Please note that any term-specific content of this document is decided tentatively at the beginning of the term, and is subject to change. See the course website for current, up-to-date information.

**CS 341 Description**

The objective of the course is to study efficient algorithms, effective algorithm design techniques and approaches to handling situations in which no feasible algorithms are known. The course is intended to give the student experience in program design and to emphasize both pragmatic and mathematical aspects of program efficiency. Topics include: basics of analysis of algorithms; general algorithmic paradigms – divide and conquer, greedy algorithms, dynamic programming; graph algorithms; and hardness results including NP-completeness and its implications.

The lectures will be delivered on the blackboard. All other communications for the course will be made on the course website (for assignment postings) and on the Piazza page for the course (for all other notices and for discussions and questions about the assignments and all other aspects of the course).

**Recommended text**

The main textbook of the course is


The following textbooks and lecture notes are also recommended as supplementary reading material:


- Kleinberg and Tardos. *Algorithm Design*.
  On reserve in the DC library (QA76.9.A43K54 2006).

  On reserve in the DC library (QA76.6.G35 1979).


- Erickson. *Algorithms, etc.* [http://jeffe.cs.illinois.edu/teaching/algorithms/](http://jeffe.cs.illinois.edu/teaching/algorithms/)
Spring 2018 Schedule and Contact Information

Lecture Schedule

<table>
<thead>
<tr>
<th>Days</th>
<th>Times</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTh</td>
<td>11:30am–12:50pm</td>
<td>MC 4040</td>
<td>Eric Blais</td>
</tr>
<tr>
<td>TTh</td>
<td>1:00pm–2:20pm</td>
<td>MC 4040</td>
<td>Eric Blais</td>
</tr>
<tr>
<td>TTh</td>
<td>2:30pm–3:50pm</td>
<td>RCH 308</td>
<td>Eugene Zima</td>
</tr>
<tr>
<td>TTh</td>
<td>1:00pm–2:20pm</td>
<td>RCH 308</td>
<td>Nathan Harms</td>
</tr>
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Tutorial Schedule

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<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>10:30-11:20am</td>
<td>MC 2038</td>
<td>Kaleb Alway</td>
</tr>
<tr>
<td>F</td>
<td>11:30am-12:20pm</td>
<td>MC 4042</td>
<td>A. Bommireddi and K. Alway</td>
</tr>
<tr>
<td>F</td>
<td>2:30-3:20pm</td>
<td>MC 4041</td>
<td>Abhinav Bommireddi</td>
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<tr>
<td>F</td>
<td>9:30-10:20am</td>
<td>MC 2038</td>
<td>Kaleb Alway</td>
</tr>
<tr>
<td>F</td>
<td>12:30-1:20pm</td>
<td>MC 4060</td>
<td>Abhinav Bommireddi</td>
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Office Hours

<table>
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<th>Days</th>
<th>Times</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>1-2pm</td>
<td>DC 3122</td>
<td>Eric Blais</td>
</tr>
<tr>
<td>W</td>
<td>3-4pm</td>
<td>DC 2128</td>
<td>Nathan Harms</td>
</tr>
<tr>
<td>TTh</td>
<td>4-5pm</td>
<td>DC 2127</td>
<td>Eugene Zima</td>
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<tr>
<td>F</td>
<td>1:30-2:30pm</td>
<td>TBD</td>
<td>TAs</td>
</tr>
<tr>
<td>F*</td>
<td>3:30-4:30pm</td>
<td>TBD</td>
<td>TAs (Assignment weeks only)</td>
</tr>
</tbody>
</table>

Course Staff Contact Information

**Eric Blais** (Instructor)
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**Nathan Harms** (Instructor)
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**Si Chuang Li** (TA)
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Spring 2018 Weekly Calendar

Lectures

The schedule for the lectures in this course is as follows.

- May 1  Introduction.
- May 3  Analyzing algorithms.
- May 8  Solving recurrences.
- May 10, 15  Divide & Conquer algorithms.
- May 17, 24  Greedy algorithms.
- May 29, 31, June 5  Dynamic programming.
- June 7, 12, 14, 19, 21, 26  Graph algorithms.
- June 28  Exhaustive search techniques.
- July 3, 5, 10, 12  NP-completeness and reductions.
- July 17  Approximation algorithms.
- July 19, 24  Undecidability and additional topics.

Assignments

There will be five assignments in the course expected back according to the following schedule.

- Assignment 1. Due on May 18.
- Assignment 2. Due on June 1.
- Assignment 3. Due on June 15.
- Assignment 4. Due on July 6.
- Assignment 5. Due on July 20.

Examinations

The midterm will be held on Monday, June 18, 7:00-8:50pm.

For details concerning final examinations (http://www.registrar.uwaterloo.ca/exams/final_exams.html), various course drop deadlines (http://quest.uwaterloo.ca/undergraduate/dates.html), etc., see the appropriate UWaterloo webpages.
Grade calculation

The final grades for the class will be determined by the scores on the assignments, the midterm, and the final exam, according to the following percentages:

- 30%: Assignments
- 25%: Midterm
- 45%: Final exam

There will be 5 assignments during the term. They are all weighed equally in the Assignments portion of the final grade. All assignments will be available on the class web page.

Viewing Current Marks

The current marks will be available to the students throughout the term online via the course’s LEARN course site.

Course Work Policies

Assignment Instructions

Your written solutions will be judged not only for correctness but also for the quality of your presentation and explanations. In questions that involve designing an algorithm, (i) describe the main idea first, (ii) present clearly written pseudocode (e.g., at a level of details mimicking the style of the lectures, the model solutions, or the textbook), (iii) give a correctness proof/argument if it is not immediately obvious, and (iv) include an analysis (usually, of the running time).

Assignment Submission

Assignments will be submitted as pdf files (each question as a separate pdf). Type your assignments or write legibly. We are using Crowdmark to submit assignments this term. Before the submission deadline (usually the weekend before the deadline), we will send a submission link to your uwaterloo email and make an announcement on piazza. If you didn’t get the link or have any question about the submission, you can contact (...@uwaterloo.ca).

Some of the assignments will contain programming questions, for which we will provide detailed instructions on how to submit your programs.

Missed or Late Work

Assignments are due at 11:59PM on the due dates. No late submissions will be accepted.

Obtaining Marked Work

Marked assignments and midterm will be available on Crowdmark.
Mark appeals

All mark appeals (for assignments and midterm) must be made within two weeks of the date of the return (if you pick up your assignment/exam late, your appeal period does not lengthen). Your appeal should be submitted by email to the TA who marked the question. Only if the problem is still unresolved should you then bring the case to the instructor’s attention.

Collaboration

The work you hand in must be your own. The value of the assignment is in doing it yourself (as you must do on tests and exams). You may discuss the assignment questions verbally with others, but you should come away from these discussions with no written or electronic records and you must acknowledge the discussion. If you use an electronic source, again, read it, then close it, then compose your solution and acknowledge your source. Write your solutions in your own words, from your own head. Acknowledge any sources (human or non-human) you have used. Any assistance received (from human or nonhuman sources) that is not given proper citation may be considered a violation of the university policies as discussed below in the Academic Integrity section.

Other Important Information

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. Check the Office of Academic Integrity’s website, www.uwaterloo.ca/academicintegrity/ for more information.

All members of the UW community are expected to hold to the highest standard of academic integrity in their studies, teaching, and research. 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.

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, http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm When in doubt please be certain to contact the departments administrative assistant who will provide further assistance.

Discipline. A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about rules for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. For information on categories of offenses 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
Avoiding Academic Offenses. Most students are unaware of the line between acceptable and unacceptable academic behaviour, especially when discussing assignments with classmates and using the work of other students. For information on commonly misunderstood academic offenses and how to avoid them, students should refer to the Faculty of Mathematics Cheating and Student Academic Discipline Policy, [http://www.math.uwaterloo.ca/navigation/Current/cheating-policy.shtml](http://www.math.uwaterloo.ca/navigation/Current/cheating-policy.shtml).

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, [http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm](http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm).

Note for students with disabilities. The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term. See [http://www.studentservices.uwaterloo.ca/disabilities](http://www.studentservices.uwaterloo.ca/disabilities) for more information.