

CSC595 Topics in Computer Science: Logic and Theorem Proving Syllabus for Winter 2015

Corin Pitcher

4 January 2015

Overview

This course provides an introduction to formal logic via proof assistants and/or automated theorem provers. These tools can be used to develop machine-checked proofs that software behaves correctly. This course will cover topics including: formal logic and proofs, type theory, unification, tactics, and decision procedures. The course focuses on the application of these concepts to proving programs correct. The course will use the Coq proof assistant.

Instructor Information

- **Instructor** Dr. Corin Pitcher
- **Loop Office** 835, CDM Building, 243 S. Wabash Avenue
- **Email** cpitcher@cs.depaul.edu
- **Tel** +1 312 362 5248
- **Instructor's Homepage**
<http://fpl.cs.depaul.edu/cpitcher/>
- **Course's Homepage**
<http://fpl.cs.depaul.edu/cpitcher/courses/latp/>
(for lectures slides, assignments, reading schedules, examples, learning outcomes)

- **LMS Homepage**
<http://d2l.depaul.edu>
 (for grades and video recordings)
- **Office Hours** : http://my.cdm.depaul.edu/people/facultyInfo_mycti.asp?id=104

Prerequisites

If you are not sure that you have satisfied the prerequisites, speak to the instructor before the second lecture.

Prerequisite Courses

- **Concepts of Programmng Languages** (CSC347 or CSC447)
 Or prior functional programming experience, e.g., programming in Scala.

Textbooks

This course will use the Software Foundations materials available online for free at <http://www.cis.upenn.edu/~bcpierce/sf/current/index.html>.

There are two optional textbooks:

- *Interactive Theorem Proving and Program Development*, by Yves Bertot and Castéran, Springer, 2004.
- *Certified Programming with Dependent Types*, by Adam Chlipala, 2014.
 Available online for free at <http://adam.chlipala.net/cpdt/>.

Assessment

The course grade will be based on:

| Item | Weight |
|----------------------|--------|
| Homework assignments | 70% |
| Final project | 30% |

- The homework assignments will primarily involve programming / proving in Coq.

- The final projects will be individual projects. Each student can choose a topic involving logic and theorem provers (subject to instructor approval).

Policies I

Changes to Syllabus

This syllabus is subject to change as necessary during the quarter. If a change occurs, it will be thoroughly addressed during class, posted under Announcements in D2L or COLWeb, and sent via email.

Attendance

1. Students are expected to either attend class or watch the online recording within 72 hours of its publication online.
2. Students are expected to subscribe to the mailing list, and read emails in a timely fashion.
3. **Lecture slides are a supplement to lectures only.** The slides are not intended to be read in lieu of listening to the lecture.

Homework

1. Students must keep backup copies of all submitted homework.
2. Students must verify that homework has been submitted correctly, i.e., download the submitted version and check that it is the one you intended to submit. NOTE: the Desire2Learn interface requires confirmation of the homework submission after the file has been uploaded.
3. Homework submissions are usually due by 5:00PM on the day of class. **Late submissions will not be accepted at all because each assignment is discussed in class.**
4. Homework submissions must be submitted online via D2L. **Email submissions will not be accepted at all.**
5. Submitted work must be worked on individually. You must not use or look at anyone else's solution, and you must clearly acknowledge any code that you obtain from other sources (such as books, magazines, or the Internet). If you are in any doubt, contact the instructor well

before the submission date for advice. You may use as much code as you like (without acknowledgement) from the examples discussed in class. Plagiarism will result in penalties up to and including failing the course.

Expectations

1. Several languages and tools will be used. Students are expected to learn these languages and tools without the level of guidance that would be available for 100 and 200 level classes.
2. The course requires that students actively engage the material on your own. Students should not only read the notes and example programs, but also do self-tests, modify code, and run it. As always, figure out what you can definitely code, code it, try it, and then consider extending the boundaries.
3. Students must keep up with the assigned textbook reading.
4. Students are strongly encouraged to ask questions and offer comments relevant to the day's topic.
5. All electronic interactions are an extension of the classroom and should be treated as such. While disagreement can be part of the discourse, online communication should remain respectful and appropriate rather than demeaning and/or unprofessional.
6. Classroom use of a laptop or tablet must normally be restricted to class-related tasks such as note taking, checking references, testing code examples, etc.

Policies II

Retro-Active Withdrawal

CDM understands certain extenuating circumstances can hinder one's ability for academic success and completion of course work. Please see <http://www.cdm.depaul.edu/Current%20Students/Pages/Enrollment-Policies.aspx> for additional information.

Absence Notifications

In order to petition for an excused absence, students who miss class due to illness or significant personal circumstances should complete the Absence Notification process through the Dean of Students office. The form can be accessed at <http://studentaffairs.depaul.edu/dos/academicprocesses.html>. Students must submit supporting documentation alongside the form. The professor reserves the sole right whether to offer an excused absence and/or academic accommodations for an excused absence.

Academic Integrity and Plagiarism

This course will be subject to the university's academic integrity policy. More information can be found at <http://academicintegrity.depaul.edu/>. If you have any questions be sure to consult with your professor.

Academic Policies

All students are required to manage their class schedules each term in accordance with the deadlines for enrolling and withdrawing as indicated in the University Academic Calendar. Information on enrollment, withdrawal, grading and incompletes can be found at: <http://cdm.depaul.edu/enrollment>

Incomplete Grades

An incomplete grade is defined in the Student Handbook as follows (note that the policy in the undergraduate student handbook applies to both undergraduate and graduate students): A temporary grade indicating that the student has a satisfactory record in work completed, but for unusual or unforeseeable circumstances not encountered by other students in the class and acceptable to the instructor is prevented from completing the course requirements by the end of the term. Please see <http://www.cdm.depaul.edu/Current%20Students/Pages/Grading-Policies.aspx> for additional information.

Students with Disabilities

Students who feel they may need an accommodation based on the impact of a disability should contact the instructor privately to discuss their specific needs. All discussions will remain confidential. To ensure that you receive

the most appropriate accommodation based on your needs, contact the instructor as early as possible in the quarter (preferably within the first week of class), and make sure that you have contacted the Center for Students with Disabilities (CSD) at: <mailto:csd@depaul.edu>

- Lewis Center 1420, 25 East Jackson Blvd.
- Phone number: 312 362 8002
- Fax: 312 362 6544
- TTY: 773 325 7296

Dean of Students' Office

The Dean of Students' Office (DOS) helps students navigate the college experience, particularly during difficulty situations such as personal, financial, medical, and/or family crises. For a list of support services and advocacy information, please visit <http://studentaffairs.depaul.edu/dos/>.

Online Course Evaluations

Evaluations are a way for students to provide valuable feedback regarding their instructor and the course. Detailed feedback will enable the instructor to continuously tailor teaching methods and course content to meet the learning goals of the course and the academic needs of the students. The evaluations are anonymous; the instructor and administration do not track who entered what responses. A program is used to check if the student completed the evaluations, but the evaluation is completely separate from the student's identity. Since 100% participation is our goal, students are sent periodic reminders over three weeks. Students do not receive reminders once they complete the evaluation. Students complete the evaluation online in CampusConnect.