



General Course Information

Course Number	CS 2100
Course Name	Discrete Structures
Credit Hours	3
Component	Lecture
Designation	Core course for computer science and data science programs
Contact Hours	15 weeks (not including Spring Break): two 80-minute lecture per week (not including Martin Luther King Jr. Day and Presidents Day holidays)
Semester	Spring 2023

**Pre-requisites** 'C-' or better in (CS 1410 OR CS 1420 OR AP CS-A score of 5) AND (MATH 1210 OR MATH 1220 OR MATH 1250 OR MATH 1310 OR MATH 1311 OR AP Calc AB score of 4+ OR AP Calc BC score of 3+ OR Higher Math)

*Students who do not meet these prerequisites are to be removed from CS 2100 in the first week of class.*

**Class Meeting Time** MoWe / 08:05AM - 09:25AM (MDT) led by Prof. Elhabian

*Students should come to class prepared and expect to practice solving problems individually and in small groups.*

**Meeting Place** In-person – [WEB L104](#)

**Discussion Sections** Fridays at various times and locations (students should check their class schedule), led by Teaching Assistants (TAs).

*Students should come to discussions prepared with questions about the recently-covered material and expect more problem-solving practice.*

**Course Website** Canvas

**Textbook** *Discrete Mathematics* by Ensley and Crawley (2006, ISBN: 0471476021) **(required)**

**Final Exam** Monday, May 1, 2023 8:00 – 10:00 am MDT @ [WEB L104](#)

#### Instructor

**Name** Prof. Shireen Elhabian ([WEB 3608](#))

**Email** [u0877336@gcloud.utah.edu](mailto:u0877336@gcloud.utah.edu)

**Home Page** <http://www.sci.utah.edu/~shireen>

**Office Hours** MoWe / 9:30 AM – 10:30 AM (MDT) @ [WEB 3608](#)

#### Teaching Assistants

**Office Hours** Check [How to get help in CS 2100](#) for details

Name	Email
Bryn Ballard	<a href="mailto:u0757868@utah.edu">u0757868@utah.edu</a>
Shad Boswell	<a href="mailto:u1057240@utah.edu">u1057240@utah.edu</a>
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Michael Kamerath	<a href="mailto:u0773130@utah.edu">u0773130@utah.edu</a>
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University Calendar <https://registrar.utah.edu/academic-calendars/spring2023.php>

**IMPORTANT NOTE:** Due to COVID-19, all dates and policies in the CS 2100 syllabus and Canvas course are subject to change. Any changes will be announced within a reasonable timeframe during lectures and/or posted on Canvas under the Announcements page.

### Course Description

CS 2100 introduces discrete mathematics and structures at the foundation of computer science and teaches logical thinking about discrete objects and abstract things. It covers logic, set theory, functions, relations, graph theory, combinatorics, probability, and proofs.

*This class is fast-paced and relies on students spending considerable time reading, watching videos, studying, and solving problems outside class.*

### Learning Objectives

This course aims to give the students a fundamental understanding of propositional logic, predicate logic, formal logical arguments, finite sets, functions, relations, graphs, counting problems, probability, mathematical proofs, and their applications to Computer Science.

Upon completion of CS 2100, students are able to:

1. use symbolic logic to model real-world situations by converting informal language statements to propositional and predicate logic expressions, as well as apply

formal methods to propositions and predicates (such as computing normal forms and calculating validity)

2. analyze problems to determine underlying recurrence relations, as well as solve such relations by rephrasing as closed formulas
3. assign practical examples to the appropriate set, function, or relation model, while employing the associated terminology and operations
4. map real-world applications to appropriate counting formalisms, including permutations and combinations of sets, as well as exercise the rules of combinatorics (such as sums, products, and inclusion-exclusion)
5. calculate probabilities of independent and dependent events, in addition to expectations of random variables
6. illustrate by example the basic terminology of graph theory, as well as properties and special cases (such as Eulerian graphs, spanning trees, isomorphism, and planarity)
7. employ formal proof techniques (such as direct proof, proof by contradiction, induction, and the pigeonhole principle) to construct sound arguments about properties of numbers, sets, functions, relations, and graphs

Students can expect to achieve these outcomes only if they:

- read assigned reading material from the textbook and watch the designated videos before class;
- attend class meetings and discussion sections;
- come to class and discussion sections prepared to practice solving problems individually and in small groups;
- and complete pre-class Canvas quizzes, homeworks, and tests/exams in good faith and on time.

Note: students may vary in their competency level on these outcomes.

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## Learning Environment

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**Safe and respectful learning environment:** In this class, derogatory comments based on race, ethnicity, class, gender identity, sexual orientation, religion, (dis)ability status, age, citizenship, or nationality will not be tolerated, nor is it permissible to state one's opinion in a manner that silences the voices of others. Further, egregious disrespect, including, but not limited to, racism, sexism, ageism, homophobia, transphobia, classism, etc. will not be tolerated. We take incidents of discrimination, bias, and harassment seriously. We will file reports with the [Office of Equal Opportunity, Affirmative Action, and Title IX](#)

[\(OEO\)](#) about such incidents. If a student is unsure what differentiates free speech and professional behavior from discrimination, bias, and harassment, we are happy to have an open, judgement-free, and confidential conversation with the student, or refer them to the OEO.

**Equitable, diverse, and inclusive environment:** It is our intent that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that the students bring to this class be viewed as a resource, strength and benefit. It is our intent to present materials and activities that are respectful of diversity: gender identity, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, and culture. We also expect students to treat others in the class, including the teaching staff, with the same level of respect. Students are encouraged to reach out to us if they would like to make us aware of ways that the classroom environment or teaching materials could be improved to create a more equitable, diverse, and inclusive learning environment.

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## Course Materials

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**Website:** The CS 2100 Canvas course is always under development, with updates to the class schedule, course notes, homework instructions, and more, occurring regularly. It is critical that students become familiar with the Canvas course right away and plan to visit it several times a week, at a minimum.

**Textbook:** Regular reading and homework problems are assigned from *Discrete Mathematics: Mathematical Reasoning and Proof with Puzzles, Patterns, and Games* by Ensley and Crawley (2006, ISBN: 0471476021). Students are encouraged to purchase used copies or rent the textbook.

**Course notes:** The instructor often uses slides, written notes, sample problems, and other materials during class. These items are posted to Canvas following the class meeting. Discussion slides are provided on Canvas but not solutions/scribble.

**Personal computers:** Students may use their own computers for completing homework assignments (typing problem solutions and taking Canvas quizzes); however, broken tools or computers or network connectivity issues are not a sufficient basis for a deadline extension. Plan ahead and use a lab computer if your own is not working.

**Recordings:** Due to the interactive nature of class meetings and discussion sections, they are not recorded. Students who miss class are encouraged to thoroughly study the

materials provided for pre-class prep (reading and videos), solve the practice problems (posted after each meeting/session) on their own or with classmates and ask questions during instructor office hours or TA help hours.

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## Communication

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Please review the communication methods and requirements for this course.

**Class website:** The class website is on Canvas at <https://utah.instructure.com>. A key responsibility for a student in this course is to use the online Canvas class website. Students must check their email and Canvas regularly for the updated syllabus, course materials, announcements, corrections, and grades until final grades are posted.

**Email linked to Canvas:** The teaching staff will use the email addresses connected to the Canvas site to reach out to students when necessary. Students are expected to check their email and the class website regularly.

**Which email to use:** Students are required to use their University Umail for all communications with the teaching staff (instructor and TAs).

**Piazza:** We will use Piazza for class discussion, including technical questions, clarifications, and announcements. The system is highly catered to getting the students help fast and efficiently from classmates, TAs, and the instructor. Rather than emailing questions to the teaching staff, students are expected to post their questions on Piazza. Students should sign up right away and set notifications appropriately.

**Timeframe for response:** Students should allow two business days for the teaching staff to reply to their questions. The teaching staff will aim to address questions posted on Piazza promptly during regular weekday work hours (roughly 9 am to 5 pm, Monday-Friday); questions posted in the evenings or during weekends will typically be addressed during regular work hours the following day or week, respectively. While we might occasionally respond even in the evenings or weekends, do not count on that.

**Online etiquette:** Students and the teaching staff (instructors and TAs) are expected to create a respectful online learning environment. All online interactions (including but not limited to emails, Piazza, Canvas, and Zoom) are expected to follow common rules for good online etiquette:

- Be respectful and professional.
- Be aware of strong language, all caps, and exclamation points.
- Be careful with humor and sarcasm.

- Do not post or share (even privately) inappropriate material.

Disrespectful or inappropriate online communications will be deleted from online platforms (e.g., Piazza and Canvas). Severe cases may be referred to the appropriate committee or office within the University for possible disciplinary actions.

**Announcements:** Important announcements to the class will be made through the "Announcements" tab on the class canvas; there is otherwise no class mailing list. Students are responsible for monitoring announcements sent via Umail or Canvas.

**Check Canvas and Piazza regularly:** The instructor and TAs will communicate with students through Canvas and Piazza. If a student does not receive emails sent to them through Canvas or fails to see an announcement, that is on the student and is not grounds for an extension or regrade.

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## Class Format

**Flipped classroom:** This course is taught as a "flipped classroom". The student's main at-home activity will be preparing for class by reading the textbook, watching video lectures, and completing pre-class quizzes. Class time will be reserved for practicing problems solo and in small groups. Compared to a traditional class (where lectures happen in class and practice happens at home), this format helps the student see more practice problems and get faster feedback on their solutions (which is good) but relies much more heavily on the student to study the materials by reading the textbook and watching designated videos. In other words, students will learn more if they come to class prepared; however, if students don't prepare, they will learn much less, and they may have difficulty passing the class. See [How to succeed in CS 2100](#) for tips.

**Preparing for the class:** To help students prepare for each class, the teaching staff will post textbook readings and video recordings, and practice problems each week. We recommend watching the video lectures first, then reading the textbook, and then doing some of the practice problems; all are expected to be done before each class. We recommend setting a 3-minute timer before each problem to make sure the student gives it a solid attempt. We will also post online pre-class quizzes (via Canvas) to help students recall the material and give them early feedback if they need more preparation for class.

**In class:** Bring a notebook and a pencil to class. These will be useful as scrap paper for working on in-class problems, plus students can use them to take notes. In class, students will be asked to solve problems and then discuss their solutions with neighboring

students and/or a TA. The point of the discussion aspect is to make the student's reasoning explicit and reinforce not only getting the right answer but also using the right solution.

**Class participation:** The instructor will do two or more class polls during each lecture to assess students' understanding. Students are required to sign up for [Poll Everywhere](#) for free using their Umail. Students can respond to the polls using their phone, computer, or tablet/iPad. This class activity will further promote students' active learning in class.

**Discussion sections:** Discussion sections are held at various times on Fridays and are led by TAs. They are a good time to ask questions about the content, practice more problems, and get help if the student needs to catch up. We strongly recommend students attend their discussion section. Students should come to discussions prepared with questions about the recently-covered material and expect more problem-solving practice. Discussion slides are provided on Canvas but not solutions/scribble. Students are encouraged to use Piazza or TA during office hours if they need additional help with problems discussed during the discussion sections.

**Getting help:** If you need additional help, please use Piazza to ask additional questions. The teaching staff or other students can help answer questions. Use of the Canvas Inbox or email is discouraged for CS 2100 questions. The teaching staff will also hold regular office hours, including remote office hours if the student is isolated or unable to attend in person. The teaching staff will be doing their very best to help students with learning and practicing the course material, but they are human too and probably won't be very available during nights or on weekends.

For this reason, we **strongly recommend that students start their homework early** (as soon as it is released) so that students can seek help at a time when help is available. See [How to get help in CS 2100](#) for more details. See also the resources provided by the [University Student Success Advocates](#).

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## Attendance

Attendance in lectures is strongly recommended for learning problem-solving skills through practicing problems individually and in small groups.

**Policy on the use of technology in class:** Class time is used for problem-solving and practice. Students are expected to engage with the instructor and classmates during lectures. Laptops, iPads, Tablets, and mobile devices are only permitted for note-taking



and in-class participation (responding to class polls); however, research has shown that handwritten notetaking is more beneficial to students than typed note-taking [\*]. Similarly, all CS 2100 tests and the final exam require students to handwrite solutions on paper, making handwritten note-taking a good practice. See [How to take good notes](#) for tips. Furthermore, technology tempts students to multitask during class meetings, the success of which is wishful thinking for students who must focus on learning new and complex material. For these reasons, students are discouraged from using laptops, iPads, Tablets, and mobile devices during class. Laptops and mobile devices should be used during class only when instructed, and the use is limited strictly to in-class activities.

[\*] Mueller, P. A. & Oppenheimer, D. M. (2014). The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological Science*, 25(6), 1159-1168. doi:10.1177/0956797614524581.

## Student Course Feedback

The student course feedback survey is important to the school for several reasons. First, it is used to measure the program's success, and the quality of the teaching students receive. The school takes the evaluations seriously, and students can have a direct impact on what they say. All responses are confidential and anonymous and will be made available to the instructor after the final grades posting.

This survey is also important to the instructor. The instructor strives to offer the best class and always looks for ways to improve her teaching. Students' honest and constructive feedback is important to help the instructor improve her teaching strategy and understand students' perceptions and experiences.

The instructor will implement the strategy below to encourage students to provide feedback.

- The instructor will give students in-class time to complete the course evaluation. The instructor will leave the classroom to make students more comfortable, and the TAs will stay to answer questions.
- If the response rate exceeds 80% of the class, everyone in the class gets 0.5 points of total 100 points as extra credit.
- The instructor will also administer mid-semester anonymous survey(s) to understand better students learning experience, where students are encouraged to mention what they like about the course and what they would like to see improved. Constructive comments and suggestions are very welcomed.

## Evaluation

Students are expected to make a good effort on all homeworks, tests, in-class discussions, and quizzes based on careful reading and watching the assigned material. The following criteria will evaluate student performance in this course:

**Midterm tests and final exam:** All tests and exams are paper-based and administered in person. Three tests are to be given during the class meetings on the following dates:

- Test #1: Logic, sets, functions, and relations on **Wed Feb 8, 2023**
- Test #2: graphs and combinatorics on **Wed Mar 29, 2023**
- Test #3: probability, proofs, and induction on **Mon Apr 24, 2023**

As an accommodation for any travel, illness, or quarantine, the two highest test scores for each student are used to compute their final course grade. Therefore, students who cannot be in attendance for one of the test dates above should plan to use their "drop" score accordingly. Students who cannot be in attendance for more than one of the test dates above should plan to take CS 2100 in a future semester. No make-up exams are available.

The final exam is cumulative and scheduled for **Monday, May 1, 2023, 8:00 – 10:00 am MDT**. This date and time are set by the University and are not negotiable.

Each student must bring their UCard to every test and final exam, and they may be asked to show their UCard when turning in the test/exam. No other type of identification may be used for this purpose.

### General rules for tests and final exam:

- During the exam, no other materials/devices are permitted *except for an 8.5x11" letter-sized cheatsheet (double-sided, handwritten, type-set, or print, with any texts not smaller than 8 points font size)*. The cheatsheet is not mandatory. If a student uses one, it must be submitted together with their test/exam.
- The exam is to be done independently. Submitting as one's own, work that is copied from another student or an outside source is considered academic misconduct. *The sanction for academic misconduct in CS 2100 is to fail the course.*
- Students with ADA accommodations are allowed extra time based on a *prior agreement with the instructor.*

**Pre-class Canvas quizzes:** To ensure students prepare adequately before each class meeting by reading the textbook and watching designated videos, Canvas quizzes are assigned regularly. See the advice on [How to prepare for class meetings](#). The two lowest Canvas quiz scores are dropped for each student as an accommodation for any travel, illness, quarantine, or any other reason. No extensions will be granted for pre-class quizzes as they are auto-graded.

**Homeworks:** Homework is posted to Canvas and submitted through Gradescope. The instructions and deadline for each homework are posted to Canvas. Students can resubmit as many times as they wish until that deadline as measured by Gradescope, which may not be the same as the student's clock. No submissions afterward will be accepted. The lowest homework score is dropped for each student as an accommodation for forgetfulness, illness, or any other reason.

Students are advised to **start working on the homework early and give themselves plenty of time to think about the material**, planning to work on the assigned problems a little each day and asking questions when they get stuck. Homework must be submitted independently. It is acceptable for students to discuss how to solve problems with classmates, but copying solutions is considered academic misconduct — see the Academic Misconduct section below.

It is the student's responsibility to ensure the successful and timely submission of each assignment via Gradescope — start early and follow the instructions carefully. Neither computer or Gradescope issues nor corrupted or missing files are grounds for deadline extensions or resubmissions; therefore, students are advised to submit at least one hour before the deadline (even if the submission is incomplete), as well as double-check their submissions.

**Class participation:** Class discussions and students' engagement during the lectures are key components to realizing the learning objectives for this class. In-class activities will include in-class polls and solving practice problems solo or in small groups. More than half of the class's TAs will attend lectures to interact with and help students solve practice problems in class. Students can share their solution by participating on the class board, and/or discussing their solution in class with a TA. The class participation in four lectures will be dropped to accommodate for illness or any other reason.

**X-in-Practice homeworks (for extra credit):** To help students relate abstract mathematical concepts to real-world CS-related problems, the teaching staff will design lightweight homework problems that entail algorithmic thinking and programming. Students are free

to use their preferred programming language, and they are encouraged to document their code fully.

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## Class Schedule

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**Topics:** Seven modules are planned for study in CS 2100: logic; sets, functions, and relations; graph theory; combinatorics; probability; proofs; and mathematical induction. The coverage of topics by class meetings and other activities is given via the schedule in the [Canvas Modules](#) and outlined in the following table.

**Lectures:** The lectures will cover practice problems on seven modules based on the following schedule. This schedule may vary during the semester to accommodate progress. Individual modules can be covered in two or more lectures. The instructor will use slides to teach students how to think about different problems and help them develop their problem-solving skills. Materials shown in class will be posted on Canvas. Students are expected to participate in lectures by thinking about the material, asking questions, and offering answers to the instructor's questions.

**Homeworks:** Each module will have its own homework that will be released on Canvas on the day of the first lecture covering the module. The homework will be due the first Friday after the module's material is covered. Links to homeworks and other materials will be added on Canvas during the semester.

**Intro survey:** On the first day of class, students will be asked to fill out an intro survey as the zeroth homework and will be due on Wednesday, January 11<sup>th</sup>. This survey will help the instructor get to know the students, their backgrounds, and their interests. The survey will take at most 10 minutes to fill out.

Week #	Lecture/ Discussion /Test #	Date	Topic	Reading Material (Ensley & Crawley)	Homework Release & Due	Practice test release	Review session	Grades Due (for TAs)	Regrades due (for students)	
<b>Module #1: Logic</b>										
1	L1	Mon Jan 9, 2023	Intro to CS 2100 Propositional logic	1.3	Homework #0 Release (Intro Survey)  Homework #1 Release					
	L2	Wed Jan 11, 2023	Predicates & implications	1.4, 1.5	Homework #0 Due					
	D1	Fri Jan 13, 2023	Practice problems on logic, predicates, and implications	1.3 - 1.5	Homework #1 Due					
		Mon Jan 16, 2023	Martin Luther King Jr. Day holiday							
<b>Module #2: Sets, functions, and relations</b>										
2	L3	Wed Jan 18, 2023	Set theory	3.1, 3.2	Homework #2 Release					
	D2	Fri Jan 20, 2023	Practice problems on sets	3.1, 3.2				Homework #1 grades		
3	L4	Mon Jan 23, 2023	Introduction to functions and relations	4.1, 4.2						
	L5	Wed Jan 25, 2023	Properties of functions and relations	4.3, 4.4						
	D3	Fri Jan 27, 2023	Practice problems on functions, and relations	4.1 - 4.4	Homework #2 Due				Homework #1 regrades due	
4	L6	Mon Jan 30, 2023	<i>Slack lecture</i>			Practice test #1 release				
	<b>Module #3: Graph theory</b>									
	L7	Wed Feb 1, 2023	Introduction to graphs	7.1	Homework #3 Release					
	D4	Fri Feb 3, 2023	Practice problems on graphs + others (based on slack lecture)	7.1			Review session for test #1	Homework #2 grades due		
5	L8	Mon Feb 6, 2023	Graph algorithms and spanning trees	7.2						
	T1	Wed Feb 8, 2023	<b>Test #1: Logic, sets, functions, and relations</b>	<b>1.3 - 1.5, 3.1, 3.2, 4.1 - 4.4</b>						
	D5	Fri Feb 10, 2023	Practice problems on graph algorithms and spanning trees	7.2					Homework #2 regrades due	
6	L9	Mon Feb 13, 2023	Isomorphic and planar graphs	7.3						
	L10	Wed Feb 15, 2023	Connecting graphs to matrices and relations	7.4						
	D6	Fri Feb 17, 2023	Practice problems on graphs and matrices	7.3, 7.4	Homework #3 Due			Test #1 grades due		
		Mon Feb 20, 2023	Presidents Day holiday							
<b>Module #4: Combinatorics</b>										
7	L11	Wed Feb 22, 2023	Introduction to combinatorics Basic rules for counting - Part 1	5.1, 5.2	Homework #4 Release					
	D7	Fri Feb 24, 2023	Practice problems on combinatorics and counting	5.1, 5.2				Homework #3 grades due	Test #1 regrades due	
8	L12	Mon Feb 27, 2023	Basic rules for counting - Part 2	5.2						
	L13	Wed Mar 1, 2023	Basic rules for counting - Part 3	5.2, 3.2						
	D8	Fri Mar 3, 2023	Practice problems on counting	5.2, 3.2					Homework #3 regrades due	
		Mon Mar 6, 2023	Spring break							
	Wed Mar 8, 2023									
	Fri Mar 10, 2023									
9	L14	Mon Mar 13, 2023	Combination and the binomial theorem  Binary sequences	5.3  5.4						
	L15	Wed Mar 15, 2023	<i>Slack lecture</i>							
	D9	Fri Mar 17, 2023	Practice problems on combination, binomial theorem, and binary sequences	5.3, 5.4	Homework #4 Due					

Module #5: Probability									
10	L16	Mon Mar 20, 2023	Introduction to probability	6.1, 6.2	Homework #5 Release	Practice test #2 release			
	L17	Wed Mar 22, 2023	Bernoulli trials, expected value	6.2 - 6.4					
	D10	Fri Mar 24, 2023	Practice problems on probability	6.1 - 6.4	Homework #5 Due		Review session for test #2	Homework #4 grades due	
Module #6: Proofs									
11	L18	Mon Mar 27, 2023	Introduction to proofs Proofs of implications	2.1, 2.2	Homework #6 Release				
	T2	Wed Mar 29, 2023	<b>Test #2: graphs and combinatorics</b>	<b>7.1 - 7.4, 5.1 - 5.4, 3.2</b>					
	D11	Fri Mar 31, 2023	Practice problems on proofs	2.1, 2.2				Homework #5 grades due	Homework #4 regrades due
12	L19	Mon Apr 3, 2023	Proof by definition	3.3, 4.3, 4.4					
	L20	Wed Apr 5, 2023	Proof by contradiction and the pigeonhole principle	2.5					
	D12	Fri Apr 7, 2023	Practice problems on proofs	2.5, 3.3, 4.3, 4.4	Homework #6 Due			Test #2 grades due	Homework #5 regrades due
Module #7: Mathematical Induction									
13	L21	Mon Apr 10, 2023	Number sequences Proof by induction - Part 1	1.2, 2.3	Homework #7 Release				
	L22	Wed Apr 12, 2023	Proof by induction - Part 2	2.3, 2.4					
	D13	Fri Apr 14, 2023	Practice problems on number sequences and proofs by induction	1.2, 2.3, 2.4				Homework #6 grades due	Test #2 regrades due
14	L23	Mon Apr 17, 2023	Proof by induction - Part 3	2.3, 2.4		Practice test #3 release			
	L24	Wed Apr 19, 2023	<i>Slack lecture</i>						
	D14	Fri Apr 21, 2023	Practice problems on proof by induction	2.3, 2.4	Homework #7 Due		Review session for test #3		Homework #6 regrades due
15	T3	Mon Apr 24, 2023	<b>Test #3: probability, proofs, and induction</b>	<b>6.1 - 6.4, 2.1 - 2.5, 3.3, 4.3, 4.4</b>					
		Fri Apr 28, 2023						Homework #7 grades due. Test #3 grades due	
	Final	Mon May 1st, 2023	Final Exam, 8am – 10am MDT	ALL					
		Fri May 5, 2023							Homework #7 regrades due. Test #3 regrades due

## Submitting Homeworks

There are seven homework assignments. One homework assignment with the lowest score will be dropped. The homework assignments constitute 10% of the final course grades. Each remaining 6 homework assignment contributes the same number of points towards the final course grade, i.e., homeworks are equally weighted regardless of the number of questions in each homework.

We strongly recommend students complete the textbook problems as **most of the problems are covered in class or discussions**. This way students can finish the homework in bite-sized pieces. If students wait until the deadline, the homework can suddenly seem overwhelming.

**Grading:** For each homework assignment, each individual question is graded according to the following four-tier scale:

- 3/3 points: **Correct**. The submission is correct.
- 2/3 points: **Partial Correct**. The submission shows reasonable effort, and it is mostly correct.
- 1/3 points: **Incorrect**. The submission shows reasonable effort; however, it needs to be corrected.
- 0/3 points: **No Submission/Unreadable/Trivial**. There is no submission, or it is unreadable, or the answers provided need to show reasonable efforts (a.k.a. trivial).

**Options for writing solutions:** To work on the homework, there are a few options:

- Students must submit their solutions in a PDF file.
- Students can submit hand-written solutions (scanned in PDF), as long as they are neat, organized, and readable (written using a black pen). Students should check:
  - o the scan has a high enough contrast to be easily read;
  - o the scan has a high enough resolution to be easily read;
  - o the handwriting is large enough to be easily read;
  - o the handwriting is neatly written; and
  - o the scanned file is a manageable size, so we don't spend forever downloading it.
- Only solutions that are readable/illegible will receive points.
- Alternatively, Students can use the provided WORD template or the LATEX template to add their solutions, then submit a converted/compiled PDF.
- Students can also download the provided PDF and use Adobe or Preview (or similar tools) to edit their solutions directly on the PDF file.
- Please only put one problem on each page. If more space is needed for a problem, use a blank piece of paper or a blank digital page.
- Please only use a single page for one problem.

**LaTex (optional):** If students would like to use LaTeX (which is not required) to write their solution, here is a [quick guide](#). The easiest tool to use is [Overleaf](#), an online LaTeX editor.

**Submissions via Grapescope:** All homeworks must be submitted through Grapescope. Do not submit assignments via email. The following is enforced for each homework submission:

- Each homework should contain at least two pages.

- The page number containing the answer to each homework question should be specified during submission (via Gradescope). Students **must** do this "matching" process for us to be able to grade their assignments.
- If the submission contains only 1 page; that is, if no pages are specified for each answer, then 20% is deducted from the homework score.

Students must ensure that their submission is properly indexed with the correct page numbers for each question. This can be made easier if students do not have answers that overflow onto the next page.

**Submission deadline:** The submission deadline is midnight at 11:59 pm MDT. Occasionally, students try to submit their work close to the deadline and can't, whether because of a bad Internet connection or their machine freezing or different clocks or something else. Don't let this happen to you: **submit early**.

**Getting help with Gradescope:** For students who have not used Gradescope prior to this course, here is a [video tutorial outlining the submission process](#). There is a [PDF guide](#) as well.

**Getting help with homework:** Students should use Piazza and/or TA office hours if they have any questions.

**Regrading policy:** Students who wish to appeal a score on a homework assignment or a quiz must do so **within one week** of receiving the score via Gradescope. Students are required to provide concert reasons why they disagree with the grade. Regrading is expected to result in either no change in grade or a change in grade (more or fewer points) if there was a grading mistake. The teaching staff has the right to regrade the entire homework and change the grade if they feel the student was erroneously awarded too many or too few points on other problems.

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## Late Work

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**Homeworks:** All homework assignments are due on Friday at 11:59 p.m. Every student gets automatic 2-day extension on homework assignments. Students do not need to contact the teaching staff for extensions. Since homework assignments already come with an automatic 2-day extension, additional extensions will not be arranged for any reason other than a documented medical emergency or a family emergency (see Documented Emergency below). They are evaluated on a case-by-case basis.



**Tests and quizzes:** No extensions are available on tests or pre-class quizzes.

**Final exam:** The final exam time is set by the university and cannot be changed for any reason.

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## Documented Emergency

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The instructor understands that certain factors may occasionally interfere with your ability to participate or to hand in work on time. If that factor is an extenuating circumstance such as a medical or family emergency, the instructor will ask the student to provide documentation directly issued by the University, and she will try to work out an agreeable solution with the student. Emergencies are evaluated on a case-by-case basis.

A documented medical emergency is defined as a **verifiable document from a doctor's office** or a proof of **positive COVID-19 testing result** (within a reasonable timeframe). Getting a COVID-19 test by itself is not a medical emergency. A documentation does not automatically guarantee approval.

Documented emergency other than medical or family emergencies will be dealt with on a case-by-case bases. Please email the instructor with documented proof of the emergency. Such a document does not automatically guarantee approval.

If a student needs to seek an ADA accommodation to request an exception due to a disability, they should contact the Center for Disability and Access (CDA). CDA will work with the instructor to determine what, if any, ADA accommodations are reasonable and appropriate.

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## Grading

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**The default option for grading will be as follows:**

- Final exam: 20%
- Tests: 50%
- Pre-class quizzes: 10%
- Homeworks: 10%
- Class participation: 10%

**The growth-mindset option for grading will be as follows:**

- Final exam: 35%
- Tests: 35%

- Pre-class quizzes: 10%
- Homeworks: 10%
- Class participation: 10%

**Extra credit:**

- All students receive 0.5 points as extra credit if the student course feedback response rate reaches 80% of the class.
- Students can receive up to 1.5 points as extra credit for solving the X-in-Practice homeworks.

**Benefits and conditions of exercising the growth-mindset option:** Occasionally, CS 2100 students perform poorly on early tests and withdraw from the course (officially or unofficially), assuming they have no chance of earning a passing grade (C- or better) for the semester. The CS 2100 material is naturally cumulative — Module 2 reinforces the Module 1 concepts, Module 3 reinforces concepts from the previous two modules, and so on. Furthermore, many students who struggle early on in the course improve significantly for the final exam, given the additional practicing concepts in later modules. To encourage a growth mindset among students, a second option for calculating the final course grade is available. The student's final course grade is the highest of the default and growth-mindset options.

Please note the following:

- Canvas is configured to use the default grade calculation. For any student with a higher course grade using the growth-mindset calculation, the grade is entered manually at the end of the semester.
- If the University transitions to requiring final exams be administered remotely (i.e., not in person), the default calculation is to be used for all students.

For more information on adopting a growth mindset, see [the resources provided by the University Student Success Advocates](#) (expand the Mindset section).

**Regrades.** Students desiring to appeal a score on a homework or test must do so via Gradescope no later than one week after the score is published. Later regrade requests will not be considered. Regrading request for the final exam should be submitted no later than 3 days after the score is published. Students are required to provide concert reasons why they disagree with the grade. Regrading is expected to result in either no change in grade or a change in grade (more or fewer points) if there was a grading mistake. The teaching staff has the right to regrade the entire test/exam/homework and

change the grade if they feel the student was erroneously awarded too many or too few points on other problems.

**Grades posting:** Homework grades will be posted on Canvas within 1 week after the homework due date. Pre-class quiz grades will be posted the same day as they are auto-graded. The final course grade will be posted on Canvas before the grades' due date by at least 3 business days.

**Conduct violations:** Students who are found to have violated the conduct of this class, as stated in the "Academic Misconduct" section, will be given a failing grade.

**Letter grades:** This class uses the standard university grading scale, shown below. Grades will not be rounded in any way.

Letter	Scoring
A	100% - 94%
A-	93.9% - 90%
B+	89.9%–87%
B	86.9%–84%
B-	83.9% - 80%
C+	79.9%–77%
C	76.9%–74%
C-	73.9% - 70%
D+	69.9%–67%
D	66.9%–64%
D-	63.9% - 60%
E	59.9%–0%

### Changes to the Syllabus

**This syllabus is not a contract.** This syllabus is meant to serve as an outline and guide for the course. Please note that the instructor may modify it at any time as long as reasonable notice of the modification is provided to students. The instructor may also modify the General Course Outline at any time to accommodate the needs of our class. Any changes will be announced during lectures and/or posted on Canvas under

Announcements. Should you have any questions or concerns about the syllabus, it is your responsibility to contact the instructor for clarification.

**You will be notified of any changes to the Syllabus.**

### COVID-19 Policy and Campus Guidelines

COVID-19 Vaccination, indoor masking in times of high transmission, and frequent COVID testing are strongly encouraged. Please visit the [Syllabus page](#) on the Canvas class website under "University Policies" for the latest COVID-19 Campus Guidelines. Also, visit [coronavirus.utah.edu](https://coronavirus.utah.edu) for the most up-to-date university policies.

**Positive COVID-19 Tests:** Any student who tests positive for COVID-19 must self-report via [coronavirus.utah.edu](https://coronavirus.utah.edu).

**Exposure:** According to the University policy, please self-report exposure and wear masks. [Login - University of Utah IT Portal](https://portal.uofu.edu/service-now.com)

**Latest recommendation on COVID quarantine:** "People with COVID-19 should isolate for 5 days and if they are asymptomatic or their symptoms are resolving (without fever for 24 hours), follow that by 5 days of wearing a mask when around others to minimize the risk of infecting people they encounter."

**Vaccinations:** We *strongly advise* that students get vaccinated, including all doses. The mRNA vaccines (Pfizer and Moderna) are unusually safe and effective, even compared to other vaccines. If a student has not been vaccinated, they can walk in to most pharmacies (like Walmart, Costco, Smith's, Harmon's, Walgreens, or CVS), or schedule a shot at U Health (the Pharmacy near 1300 E, the Madsen clinic, or the Hospital). The vaccine is totally free, whether or not the student has insurance.

**Absences:** If a student is sick, whether with Covid, with vaccine side-effects, a cold, or anything else, please do not come to class. This applies if the student has a positive Covid test, but also if they are just feeling ill. Besides cases of illness and other emergencies, though, attendance is expected; the class will not be recorded, and accommodations for absences will not be routinely made.

**If you are sick:** Do not come to class. Do still watch the videos / read the textbook sections assigned, and still complete the pre-class quizzes. After class, go through the posted slides and attempt to solve each practice problem before looking at the solution. We recommend setting a 3-minute timer before each problem to make sure you give it

a solid attempt. Do not come to the discussion section either; those slides with solutions will be posted too. If you need additional help, attend a Zoom office hour or ask for help over Piazza. If you find yourself sick enough that you cannot work, remember that one homework, one test, and two quizzes are dropped from your grade.

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### Student Mental Health Resources

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Rates of burnout, anxiety, depression, isolation, and loneliness have noticeably increased during the pandemic. If you need help, reach out for [campus mental health resources](#), including counseling, training, and other support. Be on the lookout for your classmates as well. If you see someone struggling, ask how you can help, and if appropriate remind them that these resources exist.

Consider participating in a [Mental Health First Aid](#) or other [wellness-themed training](#) provided by our Center for Student Wellness and sharing these opportunities with your peers, teaching assistants, and department colleagues.

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### ADA Statement

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The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability & Access, 162 Olpin Union Building, 801-581-5020. CDA will work with you and the instructor to make arrangements for accommodations, such as alternative formats for all materials. Please request via the CDA, because the course instructors are not equipped to assess your individual needs.

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### Academic Misconduct

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The purpose of the homeworks is to improve the student's skills at solving problems and demonstrating that they understand the class material. Collaboration with other class members is acceptable in understanding problems and class material, i.e., students can discuss high-level strategies for solving homeworks and pre-class Canvas quizzes with fellow classmates, but each student is responsible for writing their own answer. However, each student is required to list the names of other students with whom they discussed their homework problems at the top of the homework submission. For any homework or work turned in, each student is responsible for formulating and writing their own answer. Submitting another student's work is academic misconduct and will result in failing the course.

**Cheating is taken very seriously.** Submissions are routinely checked by the teaching staff for signs of unauthorized collaboration. The instructor also has privileged access to online resources that can track students asking online questions related to the course homeworks and quizzes.

**Definition of academic misconduct:** As defined in the [University Code of Student Rights and Responsibilities](#), academic misconduct includes, but is not limited to, cheating, misrepresenting one's work, inappropriately collaborating, plagiarism, and fabrication or falsification of information. It also includes facilitating academic misconduct by intentionally helping or attempting to help another to commit an act of academic misconduct. A primary example of academic misconduct is submitting as one's own, work that is copied from another student or an outside source. (See [Cheating Policy](#)).

Academic misconduct is not:

- Communicating with classmates about homework orally, in a spoken language like English.
- Discussing the course material with others, so that they and you may understand it better.
- Using the web and other resources for instruction beyond class, but not for outright solutions to homeworks or pre-class Canvas quizzes.
- Working with a tutor, provided the tutor does not complete a homework or pre-class Canvas quiz for you.

Academic misconduct is:

- Asking a classmate to see their solution to a homework or pre-class Canvas quiz before submitting your own.
- Viewing a classmate's solution and basing your own solution on it.
- Giving or showing to a classmate a solution when it is them, and not you, who is struggling to solve it.
- Providing or making available solutions to individuals who might take this course in the future.
- Posting questions about homeworks or pre-class Canvas quizzes to any forums other than the Piazza class designated for this semester of CS 2100.
- Posting solutions anywhere.
- Searching for or soliciting outright solutions, including from students who took this course in the past.
- Splitting a homework's workload with another individual and submitting a combination of their work and yours.

- Looking at other students' work during a test or the final exam.
- Searching for, soliciting, or viewing test or final exam questions or answers prior to taking that test/exam.
- Using resources during a test or final exam beyond those explicitly allowed in the instructions.
- Paying or offering to pay an individual for work that you may submit as (part of) your own.
- Intentionally submitting a corrupted file as a scheme to get more time to work on a homework.

**A good rule of thumb:** If you discuss a homework or pre-class Canvas quiz with others, you must leave the discussion with nothing written or typed. This is the best way to ensure that you construct your own solution, and that the work you submit honestly represents your understanding of the course material. If you are unsure what qualifies as academic misconduct, you are always welcome to talk to the CS 2100 instructor. There is absolutely no penalty for asking about a particular action, even if it is academic misconduct, so long as you seek clarification before acting.

**Sanction for academic misconduct and appeals process:** For academic misconduct in CS 2100, the sanction is to fail the course. Upon discovering the misconduct, the instructor discusses the infraction with the student within 20 days. Within the next 10 days, the instructor gives written notice to the student describing the sanction and advising them of their right to appeal. The instructor also notifies the Director of the School of Computing and the Senior Vice President of Academic Affairs of the infraction and the sanction. Finally, a letter describing the infraction is placed in the student's School of Computing academic record. As described in the [College of Engineering Academic Appeals and Misconduct Policy](#), the student has the right to appeal any academic action they feel is arbitrary and capricious.

**Academic misconduct statement:** Students are required to refer to the updated SoC (CS/DS) undergraduate handbook web page (<https://handbook.cs.utah.edu/2021-2022/Academics/misconduct.php>) on academic misconduct, which summarizes the School's policy. In accordance with the School of Computing's *Policy Statement on Academic Misconduct* dated January 10, 2012, the instructor will discuss the School's academic misconduct policy in the first two weeks of the course. Links to the policy statement is: [https://www.cs.utah.edu/docs/misc/cheating\\_policy.pdf](https://www.cs.utah.edu/docs/misc/cheating_policy.pdf)

**Strikes policy:** The School of Computing has instituted a two-strikes and you're out cheating policy, meaning if you get caught cheating twice in any SoC classes, you will

be unable to take any future SoC courses and you will be dismissed from an SoC degree program. Two lesser sanctions (anything less than a failing course grade) now accumulate to equal one "strike". Students with one strike may not be assigned as TAs or TMs.

For a complete description of academic misconduct, please refer to the SoC academic misconduct policy <https://www.cs.utah.edu/academic-misconduct/> .

For SoC academic policies, please refer to <https://handbook.cs.utah.edu/2021-2022/Academics/policies.php>

For a detailed description of the university policy on cheating, please see the University of Utah Student Code: <http://www.regulations.utah.edu/academics/6-400.html>.

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### Appeals for Grades and Other Academic Actions

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If a student believes that an academic action is arbitrary or capricious, they should discuss the action with the involved faculty member within 20 days and attempt to resolve it. If unable to resolve, the student may appeal the action in accordance with the following procedure:

1. Appeal to Department Chair, who should be notified in writing within 40 working days; chair must notify the student of a decision within 15 days. If the faculty member or student disagrees with the decision, then,
2. Appeal to Academic Appeals Committee (see flyers posted in MEB and EMCB for committee members). See II Section D, Code of Student Rights and Responsibilities for details on Academic Appeals Committee hearings.

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### Other Policies and Guidelines

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Students are bound by the following policies and guidelines:

- CS 2100 academic misconduct policy detailed in this Syllabus document
- [School of Computing policies and guidelines](#)
- [College of Engineering guidelines](#)
- [University of Utah Student Code](#)

Students should read and understand each of these documents, asking questions as needed.

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### School of Computing Code of Conduct

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The open exchange of ideas and the freedom of thought and expression are central to the aims and goals of the School of Computing. We are committed to providing a harassment-free, accessible, inclusive, and pleasant learning environment with equity in rights for all, where every student feels welcome, included, and safe. This commitment applies to all members of the School of Computing community regardless of age, sex, gender, gender identity and expression, sexual orientation, (dis)ability, physical appearance, race, ethnicity, nationality, marital status, military status, veteran status, religious beliefs, dietary requirements, medical conditions, pregnancy-related concerns, or childcare requirements. We also respect any other status protected by federal law. We do not tolerate harassment of others in any way, shape, or form. We expect all interactions between students, faculty, and staff to be respectful and constructive, including interactions in classrooms, labs, CADE, and virtual spaces.

Reports of discrimination, harassment, or sexual misconduct should be made to the Office of Equal Opportunity & Affirmative Action, [oeo.utah.edu](https://oeo.utah.edu), 383 South University St, Level 1 OEO Suite, 801-581-8365.

Students preferring confidential support for discrimination, harassment, or sexual misconduct should reach out to a Victim Survivor Advocate (<https://wellness.utah.edu/victim-survivor-advocacy>), the University Counseling Center (<https://counselingcenter.utah.edu>), the University Hospital Chaplains (<https://healthcare.utah.edu/locations/hospital/services/spiritual/>), or the Women's Resource Center (<https://womenscenter.utah.edu>). Note that with the exception of these four resources, employees of the University, including tutors and TAs are Mandatory Reporters required to report these instances.

Students concerned because of an issue they are experiencing in a class (no published office hours, classes canceled for a week or more, etc.), should [email ugrad-concerns@cs.utah.edu](mailto:ugrad-concerns@cs.utah.edu) (undergraduate students) or [grad-concerns@cs.utah.edu](mailto:grad-concerns@cs.utah.edu) (graduate students). Messages to each email address are read by one academic advisor who keeps the student's identity private, as needed, to support them and work to resolve the concern.

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### **Institutional Policies and Resources**

On the [online Canvas class website](#), you can find [up-to-date information](#) about drop & withdrawal, plagiarism, and health & safety, some of which are included below.

**Student Success:** The University of Utah has several offices to help you be successful. Please look over this collection of resources:

<https://studentsuccess.utah.edu/resources/student-support/>

**Safety:** The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit [safeu.utah.edu](http://safeu.utah.edu).

**The Americans with Disabilities Act.** The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.

**Personal conduct:** Students are expected to behave in a manner that respects other students, the staff, and the faculty. Furthermore, violence and/or harassment based on sex and gender (which includes sexual orientation and gender identity/expression), as well as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information is a civil rights offense and may be subject to University honor/conduct violations and legal prosecution.

If you or someone you know has been harassed or assaulted, you are encouraged to report it to the University's Title IX Coordinator; Director, Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or to the Office of the Dean of Students, 270 Union Building, 801-581-7066.

For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776.

To report to police, contact the Department of Public Safety, 801-585-2677(COPS). Additional information regarding reporting and victim supportive resources are available at the offices listed above.

**Wellness, resiliency, self-care, and productivity:** Maintaining or adopting new ways to proactively practice "self-care" can help maintain or improve your overall wellness and resiliency, which is valuable both for its own sake and because it can help you succeed academically. Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student's ability to

succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness; [www.wellness.utah.edu](http://www.wellness.utah.edu); 801-581-7776.

General strategies for wellbeing include things like: getting enough sleep on a consistent schedule, getting enough exercise and sunlight, interpersonal contact, separation of “work” and “play” time and spaces, accountability structure (e.g., regularly attending lecture), and practicing time management (so that you know what you should be working on when, that you have enough time to get things done based on how things are going, and that you can put work down at the end of the day).

We encourage you to dedicate some intentional time to better understand what helps you feel (and do!) your best so that you are well-equipped for whatever the year brings.

The University has resources like:

- [Center for Student Wellness](#)
- [Mindfulness Center](#)
- [Online Fitness Services at Campus Recreation Services](#)
- [University Counseling Center](#)

...However, you don't need to be limited by looking through the resources offered by the university!

**Student support:** Please visit [Course Resources](#) on Canvas to learn more about support for students of all backgrounds.

If English is your second language, please be aware of several resources on campus that will support you with your language development and writing. These resources include: the [Department of Linguistics ESL Program](#); the [Writing Center](#); the [Writing Program](#); the [English Language Institute](#). Please let me know if there is any additional support you would like to discuss for this class.