.toronto.edu)  
Ioanna Stavropolou [ioanna@cs.toronto.edu](mailto:ioanna@cs.toronto.edu)  
Chenguan Zhu [zhuchenguan.zhu@mail.utoronto.ca](mailto:zhuchenguan.zhu@mail.utoronto.ca)  
Federico Mora [fmorarocho@gmail.com](mailto:fmorarocho@gmail.com)  
Jonathan Eidelman [jonathan.eidelman@mail.utoronto.ca](mailto:jonathan.eidelman@mail.utoronto.ca)

**Course page:** <https://piazza.com/utoronto.ca/fall2016/csc410/home>

**Course lectures:** 2-4 Mondays (Chechik), 2-4 Tuesdays (Disenfeld) in BA1200

**Course tutorials:** 4-5 Mondays or Tuesdays in BA1200. No tutorial first day of class

Sometimes, the entire 3 hours will be used for lecture.

## MARKING SCHEME:

Your final mark in this course will be comprised of:

- 5% course participation (that includes answering Piazza questions). Class attendance is mandatory. Be prepared with your readings ahead of time.
- 15% midterm
- 30% final exam. You need to pass the final (i.e., get over 50%) to pass this course.
- 30% for 2 assignments (15% each, done in groups of 2)
- 20% for 5 homeworks. These are to be done individually, and different homeworks have different weights.

## ASSIGNMENTS AND HOMEWORKS

- All assignments and homeworks that are listed as going “out” on week N will be available on Sunday of week N-1 before midnight.
- All assignments and homeworks due on week N are due on Sunday before midnight of week N-1, and are to be submitted through MarkUs. Details on how to do this will be posted on piazza.
- All assignments are to be done in groups of two, where all members are in the same lecture (both in Monday’s lecture or both in Tuesday’s lecture).
- Homeworks are to be done individually, and only a selection of problems might be graded.
- If you have having a technical difficulty submitting your assignment or homework on the day it is due, you can email it (before the deadline!) to [410-admin@cs.toronto.edu](mailto:410-admin@cs.toronto.edu) to prove that it was finished on time and to avoid penalties.

## LATE POLICY AND GRACE DAYS:

For Assignments: 10% a day lateness policy for the maximum lateness of one week at 50% off.

For Homeworks: same as for assignments but each person has a total of two grace days, meaning that you have two 24-hour periods after the homework due date in which marks will not be deducted. When submitting your late homework, indicate clearly that you are using your grace days.

## E-MAIL 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 e-mail from hotmail accounts. Use your course or UTORmail accounts instead. You can easily forward mail received by these accounts to the e-mail 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 e-mail 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 e-mail, the instructors 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 instructors (or the TAs) during office hours. Nor should e-mail 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.
8. Do not expect e-mails to be answered within 24 hours of a homework or assignment due date. If you have a question, ask it as soon as possible. Our preferred method of asking questions is on Piazza.

#### 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:

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 posted after the lecture.

#### IMPORTANT DATES:

First Lecture - September 12 (Monday class), September 13 (Tuesday class)

Homework 1 is due on September 25

Homework 2 is due on October 2

October 10 is Thanksgiving. Monday lecture does not meet. Tuesday lecture does meet on October 11.

Assignment 1 is due on October 16

Homework 3 is due on October 23

Midterm for BOTH SECTIONS is on Monday, October 31, at 4 p.m. in the Exam Centre.

Last day to drop the class without penalty is November 7

No classes on November 7-8 (study break)

Homework 4 is due on November 13

Homework 5 is due on November 20

Assignment 2 is due on December 4

Last lecture in Monday's class is on Wednesday, December 7

Last lecture in Tuesday's class is December 6

Final Exam is on a yet to be determined day between December 9-21, but the exact day will be announced soon after October 21.