
COSC 290 Discrete Structures

Spring 2018

Time	Lecture MWF 8:20–9:10 am Lab A W 12:45–2:35 pm Lab B W 2:45–4:35 pm
Location	314 McGregory (lecture), 329 McGregory (lab)
Instructor	Prof. Michael Hay (303 McGregory, mhay@colgate.edu)
Office hours	M 2:00–3:00pm (<i>tentative; see course website</i>) Th 12:30–2:30pm

1 Course Description

This course introduces discrete computational structures, methods, and concepts utilized throughout computer science. Topics include types, relations, functions, equivalence and congruence relations, recursion, order relations, partially ordered sets, lattices, Boolean algebras, logic, semi-groups, monoids, morphisms, languages, graphs, trees, and finite state machines. Concrete and abstract data types, circuits, syntactic and semantic program structures provide standard motivating examples and applications. The required credit-bearing laboratory COSC 290L must be taken concurrently with COSC 290. Prerequisites: COSC 102.

2 Materials & Resources

Course schedule/website: <http://cs.colgate.edu/~mhay/cosc290/> (link is also available through Moodle)

Textbook (required): *Discrete Mathematics for Computer Science* by David Liben-Nowell, First Edition, September 2017. The book is available in the Colgate Bookstore and an eTextbook version is available online. A copy is also available on reserve in the Cooley Science Library.

Textbook (recommended): The lab work will be conducted in Java and make heavy use of object-oriented programming and data structures. It is recommended that you have available a textbook or some other resource that covers not only Java but also basic data structures (lists, maps, trees, hashtables, etc.). Your primary resources from COSC 102 should be sufficient.

Piazza (required): We will use Piazza for online discussion. It's accessible via Moodle.

Software (optional): The lab computers have all of the software needed for this course installed. These computers are available during lab and open lab hours in the evenings (schedule TBD). If you prefer to work on a different machine, you are responsible for installing the necessary software and figuring out how to adapt the assignment instructions to match the particulars of your computer setup. This includes some kind of text editor (e.g., Atom, <https://atom.io/>) and Java 8. Each assignment will include any additional software dependencies as well as instructions on how to get up and running.

3 Course & Lab Work

3.1 Course Work

Reading: Reading assignments for each lecture will be posted on the schedule. Please complete the reading *before* class.

Problem sets: The bulk of the out-of-class work for this course consists of problem sets. The problem sets will consist mostly of selected problems from the textbook.

Exams: There will be two in-class midterms (see schedule) and a final exam. All exams are closed book, closed notes, and collaboration is not permitted.

Participation in lecture: My goal is to make the classroom a fun and supportive learning environment. To achieve this goal, I need your help. Please come to class on time, mentally and physically ready to engage in the learning process (i.e., pay attention, ask questions, answer questions, give your best effort on in-class exercises, etc.).

Participation on piazza: You are expected to monitor piazza for course announcements and you are strongly encouraged to ask (and answer!) questions on Piazza.

Peer-led team-based learning (PLTL) workshops: The course tutors will host weekly sessions in which students are invited to collaboratively problem solve. Tutors lead, but do not provide answers. These sessions are voluntary but can earn extra credit (see Grading below). More details about the workshops will be given at the start of the semester.

3.2 Lab Work

Lab: Lab meets every week. Lab activities are intended to reinforce concepts from lecture and provide an opportunity to develop skills in programming and writing proofs. Some lab assignments may require additional work outside of the formal lab period.

Participation in lab: Since lab time will be used to work intensively on the lab assignments, it is important that you come prepared and attend every lab session. Please attend the lab section to which you are enrolled. Your participation grade will be determined by the following factors: on-time arrival, preparedness (completing relevant reading, reading the lab assignment closely, etc), productive use of lab time, appropriate and respectful behavior towards lab mates and support staff, on-time departure, etc.

4 Grading Guidelines

The course and the lab are graded separately.

4.1 Course Grade

The composition of your final grade for the course is as follows.

Activity	Portion of grade
Participation	5%
Problem sets (weighted average)	50% (see note 1)
Midterm 1	10%
Midterm 2	10%
Final	25% (see note 2)

[Note 1] Each problem set is expected take roughly one week to complete and contribute equally to the weighted average. However, depending on scheduling, some problem sets may end up being shorter/longer, in which case they will be weighted slightly less/more.

[Note 2] To pass the course, you must pass the final exam.

[Note 3] Participation in PLTL workshops is voluntary and does not count towards your grade. However, to incentivize participation, you can earn 1/10 point for each session and an additional point if you attend almost all sessions (you can miss up to two). Points earned will be added to your final grade.

4.2 Lab Grade

An outline of the composition of your final grade is as follows.

Activity	Portion of grade
Participation	15%
Weighted average of lab assignments	85%

Some lab assignments may require multiple lab sessions to complete. Thus, each lab assignment will be weighted proportional to the number of lab sessions devoted to it.

4.3 Grading Scale

Grading is on an absolute scale (*i.e.*, no curve). Final grades are determined as follows. As a general rule, fractions are rounded down (e.g., an 89.9 is a B+, not an A-). A grade of A+ is awarded when the student demonstrates truly exceptional performance and is not simply determined by having a high final course grade.

F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A	A+
< 60	60-62	63-66	67-69	70-72	73-76	77-79	80-82	83-86	87-89	90-92	≥ 93	*

5 Schedule & Topics

The course schedule is posted on the course website. It will be updated regularly. You are responsible for checking it after each class.

The course closely follows the textbook, focusing on the following concepts:

1. Basic data types: sets, vectors, matrices, functions (Ch. 2)
2. Propositional and predicate logic (Ch. 3)
3. Proof techniques (Ch. 4)
4. Induction (Ch. 5)
5. Analysis of Algorithms (Ch. 6) and Number Theory (Ch. 7). *These topics are covered in depth in COSC 302, so we may not spend much time on them in this course.*
6. Relations (Ch. 8)
7. Counting (Ch. 9)
8. Probability (Ch. 10)
9. Graphs and Trees (Ch. 11)

6 Policies

Attendance You are expected to regularly attend class, though formal attendance is not taken. Routine absence or late arrival can negatively impact your participation grade.

Sharing work (anonymously) At times throughout the semester, I may want to share your work with other students in the course and on occasion, share your work with the entire class. Any time student work is shared, it will be done anonymously and only short selections of student work will be shared at any one time (e.g., one proof or even just part of a proof). *If you are uncomfortable with me sharing your work anonymously, please let me know.*

Late assignment submissions A late submission is one that is not submitted before the deadline. Therefore, an assignment submitted one second after the deadline is considered late. Late submissions can earn partial credit. The default penalties for late assignments are as follows: If an assignment is submitted within the first 24 hours after the deadline can receive a maximum score of 90%; within 24-48 hours, a maximum score of 80%; and so on. There may be some assignments where the policy on late submission differs from the above; in those cases, the policy will be stated on the assignment.

Academic honesty You are expected to abide by Colgate's academic honor code: <http://www.colgate.edu/student-handbook2/academic-dishonesty-and-the-academic-honor-code>.

The guidelines for permissible collaboration and use of external resources are as follows:

- For exams and quizzes, you are not permitted to collaborate or use outside resources of any kind unless explicitly stated on the exam/quiz.
- Any artifacts (problem set answers, lab write up, code, etc.) that you submit must be *entirely your own work*. Copying from another student or resource, in whole or in part, is strictly forbidden.
- Appropriate citation of collaborators/external resources. If an assignment permits you to discuss high-level ideas with other students and you do so, you are expected to clearly acknowledge any collaboration (e.g., a brief note at the top of the submitted work saying something such as, "Talked over problem 5 with Joe Smith" would suffice). If you use any outside resources (beyond assigned readings, course notes, and other instructor-provided materials), you must provide appropriate citation. Again, a simple note indicating the resource and how it was used (e.g., "For problem 4, I used www.example.com, which describes an algorithm for [X]."). *Failing to acknowledge your collaborators or outside resources can be considered a violation of the honor code.*
- Group work. If an assignment permits you to work in groups, you may of course collaborate with your group mates. However, generally speaking collaboration between groups is forbidden.

Academic Support and Disabilities Services If you feel you may need an accommodation based on the impact of a disability, please contact Lynn Waldman, Director of Academic Support and Disability Services at 315-228-7375 in the Center for Learning, Teaching, and Research. <http://www.colgate.edu/cltr/academic-support-and-disability-services>

7 Student Resources

Open Labs The department organizes open lab hours (schedule TBA, but generally 7-10 most evenings) where you can use department labs to work *collaboratively* with your class mates and seek help from the available tutors (many of whom have taken this course).

One-on-one tutoring It is possible to arrange one-on-one tutoring support through CLTR. This is arranged on a per student basis. Please come see me if you are interested in exploring this option. You may also wish to visit the CLTR website: <http://www.colgate.edu/cltr>.

Borrowing computing equipment The department has a limited number of computers available for temporary loan. You *must* request and obtain permission before borrowing equipment – simply taking a laptop from the classroom is *not* permitted! If you are interested in borrowing a computer, contact me.

NASC Liaison Group NASC liaisons are a group of natural science and mathematics faculty members dedicated to providing science-interested students from underrepresented groups with mentorship, motivation, and individualized support as they navigate their paths in the sciences at Colgate. NASC liaisons do not replace the role of an academic advisor or offer formal academic advising. Rather a NASC liaison may meet one-on-one with a student to give another perspective on their academic plan; give tips on effective studying; or introduce a student to upper-class peers, alumni, or other faculty members that might be able to help them. The roles of NASC liaisons will depend on students' needs, and we encourage students to reach out for mentorship and moral support.

The NASC Liaison Group includes professors Gerry Gogel (Chemistry), Engda Hagos (Biology), Silvia Jiménez Bolaños (Mathematics), Patricia Jue (Chemistry), Spencer Kelly (Psychology & Neuroscience), Amy Leventer (Geology), Rebecca Metzler (Physics & Astronomy), Jason Meyers (Biology), and Elodie Fourquet / Joel Sommers (Computer Science). See the website for the most up-to-date information. (<http://www.colgate.edu/academics/departments-and-programs/division-of-natural-sciences-and-mathematics>)

Case Library/Informational Literacy and Reference: Use of the stellar library offerings, including the services of the outstanding reference and informational literacy librarians, is something to be made the most of during your time at Colgate. I suggest you get to know the librarians and to use their exceptional and imaginative expertise for assistance in ways that will enrich and enliven your intellectual studies and academic work.

Counseling Center: Dawn LaFrance, Director. <http://www.colgate.edu/offices/support/counseling>. Life at college can sometimes get bumpy; if you are experiencing emotional and personal difficulties (related to college or not), the Counseling Center offers completely confidential and highly professional services, both for individuals and groups.

ITS: IT Service Desk. Support and expertise related to computer and technology questions and problems, such as Moodle, email, Internet and public access computers on campus. Phone: (228-7111) Location: Third Floor of Case Geyer Library <http://www.colgate.edu/offices-and-services/information-technology>