CS 846: Advanced Topics in Software Testing and Debugging (Winter 2021)

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link to this syllabus

link to the schedule

This course will cover advanced topics in software engineering, with a focus on techniques that improve software reliability and developers' productivities, e.g., software testing, debugging, usability of programming tools.

This will be a seminar-style course, with students giving most of presentations. Students will read papers, write critiques, present papers and finish a course project. Through this project, I hope that students can have a brief experience of conducting research in software engineering, critiquing academic papers and delivering presentations.

1. Logistics

Instructor	Chengnian Sun
Time	09:30-11:50 AM Monday, EST
Location	Online, synchronously most of the time
Email	cnsun@uwaterloo.ca
Official Website	LEARN
Report Format	Latex Template (No MS Word Template)
Project List	Link

2. Schedule

The details of the schedule are available here, which includes the paper list, and all the milestones of this course.

No late submission will be accepted. Each submission is due at 23:59pm on the due day. Please check the corresponding submission folder on LEARN.

3. Marking Breakdown

3.1. Weekly Paper Review (20%)

Each week, each student should critique all the papers for that week and submit via Learn (Folder called Week#) a one-page critique of the paper before the start of class. The critique should offer a brief half page summary of the paper + 3 things that you want to discuss about the paper in class. You do not need to submit a critique for the paper you are presenting, but need to submit critiques for the other papers that week.

1) Format: PDF only in the specified format
2) Length: AT MOST ONE page for each paper excluding references
3) Report file name: Week#_Paper#_YourFullName.pdf
4) LEARN folder: Week#
5) Deadline: 23:59 on Sunday before each class. Submission via emails will NOT be accepted.

3.2. Paper Presentation (15%)

Each paper will be assigned to one student who will act as a presenter. The presentation will last 20 mins strictly and the discussion will last 20-30 mins. Each student should upload the slides to Learn (Folder called Slides) before the class.

Role of presenter: As a presenter you should not simply repeat the paper's content (remember you only have 20 mins), instead you should point out the main important findings of the work. You should highlight any novel contributions, any surprises, and other possible applications of the proposed techniques. You should check the authors' other work related to the presented paper. Finally, you should place the work relative to other papers covered in the course (especially the papers covered in that week).

Your presentations should

1) have at least one slide that lists the main contributions of the paper.
2) have at least one slide explaining the data mining/analysis technique used in the paper.
3) have at least one slide that places the paper relative to any recent work done by the authors of the paper.
4) have at least one slide that places the paper relative to other papers presented that week.
5) have as the final slide, a listing of at least three technical points that you like and three areas that should be improved.

3.3. Class Participation (15%)

Students are expected to read all papers covered in a week, come to class prepared to discuss their thoughts and take part of the classroom discussions. As a discussant, you should take an adversarial position by pointing out weak and controversial positions in the paper. You should present a short rebuttal of the paper. You should come prepared with problems and counterexamples for the presented work (Note that this is what you are writing in the document that you submit each week for each paper).

3.4. Course Project (50%)

The course project can be done alone or in a group of up to three students. You can pick one from a list of projects in this file. You can also propose your own project, but need to seek the instructor's approval before submitting your project proposal.

The course project includes the following components.

3.4.1. Proposal (5%)

The proposal should be written in up to two pages in ACM format, with the following structure:

1) A description of the problem area you plan to investigate
2) A motivation for why this project is interesting/important
3) The tools and dataset you plan to use or extend
4) A set of research questions you want to investigate, labeled RQ1, RQ2, etc.
5) A description of how you plan to do the project, including a schedule of milestones for the major tasks. Note that you should include the milestones due by your progress report

    a) A brief overview of related research done by others and how your work differs
    b) A list of possible problems you may encounter, and what you propose to deal with them

3.4.2. Proposal presentation (5%)

You are expected to do a ten-minute (excluding Q&A) presentation on your proposal in the class.

3.4.3. Progress report (10%)

During the term, you need to write a 1~2 page long report summarizing the progress of your project. The items in your progress report should meet the milestones listed in your proposal. If not, please explain the reason.

3.4.4. Final presentation (10%)

At the end of the term, you will present what you have done in this project. The presentation should be self-contained, and easy to follow. The presentation should follow a typical research conference talk.

3.4.5. Final report and source code (20%)

The final report should be at most ten pages long, and follow the general format of research papers. You should try to sell your report by highlighting the technical challenges, and novel contributions, as well as the technical merits.
Source code and data. If the course project is NOT your own research project, the source code and data should be tracked by a www.github.com repository created by the instructor. This is mainly to ensure that all group members contribute and all code revisions are transparent to the instructor. If this is a project related to Perses, whether the source code is merged into Perses will be a dimension of evaluation.

4. General Course Policies

4.1. Intellectual Property

Students should be aware that this course contains the intellectual property of their instructor, TA, and/or the University of Waterloo. Intellectual property includes items such as:

Lecture content, spoken and written (and any audio/video recording thereof); Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides); Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams); and Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).

Course materials and the intellectual property contained therein, are used to enhance a student's educational experience. However, sharing this intellectual property without the intellectual property owner's permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructor, TA and/or the University of Waterloo for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository). Permission from an instructor, TA or the University is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. In many cases, instructors might be happy to allow distribution of certain materials. However, doing so without expressed permission is considered a violation of intellectual property rights.

4.2. Academic Integrity

In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. All members of the UW community are expected to hold to the highest standard of academic integrity in their studies, teaching, and research. The Office of Academic Integrity's website contains detailed information on UW policy for students and faculty. This site explains why academic integrity is important and how students can avoid academic misconduct. It also identifies resources available on campus for students and faculty to help achieve academic integrity in - and out - of the classroom.

4.3. Grievance

A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, [www.adm.uwaterloo.ca/infosec/Policies/policy70.htm]. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

4.4. Discipline

A student is expected to know what constitutes academic integrity (check http://www.uwaterloo.ca/academicintegrity/ to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about 'rules' for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, [http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm]. For typical penalties check

Guidelines for the Assessment of Penalties, [http://www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm].

MOSS (Measure of Software Similarities) is used in this course as a means of comparing students' assignments to ensure academic integrity. We will report suspicious activity, and penalties for plagiarism/cheating are severe. Please read the available information about academic integrity very carefully.

4.5. Appeals

A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) [www.adm.uwaterloo.ca/infosec/Policies/policy72.htm]

4.6. Students with Disabilities

AccessAbility Services collaborates with all academic departments to arrange appropriate accommodations for students with temporary or permanent disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations, please register with the AccessAbility Services at the beginning of each academic term.

4.7. Mental Health Resources

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support.

On-Campus Resources

- Campus Wellness https://uwaterloo.ca/campus-wellness/
- Counselling Services: counselling.services@uwaterloo.ca / 519-888-4567 ext 32655 / Needles Hall North 2nd floor, (NH 2401)
- MATES: one-to-one peer support program offered by Federation of Students (FEDS) and Counselling Services: mates@uwaterloo.ca
- Health Services service: located across the creek from Student Life Centre, 519-888-4096.

Off-campus Resources

- Good2Talk (24/7): Free confidential help line for post-secondary students. Phone: 1-866-925-5454
- Here 24/7: Mental Health and Crisis Service Team. Phone: 1-844-437-3247
- OK2BME: set of support services for lesbian, gay, bisexual, transgender or questioning teens in Waterloo. Phone: 519-884-0000 extension 213

4.8. Diversity

It is our intent that students from all diverse backgrounds and perspectives be well served by this course, and that students' learning needs be addressed both in and out of class. We recognize the immense value of the diversity in identities, perspectives, and contributions that students bring, and the benefit it has on

our educational environment. Your suggestions are encouraged and appreciated. Please let us know ways to improve the effectiveness of the course for you personally or for other students or student groups. In particular:

- We will gladly honour your request to address you by an alternate/preferred name or gender pronoun. Please advise us of this preference early in the semester so we may make appropriate changes to our records.
- We will honour your religious holidays and celebrations. Please inform of us these at the start of the course.
- We will follow AccessAbility Services guidelines and protocols on how to best support students with different learning needs.

4.9. Acknowledgment

This webpage is adapted from Prof. Michael Godfrey's and Prof. Mei Nagappan's CS 846 pages.