

CSC 286/486: Computational Complexity  
Course Information Handout/Syllabus  
Spring 2024  
Version 1.0.0<sup>1</sup>  
2024/1/16 (last updated: 2024/1/16/934PM)

**Location/Time:** The course meets M/W 2:00PM–3:15PM, Gavett 301.

**Instructor:** Lane A. Hemaspaandra, csc486staff “at” cs.rochester.edu. Office hours: Mondays 3:25PM–4:40PM, Wegmans 2317. My office hours occur on each Monday (except, for both me and Hecong, office hours exist only on days when regular classes are in session, so not during Spring Break, and also not after the last class session of our course; so the last of my and Hecong’s office hours of this term will be Monday, April 29).

**Graduate TA:** Hecong Wang, csc486staff “at” cs.rochester.edu. Office hours:

- Mondays 3:25PM–4:40PM, Wegmans 2307.
- Thursdays 5:40PM–6:40PM, via Zoom; to get *to* those office hours, please go to our course’s Blackboard area, and then choose the “BB Parts of Course Content” folder and then look at the text in the “Office Hours” item, as that text will include a link to the Zoom session. That Zoom ID/URL for Hecong’s Thursday office hours will be the same every week, so it probably is a good idea to bookmark it.

Hecong’s (and my) office hours exist only on days when regular classes are in session, so not during Spring Break, and also not after the last class session of our course; so the last of Hecong’s and my office hours of this term will be Monday, April 29.

**Address for Course-Related Email:** Use csc486staff “at” cs.rochester.edu for *all* course-related email. (This address will be automatically forwarded by the system to go to both me and the TA, though he’ll do the answering of most of the email that is sent to this.) Please make *sure* to *always* use it so that both of us get it. The only exception is if you are for example trying to set up a one-on-one appointment time with Hecong, then you might want to write him directly at his individual email address of hwang99 “at” u.rochester.edu.

**Overview:** This course studies aspects of the difference between feasible and infeasible problems (and we might also touch on aspects of the difference between computable and uncomputable problems). Regarding the feasible/infeasible issue, we may study such issues as: What properties of a problem make it computationally simple? What properties of a problem may preclude its having efficient algorithms? How computationally hard are problems? Topics often covered include: Complete sets and low information content;  $P=NP?$ ; unambiguous computation and one-way functions; reductions relating the complexity of problems; complexity classes and hierarchies.

*The course is discovery-driven.* Rather than me just pushing theorems and proofs at you, we will—after a prefix<sup>2</sup> of the course that indeed will be of that flavor—be having you work on discovering for yourselves the proofs to many of the important results of the field (often in class or over a few class sessions, perhaps starting individually or in a small group, and then maybe coming together and the entire class as a group of the whole covering on and presenting its approach to a problem).

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<sup>1</sup>Any substantially updated versions (typically that means an update in the A or B of Version A.B.C; changes just in C are typically minor clarifications or typo corrections) of this document will typically be announced as the course goes on via BB, and the current version is always available via the course home page.

<sup>2</sup>However, see Footnote 8.

The goal of this framework is to help you improve your skills at discovering, formalizing, and proving, which are core skills for researchers (and more generally, for problem-solvers). (Even though the actual material of the course is my own area, and I love it, to me the most important part of the course is not the material itself, but rather, is what is mentioned in the previous sentence.)

**Prerequisites:** CSC 280 (prereq). You should also have taken (or know equivalently well) discrete mathematics (MTH 150), which is a prerequisite of CSC 280.

**Collaboration and Class Participation:** You may discuss and work *with other (current) CSC286/486 students* on the reading, studying, and problems; the goal of the course is not to compete with each other, and, indeed, in real research, collaborative work is very common. However, it is cheating to solicit help from anyone other than your classmates—this includes (as cheating) using electronic forums such as StackOverflow/wikis/Piazza-or-so-on/Facebook-or-Google-etc.-groups (or even mailing lists that function as electronic discussion forums), and includes (as cheating) using things like ChatGPT to solve the problem or even to edit, polish, or check your solution, and also includes (as cheating) using solutions from previous years’ CSC286/486.

If there are take-home exercises (which from now on I’ll often more tersely refer to as “home exercises”), perhaps in groups, those will as to collaboration follow whatever rules are attached to them if specific rules are, but by default, if those are by groups, you may speak freely to your groupmates but should not speak with anyone else, not even people in the class’s other groups (as typically the groups will work more on—or compare, or seek to negotiate and merge—their solutions at a coming class session, and the between-class time is for each group to work as a team).

In some cases the groups will be graded on the home exercises (e.g., they will, as on in-class exercises, put solutions up at a class session and I’ll assign grades to the solutions, though quite often the groups will be asked to create, during class, a group-of-the-whole solution, which in that case would typically be what is graded; or in some cases the TA might, if a home exercise was for written-answer which are collected, might grade the exercises after they are collected). These grading patterns also often will hold for graded in-class group exercises.

On home exercises that are done without groups, you (unless when assigning it I set other rules) *may* speak about the problems with your classmates within the frameworks and rules mentioned above and below (so talking to your classmates is ok, and talking to anyone else—even CSC 286/486 students from previous years or writing to web forums or etc.—is cheating). Individual home exercises usually are not graded (so your plan should not be to maximize the quality of the solution via drawing on others so early or so much that you don’t understand the solution or gain the learning from the task of trying to move toward it, but rather should be to immerse yourself in the learning/solving process, using the allowed ability to talk with your classmates wisely and in such a way as to help the learning rather than to weaken it). If a given home exercise done without groups will be graded, I’ll let you clearly know that as it is assigned.

More broadly speaking, as to what can be used, it is cheating to get or use, during this course, course exercises/quizzes/homework or home exercise or exam materials (quizzes or in-class exercises or their answers, homework sets or their answers, home exercises or their answers, exams or their answers, etc.) from any previous offering of CSC286/CSC486. Further, when doing home exercises, you indeed may use the library and the internet to search for information and examples on techniques and so on. But you should not attempt to find/look up a solution to a given in-progress home exercise; doing so is cheating. If you by accident stumble on a web page that happens to solve an in-progress home exercise, that in itself is not cheating. But you should, immediately the moment you realize that this has happened, not read or copy the solution. The experience and skills you’ll build by working on solving problems are an important part of doing this course; this is not a course about web-searching for answers.

Also, on the (rare, or quite likely none at all unless working in groups seems not to be working well; plus quite a bit of the exercise work will be done purely within the class sessions) home exercises that are done

without groups and that will be graded and on which I ask for a written turn-in (typically via pdf), the answers must be your own work/words, even if you discussed the problem(s) with others; you may in no case copy all or part of anyone else's write-up. (*A very wise way to achieve this is as follows: Even if you have discussed the problem with others, as you do your final write-up have nothing in front of you but rather write just from the knowledge/images of the solution you have in your head.*) Again, may not use things like ChatGPT solve your problems or even to edit, polish, or check your solutions.

As to in-class exercises and what can be used during them, you cannot use computers/the web/etc./slides/printouts/etc., but if you have notes taken by you by hand, I sometimes will let you use those (but often, what you may bring in will be your own knowledge).

I strongly encourage the undergrads and grads not to act as if they have no connections and cannot interact, but, rather, I'd encourage you to treat each other as what you are: fellow learners who are interested in complexity and may be able to help each other better learn this important, fun, difficult area.

Anything that has a due date must be done/submitted on time; late items get no credit (and will not be graded or marked up with comments; although you always can stop by the TA's or my office hours to, after solutions have been gone over in class, make sure you understand those solutions or to discuss an alternate approach). (No late turn-ins means no late turn-ins; even if one of my faculty colleagues tells you that they think it will be fine to hand in late an item in this course, even for some very good reason such as there being a research paper deadline or there being a fellowship deadline, you nonetheless must hand in your work on time in this course if you wish to get credit for it; similarly, none of my faculty colleagues can excuse you from this course's other items/material.)

The TA and I generally won't answer questions about home-exercise questions (or for that matter in-class exercise questions) that are currently in progress (my typical answer to such questions is to point to this sentence itself (let us label this sentence " $\beta 1$ " as a convenient reference string), or "no comment," or "understanding the question is part of solving the question" or if it was asked by email simply not to reply); of course, if you have questions about the underlying material (that a question might be related to), you can and should use the office hours to ask questions about or better learn about that material (but *not* to ask for answers to or explanations of in-progress home exercise questions; side comment: I do leave the TA some flexibility to use discretion and judgment as to where the line is between what is answering question about underlying material (which is fine) and what is an answer/explanation of the in-progress home exercise (which is not fine), since sometimes this is a line that one could see as falling in different places depending on one's judgment), and please note that on things when consulting with groupmates or classmates is allowed, that is likely your go-to resource (and a valuable part of the process—working together to understand things).

Regarding class participation, you are expected to attend class, to be prepared for class, and to participate in class. For example, if you are called on to put up your answer (or your group's answer) to a home exercise, it should be clear that you have put in a serious amount of time and thought. Note that, even if you do not know a perfect answer, if you clearly have put in careful thought (e.g., you have partial results or a clear description of what issue is stumping you), that certainly will make a much better impression than if you clearly have not thought at all about it. As another example, you of course should always have done any assigned reading.

By the way, if you have a question in class about some of the course material, it usually is a good idea to ask it. Probably other students have exactly the same question,<sup>3</sup> and you will be doing yourself, them, and the class a big favor by asking, so we all can explore whatever issue you raise!

(Some caveats: This is a course on certain material, not a course on how to design and teach a course on that same material. Thus please do not ask course-design/course-logistics questions such as "Why are there

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<sup>3</sup>Even professors sometimes—more often than they would like to admit—don't understand talks/lectures, even in their own areas! Here is a cute, relevant anecdote from Moshe Vardi's introduction to the September 2011 issue of *CACM*, where he mentions asking, at a top theoretical computer science conference, how many people understood at least  $N\%$  of at least  $N\%$  of the papers—to get 50% of the people to say yes, he had to drop  $N$  down to 50. Understanding lectures is a nontrivial challenge, and requires a lot of focus!

so many exercises?” or “Why can’t I use my supersmart pet dog Fido or my computer (so I can search the internet and find an answer rather than me or my groupmates having to solve the problem) during exercises?” I don’t answer questions about the “why”s of the course’s design or its rules. (Most of the rules are designed to help teach a good course and to allow the TA and me to spend as much of our time as possible on content. And also, some rules are related to ADA-accommodation issues.))

Audio or video recording of the class sessions is not permitted,<sup>4</sup> except if you have a documented disability that would need such recording and Disability Resources has conveyed that to me.

Again except in the case of an ADA accommodation on which I have received a letter about that on you from Disability Resources, you may *not* have laptops/tablets/smartphones/etc. opened or out or in use in class—except any laptop that is connected to the projector if you are giving the day’s talk, plus briefly and only during Q quickly attendance-taking you’ll need to use a smartphone or laptop to have your attendance recorded.

Finally, regarding asking questions about the course material: Questions should not be asked by email, but rather please ask them in class, or use Hecong’s or my office hours—and please also keep in mind that your 286/486 classmates are often a great resource with which to discuss the course material (let us label this sentence  $\beta$ 2, and if you do ask questions by email, I probably will either refer you to this sentence, or more likely will simply not reply since I expect that you know that the expected thing to do is to come into an office hour or to, when doing so is within the rules, discuss with your classmates, or to ask the question in a class session); a corollary is that if you have a question sometime after Hecong’s final office hour of the week, you likely won’t be able to ask and get an answer to it before, for example, Monday’s class session, or whenever you discuss it with a classmate (which could be substantially earlier!).

**Grading:** The overall course grades (A, A-, etc.) will not be by any fixed curve, but rather will reflect the instructor’s judgment about what grade is appropriate based on your course average. However, so that you have some context, I guarantee that (unless the given person is under an academic-honesty-related adjustment set by the Academic Honesty Board) everyone with a course average greater than or equal to 90 will get an A-range (A- or A) grade, and everyone with a course average greater than or equal to 80 will get at least a B-range (B- or B or B+) grade.

Everything in the course comes in 100-point chunks. All 100-point chunks are created equal, whatever they come from. Most or all of the chunks will be exercises (probably some in class and some home ones). *If* late in the course students in groups present a unit I assign (e.g., a book chapter or a paper from a top journal or etc.), that will count as 6 100-point chunks, “superchunked.” What I mean by that is if your score on it is 88, that will be recorded in Blackboard as 6 100-point chunks each with a score of 88. It is not impossible that some other items in the course (you will in such cases be told this either on the item itself or beforehand) will be handled as superchunks. For example, your attendance grade will count as 6 100-point chunks, superchunked (see later in this document for how the attendance grade is calculated).

*If you are taking the course as 486, at the end of the course we will average all your chunks, after dropping the lowest five. If you are taking the course as 286, at the end of the course we will average all your chunks, after dropping the lowest seven.*

Note that the grading scheme is very different from that of a course where there are major exams that count for a large part of the course grade and sometimes people try learning things the day before the exam (and forgetting them the day after perhaps). *In contrast, our stress, since almost all the chunks are coming from your exercise grades week in and week out, is on having/gaining/sustaining day-after-day and week-*

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<sup>4</sup>That is, is not permitted by you. Due to the uncertain times, we will try to capture each class session as a recording and post it in the course BB area. Please consider this syllabus your notification and warning that everything said during a class session may thus potentially be—and may well be—recorded (which is not a bad thing—it will be helpful to people who due to illness watch the class via video rather than attending live; note that watching via video does not earn attendance credit). Caveat: The Panopto autorecording can at times fail (and on two lectures we’ll be meeting jointly with a different class so those likely won’t appear in our Panopto area at all) so please if missing class always try to line up a classmate to take and share with you notes as to what happened.

*after-week (attendance, and) performance, competence, and with luck mastery, as reflected in your work on the exercises. It is a 14-week course, not a 150-minute course.*

As to grades (and what is made public and what is not), each student gets their own grade on each item, (and of course I assume and expect that you will keep each given-back item/grade for items that are on paper and are given back marked), and through Blackboard they will see some information about the overall class performance each of those items, and at the end of the course they will receive their course grade either from the registrar or from me. However, I in general do not give out grade or grade-distribution or grade-range-cutoffs info beyond that (or provide guesses of what letter grade a student is “headed toward”), though of course if a student wishes to share with some classmate their grades on some items or the course, that is up to them.

Note that, very informally put, the chunk dropping in some sense covers 286 students for seven chunks of misses, and 486 students for five chunks of misses (e.g., most in-class exercises are one chunk so if you missed a class you’d get a zero on such an exercise, so that would likely be one of your dropped chunks). However, *I would urge each of you to attend every class (except when sick or during your religious holidays) and do all items; you will learn far more and enjoy the course far more*; and that will let the drops just end up dropping whichever chunks you happened not to do well on, rather than ones you skipped outright. (Plus keep in mind that attendance itself contributes a big six chunks, superchunked.)

Beyond that, in grading the course, the 286 students will have their grades assigned with consideration of the fact that they are taking the course as 286. (Thus, 286 students should not view themselves as being in competition with the 486 students—though actually no one should view themselves as being in competition with anyone else in the course.) All undergraduates in the course (except those who did excellently in CSC280) should speak with me or the TA immediately after, or during the TA’s office hours the day after the first class, so we can get a handle on exactly what your background is as it relates to the current course, and whether you are ready for this course; so should any grads who have any worries about their background. (But don’t think you need to be a “theory person” to take or benefit from this course. Again, this course, to a very great extent, is trying to help build your collaborative problem-solving skills; and *that* is important no matter what your area of CS is.)

We will use Blackboard to store and to share with you the grades on each item.

This course is available for audit credit, but only with my permission, so if you want to audit this course, please do make sure to talk with me about that (by email to csc486staff “at” cs.rochester.edu, or on the first day of class).

**Class Attendance and Credit Hours:** Class attendance is required. This is a 4 credit-hour course.<sup>5</sup>

We’ll take attendance via Qwickly at many though perhaps not all class sessions. If you are not there for the Qwickly attendance-taking (or are but fail to put the one-time secret code for that session in in time), then you get a 0 percent attendance grade for that class session as to attendance (even if you were there for other minutes of the class; so please do show up to class strictly on time as on some classes attendance might be taken at the very start of class). If you are there for the attendance-taking and put in the correct code that I (or Hecong) will give the class during the attendance-taking within the allowed time, then you get a 100 percent attendance grade as to that class session. Your attendance average is, after internally dropping (for both 286 and 486 students, the number is the same: five) the five lowest of your class-session attendance grades, the average of the remaining attendance grades. And then *THAT* average itself, as mentioned above, will be handled in a superchunked way.<sup>6</sup> Regarding religious holidays’ interaction with attendance (and other

<sup>5</sup>The course follows the College credit hour policy for four-credit courses. This course meets twice weekly for three academic hours per week. The course also includes independent out-of-class assignments/work/reading/etc. for an average of at least one academic hour per week. In this course, students will complete group activities that will variously use course materials, readings, and notes. These activities include team-based work on challenging problems.

<sup>6</sup>*This framework does not mean you should attend class if ill or worried that you are ill with flu/COVID/cold or any other infectious disease. You of course should not attend class in such cases. But the case of illnesses is the largest part of why I am allowing such a*

things), that is covered slightly later in this document.

If while Qwickly attendance is being taken at some class session you were there from the start of the attendance-taking but are unable to log into your BB account to get credit, you must *immediately, right as that is happening so right at the end of attendance-taking window*—not that evening and not after class and not 2 minutes after attendance—raise your hand and let the TA and me know of that, so we can hand-credit you in BB/Qwickly.

**Academic Honesty:** On all aspects of the course, it is very important to follow appropriate norms of academic honesty and professional conduct, most importantly including those regarding plagiarism; do not plagiarize. Please see the link from the course's main web page to the school's site on academic honesty. And note carefully the rules about what you can and cannot do/discuss together with classmates (note the discussion at the start of the section "Collaboration and Class Participation" of this document) and the rules on what notes/etc. you can/cannot have during exercises, and the rules about (not) using things like ChatGPT.

**Missed Items/Lateness/Etc. and Some Issues Regarding What Items We Will Have:** No makeups (not after the fact; not before the fact). No exceptions (except for religious holidays discussed long in advance).<sup>7</sup> As a bow to sicknesses, varsity events, conferences, and other compelling excuses, each 486 student will have their five lowest chunks dropped (but no more, even with good excuses). As a bow to sicknesses, broken cars, varsity events, conferences, and other compelling reasons/excuses, each 286 student will have their seven lowest chunks dropped (but no more, even with good reasons excuses; the number of drops is set high already, see Footnote 6's comment). The only exceptions to the above will be with a letter from a convincing Dean (i.e., one with the authority to mandate exceptions to course policies; here and elsewhere in this document, references to letters implicitly include letters from university officials, such as certain CCAS staff members, who have the delegated authority of a dean or director having such authority) who has read the course's policy regarding no makeups and that dropped chunks are given to all students in the above way to account for all reasons, and who having seen that has determined that your case is so extraordinary that they are mandating an exception to the policy in your case.

By the way, regarding sickness or other times you'll be missing a class session at which some item that will be graded is being collected (though most often you'll be asked to have emailed it to csc486staff \*before\* the start of class), let me mention you should do your item and mail it to us as a pdf (e.g., computer typeset, or as a scan of your handwritten take-home exercise), to the address csc486staff "at" cs.rochester.edu, and as long as it arrives in that mailbox before the deadline (such as the 2:00 start of class; after sending it, keep looking for a few minutes to see if you get a "bounce" error message, e.g., because you misspelled the email address or you sent a file so large the mailer bounced it—the UR faculty email system used to bounce any message on which the total size of the message, including all attachments, was 20MB or more, although I am not sure if it still does that, except sometimes mail-with-attachments will be bounced as the systems views then as security threats, so DO send early so you can SEE if it bounced and if so can resend the email in some other way/packaging to get it to us before the deadline), we will grade it as if you had turned it in just before

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large numbers of missed-attendances without penalty. However, please use them only when you really need to, such as when you are ill or afraid you are ill, or for family tragedies, or other compelling reasons; attending classes is usually very, very central to doing well in this difficult course.

<sup>7</sup>To be explicit: You should, no later than January 27, 5PM, send us—at csc486staff "at" cs.rochester.edu an email if any of the class days fall on days where due to observance of a religious holiday you will not be able to attend; in that email, you should please let me know all such days for the entire term. If you have a religious conflict told to me by the above date, I'll regarding the in-class exercise (if any) give you a makeup (perhaps oral or perhaps written) one or will simply try to avoid having an exercise on that day. If a home exercise that is being written up and handed in falls due on a religious holiday, you should take that into account and make sure you nonetheless turn it in on or before the deadline, via emailing that item to csc486staff "at" cs.rochester.edu no later than the deadline of course, as a pdf. And on the religious holidays you let me know of, the automated Qwickly system will assign you a zero, but please right after that missed class—but no later than 48 hours after it unless the holiday's religious requirements make sending the email impossible in which case send it immediately after those requirements no longer apply—email to csc486staff "at" cs.rochester.edu reminding us of why you missed and that we have been pre-informed, so we can override that zero in the Qwickly system and turn it into a one hundred.

the class session.

The no-exceptions policy (about number of drops and lateness) is so settled and broad that I expect you to understand it and not to ask for exceptions; and so if you email asking for an exception, I generally won't reply to the email, but rather the answer is implicitly a "no."

There will be no midterm and no final. There will be many exercises. You should assume that each class might have exercises—some might have more than one, or some for home and some for class.

Please use only black or blue pen (*no pencil allowed*) on handwritten (scanned, of course, into PDFs, if the turning in is to be done via email, such as on some home assignments) turn-ins and even in computer-generated text (such as if you typeset exercise answers on a computer) please don't use the colors red or purple, as we may use those when we annotate or grade things. As to in-class exercises that will be collected graded (as opposed to those the group it instructed to put on a board for me to grade on the spot) you'll do those in black or blue pen.

By the way, if you see in Blackboard a 0.01% as your grade on an exercise, what that means is the following: If you don't submit something, we of course record a 0.00%. But if you hand something in on time and get a zero (or even any grade between 0 and 0.01%), we will often record it in Blackboard as a 0.01%, so that we can see that you did hand it in.

As mentioned earlier, depending on how the course goes, we might do discovery-based learning for the entire rest of the course once we start that part of the course;<sup>8</sup> or we might (and in fact having this is very likely), after a long stretch of discovery-based learning, end the term by having a superchunked in-groups project in the form of tackling and presenting—making slides on and using them to give lectures on—a topic (which might for example be a chapter that I assign your group from a textbook, most likely the Hemaspaandra and Ogihara complexity textbook).

Anyone with a documented disability for which accommodation is relevant to this course should please have the appropriate university office, the Office of Disability Resources, inform me of this and the related accommodations immediately (and should please speak privately with me at my office hours or by email so we can start on the logistics related to those accommodations).

Typically, during in-class exercises (and home ones too but those are covered above) you should not ask any questions; see  $\beta 1$  above; aha... see... we now have actually invoked that label! If you see on an exercise something that you're sure makes solving the problem impossible (or equivalent to something such as resolving P versus NP that is something I wouldn't likely ask you on an exercise) or makes the problem meaningless or incoherent, what you should do is that as part of your answer you or your group should clearly explain what you have noticed, and why it seems to make the problem impossible or meaningless or incoherent. If what you notice seems to be a very minor technical typo and you are sure it is and you see the correction, you probably should note that, fix it, and then solve the fixed problem (but if the original one was really what was meant, you probably won't get credit—if this is a graded-exercise setting—if you change it to a different problem; and just noticing for example a spelling error or a missed "the" doesn't get you out of having to solve a problem).

**Timing of the Reading, in the Context of Discovery-Based Learning:** For the discovery-based learning in class to work well, it is *extremely important* that you do the readings in the time periods in which I assign them. Obviously, you should complete each reading by its "Due" date/time. But I mention that, though doing

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<sup>8</sup>Caveat: I mean once we get past the prefix of the course that will take around four (or three) weeks (or maybe less or maybe more) and will review/cover the basics—and possibly some far more than basic things—about (perhaps computability and) complexity. (But as a twist within a twist, as a prelude to that prefix, we \*might\* spend a one of the earliest class sessions doing a discovery-based learning exercise, so that you can see up front—in order to help you decide if this course is for you—the flavor of our discovery-based learning course... that is, so that you can see the flavor that will occupy basically all of the course except the prefix covering the just-mentioned basics and the time near the end of the course—if we have that this year—when in groups you might (if we do such) be presenting a topic/paper(s), perhaps as is about to be mentioned in the main body of this document's text, a paper, or perhaps (parts of or all of) a chapter from the Hemaspaandra–Ogihara textbook.

so is not forbidden, if you try to read ahead in order to guess and find the answer to a day's discovery-based learning challenges, you may be cheating yourself of much of what the course offers. The challenges are to help you explore and learn and prove, and to learn how to prove, but if you come in having read an answer intentionally, you won't get that effect.

That is, if you pre-guess or pre-read a problem/solution, you'll be doing more harm than help to your learning, as you'll have lost the chance to work to find the insights that the exercise I assign is hoping you and your classmates will reach.

After some in-class discovery research days, I may on the web site or via Blackboard-announce post reading that covers or is related to what we just learned. In those cases, you absolutely should do that reading before the next class (or by its due date, but the due date will typically be the start of the next class in such cases).

**Regrading:** Many or most of your chunks may come from the grades I assign to exercise solutions you or a group put up on the board, or to your superchunked presentations/slides on a paper or chapter, and regrading does not apply to those. But if, for example on an in-class exercise, if any, where you individually write a solution for grading and we hand it back (by email, typically) graded and with comments, on *those* you can ask for regrading during the 48-weekday-hour window from when they are given back (the window applies even if you skip the class where they are given back), and to do that, you must notify us (only via the email address "csc486staff" in the domain cs.rochester.edu—not via my personal email address—since csc486staff sends it to me and the TA) of that via email within 48 weekday hours (i.e., Sat. and Sun. do not count against those) of it being given back, along with an emailed explanation of what you feel was graded incorrectly, and an emailed color scan (B&W is ok only if you don't have access to a color scanner or color smartphone camera) of your entire graded item (all parts of it—not just the lines you are asking for a regrade of). Note that the entire item that you are asking to be regraded may be regraded (not just the issue about which you are asking), and the grade may move either up or down (and moving down is a very real possibility, e.g., if I (or the TA) discover that the TA (or I) missed some errors, or just graded overgenerously, relative to what the regrader thinks during the regrading. The TA or I will usually send you the outcome of the regrading within a week of when you make your regrading request, although that is not a promise; rare cases may take longer. Also, a regrading request is irrevocable; once you make it, you cannot withdraw it. And regarding the scan you must submit, it must be identical to what was handed back to you; altering what was handed back to you, in any way, before scanning it for a regrading request will be treated as an Academic Honesty violation.

When does asking for a regrade make sense (and when does it not)? It makes sense to use regrading if we gave you almost no credit for an answer that in fact was correct; regrading is not there so students can try to argue their way to a few (or a few more) more partial-credit points on an incorrect answer.

The only exception to the above time limits and scheme is that during the last 10 calendar days before the last day of classes (i.e., from April 21 onward), the 48-weekday-hour period is replaced by a 24-calendar-hour-after-it-was-returned-to-you time limit for being submitted for regrading (so look over things given back during the last ten days within the first 24 hours of getting them back, please); again, most chunks are not even relevant to regrading, so this likely does not apply anyway. (Classroom attendance generally—unless we find that Qwickly has somehow broken down—can't be appealed as it is done precisely and via Qwickly, and so if you were there and did the right thing at the right time, you should have been recorded; if there was a religious holiday, please make sure to have followed the protocols mentioned earlier as to informing us early in the term and then reminding us within 48 hours after the class missed due to the holiday.)

#### **Texts:**

1. (Required but don't buy it as it is available free online) Bovet and Crescenzi, Intro. to the Theory of Complexity Classes, *the online edition—NOT the earlier printed edition*.
2. (Required but I believe UR's library gives you free online access to it) Hemaspaandra and Ogihara,



The Complexity Theory Companion, Springer-Verlag. (Both the softcover and the hardcover versions of this book are equally good to use; but as just mentioned UR's library gives you free access to the book as an e-book, so you might as well use that version!)

3. (Recommended but actually we'll very, very rarely refer to it, if at all) Papadimitriou, Computational Complexity, Addison-Wesley.

Currently, *Bovet–Crescenzi* is kindly made available online by the authors via a Creative Commons license; you can typically find that online (it currently—I rechecked on 2024/1/13—seems to be available at <https://www.pilucrescenzi.it/wp/wp-content/uploads/2017/09/itc.pdf>, and to the best of my knowledge that is a valid thing to download, though I'm not a copyright-law expert.

Also, the UR library has arranged, due to some access agreement for lots of Springer's content, online access to the entire Hemaspaandra and Ogihara textbook.

So you may well be able to avoid the need to buy either of those books, if these electronic versions really are available.

Also, your own notes (whatever notes you take in class) surely will be useful to you.

**Books on Reserve:** First, please keep in mind that the Hemaspaandra–Ogihara book in concept can probably (unless UR recently changed what it gives access to) be accessed simply by going to it in the UR library online catalog and going through the link there to the online resource.

On reserve for this course at Carlson Library are quite a few books, including the above books, texts covering some or all of course's topics, some more advanced (and less advanced) complexity books, some review books on discrete mathematics, and some just-plain-interesting books that I thought that you, as emerging computer-science researchers (and writers), might enjoy. Note that though the course is CSC286/CSC486, the library may list the books under the reserve list of one or both of those numbers. You will find in our BB Parts of Course Content area a link to jump to the list within the library's online catalog.

**WWW Site:** You are expected, as part of taking this course, to visit the course web site

<http://www.cs.rochester.edu/u/www/u/lane/=courses/=CSC486/>

frequently (i.e., wise would be to peek at it relatively often each day—indeed, it makes a very good homepage for your browser!). *Be careful to make sure your browser isn't caching and showing you an old version that you previously visited (browsers love to do that).* The web site will be a path that I will use to post reading assignments (and my quick description of what the topic of each past class was). The web site may also have other useful information.

Note that I usually don't send a BB announcement when I add Notes to that web page. (I assume either that you look at it often yourself (the Notes, if any, go up under the session-by-session blocks, in chronological order, and so it is easy to see what the most recently added Note(s) are), or that—since you are CS students and so know your way around computers way better than I do—you added to one of your browsers the existing extensions that notice/alert when the page is updated or, even better, that you use something like Follow That Page; do be careful though... after the first moment I save a changed version, it can take a minute or few for the page to stabilize, as I look at it and see if the update I merged into the main page came out ok after the merge-in and if not I quickly fix things. *I highly recommend using Follow That Page (at least if it still is a free service) to be automatically notified of all updates to our home page; it is at [followthatpage.com](http://followthatpage.com) and I am told it takes just about 90 seconds to get everything set up and running.*

**Blackboard Announcements:** Some day-to-day reminders/announcements (aside from those made verbally in class) may be transmitted using the Blackboard “Announcements” feature. You can see these announcements within Blackboard. By default, Blackboard will *not* send you these by email (except I can by hand-checking a special box each time override that and I try to remember to, but I make no promises about

always remembering; so...). But you can, by changing your settings in Blackboard, arrange for it to do so (although the UR Blackboard administrator warns you that that option is not necessarily reliable; and so you even if you have it turned on you should very frequently peek at the course's Announcements area within Blackboard). *You definitely should do so; I assume that you have, and that you thus are quickly getting all late-breaking updates!*

So, how do you turn on email notification of Announcements? Here is how, thanks to the UR Blackboard Administrator (disclaimer: I have not tested this to see if it works under the current Blackboard version):

In your main Blackboard screen, click on the caret or "V" near your name in the upper-right, then choose Settings, then choose Edit Notification Settings. *Fixing your general settings won't save you; the course ones override those in a bad way.* So under Edit Individual Course Settings, select this course, and then check the Email box at the top of the email column, *and then make sure to click on Submit.* (If you get a big red error screen when doing this, wait a few minutes and try again a few times; Blackboard is prone to such errors but they usually go away in a few minutes when one retries.)

**Fun with Numbers:** Although the course is both CSC286 and CSC486, depending on which you are registered under, I'll often just refer to it by one or the other of the numbers (or sometimes as CSC286/486 or CSC2/486). Be careful as, regarding the few things for which email can be used, the email address is csc486staff "at" cs.rochester.edu (note that it is "csc486staff" not "csc286staff").

**Various Other Good Stuff on the Course Web Site, Including Advice on Presenting a Paper:** Please note the "Useful Links" section on our course homepage, which contains many items. For example, that section contains a link to excellent guides by Parberry and Parberry-Spillman on how to present a paper; these should be big help in preparing your group presentations on the second part of the course (if we this year have group-based paper- or chapter-presenting).

**Caveat:** It is possible that, as has happened in some recent years, changes regarding the COVID/health situation will occur, and/or that new academic or health-related memos, rules, or guidelines will come, perhaps variously from UR's administration or the government. Those might require changes in some aspects of the course's logistics, processes, and structure, and if so, that would be conveyed through later revisions of this syllabus and/or be announced through a Blackboard announcement.