THEORY OF COMPUTATION

CSc 350, Fall 2019                      Aaron G. Cass
Department of Computer Science        Department of Computer Science
Union College                         Union College

ADMINISTRATIVE DETAILS

COURSE WEB SITE

http://cs.union.edu/csc350

CLASS MEETINGS

The course will meet from 10:30pm to 11:35pm on Mondays, Wednesdays, and Fridays in Bailey Hall Room 106.

INSTRUCTOR INFORMATION

name:       Aaron G. Cass
email:      cassa@union.edu
web site:   www.cs.union.edu/~cassa
office:     Steinmetz Hall Room 220
office phone: 388-8051
home phone:  382-9671 (before 10pm please)

OFFICE HOURS

If you need help, or just want to chat, please:

• Come by during my scheduled office hours. See http://cs.union.edu/ cassa/schedule.html for up-to-date info on my office hours.
• Just stop by, especially if you think it will be quick.
• Schedule a meeting, especially if you think it will not be quick. To schedule a meeting with me, go to http://cs.union.edu/~cassa/schedule.html and follow the easy instructions. If you and a classmate have similar questions, feel free to schedule a meeting together with me.

GOALS

Your goals in this course should be:

1. Become familiar with different models of computation, from automata to Turing machines.
2. Become familiar with the computational power, and the limitations, of the different models.
3. Develop skill in determining whether a problem is tractable or even solvable.
4. Further develop your reasoning and proof-writing skills.

My goal is to help you accomplish these goals by filling our class meetings with useful and fun exercises and discussion and by giving you plenty of practice outside class in the form of problem sets and exams. I strongly believe that you will learn primarily from working problems on your own and with others. I will give you plenty of practice with this, both in and outside of class.
PREREQUISITES

- C- or higher in CSC 151, or
- both:
  1. MTH 197, and
  2. C- or higher in CSC 150

MTH 199 can be substituted for MTH 197.

REQUIRED TEXT


GROUND RULES

ATTENDANCE AND READING

While I do not plan to take attendance, I expect you to come to all class meetings. My goal is to fill our class time with activities that will help you to master the material, so it will therefore be worth your while. I further expect that you will have at least skimmed the reading for class prior to that class meeting.

LATE WORK AND MAKE-UPS

Problem sets will not be accepted late.

If you will be unable to take an exam on the scheduled date, you must let me know ahead of time, so we can schedule a different exam for you (perhaps before others take theirs). If you are unavoidably detained because of illness or family crisis, please let me know as soon as possible.

ACCOMMODATIONS

I encourage students with disabilities to discuss with me, during the first two weeks of the course, appropriate accommodations that might help facilitate your learning. You will need appropriate documentation from the Office of the Dean of Students. All discussions will remain confidential.

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ACADEMIC INTEGRITY

GENERAL STATEMENT

Union College recognizes the need to create an environment of mutual trust as part of its educational mission. Responsible participation in an academic community requires respect for and acknowledgement of the thoughts and work of others, whether expressed in the present or in some distant time and place.

Matriculation at the College is taken to signify implicit agreement with the Academic Honor Code, available at honorcode.union.edu. It is each student’s responsibility to ensure that submitted work is his or her own and does not involve any form of academic misconduct. Students are expected to ask their course instructors for clarification regarding, but not limited to, collaboration, citations, and plagiarism. Ignorance is not an excuse for breaching academic integrity.

Students are also required to affix and sign the full Honor Code Affirmation, or the following shortened version, on each item of coursework submitted for grading:
I affirm that I have carried out my academic endeavors with full academic honesty.

**Specific Guidance for this Course**

In this course, you will learn by doing. If you do not do things for yourself, you will not learn them. Therefore, I expect you to do your own work, and only turn in that which is yours. When you have questions, feel free to talk to me, the help desk students, or even other students in the class. However, do not leave these discussions with just an answer – you need to understand how to arrive at the answer.

For **problem sets**:

- **DO** your own work.
- **DO** struggle on your own before seeking help.
- **DO** seek help (after first giving a serious, honest attempt) from Help Desk, your professor, your fellow classmates.
- **DO** help your classmates by having conversations about general strategies.
- **DON’T** help your classmates by telling them what to write.
- **DON’T** look at someone else’s proof/algorithm/assignment, except when you are trying to help them.
- **DON’T** give your answers to anyone else (on paper, electronically, or in any other way).
- **DON’T** type or write for anyone else.
- **DO** ask your professor if you are unsure what’s permissible or not.
- **DO** put the Honor Code Affirmation in a comment at the top of each program file you submit.
- **DO** explicitly cite all the people (except me or the help desk staff) and other sources you consulted.

For **exams**, of course, you should work completely alone.

**Evaluation**

**Quick Quizzes (10%)**

Every class meeting will start with a 5-10 minute quiz reviewing material from the previous class or from the problem sets. The new material in the course builds on the previous material, so it’s important to keep up by doing all the reading and reviewing your class notes. If you are keeping up, you should have no trouble with the quick quizzes.

**Problem Sets (40%)**

There will be eight (8) problem sets to develop and evaluate your skills in theory of computation. These problems will have you using a new model of computation to solve a problem, exploring the limitations of a model of computation, proving that a problem can or cannot be solving within a particular model of computation, or proving that a problem belongs in a particular complexity class. These will be evaluated based on your creativity in coming up with solutions and your rigor in explaining the answers, including proofs where appropriate.

You problem sets must be properly typeset using \LaTeX. I will provide \LaTeX files with the problems and place for you to provide your answers.
Examinations (50%)

There will be one in-class mid-term exam (20%) and a final exam (30%).

Grading Scale

Individual problems on problem sets and exams will be graded on a four-point system as follows:

<table>
<thead>
<tr>
<th>Mark</th>
<th>What it means</th>
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<tbody>
<tr>
<td>✓</td>
<td>4 A  Your solution is correct, and well-argued.</td>
</tr>
<tr>
<td>✓ −</td>
<td>3 B  Your solution is almost right, but with minor errors, or it is correct but not well-argued.</td>
</tr>
<tr>
<td>1/2</td>
<td>2 C  Your solution is half right, with at least one substantial error in the solution or the argument.</td>
</tr>
<tr>
<td>×</td>
<td>1 D  Your solution attempts to answer the right question, but gets it wrong, with either several substantial errors, at least one very substantial error, or a plan of attack that would not lead to a correct answer.</td>
</tr>
<tr>
<td>0</td>
<td>0 F  You have given no solution or your solution does not seem to be answering the given question.</td>
</tr>
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I will also occasionally mark a problem with a ✓ +, indicating a particularly creative or well-argued solution, and worth five points on the four-point scale. Using the scores on individual problems, I will generate a grade for each problem set or exam on a 100-point scale in such a way that a final grade of (A-, B-, C-) is approximately (90, 80, 70) on this scale.