

Teaching Portfolio

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i Note

There is a web version of this dossier available [here](#) with significantly better UI. Some interactive elements are not available in this PDF version.

1 Statement of Teaching Philosophy

My teaching philosophy can be summarized as follows.

I create positive learning experiences and lasting impacts on students by bringing out the joy in learning.

I would argue that there are ways in which learning can be profoundly and universally joyful, appealing to our basic desires as human beings. Furthermore, as educators, we can strive to bring out this joy in our students, leading to effective learning and positive long-term outcomes.

In the following, I will focus on three powerful ways learning can be joyful, and how I have tried to incorporate these in my teaching. I'll then conclude with why I teach. Below are the three joys related to learning that I want to focus on. Rather than explain why each of these feelings is so powerful, I invite you to remember when you experienced each joy. I'm sure you can relate to each of them in some way.

- **The joy of empowerment.** Think of a time when you learned something that allowed you to create something, solve a problem, or express yourself in a way you couldn't before.
- **The joy of exploration and discovery.** Think of a time when you explored something new and discovered something interesting or surprising.
- **The joy of curiosity.** Think of a time when you were obsessed with some question or puzzle, and finally found the answer.

A hands-on approach to theory. Programming has several advantages when it comes to teaching and learning. Firstly, exploration is extremely straightforward. You can ask “what if ...”, and check in seconds by running some code. Secondly, programming is extremely easy to make relevant and high-value – students know that programming is a useful skill and there are many real-world examples to draw upon when creating assignments/exercises. Thus, the joys of empowerment and exploration are relatively straightforward to emphasize when teaching students how to program. I try to bring this spirit to teaching *theory* by making the concepts in theory tangible and concrete.

For the algorithms class for 3rd year students, CSC373, I created coding notebooks using Google Colab where students can implement, test, and compare the algorithms from class. The notebooks provide an environment where exploration is easy – since all the data and setup are provided, students can focus on implementing the algorithm and trying variations. Aside from being able to explore, implementing the algorithms makes it ‘real’ for the students. They see the algorithms working on real data and can ‘feel’ the difference in efficiency. Understanding $O(n \log(n))$ vs $O(n^2)$ is one thing, but seeing one algorithm crash your computer while the other runs in seconds is a completely different experience.

Another example of my hands-on approach is demonstrating how the topics students are learning about can solve real-world problems relevant to their lives. For example, when teaching a unit on modelling problems with graphs, I show students how I solved a very real problem related to the course – assigning homework partners. In the lecture, I show them the data I'm working with – I have more than 100 students, and each pair of students has some compatibility score determined by the times they're available to work on the problem sets. I tell them that I would like to assign homework partners to maximize the overall compatibility. I have them work through some small examples to get some intuition for the problems (and to convince them that it is indeed

a challenging problem). Then, using concepts just learned in class, I model the problem as a max-weight matching problem and show students how to solve the problem in seconds with a single library call. Students are impressed by the simplicity of the solution, and hence the idea sticks: “If I can model a problem as a graph problem, then I can solve it”.

Priming Curiosity. I also like to preview more advanced aspects of my course early on to spark students’ curiosity. For example, in my introduction to theory course, I pose the following question to students in the first week (which will appear on a problem set by the end of week 4).

*“Suppose I have a Rubik’s cube in its solved state. Is it true that for **any** sequence of turns, if I repeat that sequence enough times, the cube will eventually return to the solved state?”*

The question is straightforward enough to state and concrete enough to explore. After trying some sequences, students might form a hypothesis, but it’s not clear to them how to prove it. Indeed, they don’t have the techniques yet—it is currently out of reach. For some students, this puzzle is very motivating—they think about how the topics in class will help them answer the Rubik’s cube question, and that’s exactly what I want! By the end of week 4, students can finally answer the question by putting together topics from the first few weeks.

Asking the right questions at the right times is a powerful way to motivate students. Having them use the topics learned in the course to satisfy their curiosity is an empowering feeling.

Why this is so important. Bringing out the joy in learning can be a powerful motivator for students. When students see learning in a course as fun, interesting, and relevant, they continue to show up and stay engaged. More importantly, bringing out the joy creates a **lasting impact** on students. If I can impart the joy of learning computer science to my students, then they will be more likely to continue to pursue learning computer science and continue to experience that joy. This is what matters to me – I want to inspire students to continue learning long after the course ends.

Why I teach. By now, it should be clear that I find learning a joyous experience. I love the feeling of learning something new and being able to apply it in my life, the feeling of grappling with a complex puzzle (and eventually solving it), and the feeling of exploring – getting my hands dirty to discover or understand something new. There’s another deeply innate source of joy that I’ve discovered in my life, and that’s **the joy of sharing**. There’s nothing better than sharing something you’re passionate about with others – especially when they find it interesting or it empowers them. I have found this through teaching, and it’s why I want to pursue a career in education.

2 Reflections on Teaching Experiences

In this section, I reflect on my past experiences as a course instructor at U of T.

2.1 CSC236 – Introduction to the Theory of Computation – Summer 2022

Context.

- Summer course
- Sole instructor
- ≈ 100 students
- First time as a course instructor

I modelled the course on previous iterations with several modifications. When reviewing previous iterations of the course, I noticed that the first five weeks were spent studying proofs by induction, which I felt was too much time, especially given the fact that students have already seen proofs by induction in a previous course. Furthermore, since induction was the first topic covered in the course, most of the problems that can be asked of the students in these first few weeks are rather dry and uninteresting (for example, proving divisibility properties). To address my concern, I started the course by teaching functions, binary relations, and graphs. Aside from being foundational topics in their own right, teaching these topics first made more interesting induction problems available to students, such as the Rubik's Cube Problem (See Section 3.3) (using induction on injective functions), and topological sort / extending partial ordering.

Below is some positive feedback I received in my course evaluations related to my efforts to make the course content more interesting and applicable.

“Professor Sha did an excellent job at making CSC236 a really engaging, interesting, and overall enjoyable experience. All of the course materials used and developed by Professor Sha for this course showed a high level of detail, care, and thought, including lecture slides and homework assignments. Lecture content was extremely engaging, and covered a wide variety of CS concepts in good detail.”

“Harry pulled on a lot of application-type presentations to explain new concepts to us, and this helped it stick with me more rather than a pure theoretical take on the concepts. I found the problem sets to further enforce the content that we learned in class in a fair manner as well as being fun to do (like a puzzle). He allowed a lot of opportunity for us to ask questions and brought up some of his own if no one was asking any (I found this helpful since his self-questions were ones I had on my mind).”

“[...] Homework was extremely creative and interesting and allowed a deeper, more conceptual understanding of course material.”

“The instructor designed very thought-invoking homework and tutorials to help understand and apply course concepts”

In this semester, I also gained valuable experience in managing course logistics such as managing TAs, communicating with support staff, computing grades, and running exams.

2.2 CSC236 – Introduction to the Theory of Computation – Fall 2022

Context.

- Immediately after the summer course.
- Co-taught with François Pitt (the course coordinator) and Siphelele Danisa.
- Five sections.
- ≈ 500 students.

In this course, the teaching team decided to use a pedagogical approach that was quite different from what I was used to – we had 6 term tests (one every other week), a final, and assignments were graded on (essentially) completion. This was an approach from François Pitt based on the finding that frequent testing leads to better learning. The idea was that if marks were based on tests, then students would be more focused on learning from the problem sets rather than simply submitting a correct solution. Here are the pros and cons of this approach in my experience:

Pros

- Students were less likely to procrastinate and fall behind (since they need to be caught up with the course at least every other week, in time for the term test)
- No concerns about academic integrity on the assignments.

Cons

- Term tests took place during tutorials, which meant fewer tutorials.
- Many test questions need to be generated – 3 different versions of each of the 6 term tests.
- Limited in what kinds of questions can be asked (since each term test was just 50 minutes, and there need to be three roughly equivalent variants of the problem)
- Tests (even if they are low-weight) are stressful for some students.

To keep consistent with the other sections, we all used the original course content (without my additions from the previous summer). This was challenging for me at first because I understand certain topics in slightly different ways, and sometimes it's unclear what exactly the author of the materials had in mind when creating a slide. In hindsight, I learned that I should have consulted more with the author of the slides.

Later in the course, I also tried using the blackboard instead of the slides to help with pacing, and add flexibility. After this course and receiving feedback, I decided this approach did not work well for me, and I would reconsider my lecturing method in my next semester of teaching.

2.3 CSC236 – Introduction to the Theory of Computation – Summer 2023

Context.

- Summer course
- Sole instructor
- ≈ 100 students

This semester, I decided on a different grading scheme. I wanted to capture the pros of the grading scheme from the previous fall (many tests, low-weight assignments), and adapt it for a summer course. I used 5 TA check-ins (15-minute meetings), one midterm, and one final. There are 5 homework assignments (one for each check-in), and I promise that at least one of the problems on the midterm and final is based on one of the homework problems. In the check-ins, the TA asks students to explain one or two problems from the problem set, and then students have a chance to ask the TAs any questions they might have about the course. Each check-in is worth 2% of the overall grade.

Rationale:

- Since most of the points from the course come from the exam, students need to understand the topic.
- Students are still motivated to engage with the homeworks because of the check-ins and the promise that one of the problems from the exams will be heavily inspired by a homework problem. Furthermore, students don't feel pressure to create a perfect solution to the homework and hence see them more as opportunities to learn.
- This approach does not limit the resources available to students to support their learning (if assignments are graded, then no outside resources are allowed, including the internet).

I have included the guide to check-ins and homework from this semester in Section 7, in which I explain the goal of the homework and describe the rationale behind the grading scheme to my students.

Reflecting on this marking scheme, I felt that it mainly achieved the goals I had for it, but there were also some important drawbacks:

- TA time is spent on repetitive work (checking in with students about the same problems).
- Students don't get feedback on their written proofs until the midterm. There is only limited feedback on assignments. If a TA does not ask them about a particular problem, students might think they understand it even if they really don't.
- Heavy-weighted exams can be stressful.

I also include the syllabus for this semester in the appendix (Section 7.3).

Approach to lecturing. This semester, I went back to using slides. However, I used a reduced version of the slides that omitted certain proofs and examples for lectures. I then drew over the slides using my iPad. In the end, there were 3 versions of the slides: the reduced version, the full version, and the version with my in-class writing. Writing on the slides helps me pace and allows me the flexibility to add more examples on the fly to better answer questions. The full version of the slides serves as a reference, while the version with my in-class writing captures a record of the additional examples. I also recorded my lectures this semester to make them more accessible to students who might have to miss several lectures due to work, travel, or illness.

2.4 CSC373 – Algorithms Design and Analysis – Winter 2024

Context.

- Co-taught with Nathan Wiebe (course coordinator)
- Three sections

- ≈ 300 students
- First time teaching this course

While reviewing the course materials, I noticed a lack of applications for the algorithms learned in class. In fact, in its current state, students go through CSC373 without running a single line of code. In my opinion, this felt like too theoretical an approach, and a big missed opportunity – one of the best things about computer science is the ability to explore and test things out for yourself! Thus, I introduced several coding notebooks, which we set as optional extra credit problems on assignments. For more about these notebooks, see Section 3.1.

Other than these additions, I mostly stuck to the existing materials to stay coordinated with Nathan.

2.5 CSC373 – Algorithms Design and Analysis – Winter 2025

Context.

- Co-taught with Nathan Wiebe (course coordinator)
- Three sections
- ≈ 300 students

This time it went much more smoothly. I developed new slides (largely based on the old slides but with additional modifications to suit my lecturing style)

Since I received positive feedback from students on the coding notebooks, I decided to move them into the lecture (instead of being an optional extra credit problem) to improve their reach.

2.6 CSC236 – Introduction to the Theory of Computation – Summer 2025

Context.

- Summer course
- Sole instructor
- ≈ 100 students

I went back to the drawing board again for the grading scheme for this course.

The main points I wanted to address from the last time were the usage of TA time and the fact that students don't get quality feedback until their midterm (halfway through the course). The grading scheme I ultimately landed on was three-term tests and one exam. Problem sets were assigned, but were ungraded.

Rationale:

- Instead of grading or doing check-ins (repetitive work), TA time was freed up to create resources like explainer videos, host office hours, and answer questions on Piazza.
- One of the term tests happens in Week 3 and is lighter weighted than the other term tests, so students can at least get some feedback on their work, and a diagnostic on our expectations.

Additionally, this time I made significant upgrades to the course website (See Section 3.4).

Here is some of the positive feedback related to these factors on my course evaluations.

“Tutorial videos were very helpful in demonstrating how to solve problems.”

“After a full semester, I see why this course has its own website: the website is superior to Quercus in just about every way.”

“The learning support for this course was excellent. The practice problems, tutorials, and explanations provided ample opportunities to reinforce the material. The instructor and TAs were approachable and provided helpful guidance whenever questions arose.”

“Piazza was also used very effectively, with questions being answered promptly.”

2.7 CSC108 – Introduction to Computer Programming – Fall 2025

Context.

- 10 sections
- Co-taught with several instructors including the course coordinator, Jen Campbell
- $\approx$ 2000 students
- First time teaching programming

This course is currently in progress, and it is my first time teaching a non-theory course. I’m really enjoying it so far, and I love how easy it is to engage students, demonstrate errors, and show the problem-solving process.

This is a flipped class, where lectures are mostly reserved for working through worksheets together with the students rather than lecturing. I really enjoy this style of teaching and have gained practice facilitating active learning activities.

3 Materials

In this section, I showcase some teaching materials I have developed over the years. I have selected a couple here to highlight.

3.1 Coding Notebooks

I create coding notebooks to make algorithms tangible: students implement, visualize, and compare methods so efficiency and correctness are felt, not just stated. This supports empowerment (they can build it) and exploration (they can test hypotheses and try variations).

I used Google Colab for the following reasons.

- Minimal setup required. The notebook runs in the cloud, so no local setup is required (no need to install Python or other libraries).
- Easily shareable. Students can easily make a copy of the notebook to work on their own version.

I'll highlight one of these notebooks, and the rest can be found in Section [3.1.2](#).

3.1.1 Huffman Coding and Closest Pair of Points in $\mathbb{R}^2$

The notebook I want to highlight (linked [here](#)) is one I created for the first two topics of the algorithms course – divide and conquer and greedy algorithms. In this notebook, students implement two algorithms that were discussed in lecture, Huffman Coding and a divide and conquer algorithm for the closest pair of points in $\mathbb{R}^2$ problem.

Below is a summary of the notebook and some screenshots

Huffman Coding

- Setting up the problem and motivation (data compression)
- Examining provided tools (Binary tree, priority queue, and visualizations)
- Implementing the algorithm and generating an encoding
- Testing the encoding on different texts. Open ended question: *does this encoding do better than the naive encoding on all texts?*

Huffman Coding

In the first part of this tutorial, we will implement Huffman Coding.

1. The cell below contains some text that we will use to learn the encoding - the content of the text is **not** important.
2. `preprocess(text)` converts `text` into lowercase, and keeps only characters from the alphabet, space, comma, period, and dash. We are doing this to make the tree less cluttered when we visualize it later. You can return to this cell later and remove the preprocessing step to get an encoding that covers more punctuation, numbers and uppercase letters if you want.

```
# text comes from https://en.wikipedia.org/wiki/Huffman\_coding

text = """In 1951, David A. Huffman and his MIT information theory classmates were given the choice of a term paper

In doing so, Huffman outdid Fano, who had worked with Claude Shannon to develop a similar code. Building the tree fr

Terminology
Huffman coding uses a specific method for choosing the representation for each symbol, resulting in a prefix code (s

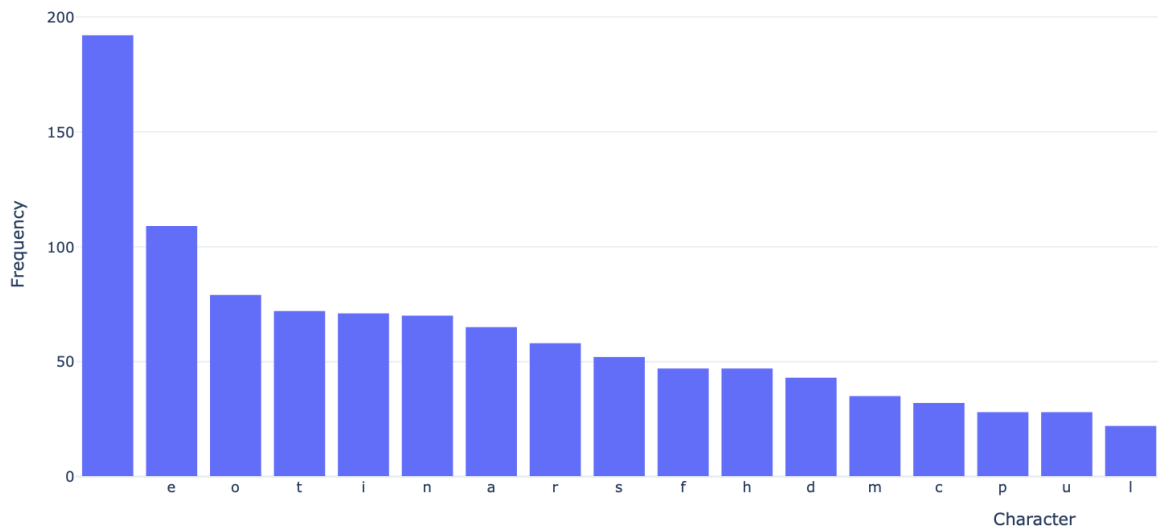
def preprocess(text):
    return "".join(x for x in text.lower() if x.isalpha() or x in ".,-")

text = preprocess(text)
print(text)
```

```
in , david a. huffman and his mit information theory classmates were given the choice of a term paper or a final exa
```

Run to visualize **frequencies**

 [Show code](#)



As one might expect, the distribution of the letters is not very uniform, with some letters like "i" and "e" occurring often and other letters like "x" and "z" occurring only a few times. Huffman coding exploits this variation to find a more efficient encoding..

Task. Implement the Huffman Coding algorithm described in lecture and apply it to the given text. To help you get started, here are a few definitions.

Binary Tree

- `BinaryTree(value, left, right)` defines a Binary Tree with label `value`, left child `left`, and right child `right`.
- `left` (`right`) should either be a `BinaryTree` object or `None`. `None` indicates that there is no left (right) child.
- If `tree` is a `BinaryTree`, then you can visualize it using `plot_tree(tree)`.

Priority Queues

- To add something to the priority queue do `q.put(PrioritizedItem(priority, item))` where `priority` is the priority and `item` is the item you want to enqueue.
- `q.get()` returns the `PrioritizedItem` with the **smallest** priority
- If `i` is a `PrioritizedItem`, you can extract the priority and the item itself with `i.priority`, and `i.item`

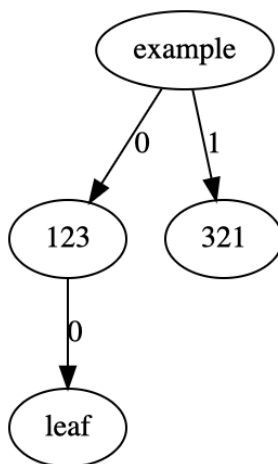
```
class BinaryTree:
    def __init__(self, value, left, right):
        self.value = value
        self.left = left
        self.right = right

from dataclasses import dataclass, field
from typing import Any

# Reference: https://docs.python.org/3/library/queue.html#queue.PriorityQueue
@dataclass(order=True)
class PrioritizedItem:
    priority: int
    item: Any=field(compare=False)
```

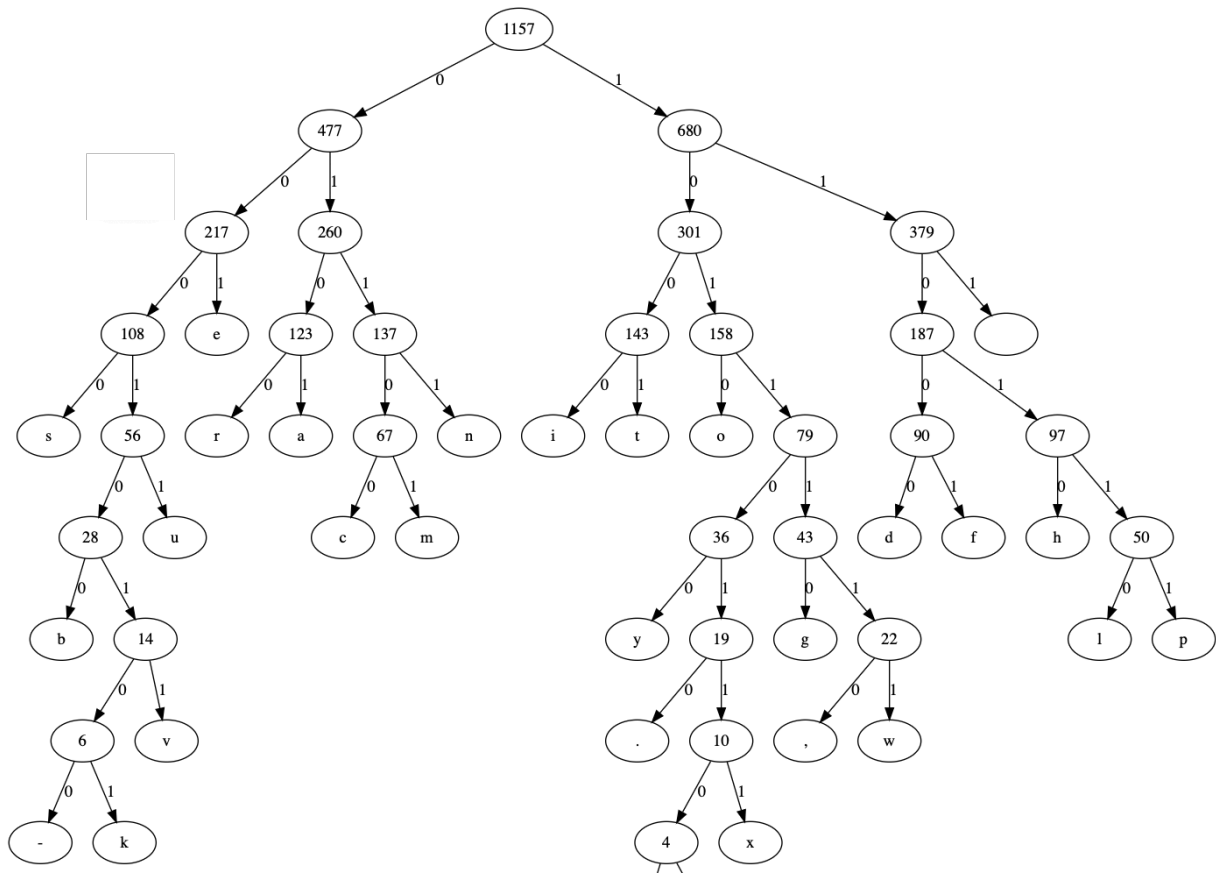
Example usage of `BinaryTree`

```
l = BinaryTree(123, BinaryTree('leaf', None, None), None)
r = BinaryTree(321, None, None) # leaf
p = BinaryTree("example", l, r)
plot_tree(p)
```



Task. Find the encoding tree for `text` using the Huffman Coding Algorithm. Once you found it, plot the tree!

YOUR CODE HERE



Call `extract_encoding` on your encoding tree to get a dictionary mapping characters to their encoding. Store the resulting dictionary in a variable called `encoding`

```
def extract_encoding(tree):
    encoding = dict()
    def _extract(t, s):
        if t.left is None and t.right is None:
            encoding[t.value] = s
        if t.left is not None:
            _extract(t.left, s + "0")
        if t.right is not None:
            _extract(t.right, s + "1")
    _extract(tree, "")
    return encoding

encoding = extract_encoding(tree) # replace with variable storing your encoding tree
print(encoding)
```

↵ {'s': '0000', 'b': '000100', '-': '00010100', 'k': '00010101', 'v': '0001011', 'u': '00011', 'e': '001', 'r': '0'}

Let's see how this encoding compares with the naive encoding. First, let's compare it on the text we learned the encodings from in the first place.

```
def encode(encoding, s):
    return "".join([encoding[c] for c in s])

def huffman_encoding_length(encoding, text):
    return len(encode(encoding, text))

def naive_encoding_length(text):
    return len(text) * 5 # since there are 30 < 2^5 characters, the naive encoding uses 5 bits per character

def compare_encoding_length(encoding, text):
    print("Naive Encoding Length: ", naive_encoding_length(text))
    print("Huffman Encoding Length: ", huffman_encoding_length(encoding, text))
    print()

compare_encoding_length(encoding, text)
```

↵ Naive Encoding Length: 5785
Huffman Encoding Length: 4950

Closest pair in $\mathbb{R}^2$

- Examining provided tools (Point class, visualization, brute force algorithm)
- Implementing the divide and conquer algorithm
- Comparing runtimes of brute force vs divide and conquer
- Testing on large inputs (to see the efficiency difference)

The next problem is to implement the closest pair of points in $\mathbb{R}^2$ algorithm using divide and conquer. Again, I start by setting up the problem and giving them several tools to work with in their implementation, including a function to visualize points.

In this part - we'll implement the closest pair of points in $\mathbb{R}^2$ algorithm from week 1.

Below we provide a `Point` object, as well as a function to calculate the distance between two points.

```
@dataclass
class Point:
    x: float
    y: float

def distance(p1, p2):
    x1, y1 = p1.x, p1.y
    x2, y2 = p2.x, p2.y
    return ((x1 - x2) ** 2 + (y1 - y2) ** 2) ** 0.5
```

Here is some example usage, including how to

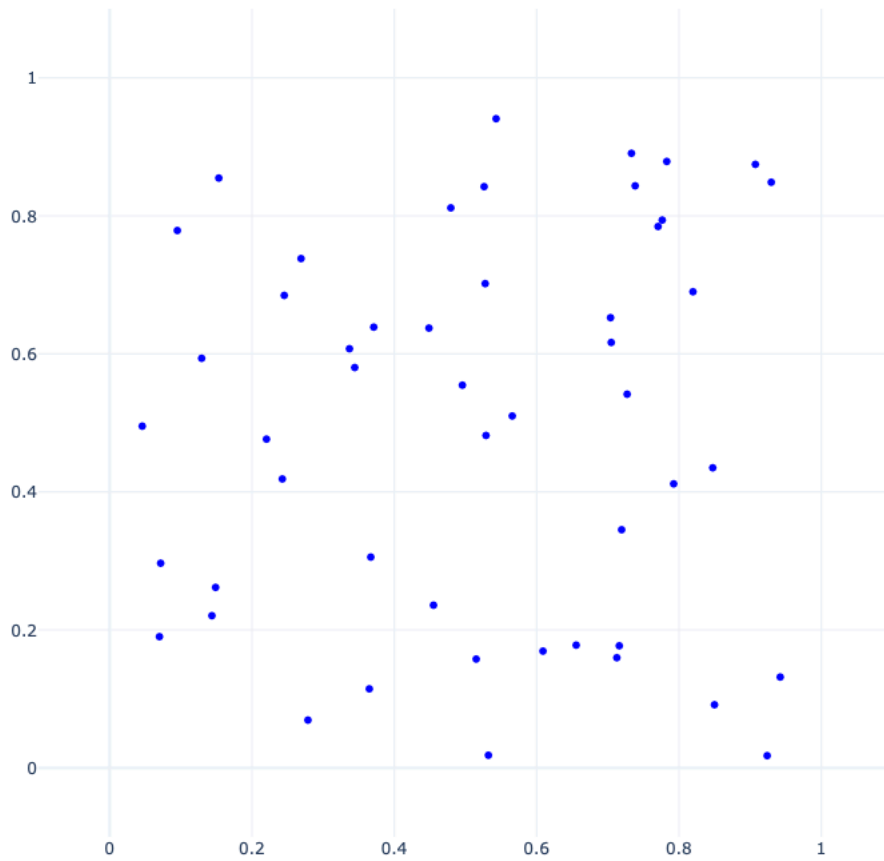
- Declare points
- Access coordinates
- Compute the distance

```
p1 = Point(2, 3)
p2 = Point(3, 9)
print(p1)
print(p1.x)
print(p2.y)
print(distance(p1, p2))
```

```
➦ Point(x=2, y=3)
2
9
6.082762530298219
```

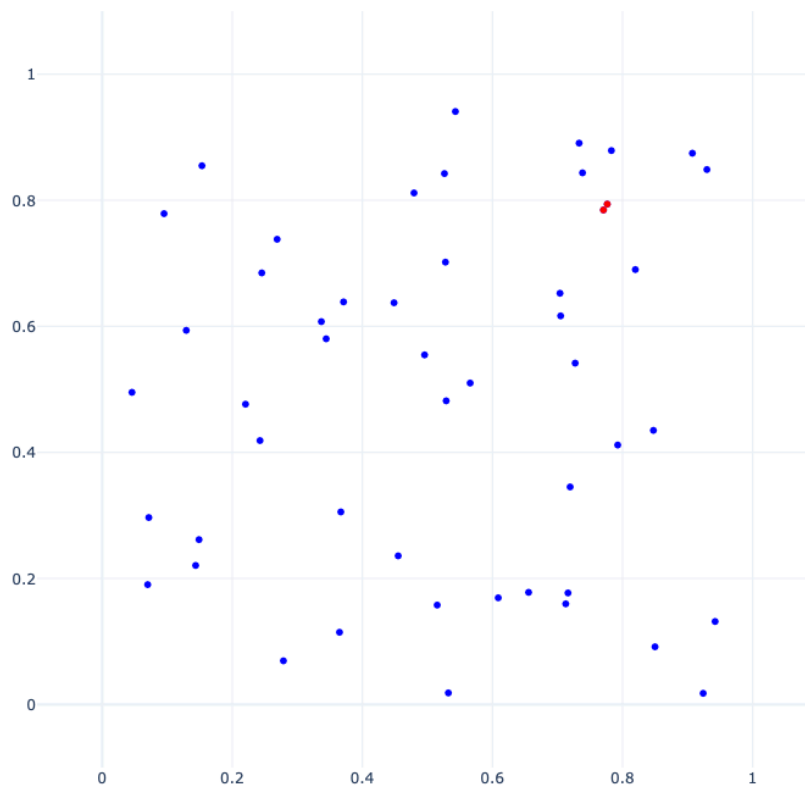
Let's work with a random collection of points

```
points = get_random_points(50)  
plot_points(points)
```



Here is a brute force algorithm - it enumerates all pairs of points. You can use this to check your solution for correctness. It will also be fun later to compare the runtime of the divide and conquer algorithm with this one.

```
def closest_pair_brute_force(points):  
    """Finds the closest pair  
  
    Args:  
        points (list): a list of points in R^2  
  
    Returns: (pair, d)  
        pair (list): is a list of two points with the smallest distance  
        d (float): the smallest distance  
    """  
    distances = [distance(*pair) for pair in itertools.combinations(points, 2)]  
    return min(zip(itertools.combinations(points, 2), distances), key=lambda t: t[1])  
  
closest, dist = closest_pair_brute_force(points)  
plot_points_and_closest(points, closest)
```



Task. Implement the closest pair divide and conquer algorithm below. Feel free to refer back to the slides! Your function should have the inputs and outputs as specified in the docstring - i.e. it should have the same inputs and outputs as the brute force algorithm.

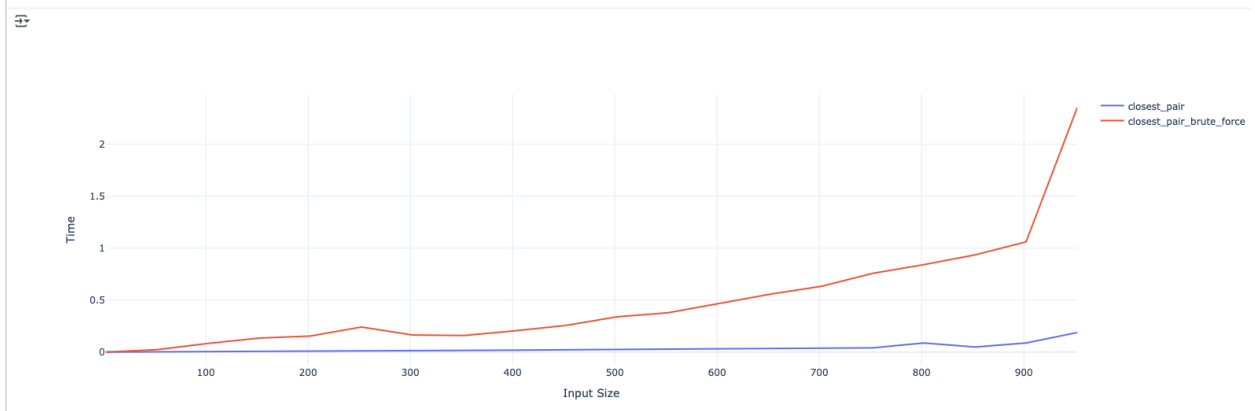
```
def closest_pair(points):
    """Finds the closest pair

    Args:
        points (list): a list of points in R^2

    Returns: (pair, d)
        pair (list): is a list of two points with the smallest distance
        d (float): the smallest distance
    """
```

Run the next cell to compare the runtime of the divide and conquer algorithm and the brute force algorithm (it might take some time to run)

```
compare_function_plot(
    [closest_pair, closest_pair_brute_force],
    get_random_points,
    list(range(2, 1000, 50)),
)
```



3.1.2 List of Notebooks

For CSC373

- [Huffman Coding + Closest Pair of Points in \$\mathbb{R}^2\$](#)
- [Dynamic Programming algorithms for the knapsack problem and the TSP problem](#)
- [Flow and Linear Programming on weighted bipartite matching](#)

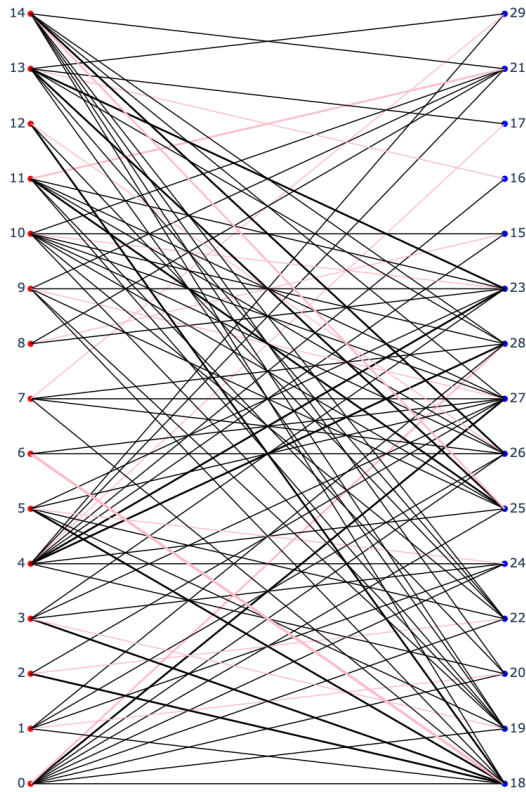


Figure 1: LP solution to weighted bipartite matching

For CSC236

- [Matching](#) (Also see Section 3.2.1).
- [TSP vs. MST](#)

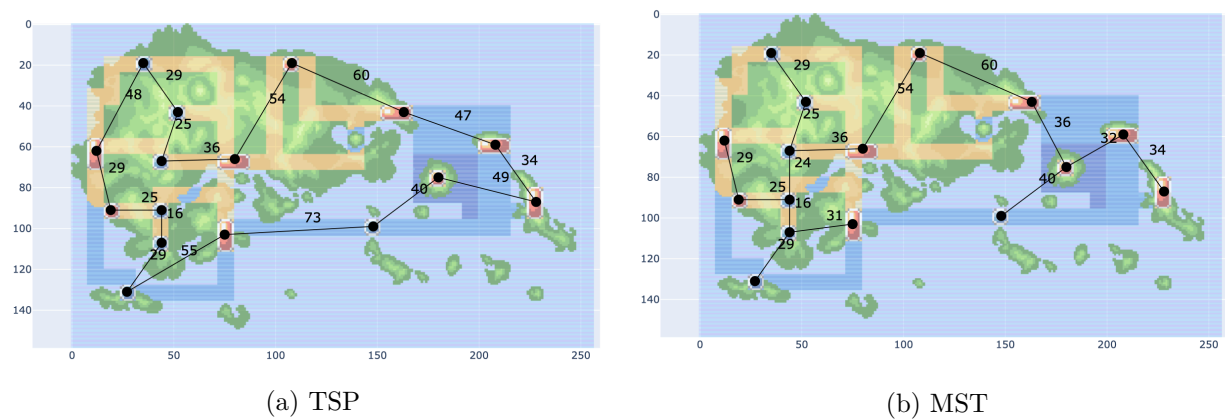


Figure 2: A notebook illustrating modelling problems as using graphs, as well as the relationship between the travelling salesperson problem and the minimum spanning tree problem.

For CSC448 (as a TA)

- Turing Machines

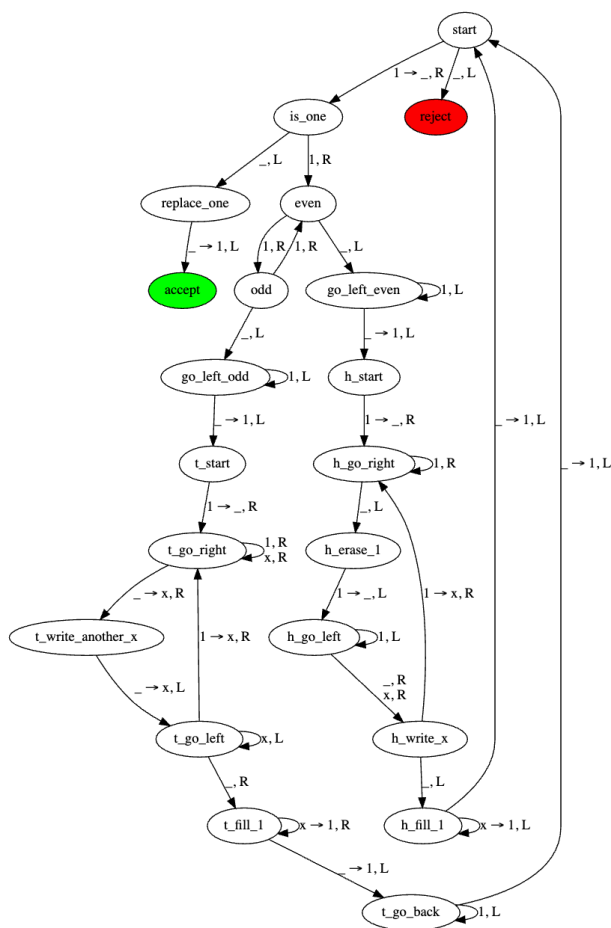


Figure 3: Collatz Turing Machine example

3.2 Lectures

In this section, I highlight parts of two lectures I developed for CSC236 (Introduction to the Theory of Computation). I chose these two lectures because they illustrate my approach to making theory tangible and relevant to students, as well as my approach to learning theory through exploration and discovery.

3.2.1 Matching

This example is from a lecture on graphs and modelling in CSC236 (Introduction to the Theory of Computation). The main goal of the unit was for students to model real-world problems as well as studied problems on graphs. I introduced this unit because it squarely belongs in theory (the idea of **reductions** is central to theoretical computer science), yet also has clear applications to the real world. Throughout the lecture, I define several graph problems and give examples of how real-world problems can be made instances of these graph problems.

After defining the matching problem, I tell students that I've actually been working on a problem that can be modelled as a matching problem – assigning homework partners from this course! At this point, I open up a [coding notebook](#) I prepared earlier and show them the data I have collected earlier in the week on their availability and working preferences. It looks like this.

Username	Virtual	Weekday afternoon	Weekend evening	Weekday evening	Weekend morning	Weekend afternoon	Weekday morning
Mildred Havercroft	0	1	1	0	0	0	0
Melody Mastroianni	1	0	1	1	1	1	0
Diana Williams	0	1	1	0	1	1	0
Kim Massaro	0	1	1	0	0	1	0
Larry Vass	1	1	1	1	0	1	0
Ethel Roberts	1	1	1	0	1	1	0
Laura Morello	0	1	1	1	0	1	0
Paula Mercado	1	0	1	1	1	1	0
Miriam Hurst	1	1	1	1	1	1	1

Figure 4: Data for matching (fake names)

I then get students to model the problem of assigning homework partners as a matching problem. Once we have agreed on how to do it, I show them some code to turn the table into the graph that they defined. Next, I help students develop intuition for the problem and appreciate how non-trivial it is. I start by plotting the graph for just 6 students, and ask for an optimal assignment.

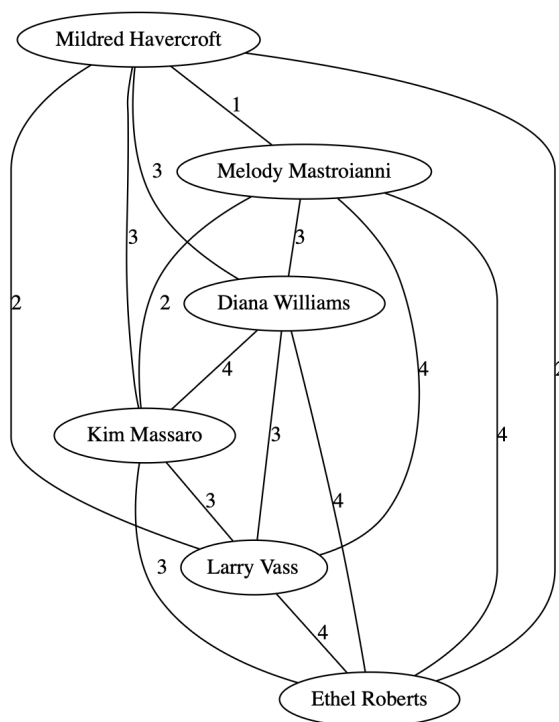


Figure 5: Graph for 6 students

Solution

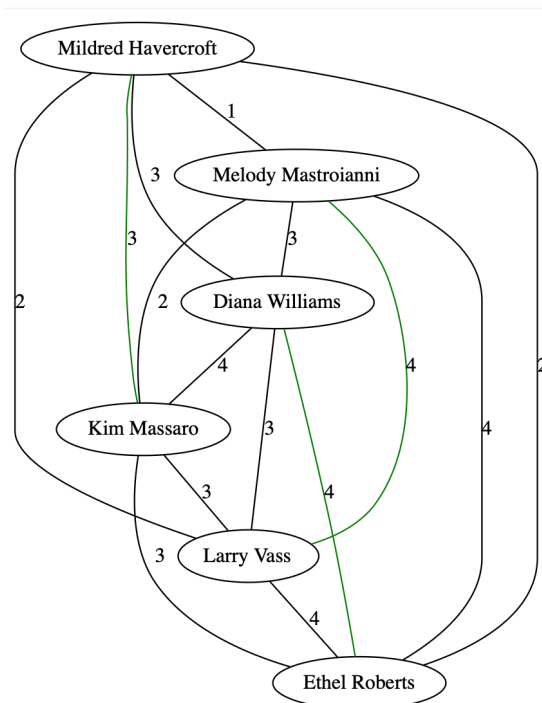


Figure 6: One max weight matching (shown in green)

This is still easy enough to compute by hand. Then I plot the graph for 8 students, and it already becomes difficult. Next, I try to plot the graph for 20 students, and it becomes a complicated mess. Now that the students have some appreciation for the complexity of the problem, I then show them how to solve the problem using a single library call.

```
matching = nx.max_weight_matching(g, maxcardinality=True)
```

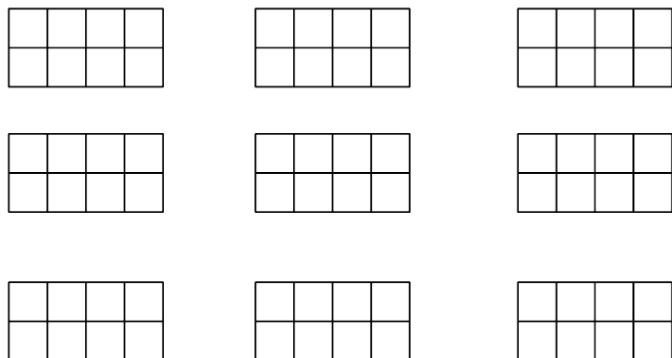
Finally, I show them the documentation for networkx, which implements several graph algorithms. I emphasise to them that I did *not* need to know how to solve the matching problem to do all of this. All I needed to do was to know how to model my problem as a problem on a graph. This drives home the importance of modelling, which was the topic of this lecture.

3.2.2 Fibonacci

This example is from lecture 5 from CSC236 (Introduction to the Theory of Computation). The main goal of this lecture is to introduce students to the idea of recurrence relations and how to solve them using induction. This part of the lecture comes after defining recurrence relations and reviewing asymptotics. To introduce Fibonacci numbers, I use the classic domino tiling problem. I pose the following question.

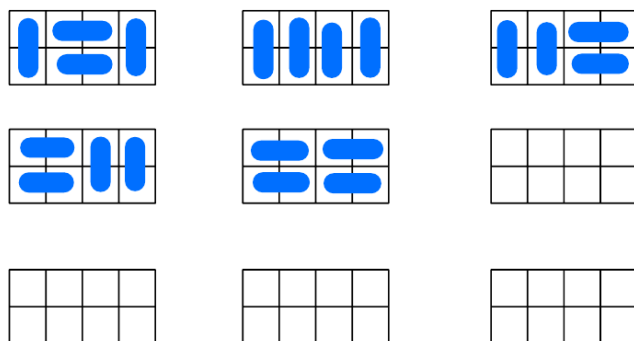
How many ways are there to tile a $2 \times n$ board using 2×1 dominoes?

I define $T(n)$ to be the number of tilings of a $2 \times n$ board, and we work through some small examples together: I show them the following empty boards for $T(4)$ and take suggestions from them on how to place the dominoes.



Eventually, we end up with the following tilings.

Solution



$$T(4) = 5$$

Figure 7: Enumerating $T(4)$ tilings

We then do the same for $T(5)$.

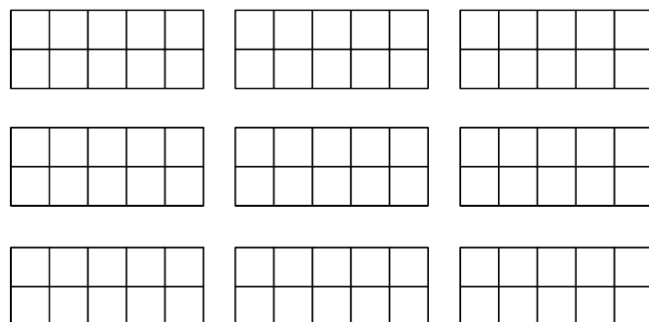
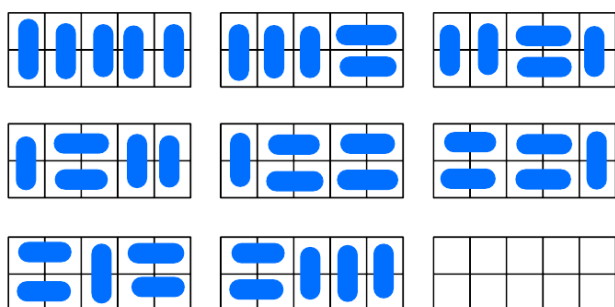


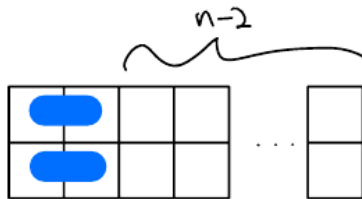
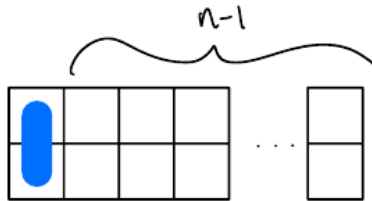
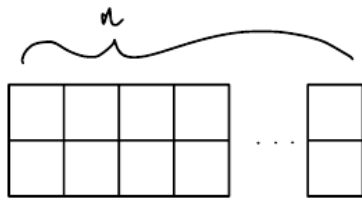
Figure 8: Enumerating $T(5)$ tilings

Solution



$$T(5) = 8$$

Then, I ask students to find a recurrence relation for $T(n)$. Usually, someone notices the key insight: the first domino placed can be either vertical or horizontal, leading us to the following conclusion.



Every tiling of $2 \times n$ is either

1.  followed by a tiling of $2 \times (n-1)$

2.  followed by a tiling of $2 \times (n-2)$!

$$\Rightarrow T(n) = T(n-1) + T(n-2).$$

I note that this recurrence might be familiar to them, and it's the famous Fibonacci sequence (shifted by 1).

$$F(n) = \begin{cases} 0 & n = 0 \\ 1 & n = 1 \\ F(n-1) + F(n-2) & n \geq 2 \end{cases}$$

I then prove a simple upper bound on $F(n)$.

Claim. $\forall n \in \mathbb{N}. F(n) \leq 2^n$.

Solution

Base case. $F(0) = 0 \leq 1 = 2^0$, and $F(1) = 1 \leq 2 = 2^1$.

Inductive step. Assume for some $k \geq 1$ that $F(k) \leq 2^k$ and $F(k-1) \leq 2^{k-1}$. Then,

$$F(k+1) = F(k) + F(k-1) \leq 2^k + 2^{k-1} \leq 2^k + 2^k = 2^{k+1}$$

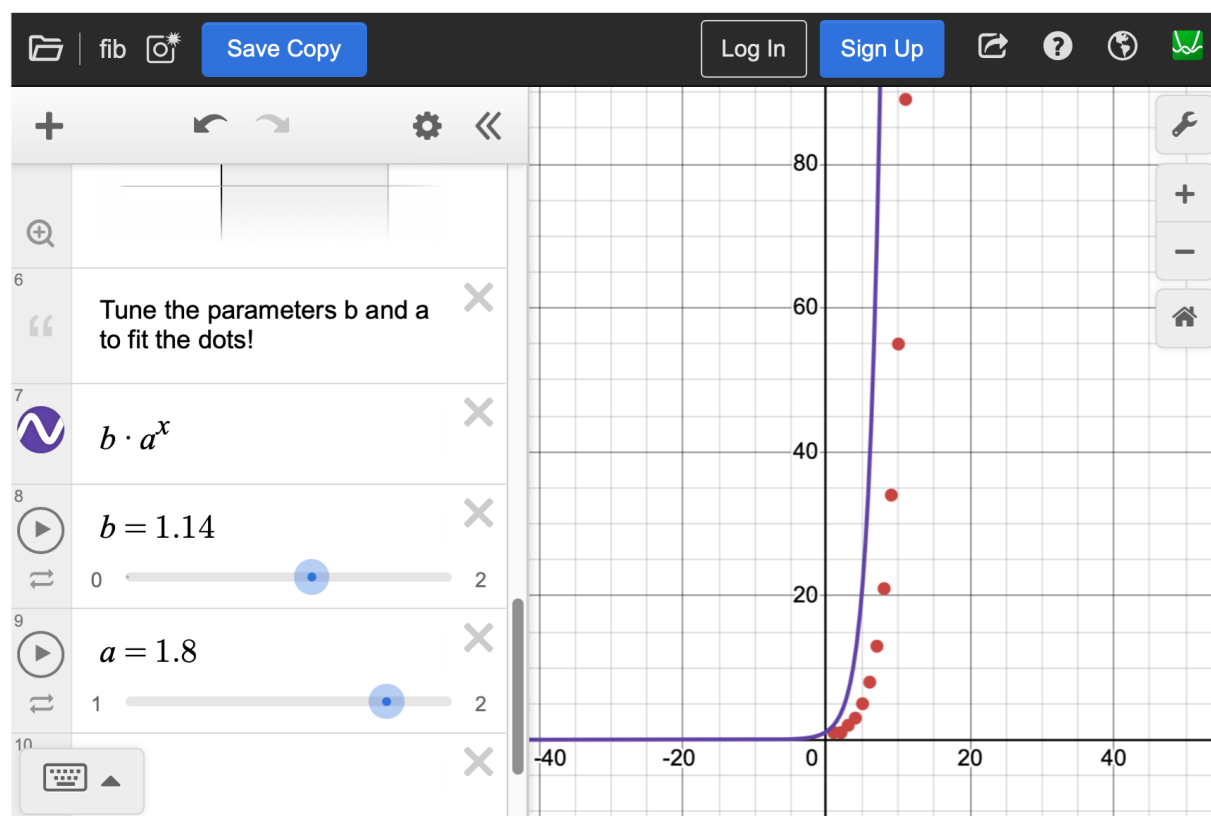
I then ask if there was slack in this argument, and students usually notice that the inequality $2^k + 2^{k-1} \leq 2^k + 2^k$ is quite loose. We then try to prove $\forall n \in \mathbb{N}. F(n) \leq 1.8^n$, and the proof still works. I then get ambitious and try with 1.5 instead of 2, but now the key inequality fails. In particular, we have

$$(1.5)^k + (1.5)^{k-1} = (1.5)^k(1 + 1/1.5) = (1.5)^k \cdot 1.666$$

But this is **not** less than 1.5^{k+1} since $1.666 > 1.5$.

So the true answer must be somewhere in between 1.5 and 1.8. This setup naturally begs the questions: what is the true answer? How can we find it? At this point, students who don't know about the golden ratio are curious, while those who do know the right answer are wondering how to arrive at it.

Before arriving at the true answer, I have students explore to find the right exponent 'graphically' using the following interactive [Desmos graph](#).



I have populated the graph with Fibonacci numbers and some sliders to adjust the exponent and scale. Students can then visually see how close they are to the true exponent by adjusting the sliders. This activity usually happens during a break in the lecture. After the break, I project a copy of the plot on the screen and ask students for the best values that they found, and show the graph with those values plugged in. Usually, we get something very, very close (usually, the exponent is correct up to 2 decimal points).

Now that the students have an idea of the correct answer, I show them how to arrive at it by modifying the inductive proof to use x as the base of the exponent, and then solving for x so that the key inequality becomes an equality.

I like this activity because it engages students in a discovery process. Instead of defining the golden ratio and proving outright that $\forall n \in \mathbb{N}. F(n) \leq \varphi^n$, I show how one might arrive at the golden

ratio. This hands-on approach gives students a deeper understanding of the *why* the golden ratio is the right answer, rather than just accepting it as a fact.

3.3 Assignment Problem – Rubik’s Inevitability

This problem shows up in an introduction to theory course after students have learned about functions, graphs, and induction.

I see this problem as a milestone for students, as it combines several concepts learned in the first few weeks and requires creative thinking to solve. The problem centers around the following strange phenomenon.

Fix a sequence of turns of a Rubik’s cube, and suppose the Rubik’s cube starts in the solved state. If we repeat this sequence of turns enough times, the Rubik’s Cube will eventually return to the solved state. Crucially, this is true **regardless** of what sequence of turns we choose!

For simple sequences, this is easy to verify – for example, if the sequence is “turn the front face clockwise”, then it’s not hard to see that after 4 repetitions, the cube returns to the solved state. However, for more complex sequences, the cube becomes quite scrambled, and it’s not clear why repeating the same sequence would eventually return it to the solved state. However, inevitably, almost like magic, the colors begin to match up again, and the cube returns to the solved state. [Here’s one example](#).

I like this problem for two main reasons.

1. It is a surprising and counterintuitive fact that piques students’ curiosity.
2. The problem is challenging and integrates several concepts learned in the first few weeks of the course, which makes students feel accomplished when they finally solve it.

I have asked several versions of this problem (with varying levels of scaffolding). Below is the most recent version of the problem I have used. Note that in the web version, solutions and hints are collapsible.

A Rubik’s cube is a fun puzzle/toy. If you don’t have a Rubik’s Cube, check out [this simulator](#).

Assume the blue face of the cube is always facing you. A state of the cube describes the current position of all the stickers. For example, the solved state of the cube is the one where every face has just one color (namely, the one matching the center square of the face).

The cube has 6 faces. Let f_i be the operation of turning the i th face of the cube a quarter turn clockwise. Let $\text{Turns} = \{f_1, \dots, f_6\}$ be the set of turns one can perform on the Rubik’s cube.

a.) Let s be the solved state of the Rubik’s cube. Define the set of possible Rubik’s cube states, recursively or inductively.

Solution

Rubiks is the smallest set such that

- $s \in \text{Rubiks}$
- If $x \in \text{Rubiks}$, then $\forall i \in \{1, 2, 3, 4, 5, 6\}, f_i(x) \in \text{Rubiks}$.

b.) Model the task of solving a Rubik's cube in the minimum number of moves as a graph problem. Fully specify the vertex set, edge set, and edge weights (if any), and explain why a solution to the graph problem corresponds to solving the cube.

Solution

Let $s \in \text{Rubiks}$ be the solved state of the cube. Define the following directed graph $G = (\text{Rubiks}, E)$ where for any states $x, y \in \text{Rubiks}$,

$$(x, y) \in E \iff \exists f \in \text{Turns}. (f(x) = y).$$

I.e. there's an edge from x to y if and only if you can reach state y from state x with one turn. Set all the edge weights to be 1.

A path in the G from $(x_1, \dots, x_n)$ corresponds to a sequence of turns, that takes the cube from state x_1 to state x_n . Thus, the problem of solving a Rubik's cube from a scrambled state r in the fewest number of turns corresponds to the shortest path problem on input G , starting vertex r , and end vertex s .

Start with a solved Rubik's cube and consider any fixed sequence of turns. Now repeat that sequence of turns many times. **Eventually, somewhat magically, the Rubik's Cube will return to the solved configuration!** In this problem, we will prove this fact.

c.) Let g be an arbitrary sequence of turns. Show $g : \text{Rubiks} \rightarrow \text{Rubiks}$ is an injective function.

Hint 1.

Represent g as a composition of functions in Turns.

Hint 2.

Show that each function in Turns is injective.

Hint 3.

Show by induction on n that the composition of n injective functions is injective.

Solution

Note that each $f_i \in \text{Turns}$ is injective, since each turn f_i has a left inverse, namely f_i^3 . f_i^3 is the function that applies f_i three times, i.e., a 270-degree turn, which is equivalent to a 90-degree turn in the counterclockwise direction, and clearly this undoes a 90-degree turn in

the clockwise direction. I.e. $f_i^3 \circ f_i(x) = x$ for all $x \in \text{Rubiks}$. Thus, by HW1, f_i is injective. Let g be an arbitrary sequence of turns. We can represent $g : \text{Rubiks} \rightarrow \text{Rubiks}$ as a composition of functions in Turns. To show that g is injective, we will show that the composition of n injective functions is injective, for any $n \in \mathbb{N}$.

Let $P(n)$ be the predicate: For any sequence of n functions $f_1, \dots, f_n \in \text{Turns}$, the composition $f_n \circ f_{n-1} \circ \dots \circ f_1$ is injective. We'll show $\forall n \in \mathbb{N}, n \geq 1. P(n)$ holds. By induction.

Base case. For $n = 1$, let $f_1 \in \text{Turns}$. By the previous part, f_1 is injective, thus the base case holds.

Inductive step. Let $k \in \mathbb{N}, k \geq 1$ be any natural number at least 1, and assume $P(k)$. Let $f_1, \dots, f_{k+1} \in \text{Turns}$ be a sequence of $k + 1$ functions. Let $h = f_k \circ f_{k-1} \circ \dots \circ f_1$. By the induction hypothesis, since h is the composition of k functions in Turns, h is injective. Then $f_{k+1} \circ f_k \circ f_{k-1} \circ \dots \circ f_1 = f_{k+1} \circ h$. Since $f_{k+1} \in \text{Turns}$ and is injective by the previous part, and h is injective, and the composition of two injective functions is injective (by HW1), $f_{k+1} \circ f_k \circ f_{k-1} \circ \dots \circ f_1$ is injective as required.

d.) Give an upper bound on $|\text{Rubiks}|$ i.e. find some k such that $|\text{Rubiks}| \leq k$

Solution

There are 6 colors on the Rubik's Cube, and $9 \times 6 = 54$ stickers. Thus, there are at most

$$6^{54}$$

states of the Rubik's Cube (each sticker can be one of 6 colors).

Let g be an arbitrary sequence of turns. Denote

$$g^m = g \underbrace{\circ \dots \circ}_m g$$

to be the function that applies g m times. Also, let $s \in \text{Rubiks}$ be the solved state of the cube.

e.) Show that for some $m \in \mathbb{N}$ with $m \geq 1$, $g^m(s) = s$. That is, after m applications of the sequence of moves defined by g , we return to the solved state!

Hint. Consider the sequence $s_0, s_1, s_2, \dots$ where $s_0 = s$, and $s_i = g^i(s)$.

Solution

Let g be any sequence of turns. Let k be the upper bound on Rubiks. Let $s = s_0$ be the solved state and $s_0, \dots, s_k \in \text{Rubiks}$ be the sequence of states obtained by repeatedly applying g . I.e. for $i \in \mathbb{N}, i \geq 1$, $s_i = g^i(s)$.

Note that since there are $k + 1$ states in the sequence, and $|\text{Rubiks}| \leq k$, by the pigeonhole principle, there is at least one state that appears at least twice in the sequence. Let $m \in \mathbb{N}$ with $m \leq k$ be the first index for which the sequence $s_0, \dots, s_m$ has some state appearing twice. I.e. $s_0, \dots, s_{m-1}$ are distinct and $s_m = s_i$ for some $i \in \mathbb{N}, i < m$.

We'll show that i must be 0. By contradiction, suppose $s_m = s_i$ for some $i > 0$. Then $g(s_{i-1}) = g(s_{m-1})$. Since $i < m$, and m is the first index for which there is a repeated state, $s_{i-1} \neq s_{m-1}$ – but this contradicts the fact that g is injective!

Thus, $g^m(s) = s$.

3.4 Course Website

When I teach CSC236 in summer terms, I develop my own course website. [Here](#) is the website for the most recent iteration of the course.

CSC236 Summer 2025

Search:

Lectures

- Lecture 01: Functions
- Lecture 02: Graphs
- Lecture 03: Induction 1
- Lecture 04: Induction 2
- Lecture 05: Recurrences 1
- Lecture 06: Recurrences 2
- Lecture 07: Recursive Correctness
- Lecture 08: Iterative Correctness
- Lecture 09: Formal Language Theory 1
- Lecture 10: Formal Language Theory 2
- Lecture 11: Formal Language Theory 3
- Lecture 12: Review, Preview, and Goodbye

CSC236 Summer 2025

Note: This course has now been archived. The problem sets and tutorials have been removed.

Quick Start

1. Join Piazza. [join-link](#), [course-link](#).
2. Read the [syllabus](#).
3. See the [calendar](#).
4. [Got a question?](#)

Schedule

Week	Date	Topic	Reading
1	May 7	Welcome and Functions	VH {0.1-0.3, 0.6}
2	May 14	Graphs	
3	May 21	Induction 1, TT1	DL 2, VH {1, 4}
4	May 28	Induction 2	
5	June 4	Recursive Algorithms 1	DL 3, VH {2.7-2.8, 3}
6	June 11	Recursive Algorithms 2, TT2	

On this page

- [Quick Start](#)
- [Schedule](#)
- [Course Info](#)
- [Calendar](#)

Figure 9: Website screenshot

The main benefit of this approach is that all course content is in one place, including lectures, tutorials, and problem sets. This enables the following:

- **Search functionality.** There's a search bar that lets students find what they are looking for quickly. In my experience, this drastically reduces the number of clicks required to find something.

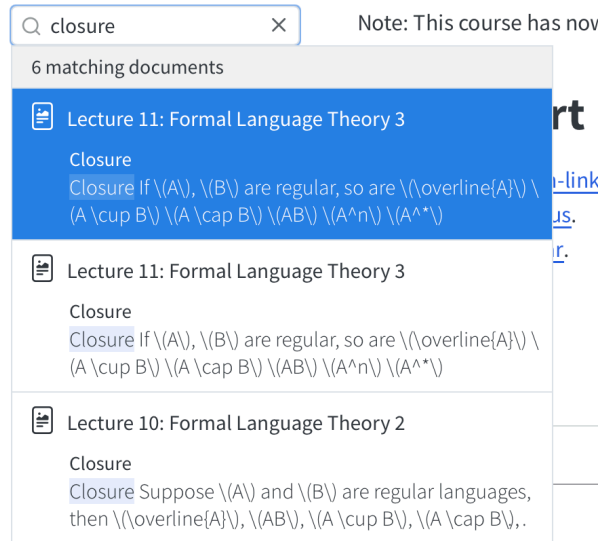


Figure 10: Website search example

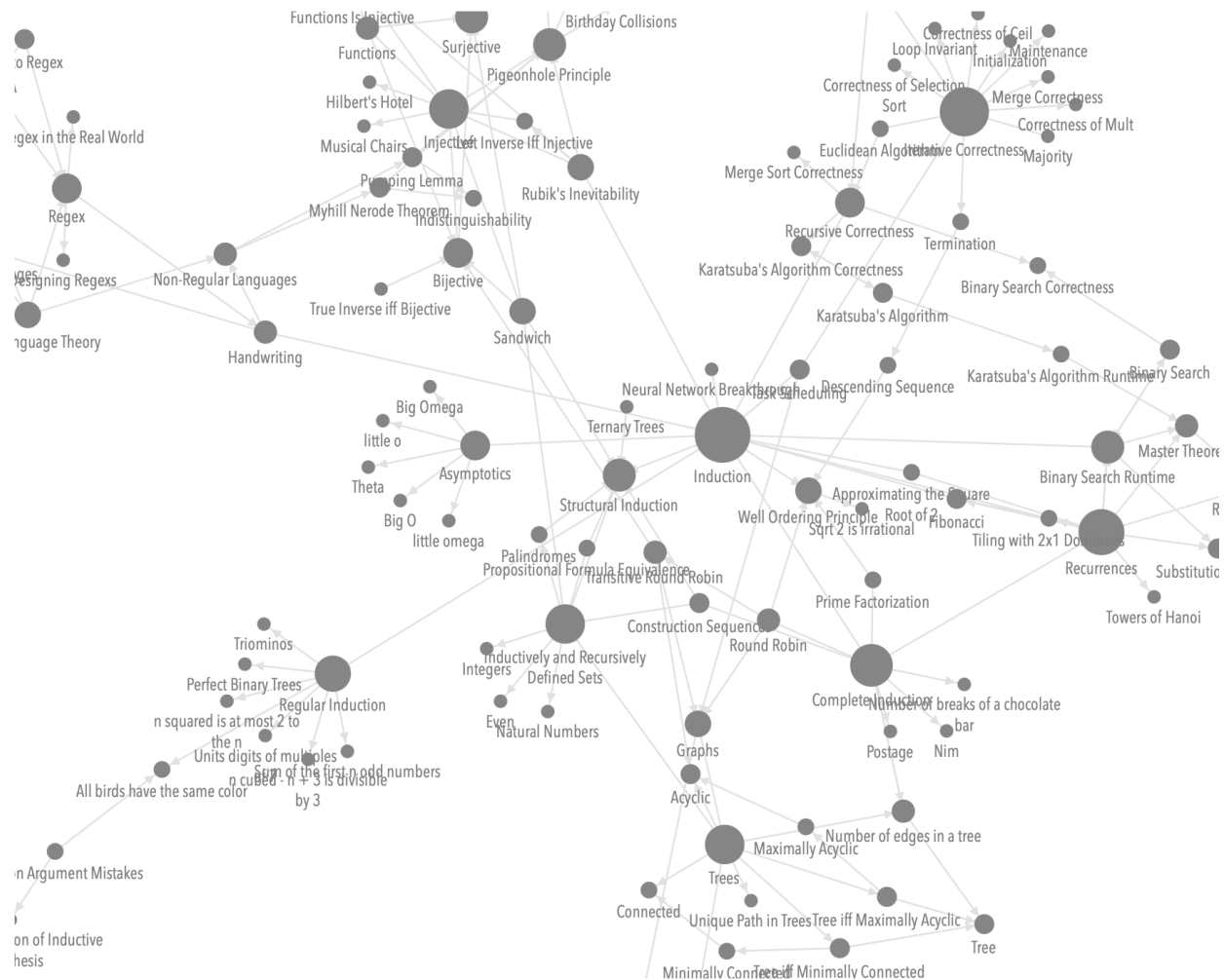
- **Everything is linkable.** Not only does each lecture/assignment/tutorial have links, each heading and subheading in each webpage also have links. This allows me to precisely direct students to relevant material. For example – [here is The Master Theorem](#).

It's also faster than the course management system that the university provides.

While creating a website seems overkill when other course management systems like Quercus / Canvas are available, the website actually made things easier for me to manage.

- Since I create the website, I can automate much of the updating.
- It's easier to deal with students enrolling late – I can just link them to the course website instead of looking them up on the CMS and manually adding them as an observer.

3.5 CSC236 Concept Map



I made this concept map as a present to my students in CSC236 at the end of the course.

I showed it to them in the last lecture for them to celebrate how much they have learned over the semester. I wanted students to appreciate the breadth of topics we covered and how they all fit together. Seeing all the topics laid out like this seems very impressive and hopefully makes the students feel accomplished.

Next time I teach, I will keep a running version of this map throughout the course, updating it as we cover new topics. This may help students see how new topics fit into the big picture as we go along. I also imagine a cool animation of the graph growing as we cover new topics, starting as a few nodes and gradually expanding into the full map by the end of the course – that could be awesome!

3.6 Tutorials Slides

I have TA'ed for CSC448 (Formal Languages and Automata) and CSC463 (Computational Complexity and Computability) several times, and I have developed tutorial slides for both courses

that cover some additional topics. These tutorial slides I developed are still being used in current iterations of the course.

I would like to highlight tutorial 9 on the time hierarchy theorem from CSC463, which I include in the appendix (Section 8).

Here are dropbox links to the full set of [tutorial slides for CSC463](#), and [tutorial slides for CSC448](#).

3.7 Inspirit AI

Before starting my PhD, I developed several AI projects for high school and middle school students for [Inspirit AI](#). A big part of this work involved making AI concepts accessible and fun for younger students. Here are some of the projects I developed.

- Self-driving cars: [1](#), [2](#), [3](#)
 - In this project, students gradually build models to drive cars in one of the OpenAI Gym environments.
 - The project starts with basic models to decide whether the road turns left or right and gradually builds to models based on behavioral cloning and deep Q-learning.



Figure 11: Screenshot from self-driving car project

- COVID-19 mask detection: [1](#), [2](#), [3](#)
 - In this project, students build models to detect whether or not someone is wearing a mask.
 - The models start very simple (using the color distribution of the input image) and gradually get more complex, building up to a convolutional neural network with a facial recognition preprocessing step.
 - Students then get a chance to test the model on their images.
- [Game-playing AI – the minimax algorithm and variants](#)
 - Students implement the minimax algorithm and use it to play tic-tac-toe and Connect 4.
 - Students tune a heuristic evaluation function and then get to play against their algorithm, which is always fun :)

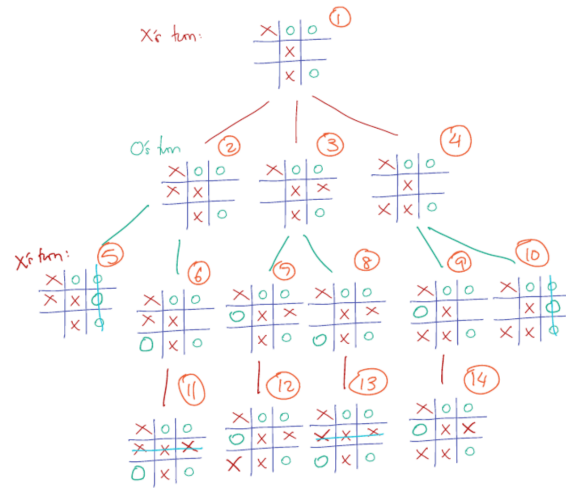


Figure 12: Game tree visualization

4 Course Evaluations

In this section, I summarize some information from my course evaluations.

- Section 4.1 picks out some comments from students grouped by theme,
- Section 4.2 summarizes the quantitative rating data from my course evaluations.
- My raw course evaluations can be found in the appendix (Section 6).

Scope: 6 courses between 2022 and 2025 (see Section 2).

4.1 Comments

4.1.1 Creating a positive learning environment

“The overall quality of the instruction of the course was very positive and strong. It was very well organized, each lecture signified a different section of the course and all material supported each other which really help create a learning atmosphere for me.”

“Clear instruction, good atmosphere, gives opportunity to discuss, always leave room for student to express confusion, overall incredible.”

“Harry is a good instructor who explains concepts clearly. In-class examples were well-chosen to illuminate the subject matter. He brings a good sense of energy to the class and keeps things moving at a good pace. The class at times had a wonderful informal vibe, where people seemed to feel empowered to ask questions. I would encourage taking more moments for class participation and/or for students to work on problems on their own, as this was engaging when it happened.”

“Harry was very engaging in lectures and created a great teaching atmosphere. He also responded quickly to my questions.”

4.1.2 Relevant examples and applications

“Great! I really enjoyed the course a lot! I find that the material on its own is not easy but Harry made it a lot more interesting and engaging in the lectures/homework questions so I actually felt more inclined to learn more about it.”

“One of the best instructors I’ve had at UofT so far. Mr. Sha comes in to his lectures with a lot of enthusiasm. Additionally, when creating / providing examples for his slides or homework problems, he comes up with things that “relate” in a way to people who grew up in my generation. I also love the doodles he created for his lecture examples. The format of the course is conducive to learning: ie. when you show your effort in your homework solutions, you are not punished for the mistakes you made, synonymous to my belief that problem sets / homework are tools to learn from your mistakes, whereas midterms/finals are to show what you have learnt.”

“Professor Sha did an excellent job at making CSC236 a really engaging, interesting, and overall enjoyable experience. All of the course materials used and developed by Professor Sha for this course showed a high level of detail, care, and thought, including lecture slides and homework assignments. Lecture content was extremely engaging, and covered a wide variety of CS concepts in good detail.”

“The instructor was very enthusiastic and presented information well. He was very approachable and answered questions in an encouraging manner. I liked the commentary tying the material to future endeavors and related fields in computer science and STEM applications. Problem sets and tutorial questions were critical in solidifying understanding of lecture content. Tutorial videos solving problems were a great add.”

“Harry pulled on a lot of application-type presentations to explain new concepts to us, and this helped it stick with me more rather than a pure theoretical take on the concepts. I found the problem sets to further enforce the content that we learned in class in a fair manner as well as being fun to do (like a puzzle). He allowed a lot of opportunity for us to ask questions and brought up some of his own if no one was asking any (I found this helpful since his self-questions were ones I had on my mind).”

4.1.3 Effective lecturing and class participation

“Extremely well planned and executed lectures and tutorials. Professor was an absolute pleasure to listen to and I would highly recommend any class he teaches. He really knows his material and has a deep passion for the subject.”

“Harry has a deep grasp of the lecture material and explains it quite well. Unfortunately the course material does get quite repetitive but Harry’s charm allows for this reengagement to still be a little intellectually satisfying.”

“I have previously taken an equivalent course at another campus, but I had a more pleasant and motivating learning experience with Harry. The level of assignments and midterms are adequately adjusted to show my understanding of the course materials and challenge me sometimes. Harry really takes his time to answer any questions, introduces techniques to tackle problems, and creates an enjoyable atmosphere during lectures. Although I find the nature of the subject material to be difficult, it was his teaching that made me like solving problems in this class.”

“Harry is a superb lecturer. It is clear that he cares a lot about the material and wants his students to succeed. He explained the material in a very clear and understandable way, which allowed me to spend most of my revision time approaching practice problems/assignments rather than retroactively trying to decipher lecture material (as I did for 236 and 263). I also really appreciated that Harry did a good job of summarizing concepts so I could intuitively understand them and not memorize as much.”

“Lectures were engaging and relatively easy to follow”

4.1.4 Generating enthusiasm and creativity for the course

“One of the best quality instruction I’ve ever received in any course at UofT. The prof generates a great deal of enthusiasm towards the course content. Furthermore, every now and then, he pauses to ask the class if they have any questions which I think is a great thing.”

“The instructor designed very thought-invoking homework and tutorials to help understand and apply course concepts”

“Quality was amazing, Harry is a phenomenal instructor who describes topics clearly and is very approachable. He makes learning fun!”

“Professor Sha is an extremely enthusiastic teacher, and his knowledge and excitement about course content was obvious during every lecture. I’m a physics major but I looked forward to this class’ lectures more than my physics class’ lectures!”

“The quality of instructions was very impressive. Harry made the class very accessible and fun. Really enjoyed learning in his class.”

4.1.5 Course organization

“Excellent course and great delivery. Loved the fact that the homework was not graded for correctness but for effort and this allowed to study so much better for exam.”

“Overall the course is clear. I really like the fact that professor helped us to find an assignment partner. This really motivated me to learn more and be more and submit assignment in time.”

“Very straightforward slides / website. The professor (Harry Sha) was also very organized and attentive”

4.1.6 Overall quality of the course

“Harry was an excellent instructor. Truly a super nice person, and actually wants all of his students to succeed. Harry taught the material really well, and communicated difficult concepts really well.”

“The instructor did an excellent job of teaching this course. He made the course enjoyable while keeping it intellectually challenging and did administration tasks well.”

“Harry is an excellent instructor and very approachable and enthusiastic excellent”

“Harry Sha is one of my favorite course creators in my time at uoft. everything in the course was immaculate. from the amazing assignments, to the crystal clear slides. He took a extremely difficult topic and made it accessible and understandable to everyone”

“Excellent. The best course I have taken in the university so far!”

4.2 Ratings

Question Number	Question
1	I found the course intellectually stimulating.
2	The course provided me with a deeper understanding of the subject matter.
3	The instructor (Harry Sha) created an atmosphere that was conducive to my learning.
4	Course projects, assignments, tests, and/or exams improved my understanding of the course material.
5	Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.
6	Overall, the quality of my learning experience in this course was:
7	The instructor generated enthusiasm for learning in the course.
8	Compared to other courses, the workload for this course was:
9	I would recommend this course to other students.

The following charts summarize the quantitative ratings from my all of my course evaluations, they are plotted against departmental and divisional averages for comparison. Ratings are on a scale of 1 to 5.

The total number of responders is 197

Note

Key takeaways

- Scores exceed departmental and divisional benchmarks on all questions.
- The largest margins are on questions 3 and 7, which are about creating a positive learning environment and generating enthusiasm for the course. The margins are 0.35 and 0.34 respectively.

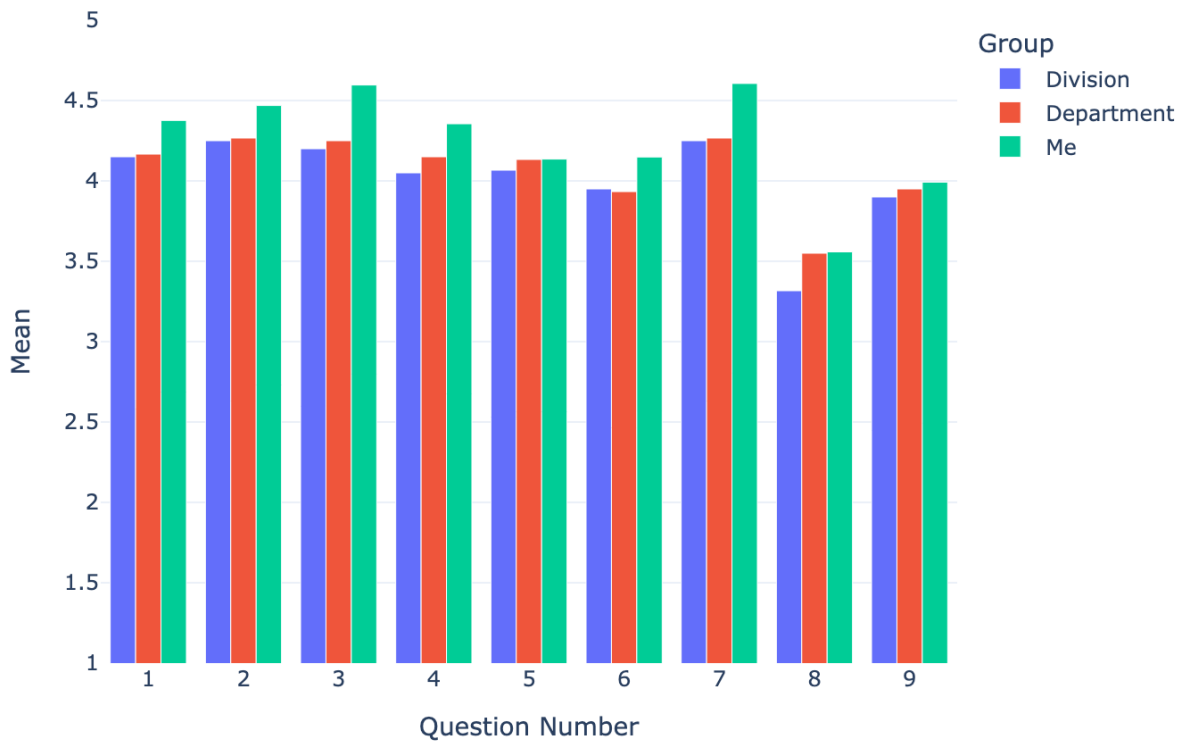


Figure 13: Course evaluations aggregated over all courses I have taught (weighted by number of responders).

Here are the average ratings for courses in which I was the course coordinator / sole instructor. The total number of responders in this subset is 121.

i Note

Key takeaways

- Scores exceed departmental and divisional benchmarks on all questions except question 8 (workload).
- The largest margins are again on questions 3 and 7, with even larger margins (0.52, and 0.48 respectively).

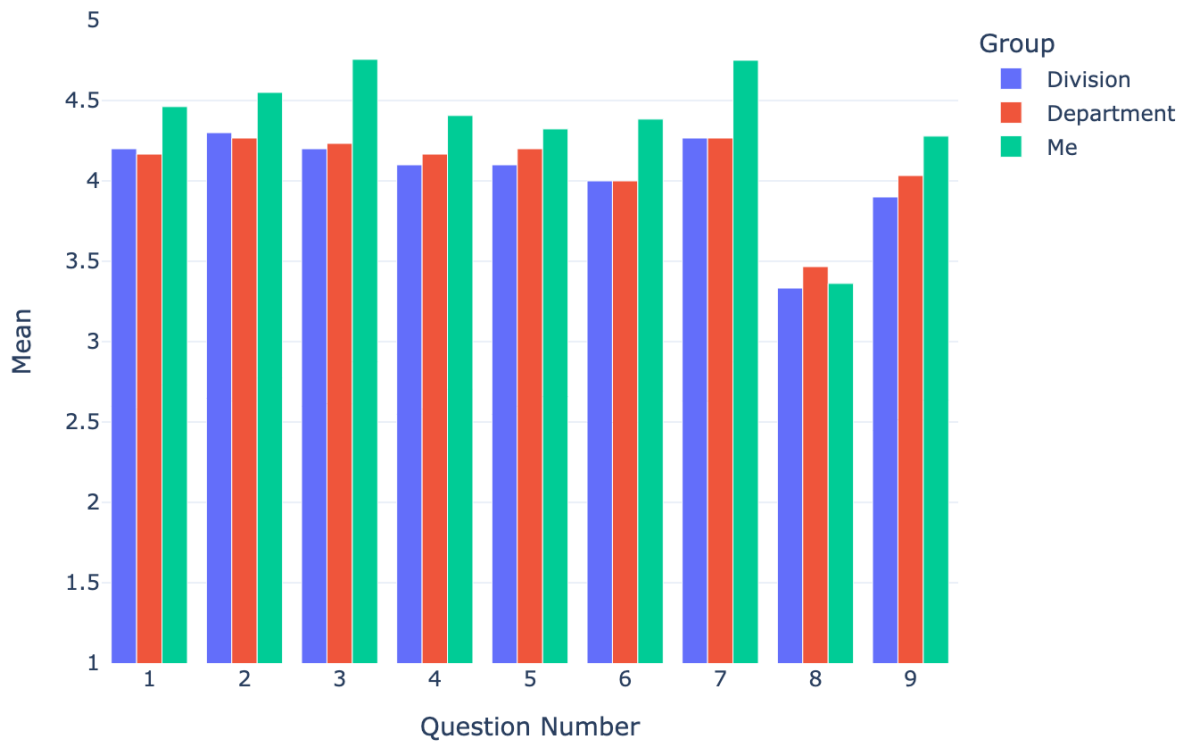


Figure 14: Course evaluations aggregated over courses I coordinated (weighted by number of responders).

Here is the same information as a radar chart.

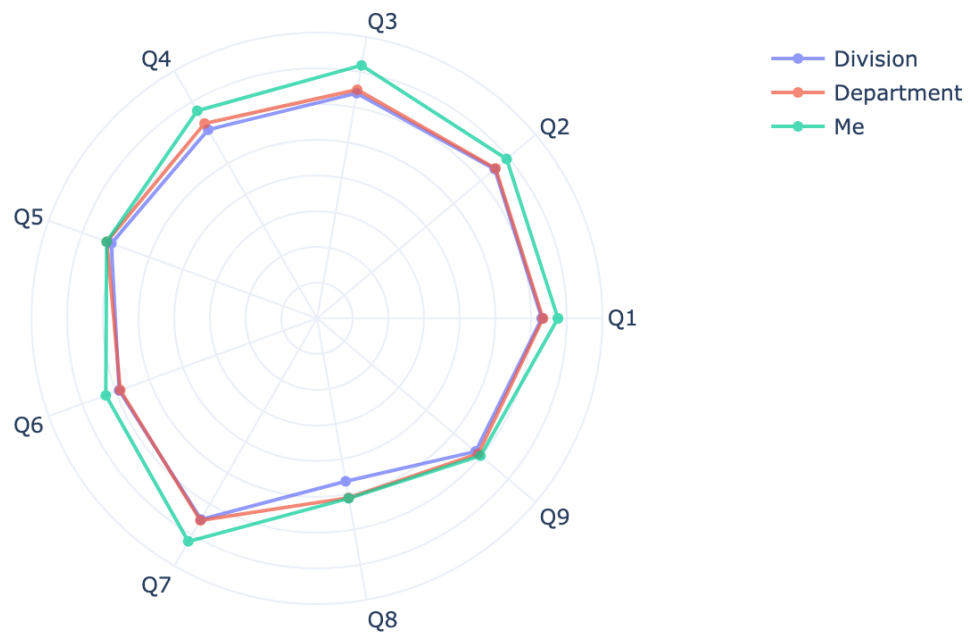


Figure 15: Course evaluations aggregated over all courses I have taught (weighted by number of responders).

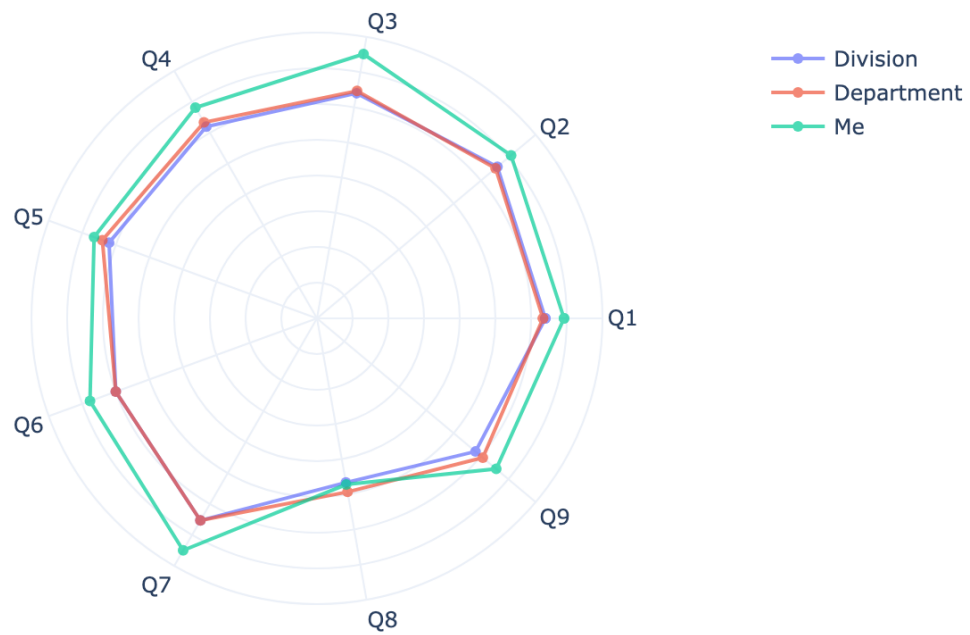


Figure 16: Course evaluations aggregated over courses I coordinated (weighted by number of responders).

5 Scholarly activities related to teaching

5.1 CSC1500 – Fundamentals of Teaching Computer Science in Higher Education

In the fall semester of 2025, I took CSC1500H – Fundamentals of Teaching Computer Science in Higher Education. Taught by [Diane Horton](#), an award-winning teaching stream professor in the Computer Science Department at UofT.

Course description:

In this course, students will learn and apply evidence-based practices in university teaching of computer science. Topics include principles of instructional design, active learning techniques, and assessment of student learning. While based on foundations in the literature, this is a practical course where students will design course materials, give a teaching demonstration, and reflect on the teaching of others. Students will develop a practice of reflecting on their own teaching, and learn to create a compelling, personal Statement of Teaching Philosophy.

Suitable for computer science graduate students interested in an academic career that includes teaching, and who would like to both be effective and enjoy their teaching.

This course was really eye-opening for me and helped me in two main ways.

- We covered theoretical frameworks and some of the pedagogical and psychological research related to teaching. For example, the concept of learning outcomes and backward design was very powerful for me, and really helped me to organize my thinking about designing assessments and my approach to lectures. Before this, I have always been an intuitive teacher, and my teaching practices mainly centered on either my prior experiences teaching or my own experience as a learner. While relying on intuition has worked decently well, learning about the education literature helps a lot, and I am inspired to learn more.
- Diane often gives extremely concrete examples from her own teaching experience, and I have taken several of these and tried to integrate them into my own teaching. Examples of this are
 - “Breaking the sound barrier”: Have everyone in the class say something or make a noise at the start of the lecture (for example, by introducing themselves to each other). This subconsciously makes students feel less afraid of speaking in class.
 - Peer instruction as an active learning technique.
 - Course overview spreadsheet: A spreadsheet mapping out the learning outcomes, assessments, and activities over the entire semester.
 - Lecture logs: A brief log following each lecture about how it went – whether certain activities worked well, or if something took longer than expected, etc.

5.2 Talks, seminars, symposiums

- Geoffrey Herman Talk on effective assessment.
 - Compared frequent testing vs. second chance testing and how they translated into student learning.

- The benefits of their department’s computerized approach to testing.
- 2025 University of Toronto Teaching and Learning Symposium: Teaching and Learning for Human Flourishing
 - I attended a talk about the role of AI in education, and a workshop on learning as play.
- CS Pedagogy Round Table – Doing Computer Science Education Research
 - Several presentations from faculty about their experiences doing CS education research.

6 Appendix – Raw Course Evaluations

6.1 CSC236 – Introduction to the Theory of Computation – Summer 2022

Description of Your Report

Your Course Evaluation Report contains up to four sets of items, represented in up to four sections in your report, described below.

Sets of Items

Institutional Items

These eight items are consistent across the University of Toronto. They are comprised of:

- Five rating-scale items which represent institution-wide teaching and learning priorities.
 - **The institutional composite mean, a mathematical average of these first five items.**
- One rating-scale item on the overall quality of a student's learning experience.
- Two qualitative comment items.

Divisional Items

These items are consistent across your division. They represent division-wide priorities for teaching and learning.

Departmental/Program/Course-Type Items

These items (when applicable) represent further levels of granularity and specificity for teaching and learning priorities within your division (e.g., department, program, course type).

Instructor-Selected Items

These items are optional items which may be selected from the item bank by instructors during the question personalization period.

- **Note that the results from these items are only reported to instructors, as they are primarily intended to function as personal formative feedback.**

Report Sections

The following provide different statistical summaries and representations for your institutional, divisional, and departmental/programmatic items (where appropriate).

Section 1: Course Evaluation Overview

Provides all course evaluation data except instructor-selected items.

Section 2: Response Distributions and Additional Statistics

Provides detailed response distributions.

- The number and relative percentage of respondents providing a given answer is provided, along with a graphical representation.
- This section also reports further statistics for each set of items relative to Section 1.

Section 3: Comparative Data

Provides comparative means for your course as compared to the relevant means across *all other evaluated courses at a particular level of comparison (e.g. division, program)* for each set of items.

Section 4: Instructor-Selected Items

Provides data for optional items that instructors can select from the item bank during the question personalization period. This section is formatted identically to Section 2.

Statistical Terms Used in this Report

Mean: The mathematical average. This measure is the most sensitive, and can be greatly affected by extreme and/or divergent scores.

Median: The middle value when all responses are ordered. This measure is less affected by extreme and/or divergent scores.

Mode: The most frequently occurring score.

Standard deviation: A measure of the "spread" of the data.

FAS Summer 2022 'YS' Undergrad

Course Name: Intro to Theory Comp CSC236H1-Y-LEC5101 (INPER)
Division: ARTSC
Session: Y
Session Codes: F = First/Fall, S = Second/Winter

Instructor: Harry Sha
Section: LEC5101
Delivery Mode: INPER

Report Generation Date: September 2, 2022

Raters	Students
Responded	54
Invited	123

Section 1: Course Evaluation Overview

Part A. Core Institutional Items

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

Question	Summary	
	Mean	Median
I found the course intellectually stimulating.	4.6	5.0
The course provided me with a deeper understanding of the subject matter.	4.6	5.0
The instructor (Harry Sha) created an atmosphere that was conducive to my learning.	4.9	5.0
Course projects, assignments, tests, and/or exams improved my understanding of the course material.	4.7	5.0
Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.	4.6	5.0
Institutional Composite Mean	4.7	-

Scale: 1 - Poor 2 - Fair 3 - Good 4 - Very Good 5 - Excellent

Question	Summary	
	Mean	Median
Overall, the quality of my learning experience in this course was:	4.6	5.0

7. Please comment on the overall quality of the instruction in this course.

Comments
The overall quality of the instruction of the course was very positive and strong. It was very well organized, each lecture signified a different section of the course and all material supported each other which really help create a learning atmosphere for me.
It was excellent. Lectures are well paced and teaching is very clear.
Great! I really enjoyed the course a lot! I find that the material on its own is not easy but Harry made it a lot more interesting and engaging in the lectures/homework questions so I actually felt more inclined to learn more about it.
clear insturction, good atmosphere, gives opportunity to discuss, always leave room for student to express confusion, overall incredible.
Harry Sha is one of my favorite course creators in my time at uoft. everything in the course was immaculate. from the amazing asignments, to the crystal clear slides. He took a extremelly difficult topic and made it accessible and understandable to everyone
The instructor was very knowledgeable and explained content in a very effective manner.
The instruction of the course was well-paced. It covered not just the content that was expected but beyond by bringing current exploring topics that correlate with course content. The course was easy to follow and allowed me to learn very easily.
It was mostly good. Maybe a little bit more preparedness as there were times it felt like improv
Highest.
Very clear and Harry was very approachable and open to questions.
Excellent
The Professor was very clear during the lecture and explained concepts in a way that made sense, making sure to answer any questions that anybody in the class had.
Harry is an awesome instructor. I think the course material is heavy, but Harry did do his best to convey the info in digestible way. There were a few gaps that I think was on purpose to promote learning. Overall I highly recommend Harry as an instructor. However I wouldn't recommend this course unless Harry is teaching it.
The instructor did an excellent job of teaching this course. He made the course enjoyable while keeping it intellectually challenging and did administration tasks well.
Harry was very engaging in lectures and created a great teaching atmosphere. He also responded quickly to my questions.
Excellent quality of instruction.
Pretty good
It went really well, not too fast as I expected! The quality was great!
Gooooood
The pace of the course is adequate, with enough and strong example.
I wish Harry could be more confident. Incredible lecture, but he sometimes cuts himself off or goes back and forth when discussing contents. I can see that he is trying to make us better understand the content, it would be much better if he does not go back and forth.
Professor Harry Sha made this course extremely enjoyable. He was very knowledgeable and I learned a lot through his teachings. I felt confused during lectures on certain topics but the professor gave us many opportunities to furnish our skills through assignments and tutorials.
Overall was a intense course. I learned alot
Overall the course is clear. I really like the fact that professor helped us to find an assignment partner. This really motivated me to learn more and be more and submit assignment in time.
good
Professor Sha did an excellent job at making CSC236 a really engaging, interesting, and overall enjoyable experience. All of the course materials used and developed by Professor Sha for this course showed a high level of detail, care, and thought, including lecture slides and homework assignments. Lecture content was extremely engaging, and covered a wide variety of CS concepts in good detail.
Good things – Homeworks are relatively fun and allowing us to discuss questions with anyone (provided that we cite each other) creates a more supportive environment for doing homework – Your passion during lectures and office hours was awesome – Website has course content in one place and overall organization of course was excellent
Areas for improvement – Perhaps having more oportunties for active learning during lectures would be nice. This might be having time to try in-class

Comments
exercises on our own and discuss them with a partner. – Maybe TAs can take up solutions to tutorial problems by writing them on a board, instead of narrating the solution slides
The instructor designed very thought-invoking homework and tutorials to help understand and apply course concepts
One of the best quality instruction I've ever received in any course at UofT. The prof generates a great deal of enthusiasm towards the course content. Furthermore, every now and then, he pauses to ask the class if they have any questions which I think is a great thing.
Excellent. The best course I have taken in the university so far!
Engaging lectures, material explained and dissected in a coherent manner. Homework was extremely creative and interesting; allowed a deeper, more conceptual understanding of course material.
Materials are very well delivered in an interesting way.
Mostly clear. The instructor explained concept well.
The lectures were well organized and Harry made an active effort to ensure that the class understood the contents of the lecture.
the overall quality was great
The instructor and TAs are great! They take their time in explaining and answers students' questions. The pace of the course is great. Approachable teaching team.
Harry has been a great professor throughout this semester. It was a great experience for me to take his class and learn cool stuffs. I really appreciate his help. And I think it will be great for future CSC236 students to have him to be the professor.
Harry pulled on a lot of application-type presentations to explain new concepts to us, and this helped it stick with me more rather than a pure theoretical take on the concepts. I found the problem sets to further enforce the content that we learned in class in a fair manner as well as being fun to do (like a puzzle). He allowed a lot of opportunity for us to ask questions and brought up some of his own if no one was asking any (I found this helpful since his self-questions were ones I had on my mind).
good
was great, made the material interesting and taught in an understanding way

8. Please comment on any assistance that was available to support your learning in this course.

Comments
The tutorials and ED.
It was excellent. The instructor is very responsive on online forum and holds office hours.
Harry was very open and considerate to all of our questions and made sure we understood the material. Also, the lectures didn't feel rushed which I deeply appreciate.
We have weekly in person OH, tutorial, and Harry is open to answer question after the lecture/on ed.
the slides were amazing and the assignments were structured in such a way as to make understanding easier
Having access to Ed was very useful for seeking assistance.
I had a board where questions can be asked. I have the prof and TA that I can go to for help.
I feel as if online office hours would've helped a ton as I couldn't always afford to go to OH
Office hours, discussion board.
Excellent
The Professor was quick to respond to posts on Ed with great detail and provided opportunities to ask questions after lectures.
TA's and office hours
The TAs were helpful in filling in my knowledge gaps and answering my questions
His office hours were very helpful and allowed me to understand the course material deeper
Extra resources, lecture recordings, and lecture slides
The assistance was great !
Gooooood
The tutorial is really helpful to consolidate my knowledge from the lecture.
During breaks in between lectures and during office hours, the professor was very approachable and I was able to ask questions. I consulted Ed Discussion (an online platform used to ask questions) for questions regarding assignments and lecture material, and the TAs were approachable as well.
Accessibility center helped me a lot.
such as discussion time
Harry ran in-person office hours twice during the week, to answer any questions regarding lecture materials or to answer homework questions. Otherwise, the course used the excellent online platform ED for posting announcements online and for answering questions. Harry was always quick to respond to questions online.
Office hours, dedicated time for asking questions during lectures, online forum
Harry Sha is super available and helpful during his office hours.
Ed was a platform that was used for students and instructors to share comments and concerned about lecture material and homework problems. Moreover, it allowed for discussions on elements beyond course syllabus.
Lots of assistance through instructor's OH, TA's OH. In addition, I particularly appreciate that the instructor encourages people to ask questions during the lecture time whenever we don't understand, which was extremely helpful when learning new and difficult concepts.
The professor and TAs offered office hours for us to ask questions. Additionally, tutorials were ran after lectures, where students had the opportunity to ask TAs questions.
we had OH every week and ed was extremely helpful
Office hours were great. The TA also offered more explanations when asked.
I think the teaching team is very responsible so there no more comment.
There were regularly scheduled office hours in the course (most of which I'd used for help with problem sets) and this was good because I knew when I could "save up" my questions for and bring them forth. Additionally, the Ed Discussion board was a great addition (especially with the bonus 2%) because everyone (both Harry and peers) was active on there, both answering and asking questions. Finally, tutorials were a good way to further cement some knowledge because rather than give the answers, the TAs gave more of a blueprint, not a surefire path (good for learning).
if could offer a list of textbook and give us some recommending content weekly would be helpful to us to interpret the content
Ed was very useful

Part B. Divisional Items**Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal**

Question	Summary	
	Mean	Median
FAS001 The instructor (Harry Sha) generated enthusiasm for learning in the course.	4.9	5.0

Scale: 1 - Very Light 2 - Light 3 - Average 4 - Heavy 5 - Very Heavy

Question	Summary	
	Mean	Median
FAS002 Compared to other courses, the workload for this course was...	3.5	3.0

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - Strongly

Question	Summary	
	Mean	Median
FAS003 I would recommend this course to other students.	4.5	5.0

Section 2: Response Distributions and Additional Statistics

This section provides detailed response distributions.

Mean: The mathematical average. This measure is the most sensitive, and can be greatly affected by extreme and/or divergent scores.

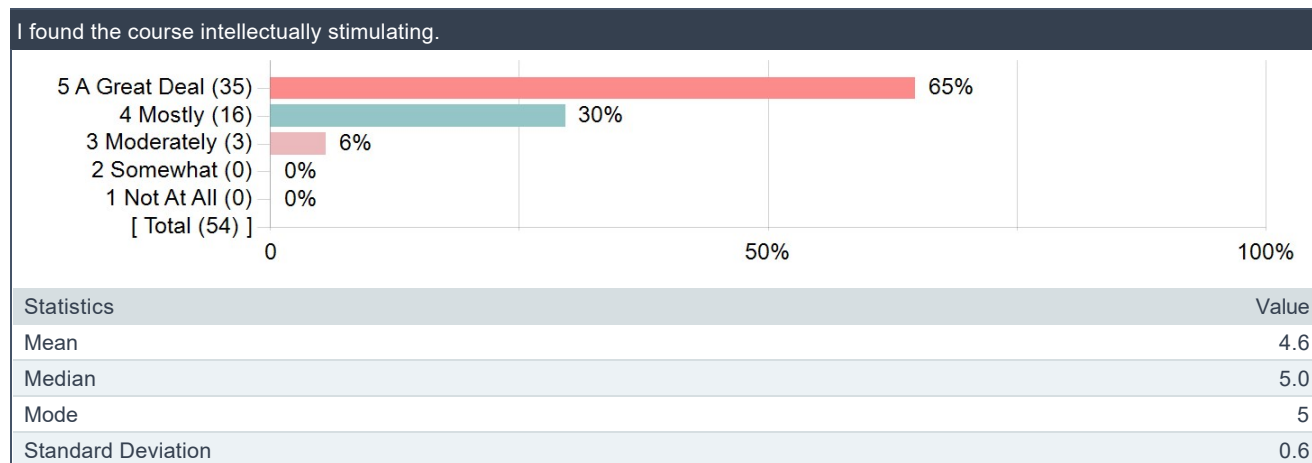
Median: The middle value when all responses are ordered. This measure is less affected by extreme and/or divergent scores.

Mode: The most frequently occurring score.

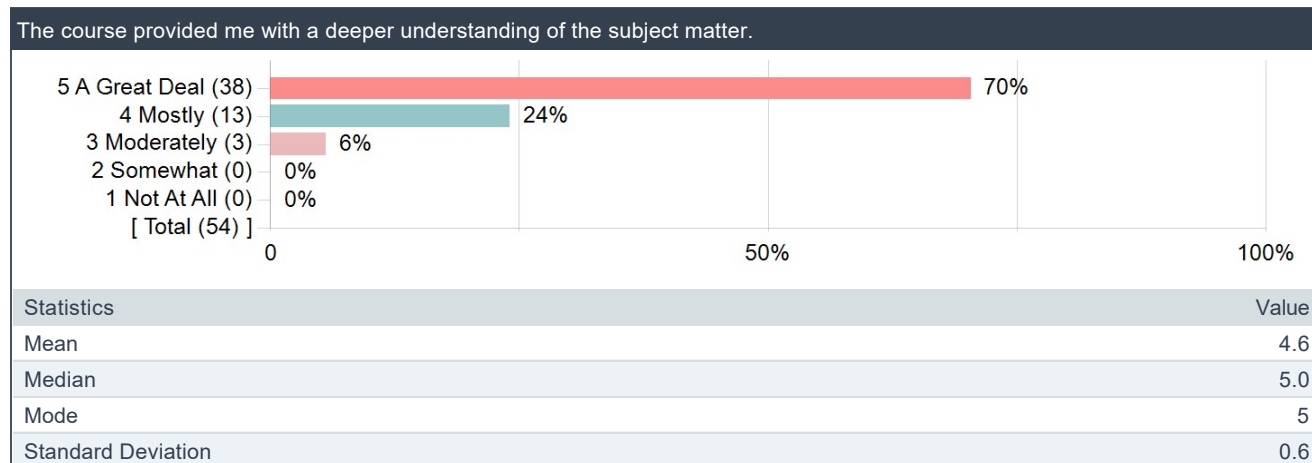
Standard deviation: A measure of the "spread" of the data.

Part A: Core Institutional Items

1. I found the course intellectually stimulating.

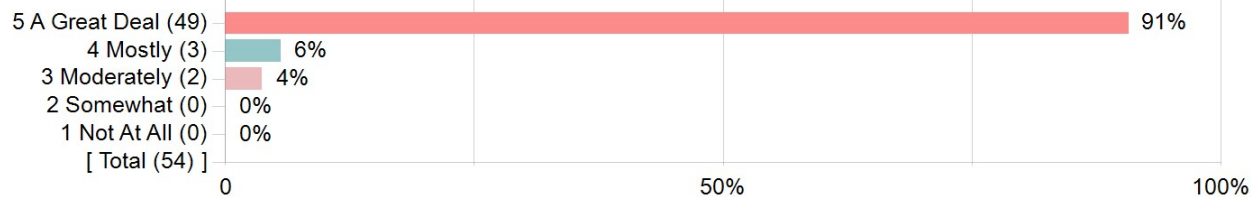


2. The course provided me with a deeper understanding of the subject matter.



3. The instructor (**Harry Sha**) created a course atmosphere that was conducive to my learning.

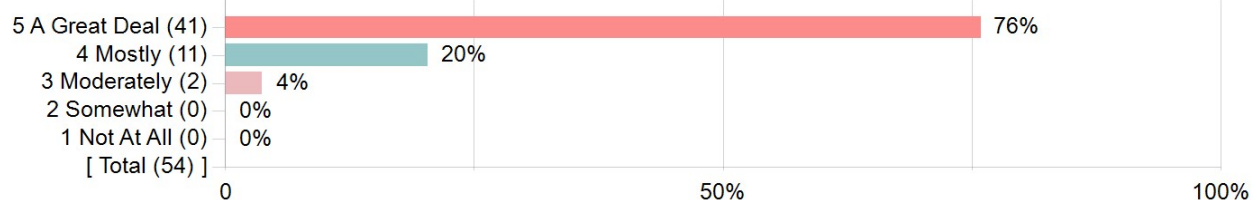
The instructor (**Harry Sha**) created an atmosphere that was conducive to my learning.



Statistics	Value
Mean	4.9
Median	5.0
Mode	5
Standard Deviation	0.4

4. Course projects, assignments, tests and/or exams improved my understanding of the course material.

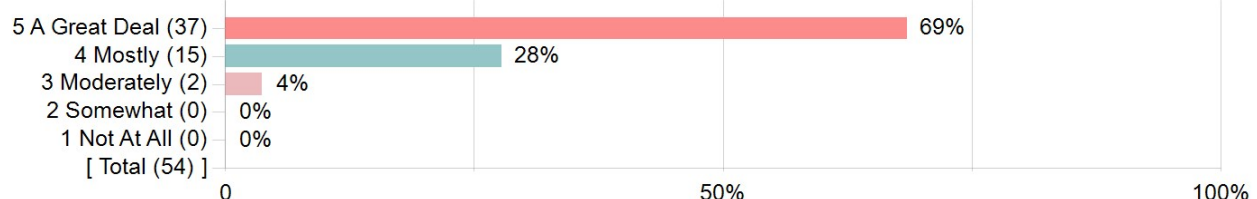
Course projects, assignments, tests, and/or exams improved my understanding of the course material.



Statistics	Value
Mean	4.7
Median	5.0
Mode	5
Standard Deviation	0.5

5. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.

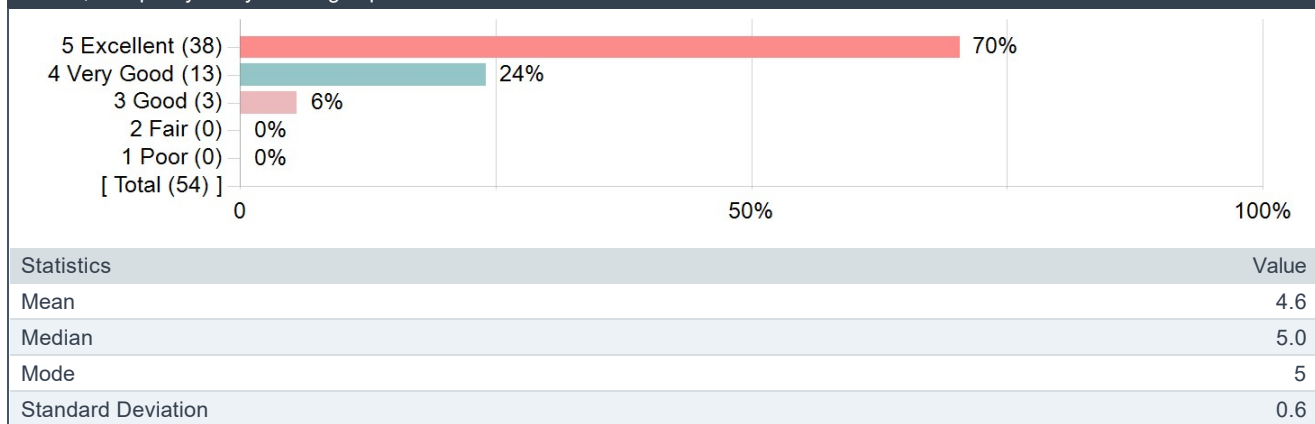
Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.



Statistics	Value
Mean	4.6
Median	5.0
Mode	5
Standard Deviation	0.6

6. Overall, the quality of my learning experience in this course was....

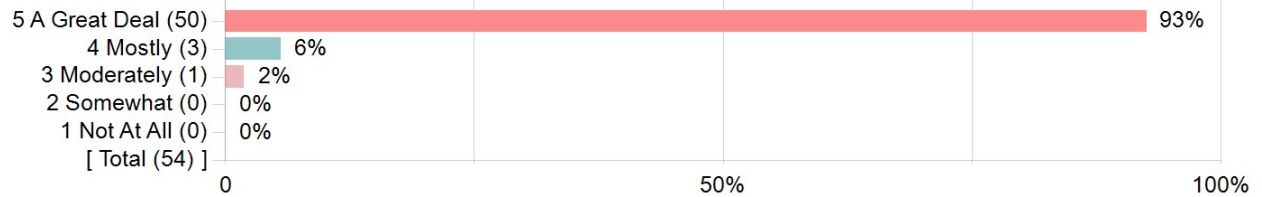
Overall, the quality of my learning experience in this course was:



Part B. Divisional Items

The instructor (**Harry Sha**) generated enthusiasm for learning in the course.

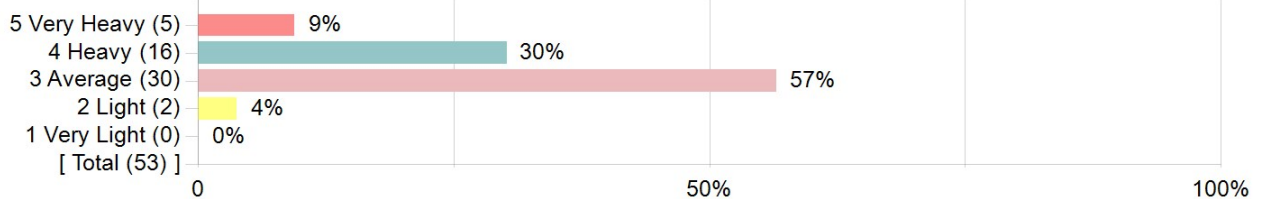
FAS001 The instructor (**Harry Sha**) generated enthusiasm for learning in the course.



Statistics	Value
Mean	4.9
Median	5.0
Mode	5
Standard Deviation	0.4

Compared to other courses, the workload for this course was...

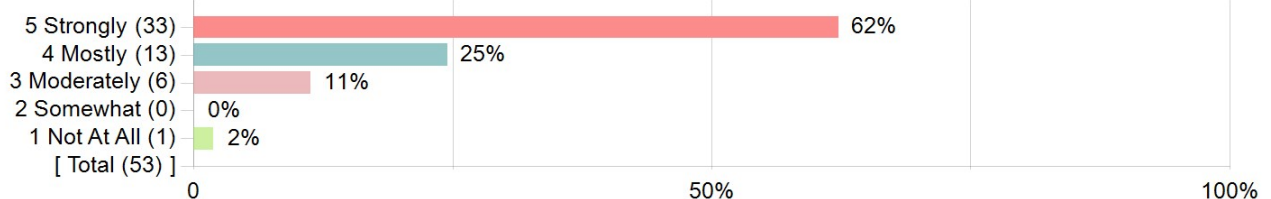
FAS002 Compared to other courses, the workload for this course was...



Statistics	Value
Mean	3.5
Median	3.0
Mode	3
Standard Deviation	0.7

I would recommend this course to other students.

FAS003 I would recommend this course to other students.



Statistics	Value
Mean	4.5
Median	5.0
Mode	5
Standard Deviation	0.8

Section 3. Comparative Data

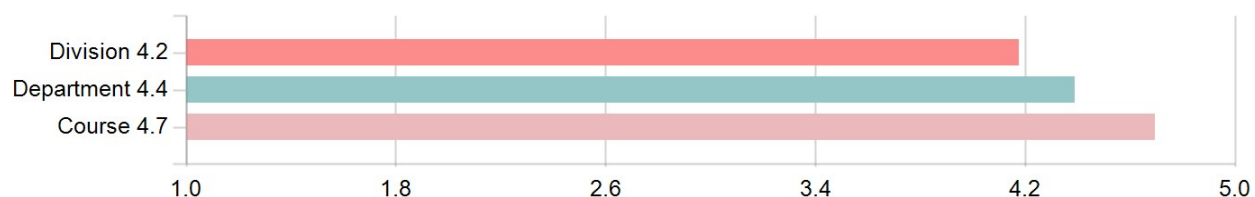
This section provides overall means for given comparators (e.g., division, department) alongside the mean values for a given course. Note that the comparators are calculated by pooling together all individual student survey responses (e.g., student responses for all of the courses in a department are pooled together and the departmental mean responses calculated from that). The provided comparators are thus a measure of the 'average' student experience for a unit or division; they are not a measure of the 'average' course in a unit or division. This calculation has the effect of giving large courses more 'weight' in the calculation of the comparator means. The effect of this on the calculated comparator varies depending on the relative proportion of large or small courses within a unit or division. As such, the departmental and divisional comparative mean values provided on course evaluations should not be regarded as an absolute and definitive benchmark.

For example, if a department offered only two courses, one with 1000 students who all answered 3.5 and the other with 10 students who all answered 4.5 (so that the means would be 3.5 and 4.5 respectively), then the departmental mean provided on the course evaluations would be 3.51 since the calculation would be $[(3.5 \times 1000) + (4.5 \times 10)] / 1010 = 3.51$ and not $(3.5 + 4.5) / 2 = 4$.

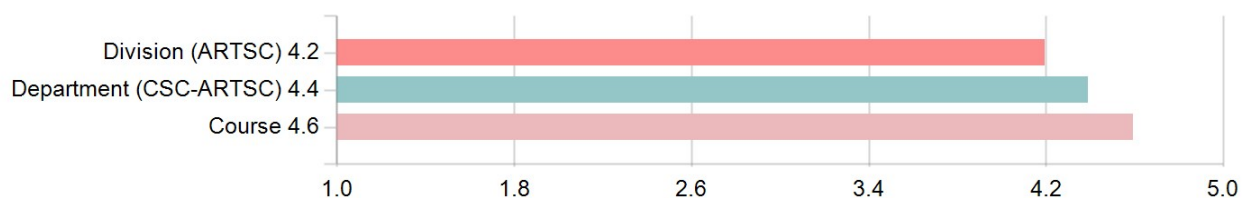
Part A. Core Institutional Items

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

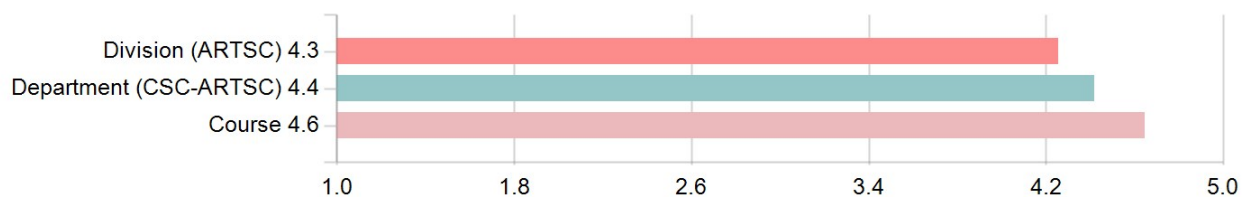
Institutional Composite Mean



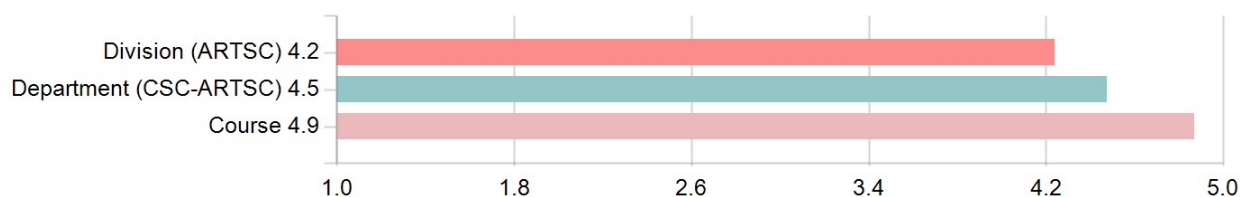
1. I found the course intellectually stimulating.



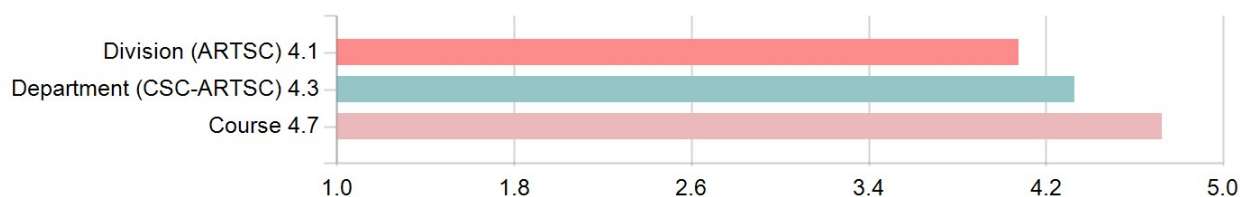
2. The course provided me with a deeper understanding of the subject matter.



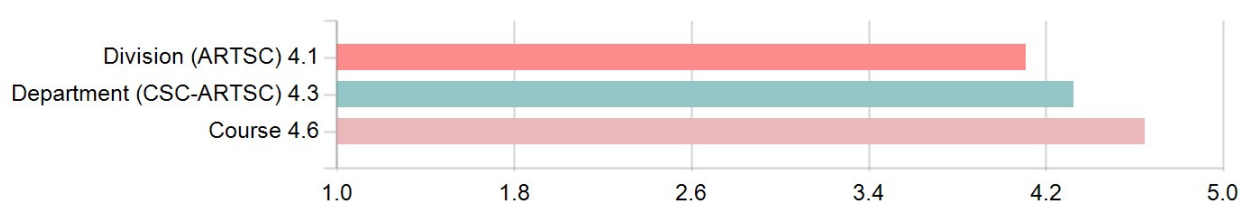
3. The instructor (**Harry Sha**) created an atmosphere that was conducive to my learning.



4. Course projects, assignments, tests, and/or exams improved my understanding of the course material.

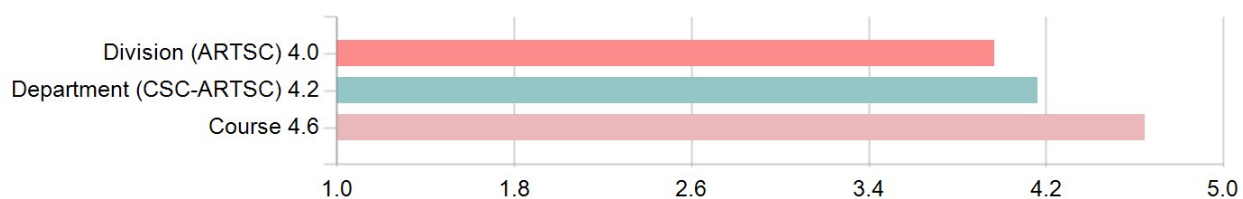


5. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.



Scale: 1 - Poor 2 - Fair 3 - Good 4 - Very Good 5 - Excellent

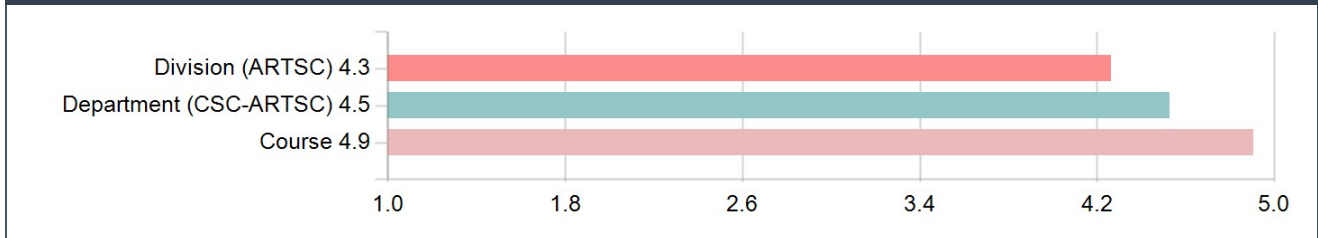
6. Overall, the quality of my learning experience in this course was:



Part B. Divisional Items

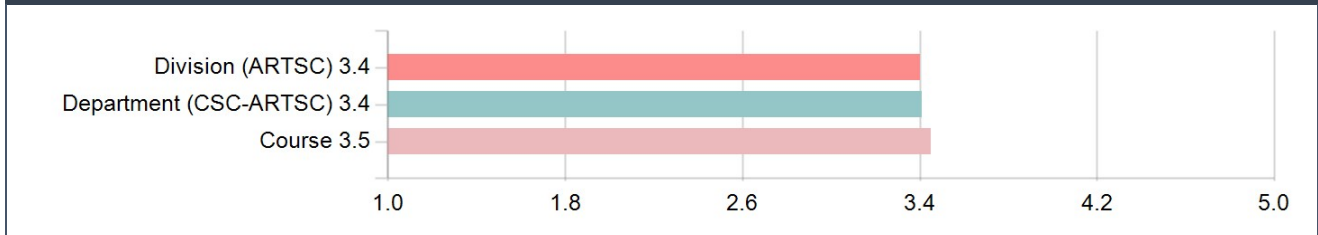
Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

9. The instructor generated enthusiasm for learning in the course.



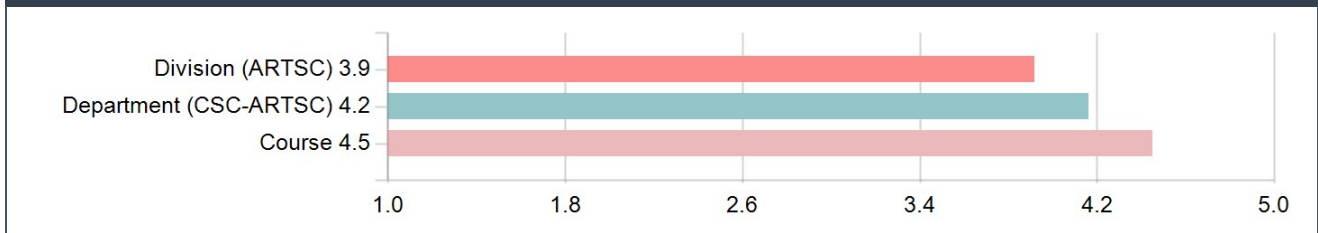
Scale: 1 - Very Light 2 - Light 3 - Average 4 - Heavy 5 - Very Heavy

10. Compared to other courses, the workload for this course was:



Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - Strongly

11. I would recommend this course to other students.



6.2 CSC236 – Introduction to the Theory of Computation – Fall 2022

Description of Your Report

Your Course Evaluation Report contains up to four sets of items, represented in up to four sections in your report, described below.

Sets of Items

Institutional Items

These eight items are consistent across the University of Toronto. They are comprised of:

- Five rating-scale items which represent institution-wide teaching and learning priorities.
 - **The institutional composite mean, a mathematical average of these first five items.**
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- Two qualitative comment items.

Divisional Items

These items are consistent across your division. They represent division-wide priorities for teaching and learning.

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These items (when applicable) represent further levels of granularity and specificity for teaching and learning priorities within your division (e.g., department, program, course type).

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Section 4: Instructor-Selected Items

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Statistical Terms Used in this Report

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Mode: The most frequently occurring score.

Standard deviation: A measure of the "spread" of the data.

FAS Fall 2022 Undergrad

Course Name: Intro to Theory Comp CSC236H1-F-LEC0301 (INPER)
Division: ARTSC
Session: F
Session Codes: F = First/Fall, S = Second/Winter

Instructor: Harry Sha
Section: LEC0301
Delivery Mode: INPER

Raters	Students
Responded	24
Invited	137

Section 1: Course Evaluation Overview

Part A. Core Institutional Items

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

Question	Summary	
	Mean	Median
I found the course intellectually stimulating.	4.0	4.0
The course provided me with a deeper understanding of the subject matter.	4.1	4.5
The instructor (Harry Sha) created an atmosphere that was conducive to my learning.	4.0	4.0
Course projects, assignments, tests, and/or exams improved my understanding of the course material.	4.0	4.0
Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.	3.7	4.0
Institutional Composite Mean	4.0	-

Scale: 1 - Poor 2 - Fair 3 - Good 4 - Very Good 5 - Excellent

Question	Summary	
	Mean	Median
Overall, the quality of my learning experience in this course was:	3.5	4.0

7. Please comment on the overall quality of the instruction in this course.

Comments
I found the bi-weekly term tests a bit overwhelming due the frequency and difficulty. Personally I would have preferred 3–4 term tests however the Problem Sets are a great way of preparing for the term tests and keeping up with the material. The lectures by Professor Sha are very informative and provide great understanding of the course materials and concepts.
Overall very good, however test marking was always very behind and thus it was hard to gauge where you stood in the course
The instruction was OK but it felt more like a prepared presentation than a live lecture. I opted to visit other lecture sections to understand concepts sometimes.
The instructor was very invested in making sure that we all understood the topic in lecture. He frequently checked in to see if we had questions and was very encouraging whenever somebody wasn't sure about a concept or a conclusion that we reached. The course was also very organized which made it really easy to find any material that you needed to learn the content.
banger
He was nervous and sounded uncertain about everything he taught. His handwriting on the board was not clear and very small. Constantly made mistakes and had to correct them.
I did not appreciate the grading structure of this course whatsoever. I understand that testing is essential but having 96% of the grade come from in-person assessments is not conducive to a class full of students who learn and display their learning differently. I for one, find that I do not test well and instead best demonstrate my knowledge through higher-level projects and take-home assessments. I feel like the grades could be spread out more evenly to the problem sets. I also think that releasing partial solutions or hints for the problem sets first and then the solutions could be helpful to those who are struggling but still want to attempt to solve the problem themselves.
I think it was good, homework felt relevant and prepared me very well for the biweekly term tests. The homework did take a very long time to do, although it was a good thing because it was very good practice, and the generous late policy made the homework not a hindrance to my schedule.
The professor provides a stimulating environment by frequent asking for student involvement and encourage discussion. Though sometimes his writing is a bit small and hard to read, but it does not hinder the experience in a major way.
Given the course material, instruction was alright.
The instruction for this course is fairly clear. My instructor was able to give me the necessary teachings to succeed in this course. There was much confusion with the course material as the textbook is very hard to follow but the instructors did a good job to teach us the contents of the textbook. I would recommend changing the textbook used.
I think the course is very well organized and very fair in the problem sets and tests' difficulty
Very good
I want to note that I was going to Francois Pitt's lectures instead of Harry Sha's due to timing and friends Francois's lectures were fun, especially after getting into languages and finite state machines While I didn't like the thought of having 6 term tests, I believe that it is a great way to make sure I'm keeping up with the course. I just wish that problem sets had a higher percentage of the grade or if we could drop some term tests.
Pretty good, he spent a lot of time going over topics that were difficult to understand and had examples. He could write bigger on the board, as sometimes it was hard to see what he was writing.
Note: I did not attend Harry Sha's section for the semester. The feedback will be regarding Francois Pitt. Francois is extremely passionate about this course material. He does his best to expel this enthusiasm onto his students. The quality of lecture is phenomenal and the concepts are very easy to follow while he's teaching. That being said, I found this course material very challenging outside of lecture – but the assignments and tests I would say are fair.
Also, the delays in marking every single term test made it difficult to judge your position on the course. It did not help that you could not review the former test and your mistakes to improve for the next term test. For reference, it is Dec 1 at the time of writing, we have written two term tests since Nov 2, neither have been returned. This is over a month to receive marks back from a 3 question, 45 minute midterm. We have the final midterm coming up next week, we still do not know our mistakes and how to improve since term test 4 and 5.
This course was organized extremely poorly, with little to no feedback given to students on where their pitfalls were. Assignments were not graded on accuracy, which is fine, but left me no ability to see where I was going wrong other than reading the solutions to try and figure it out myself
Good
Excellent
The pacing of this course is fine. The pacing of tests is awful. Every other week consisting of 10% tests does not provide us with adequate time to review the content and properly understand the material. The tests and problem sets are not graded and returned in a reasonable time preventing opportunities to understand if our study habits are effective before it's too late.

Comments
This was a very well-organized and easy-to-follow course. I enjoyed the material and felt as if I understood the concepts in depth.

8. Please comment on any assistance that was available to support your learning in this course.

Comments
Office hours etc.
Notes
There were a lot of office hours and the professors were very excited to teach the subject and often were open to discuss the content before or after lectures which really helps.
The TA for my tutorial was very helpful.
Office Hours.
Not learning specifically but I have had very positive interactions through email to the staff when I had some administrative issues.
I found myself free to ask questions and seek answers quite conveniently. The TA is also very helpful.
There was a piazza with fairly quick responses from other students and instructors.
Professor office hours were very helpful, all the professors were encouraging and made course concepts easier to understand.
I did not need any assistance
office hours, ed, textbook, problem sets answers, past exams before term tests.
Personally only used problem set answers, past exams, and slides to prepare for exams/while doing psets
I think the textbooks in this course do a good job in explaining the topics covered. Using some videos go along the textbook material helped me understand what was going on.
Extra office hours were provided before term tests to assist students with any questions they might have.
None.
Good
Great
Office hours and Ed

Part B. Divisional Items**Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal**

Question	Summary	
	Mean	Median
FAS001 The instructor (Harry Sha) generated enthusiasm for learning in the course.	4.0	4.0

Scale: 1 - Very Light 2 - Light 3 - Average 4 - Heavy 5 - Very Heavy

Question	Summary	
	Mean	Median
FAS002 Compared to other courses, the workload for this course was...	3.7	4.0

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - Strongly

Question	Summary	
	Mean	Median
FAS003 I would recommend this course to other students.	3.4	3.0

Section 2: Response Distributions and Additional Statistics

This section provides detailed response distributions.

Mean: The mathematical average. This measure is the most sensitive, and can be greatly affected by extreme and/or divergent scores.

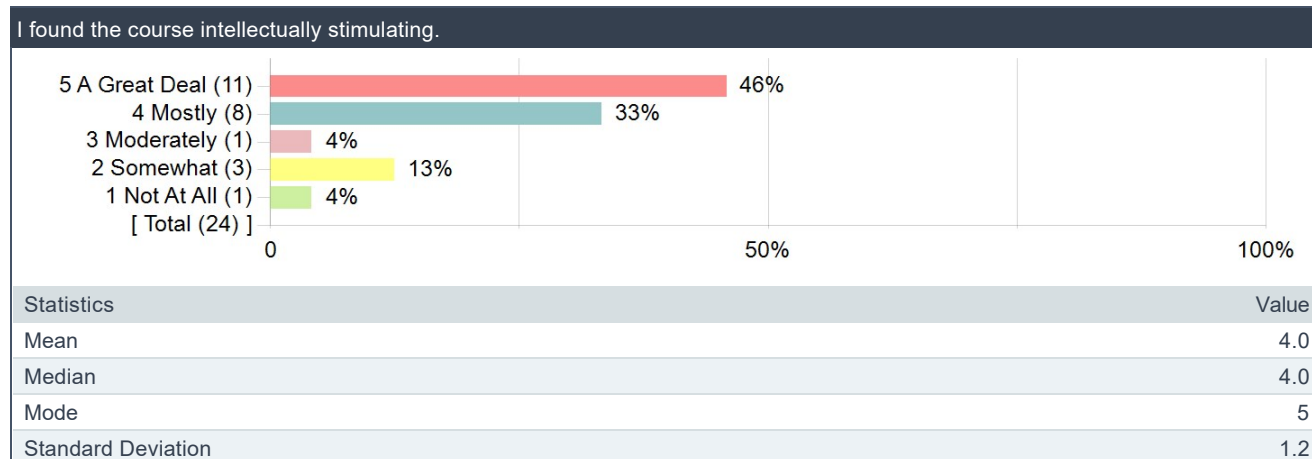
Median: The middle value when all responses are ordered. This measure is less affected by extreme and/or divergent scores.

Mode: The most frequently occurring score.

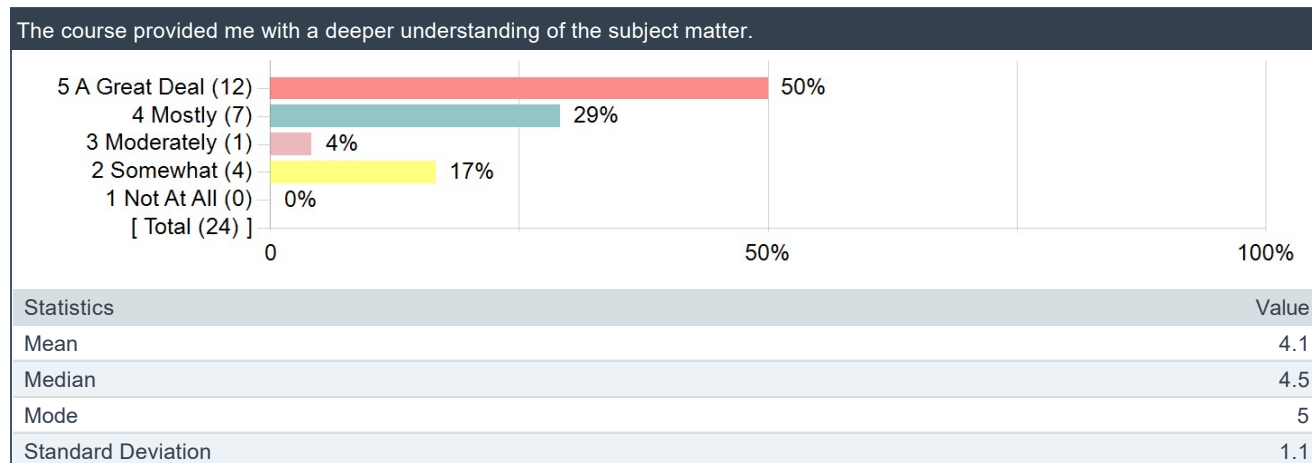
Standard deviation: A measure of the "spread" of the data.

Part A: Core Institutional Items

1. I found the course intellectually stimulating.

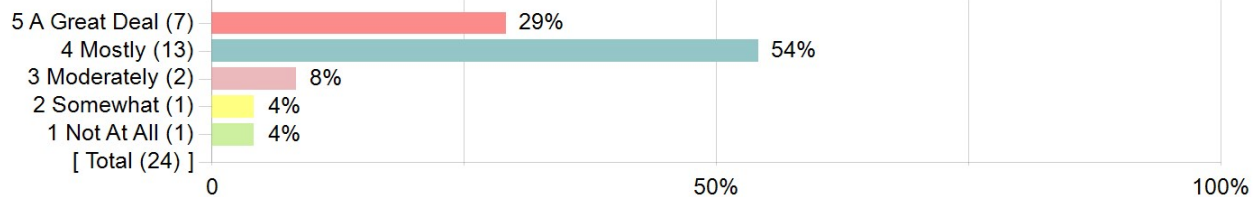


2. The course provided me with a deeper understanding of the subject matter.



3. The instructor (**Harry Sha**) created a course atmosphere that was conducive to my learning.

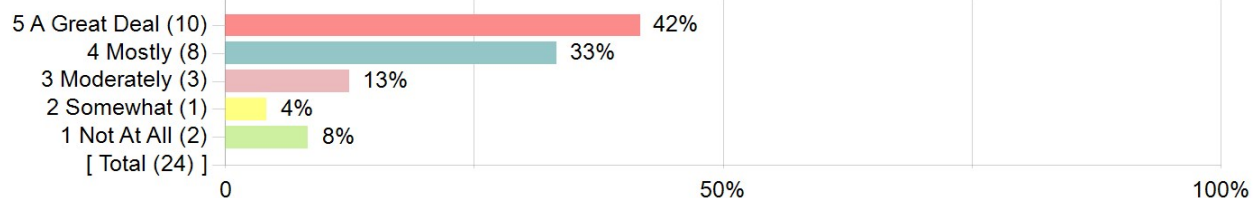
The instructor (**Harry Sha**) created an atmosphere that was conducive to my learning.



Statistics	Value
Mean	4.0
Median	4.0
Mode	4
Standard Deviation	1.0

4. Course projects, assignments, tests and/or exams improved my understanding of the course material.

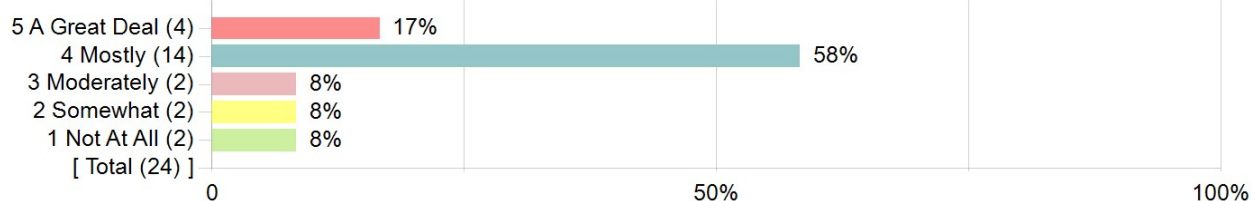
Course projects, assignments, tests, and/or exams improved my understanding of the course material.



Statistics	Value
Mean	4.0
Median	4.0
Mode	5
Standard Deviation	1.2

5. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.

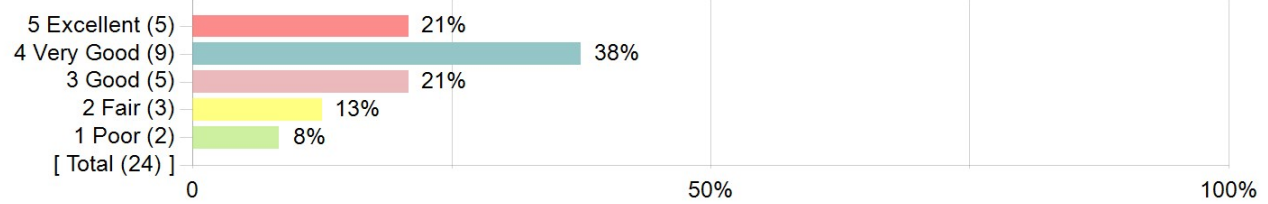
Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.



Statistics	Value
Mean	3.7
Median	4.0
Mode	4
Standard Deviation	1.1

6. Overall, the quality of my learning experience in this course was....

Overall, the quality of my learning experience in this course was:

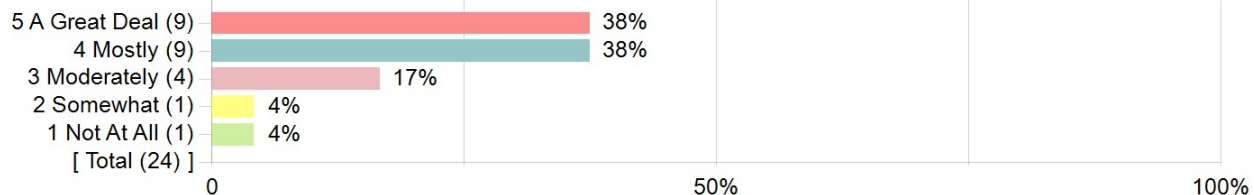


Statistics	Value
Mean	3.5
Median	4.0
Mode	4
Standard Deviation	1.2

Part B. Divisional Items

The instructor (**Harry Sha**) generated enthusiasm for learning in the course.

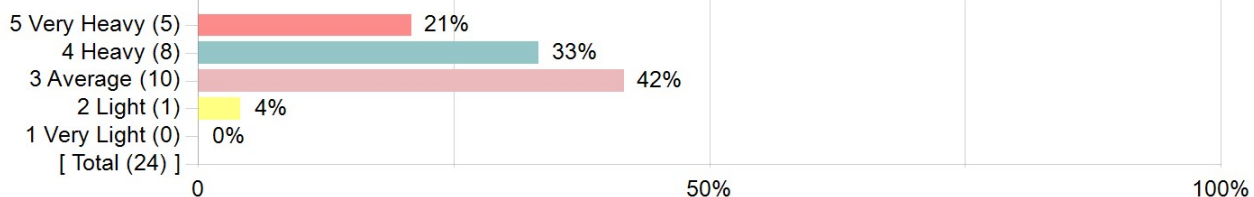
FAS001 The instructor (**Harry Sha**) generated enthusiasm for learning in the course.



Statistics	Value
Mean	4.0
Median	4.0
Mode	5, 4
Standard Deviation	1.1

Compared to other courses, the workload for this course was...

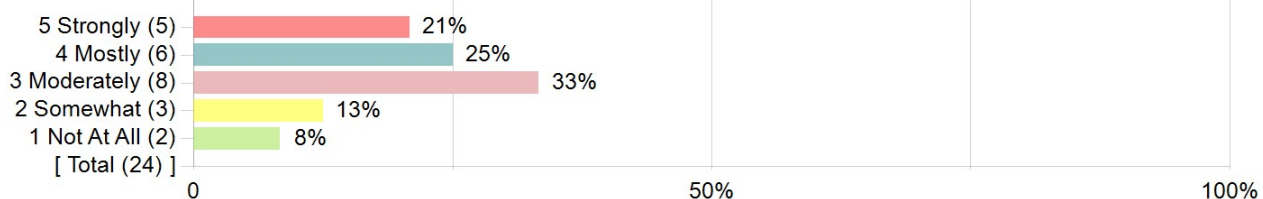
FAS002 Compared to other courses, the workload for this course was...



Statistics	Value
Mean	3.7
Median	4.0
Mode	3
Standard Deviation	0.9

I would recommend this course to other students.

FAS003 I would recommend this course to other students.



Statistics	Value
Mean	3.4
Median	3.0
Mode	3
Standard Deviation	1.2

Section 3. Comparative Data

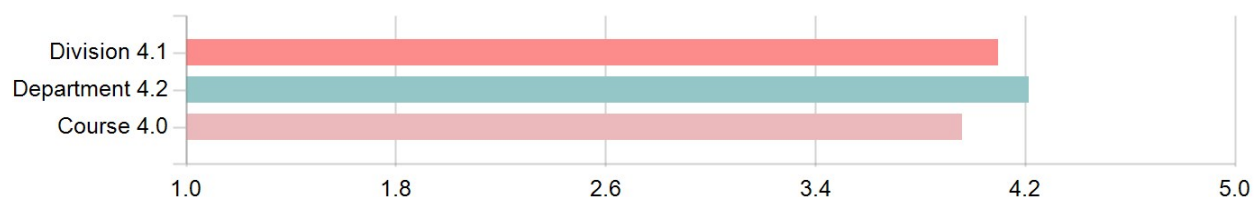
This section provides overall means for given comparators (e.g., division, department) alongside the mean values for a given course. Note that the comparators are calculated by pooling together all individual student survey responses (e.g., student responses for all of the courses in a department are pooled together and the departmental mean responses calculated from that). The provided comparators are thus a measure of the 'average' student experience for a unit or division; they are not a measure of the 'average' course in a unit or division. This calculation has the effect of giving large courses more 'weight' in the calculation of the comparator means. The effect of this on the calculated comparator varies depending on the relative proportion of large or small courses within a unit or division. As such, the departmental and divisional comparative mean values provided on course evaluations should not be regarded as an absolute and definitive benchmark.

For example, if a department offered only two courses, one with 1000 students who all answered 3.5 and the other with 10 students who all answered 4.5 (so that the means would be 3.5 and 4.5 respectively), then the departmental mean provided on the course evaluations would be 3.51 since the calculation would be $[(3.5 \times 1000) + (4.5 \times 10)] / 1010 = 3.51$ and not $(3.5 + 4.5) / 2 = 4$.

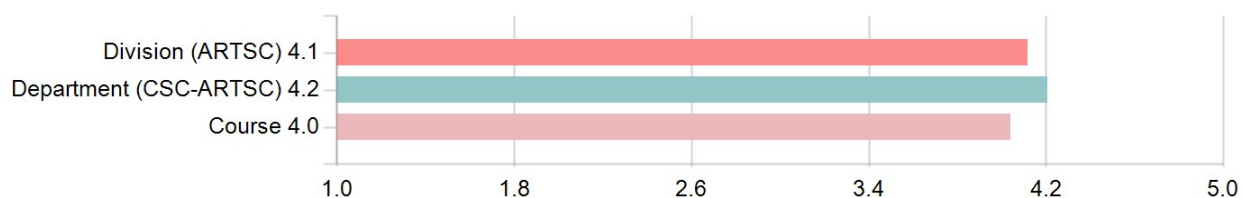
Part A. Core Institutional Items

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

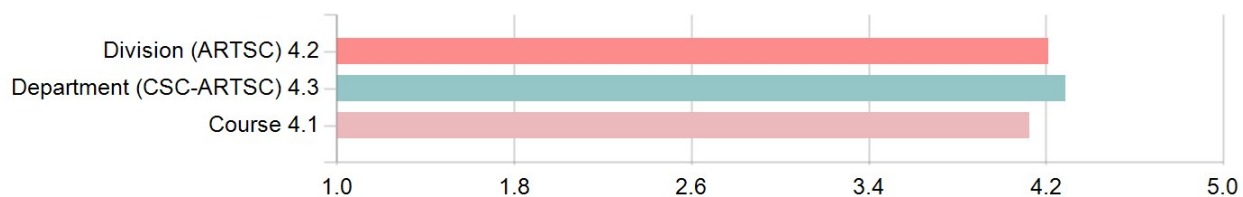
Institutional Composite Mean



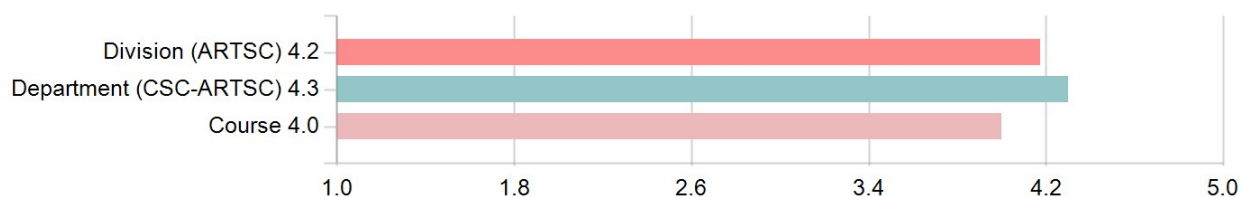
1. I found the course intellectually stimulating.



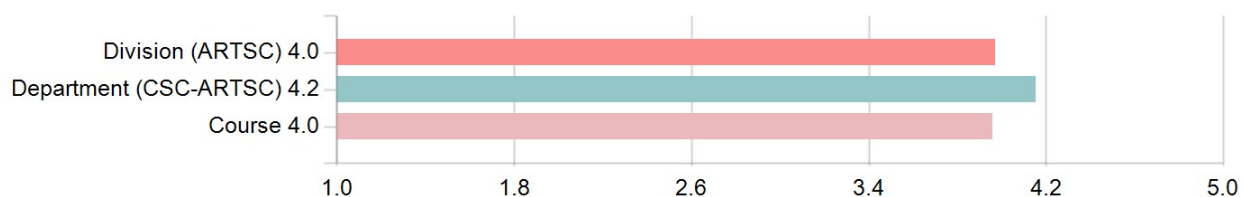
2. The course provided me with a deeper understanding of the subject matter.



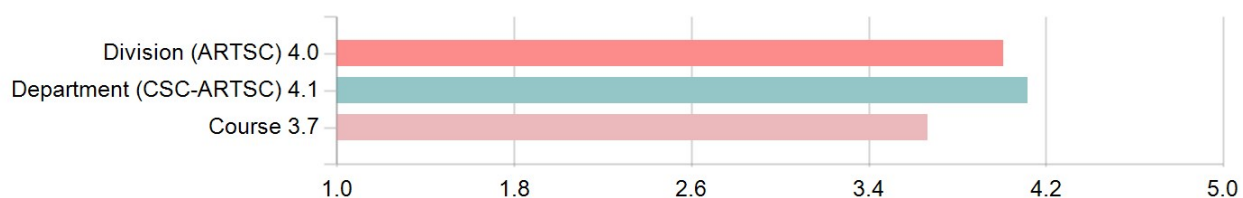
3. The instructor (**Harry Sha**) created an atmosphere that was conducive to my learning.



4. Course projects, assignments, tests, and/or exams improved my understanding of the course material.

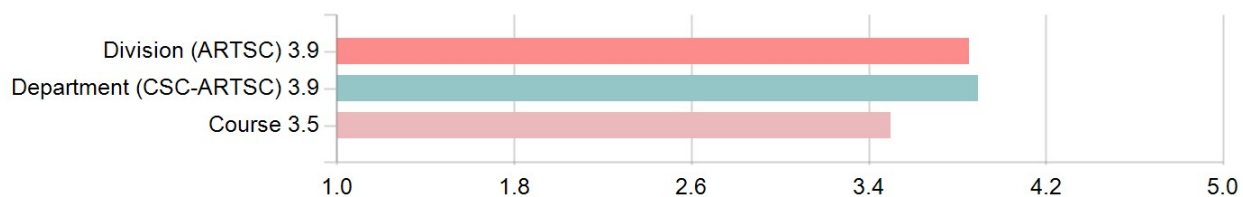


5. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.



Scale: 1 - Poor 2 - Fair 3 - Good 4 - Very Good 5 - Excellent

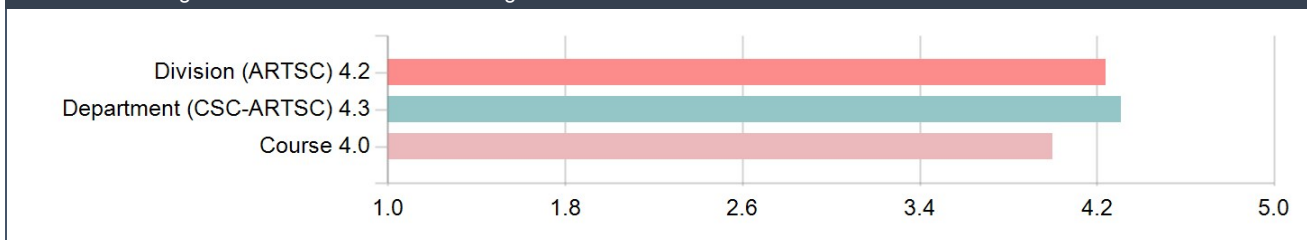
6. Overall, the quality of my learning experience in this course was:



Part B. Divisional Items

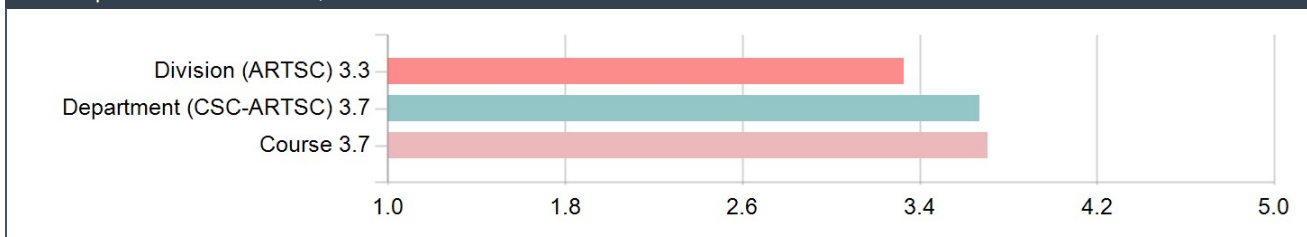
Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

9. The instructor generated enthusiasm for learning in the course.



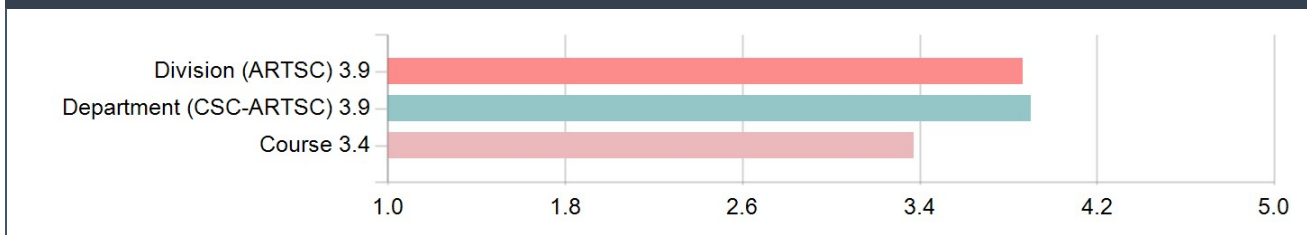
Scale: 1 - Very Light 2 - Light 3 - Average 4 - Heavy 5 - Very Heavy

10. Compared to other courses, the workload for this course was:



Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - Strongly

11. I would recommend this course to other students.

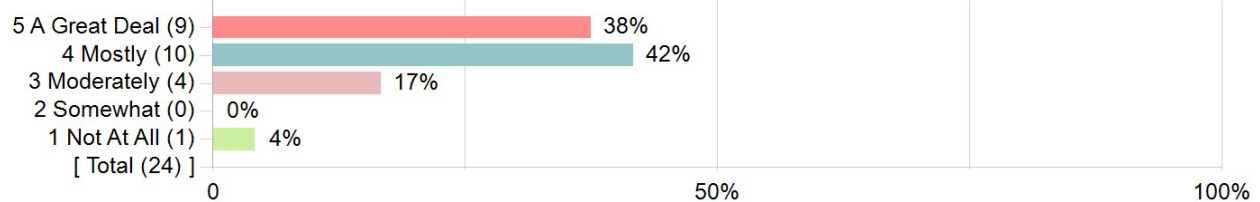


Section 4: Formative Data

These items are optional items which you selected from the item bank during the question personalization period. Note that the results from these items are only reported to you as they are primarily intended to function as personal formative feedback.

K-1. Course lectures improved my understanding of the course material.

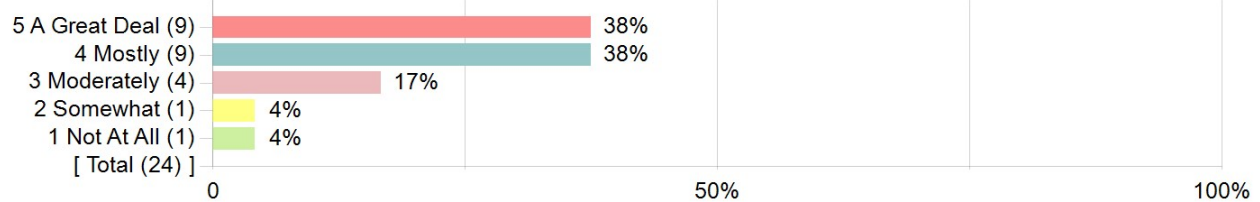
K-1. Course lectures improved my understanding of the course material.



Statistics	Value
Mean	4.1
Median	4.0
Mode	4
Standard Deviation	1.0

K-4. Course assignments, projects, tests, and/or papers highlighted important concepts of the course.

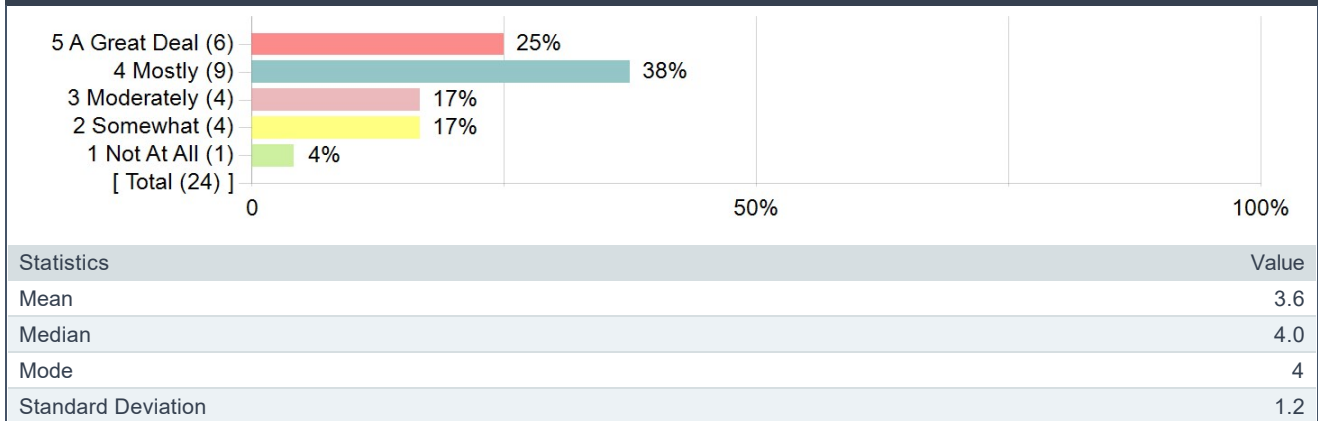
K-4. Course assignments, projects, tests, and/or papers highlighted important concepts of the course.



Statistics	Value
Mean	4.0
Median	4.0
Mode	5, 4
Standard Deviation	1.1

O-10. Course projects and/or assignments provided opportunity for reflection.

O-10. Course projects and/or assignments provided opportunity for reflection.



6.3 CSC236 – Introduction to the Theory of Computation – Summer 2023

Description of Your Report

Your Course Evaluation Report contains up to four sets of items, represented in up to four sections in your report, described below.

Sets of Items

Institutional Items

These eight items are consistent across the University of Toronto. They are comprised of:

- Five rating-scale items which represent institution-wide teaching and learning priorities.
 - **The institutional composite mean, a mathematical average of these first five items.**
- One rating-scale item on the overall quality of a student's learning experience.
- Two qualitative comment items.

Divisional Items

These items are consistent across your division. They represent division-wide priorities for teaching and learning.

Departmental/Program/Course-Type Items

These items (when applicable) represent further levels of granularity and specificity for teaching and learning priorities within your division (e.g., department, program, course type).

Instructor-Selected Items

These items are optional items which may be selected from the item bank by instructors during the question personalization period.

- **Note that the results from these items are only reported to instructors, as they are primarily intended to function as personal formative feedback.**

Report Sections

The following provide different statistical summaries and representations for your institutional, divisional, and departmental/programmatic items (where appropriate).

Section 1: Course Evaluation Overview

Provides all course evaluation data except instructor-selected items.

Section 2: Response Distributions and Additional Statistics

Provides detailed response distributions.

- The number and relative percentage of respondents providing a given answer is provided, along with a graphical representation.
- This section also reports further statistics for each set of items relative to Section 1.

Section 3: Comparative Data

Provides comparative means for your course as compared to the relevant means across *all other evaluated courses at a particular level of comparison (e.g. division, program)* for each set of items.

Section 4: Instructor-Selected Items

Provides data for optional items that instructors can select from the item bank during the question personalization period. This section is formatted identically to Section 2.

Statistical Terms Used in this Report

Mean: The mathematical average. This measure is the most sensitive, and can be greatly affected by extreme and/or divergent scores.

Median: The middle value when all responses are ordered. This measure is less affected by extreme and/or divergent scores.

Mode: The most frequently occurring score.

Standard deviation: A measure of the "spread" of the data.

FAS Summer 2023 S Undergrad

Course Name: Intro to Theory Comp CSC236H1-Y-LEC5101
Division: ARTSC
Session: Y
Session Codes: F = First/Fall, S = Second/Winter

Instructor: Harry Sha
Section: LEC5101
Delivery Mode: INPER

Raters	Students
Responded	47
Invited	105

Section 1: Course Evaluation Overview

Part A. Core Institutional Items

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

Question	Summary	
	Mean	Median
I found the course intellectually stimulating.	4.5	5.0
The course provided me with a deeper understanding of the subject matter.	4.6	5.0
The instructor (Harry Sha) created an atmosphere that was conducive to my learning.	4.7	5.0
Course projects, assignments, tests, and/or exams improved my understanding of the course material.	4.2	4.0
Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.	4.1	4.0
Institutional Composite Mean	4.4	-

Scale: 1 - Poor 2 - Fair 3 - Good 4 - Very Good 5 - Excellent

Question	Summary	
	Mean	Median
Overall, the quality of my learning experience in this course was:	4.3	4.0

7. Please comment on the overall quality of the instruction in this course.

Comments
Very good, detailed materials and lecture
Harry was wonderful. He's clearly very smart and knows a lot about the material he is teaching. He's also very kind and patient with his students, almost to the point that it's bad. It was quite a contrast from the instructor I had for csc207, my other cs course for the summer.
Unironically a top instructor.
I have previously taken an equivalent course at another campus, but I had a more pleasant and motivating learning experience with Harry. The level of assignments and midterms are adequately adjusted to show my understanding of the course materials and challenge me sometimes.
Harry really takes his time to answer any questions, introduces techniques to tackle problems, and creates an enjoyable atmosphere during lectures. Although I find the nature of the subject material to be difficult, it was his teaching that made me like solving problems in this class.
Harry has a deep grasp of the lecture material and explains it quite well. Unfortunately the course material does get quite repetitive but Harry's charm allows for this reengagement to still be a little intellectually satisfying.
Good
I liked how the prof taught the course! answered everybody's questions thoroughly and went back to re-explain difficult content
I love Harry.
The instruction was very good. The TAs and professor were very conducive to learning and open to various questions regarding the content in the course. Although sometimes there were some small errors made during the calculation, but it never got in the way of the presentation of the idea. Overall very impressive.
Quality was amazing, Harry is a phenomenal instructor who describes topics clearly and is very approachable. He makes learning fun!
I like the format of the homework.
Instruction was really good, lots of support was given
A little too fast-paced (because of the short school term) so we weren't allocated a lot of time to fully understand some concepts (sometimes we haven't yet mastered something and we're already onto something else).
Very clear instructions and explanations on the course material.
The instruction in this course was excellent. I was not struggling to follow along or on how to learn the content. In stead, I was focused on acutally learning the content. This course's material is hard and the instruction did not make it even harder.
Professor Sha is an extremely enthusiastic teacher, and his knowledge and excitement about course content was obvious during every lecture. I'm a physics major but I looked forward to this class' lectures more than my physics class' lectures!
Excellent instruction throughout
Excellent course and great delivery. Loved the fact that the homework was not graded for correctness but for effort and this allowed to study so much better for exam.
Extremely well planned and executed lectures and tutorials.
Professor was an absolute pleasure to listen to and I would highly recommend any class he teaches. He really knows his material and has a deep passion for the subject.
Very straightforward slides / website. The professor (Harry Sha) was also very organized and attentive
The overall quality of instruction in this course was very good. The lectures were very informative and helpful.
The quality of instructions was very impressive. Harry made the class very accessible and fun. Really enjoyed learning in his class.
It was quite interesting and stimulating, especially the homeworks and problems we faced in the course.
Harry was an excellent instructor. Truly a super nice person, and actually wants all of his students to succeed. Harry taught the material really well, and communicated difficult concepts really well.
not bad not bad
Instruction was great however marking and deliverables and feedback was minimal, so there is no way to know where you stand
Covered material thoroughly, always open to questions, great enthusiasm
great instructional ability demonstrated by the instructor, made me interested a bit more in the subject with his style of teaching
LGTM
One of the best instructors I've had at UofT so far. Mr. Sha comes in to his lectures with a lot of enthusiasm. Additionally, when creating / providing examples for his slides or homework problems, he comes up with things that "relate" in a way to people who

Comments
grew up in my generation. I also love the doodles he created for his lecture examples. The format of the course is conducive to learning: ie. when you show your effort in your homework solutions, you are not punished for the mistakes you made, synonymous to my belief that problem sets / homework are tools to learn from your mistakes, whereas midterms/finals are to show what you have learnt.
The instruction was easy to understand and very digestible, the subject being explained was always quite clear to me by the end of the lecture
I hope there was a more in-depth and detailed explanation of the concepts and more complete notes with better handwriting. Also, with the teaching materials are one textbook/notes rather than split between textbooks so the concepts covered are well-structured and consistent.
Professor Sha explained lecture material really well and the homework assigned accurately reflected what we'd been taught in class and would be able to complete.

8. Please comment on any assistance that was available to support your learning in this course.

Comments
Annotated lectures
I don't think Harry picked his TAs so it was probably just lucky but the TAs were fantastic this term. Matthew, Lily and Logan were all super smart and knew how to articulate themselves properly. Harry himself was great too.
Ed Discussion was very helpful for any questions. We also get one-on-one time with TAs for any questions. Prof. Sha also holds office hours.
I used edstem to ask questions about the hw
I like Logan.
The TAs and professors were open to answer any questions regarding the support and content of the course in-person or online through Ed discussions.
There was lots of assistance available from course TAs as well as office hours. I felt well supported during the entire time.
Office hours and TA checkins were helpful
Office hours are good and helpful. There is kind of a lack of practice problem sets (apart from the lecture/tutorial problems) and answer keys. Course materials are not on Quercus which can be a little difficult to manage (preferably at the same place as the other courses)
Held frequent office hours and was very approachable in general.
The office hours were very good and collaborative. I would go every week even if I did not have any questions because I always found them useful.
Professor Sha was very helpful in providing insight on problem set questions during office hours. The TAs for this course were determined to make students better problem solvers and more rigorous proof writers, although sometimes things could have been explained a bit more clearly during tutorials (but they were overall still extremely helpful).
Office hours (weekly and directly from the instructor) and tutorials were extremely helpful.
Ed was useful for the questions
TAs were all very knowledgeable and extremely helpful
Tutorials were helpful albeit not being directly related to lecture content
The office hours were very helpful in getting more time with the professor. Prof Sha was extremely helpful during office hours and provided instruction in a calm and very helpful manner.
The TAs were amazing for this course especially Logan as he provided a lot of assistance during the course.
The TAs and instructor were very helpful on ED and office hours
I thought the tutorial sessions were helpful.
More Practice problems marked, and more instruction of fundamentals
office hours/ Check ins
TAs, office hours, great great lectures
Office hours, tutorials, lecture slides, extra textbook material, in-depth midterm and homework solutions, and sometimes the TA checkins also provide some insight to different ways of seeing the problems, and Ed class page/forum.
We had office hours every week before class as well as a discussion board called Ed that we could post our questions to and ask for additional office hours if the one available doesn't work
good

Part B. Divisional Items**Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal**

Question	Summary	
	Mean	Median
FAS001 The instructor (Harry Sha) generated enthusiasm for learning in the course.	4.6	5.0

Scale: 1 - Very Light 2 - Light 3 - Average 4 - Heavy 5 - Very Heavy

Question	Summary	
	Mean	Median
FAS002 Compared to other courses, the workload for this course was...	3.4	3.0

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - Strongly

Question	Summary	
	Mean	Median
FAS003 I would recommend this course to other students.	4.1	4.0

Section 2: Response Distributions and Additional Statistics

This section provides detailed response distributions.

Mean: The mathematical average. This measure is the most sensitive, and can be greatly affected by extreme and/or divergent scores.

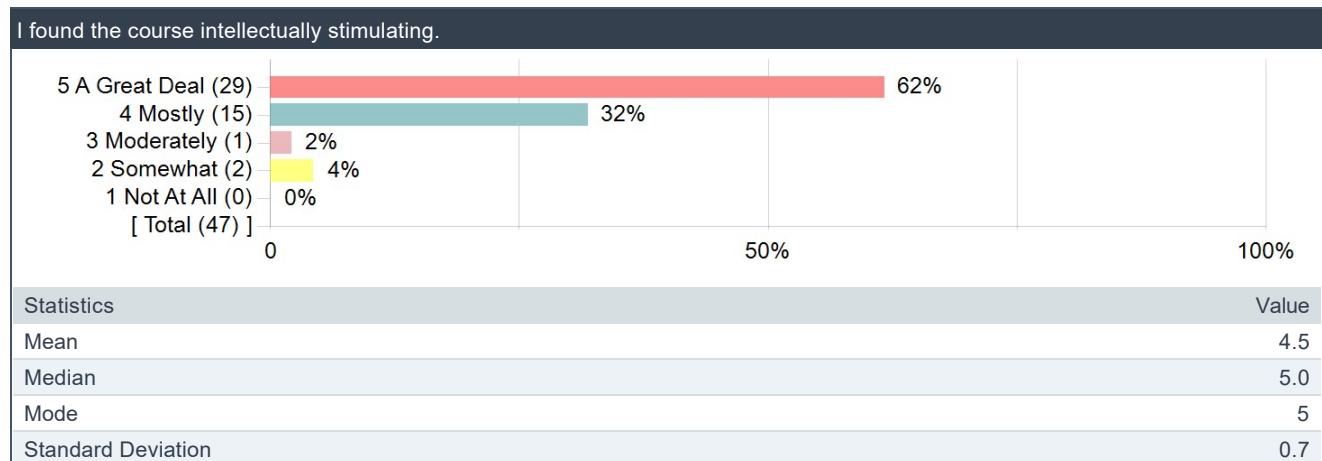
Median: The middle value when all responses are ordered. This measure is less affected by extreme and/or divergent scores.

Mode: The most frequently occurring score.

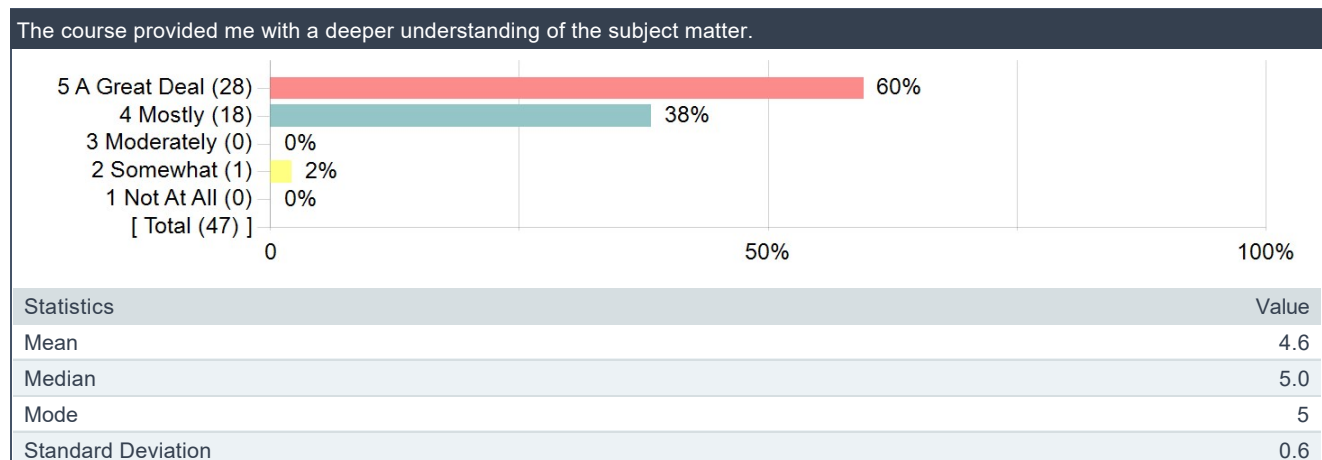
Standard deviation: A measure of the "spread" of the data.

Part A: Core Institutional Items

1. I found the course intellectually stimulating.

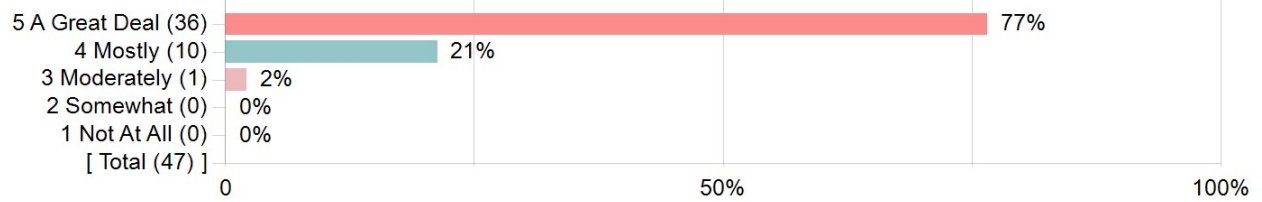


2. The course provided me with a deeper understanding of the subject matter.



3. The instructor (**Harry Sha**) created a course atmosphere that was conducive to my learning.

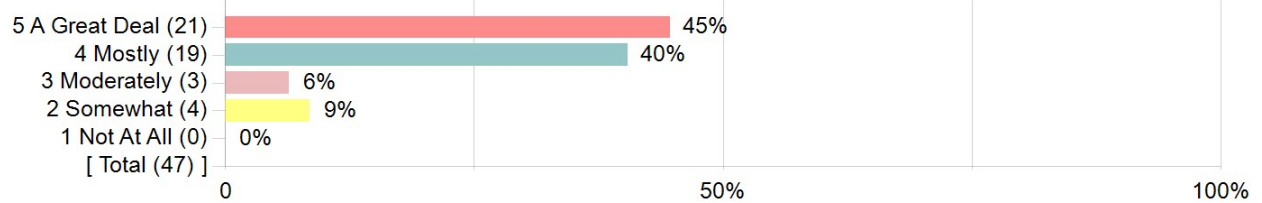
The instructor (**Harry Sha**) created an atmosphere that was conducive to my learning.



Statistics	Value
Mean	4.7
Median	5.0
Mode	5
Standard Deviation	0.5

4. Course projects, assignments, tests and/or exams improved my understanding of the course material.

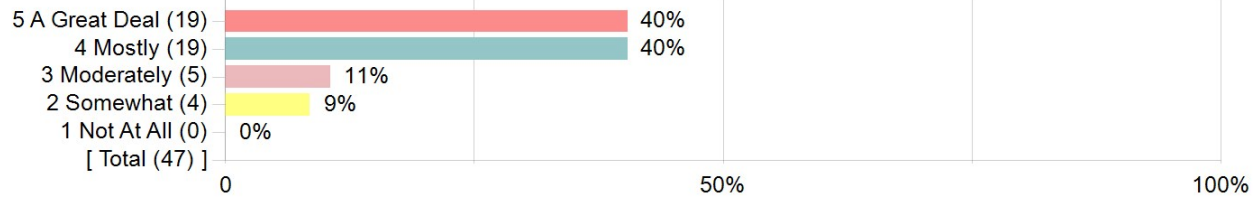
Course projects, assignments, tests, and/or exams improved my understanding of the course material.



Statistics	Value
Mean	4.2
Median	4.0
Mode	5
Standard Deviation	0.9

5. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.

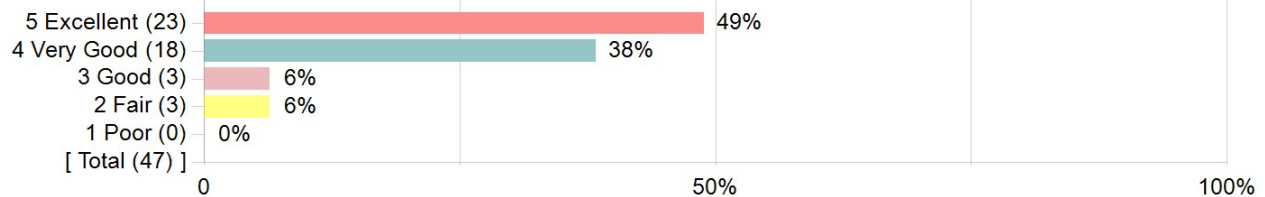
Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.



Statistics	Value
Mean	4.1
Median	4.0
Mode	5, 4
Standard Deviation	0.9

6. Overall, the quality of my learning experience in this course was....

Overall, the quality of my learning experience in this course was:

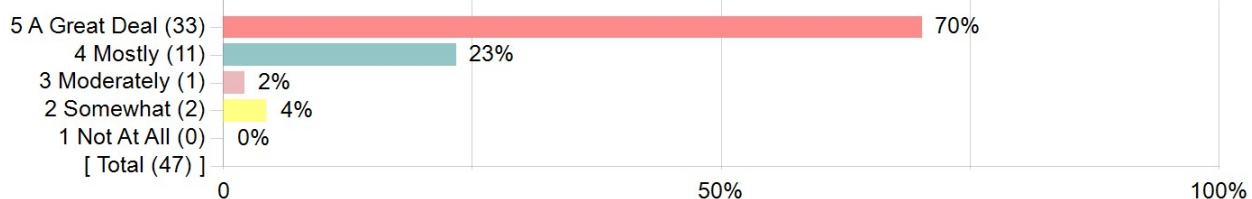


Statistics	Value
Mean	4.3
Median	4.0
Mode	5
Standard Deviation	0.9

Part B. Divisional Items

The instructor (**Harry Sha**) generated enthusiasm for learning in the course.

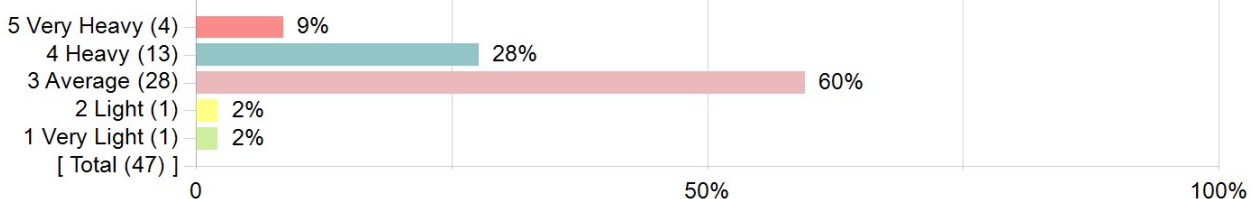
FAS001 The instructor (**Harry Sha**) generated enthusiasm for learning in the course.



Statistics	Value
Mean	4.6
Median	5.0
Mode	5
Standard Deviation	0.7

Compared to other courses, the workload for this course was...

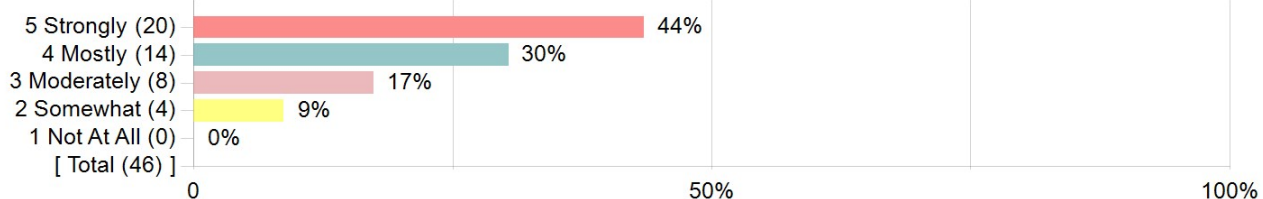
FAS002 Compared to other courses, the workload for this course was...



Statistics	Value
Mean	3.4
Median	3.0
Mode	3
Standard Deviation	0.8

I would recommend this course to other students.

FAS003 I would recommend this course to other students.



Statistics	Value
Mean	4.1
Median	4.0
Mode	5
Standard Deviation	1.0

Section 3. Comparative Data

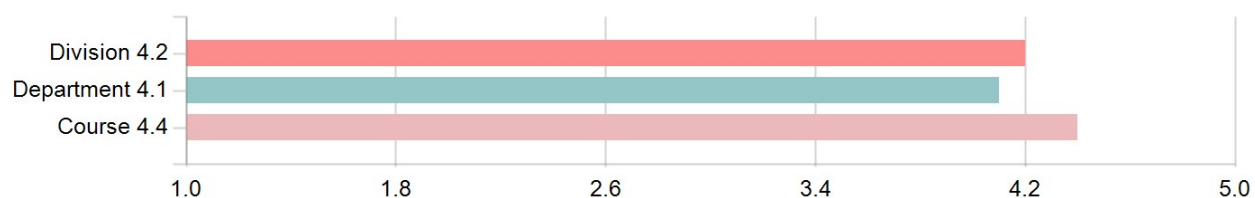
This section provides overall means for given comparators (e.g., division, department) alongside the mean values for a given course. Note that the comparators are calculated by pooling together all individual student survey responses (e.g., student responses for all of the courses in a department are pooled together and the departmental mean responses calculated from that). The provided comparators are thus a measure of the 'average' student experience for a unit or division; they are not a measure of the 'average' course in a unit or division. This calculation has the effect of giving large courses more 'weight' in the calculation of the comparator means. The effect of this on the calculated comparator varies depending on the relative proportion of large or small courses within a unit or division. As such, the departmental and divisional comparative mean values provided on course evaluations should not be regarded as an absolute and definitive benchmark.

For example, if a department offered only two courses, one with 1000 students who all answered 3.5 and the other with 10 students who all answered 4.5 (so that the means would be 3.5 and 4.5 respectively), then the departmental mean provided on the course evaluations would be 3.51 since the calculation would be $[(3.5 \times 1000) + (4.5 \times 10)] / 1010 = 3.51$ and not $(3.5 + 4.5) / 2 = 4$.

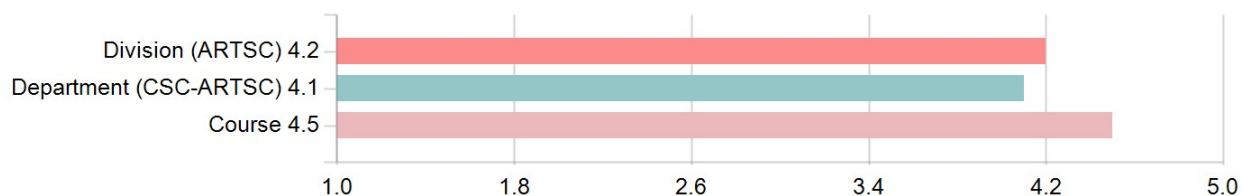
Part A. Core Institutional Items

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

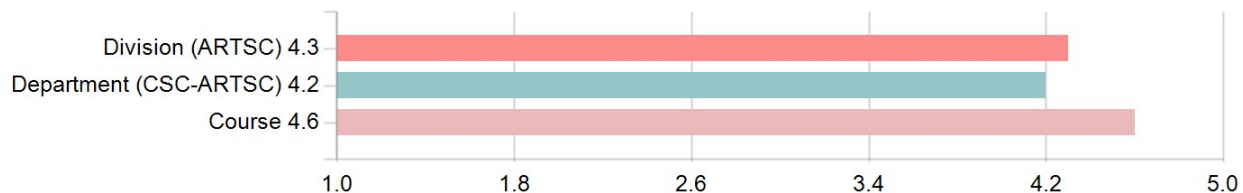
Institutional Composite Mean



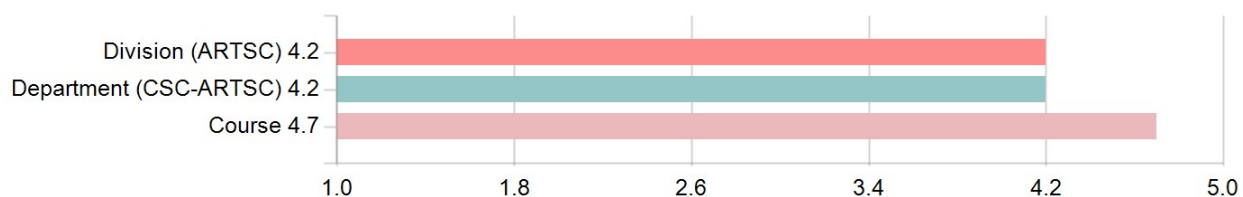
1. I found the course intellectually stimulating.



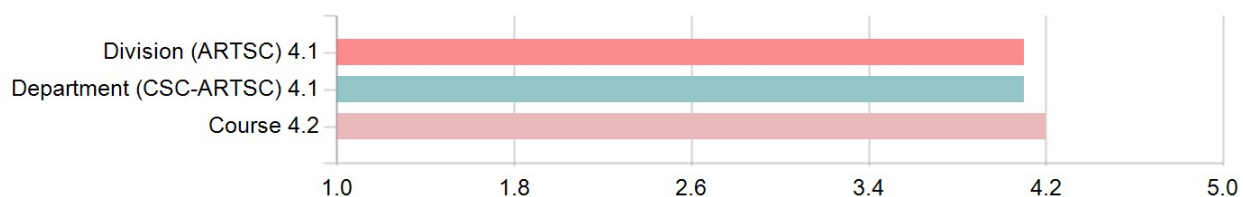
2. The course provided me with a deeper understanding of the subject matter.



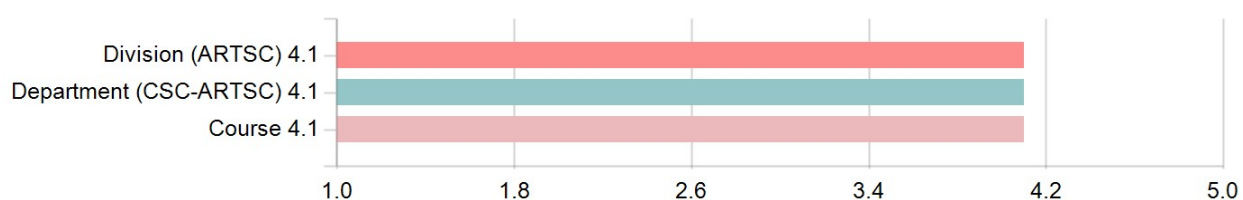
3. The instructor (**Harry Sha**) created an atmosphere that was conducive to my learning.



4. Course projects, assignments, tests, and/or exams improved my understanding of the course material.

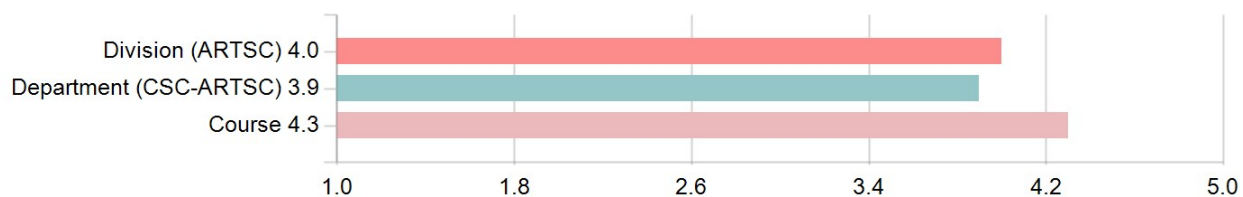


5. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.



Scale: 1 - Poor 2 - Fair 3 - Good 4 - Very Good 5 - Excellent

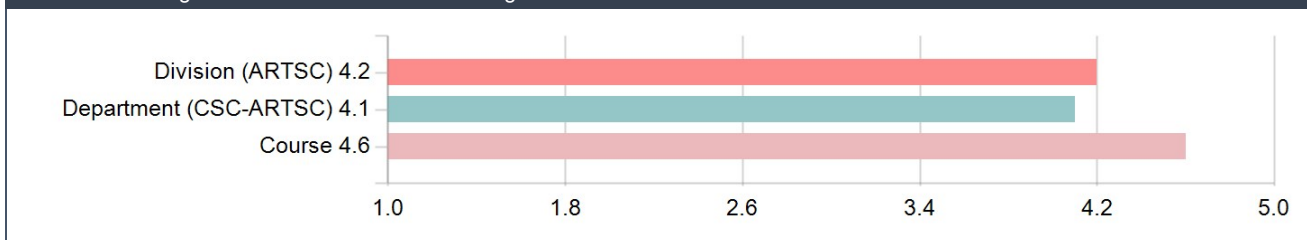
6. Overall, the quality of my learning experience in this course was:



Part B. Divisional Items

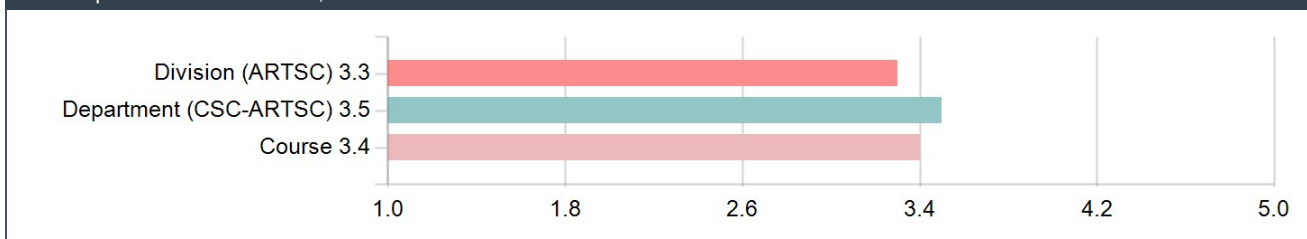
Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

9. The instructor generated enthusiasm for learning in the course.



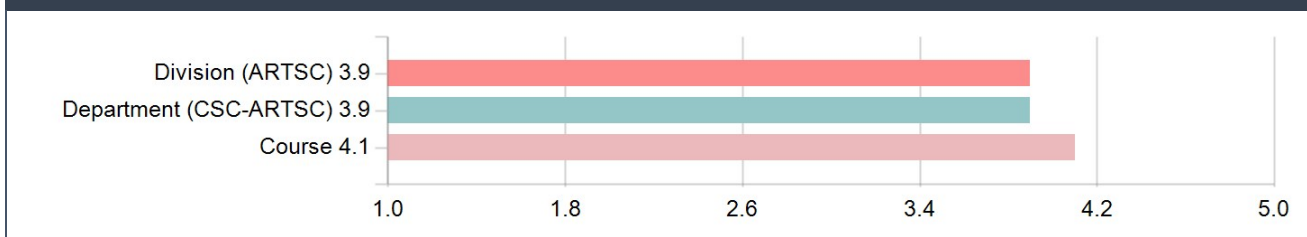
Scale: 1 - Very Light 2 - Light 3 - Average 4 - Heavy 5 - Very Heavy

10. Compared to other courses, the workload for this course was:



Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - Strongly

11. I would recommend this course to other students.



6.4 CSC373 – Algorithms Design and Analysis – Winter 2024

Description of Your Report

Your Course Evaluation Report contains up to four sets of items, represented in up to four sections in your report, described below.

Sets of Items

Institutional Items

These eight items are consistent across the University of Toronto. They are comprised of:

- Five rating-scale items which represent institution-wide teaching and learning priorities.
 - **The institutional composite mean, a mathematical average of these first five items.**
- One rating-scale item on the overall quality of a student's learning experience.
- Two qualitative comment items.

Divisional Items

These items are consistent across your division. They represent division-wide priorities for teaching and learning.

Departmental/Program/Course-Type Items

These items (when applicable) represent further levels of granularity and specificity for teaching and learning priorities within your division (e.g., department, program, course type).

Instructor-Selected Items

These items are optional items which may be selected from the item bank by instructors during the question personalization period.

- **Note that the results from these items are only reported to instructors, as they are primarily intended to function as personal formative feedback.**

Report Sections

The following provide different statistical summaries and representations for your institutional, divisional, and departmental/programmatic items (where appropriate).

Section 1: Course Evaluation Overview

Provides all course evaluation data except instructor-selected items.

Section 2: Response Distributions and Additional Statistics

Provides detailed response distributions.

- The number and relative percentage of respondents providing a given answer is provided, along with a graphical representation.
- This section also reports further statistics for each set of items relative to Section 1.

Section 3: Comparative Data

Provides comparative means for your course as compared to the relevant means across *all other evaluated courses at a particular level of comparison (e.g. division, program)* for each set of items.

Section 4: Instructor-Selected Items

Provides data for optional items that instructors can select from the item bank during the question personalization period. This section is formatted identically to Section 2.

Statistical Terms Used in this Report

Mean: The mathematical average. This measure is the most sensitive, and can be greatly affected by extreme and/or divergent scores.

Median: The middle value when all responses are ordered. This measure is less affected by extreme and/or divergent scores.

Mode: The most frequently occurring score.

Standard deviation: A measure of the "spread" of the data.

FAS Winter 2024 Undergrad

Course Name: Algo Design & Analysis CSC373H1-S-LEC0201
Division: ARTSC
Session: S
Session Codes: F = First/Fall, S = Second/Winter

Instructor: Harry Sha
Section: LEC0201
Delivery Mode: INPER

Raters	Students
Responded	26
Invited	110

Section 1: Course Evaluation Overview

Part A. Core Institutional Items

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

Question	Summary	
	Mean	Median
I found the course intellectually stimulating.	4.4	5.0
The course provided me with a deeper understanding of the subject matter.	4.4	5.0
The instructor (Harry Sha) created an atmosphere that was conducive to my learning.	4.4	4.5
Course projects, assignments, tests, and/or exams improved my understanding of the course material.	4.3	4.0
Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.	3.4	3.0
Institutional Composite Mean	4.2	-

Scale: 1 - Poor 2 - Fair 3 - Good 4 - Very Good 5 - Excellent

Question	Summary	
	Mean	Median
Overall, the quality of my learning experience in this course was:	3.8	4.0

7. Please comment on the overall quality of the instruction in this course.

Comments
Really difficult midterm. Good instructional quality.
The instruction of the course was not clear at times. I did feel as though there were details that were passed through without explanation. I also felt as though the tests were not an accurate representation of my knowledge of the course, as there was not enough time to answer the questions.
– Term tests were a bit too challenging (indicated by the curve). Maybe some adjustment there would be better. – Additionally, course organization could be a bit better on Quercus – Almost every assignment had changes made after a week which was a bit frustrating
Otherwise, the profs were great and very enthusiastic about course material.
Lectures were engaging and relatively easy to follow
great teaching !
The instructor was very good at explaining the concepts and making sure the students understood as well.
Instructors explained concepts with a great deal of detail
Instruction was pretty good, but the material was dense sometimes and it was easy to get lost because of a heavy focus on specific examples.
Harry's lectures are very clear and well-paced, and I found it helpful that he always made time to address questions throughout lectures to make sure we really understood the material.
good
Good
Harry Sha was very approachable, and always made sure to answer everybody's questions. He's a pretty good prof, but I would prefer it if 1–2 short Youtube videos explaining the concepts quickly were posted before each lecture so that it's more digestible (that is what I ended up doing).
Instruction was fine but assessments were not fine. The questions were too unclear or the paper was too long for both the mid terms.
– lectures were paced well given the difficulty of the course and plenty of time was given to think about and ask questions throughout
lectures could be confusing at times but there are many recorded lecture sessions so i could listen to numerous different explanations to help my understanding

8. Please comment on any assistance that was available to support your learning in this course.

Comments
Plentiful office hours and piazza support.
Plenty of TAs and office hours. Victor Rong was amazing and very helpful.
Good amount of office hours.
Office hours and piazza were very helpful
Harry was very approachable with questions about the course material and logistics. I appreciated having different office hours options. The Piazza questions were often answered quickly and informatively, which was very helpful. Given that the material is really challenging, I appreciated that the instructing team wanted us to do well and recognized when we were struggling as a class, and made fair grading adjustments accordingly. However, I wish updates regarding the marking scheme and policies would be announced a bit quicker and more definitively (instead of more tentative Piazza responses) so we have more time to make informed decisions about upcoming assignments and assessments.
good
Good
The TAs were pretty good.
– numerous office hours – piazza was well managed
office hours and tutorials were available, piazza replies were eh

Part B. Divisional Items

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

Question	Summary	
	Mean	Median
FAS001 The instructor (Harry Sha) generated enthusiasm for learning in the course.	4.5	5.0

Scale: 1 - Very Light 2 - Light 3 - Average 4 - Heavy 5 - Very Heavy

Question	Summary	
	Mean	Median
FAS002 Compared to other courses, the workload for this course was...	4.0	4.0

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - Strongly

Question	Summary	
	Mean	Median
FAS003 I would recommend this course to other students.	3.5	3.0

Section 2: Response Distributions and Additional Statistics

This section provides detailed response distributions.

Mean: The mathematical average. This measure is the most sensitive, and can be greatly affected by extreme and/or divergent scores.

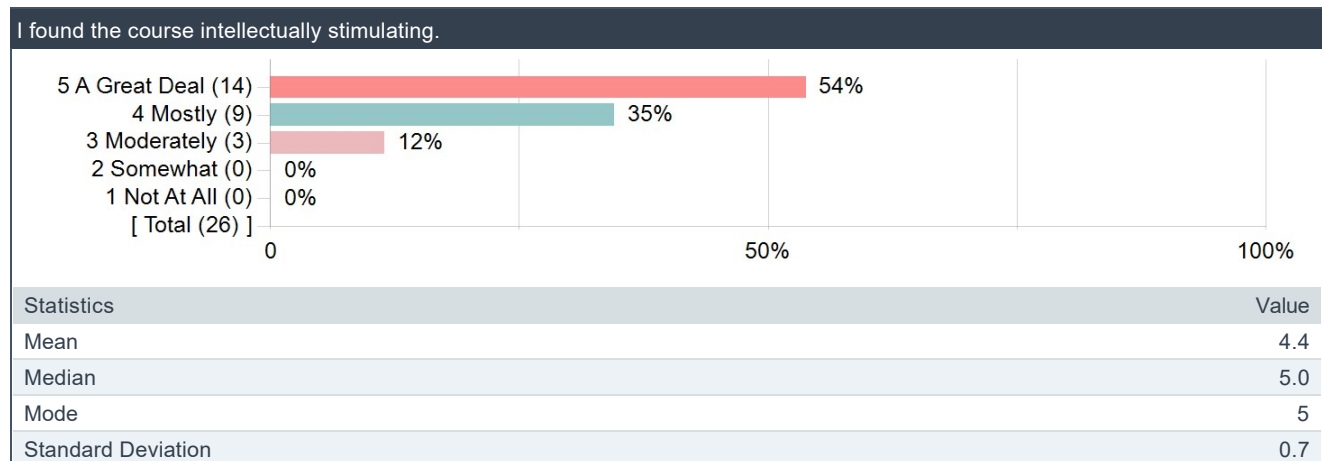
Median: The middle value when all responses are ordered. This measure is less affected by extreme and/or divergent scores.

Mode: The most frequently occurring score.

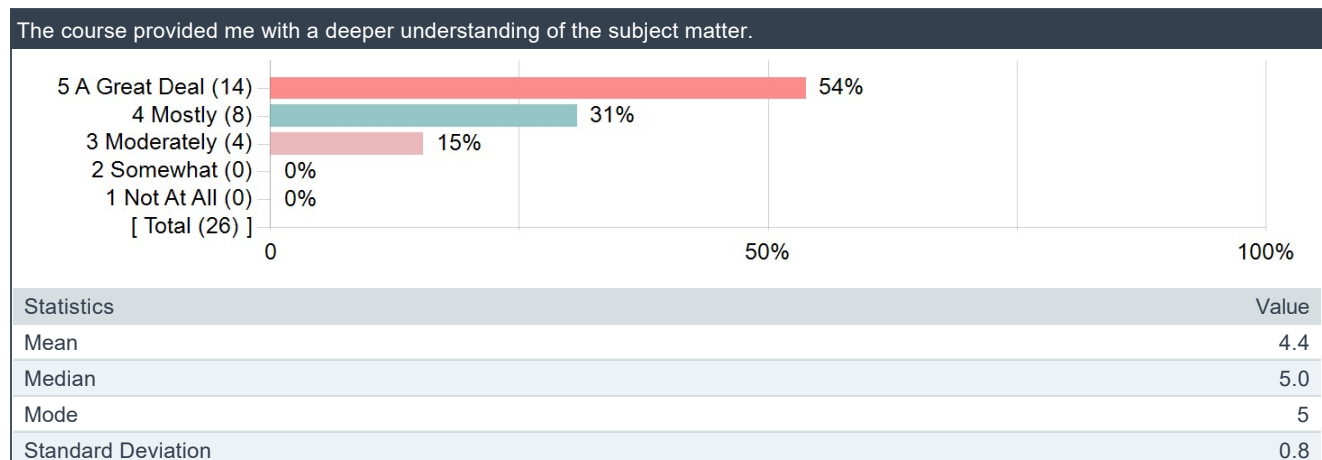
Standard deviation: A measure of the "spread" of the data.

Part A: Core Institutional Items

1. I found the course intellectually stimulating.

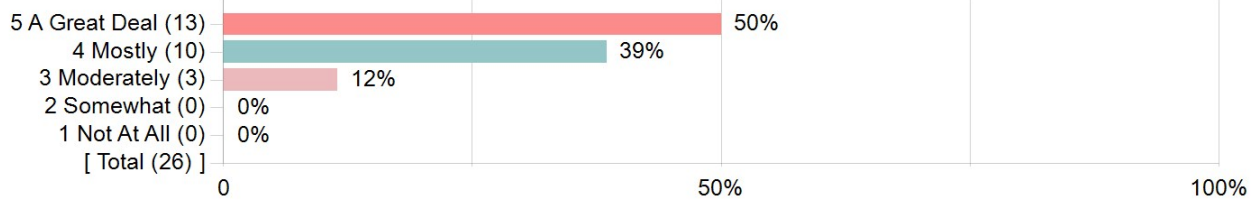


2. The course provided me with a deeper understanding of the subject matter.



3. The instructor (**Harry Sha**) created a course atmosphere that was conducive to my learning.

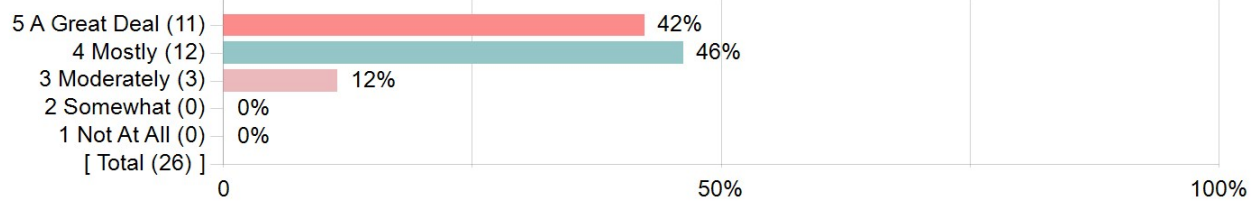
The instructor (**Harry Sha**) created an atmosphere that was conducive to my learning.



Statistics	Value
Mean	4.4
Median	4.5
Mode	5
Standard Deviation	0.7

4. Course projects, assignments, tests and/or exams improved my understanding of the course material.

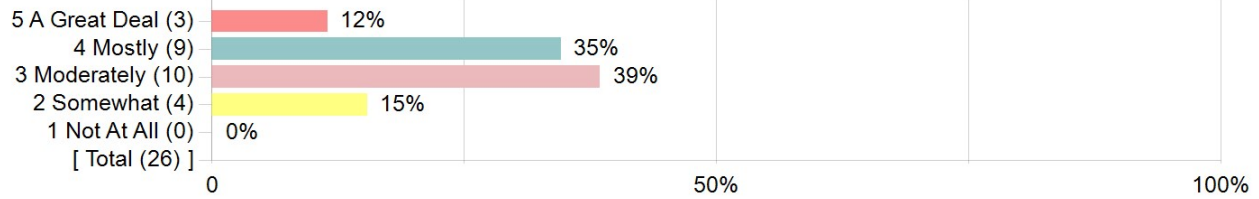
Course projects, assignments, tests, and/or exams improved my understanding of the course material.



Statistics	Value
Mean	4.3
Median	4.0
Mode	4
Standard Deviation	0.7

5. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.

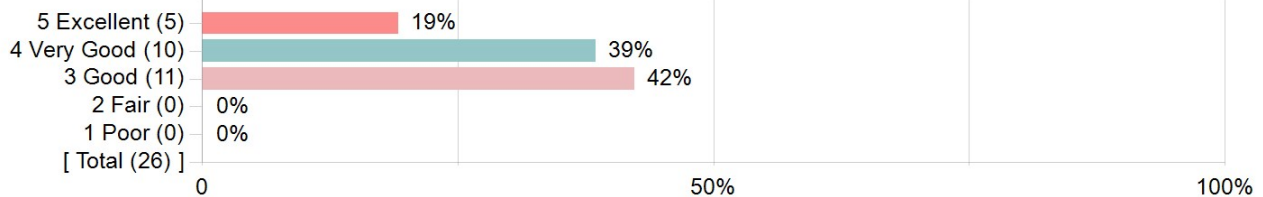
Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.



Statistics	Value
Mean	3.4
Median	3.0
Mode	3
Standard Deviation	0.9

6. Overall, the quality of my learning experience in this course was....

Overall, the quality of my learning experience in this course was:

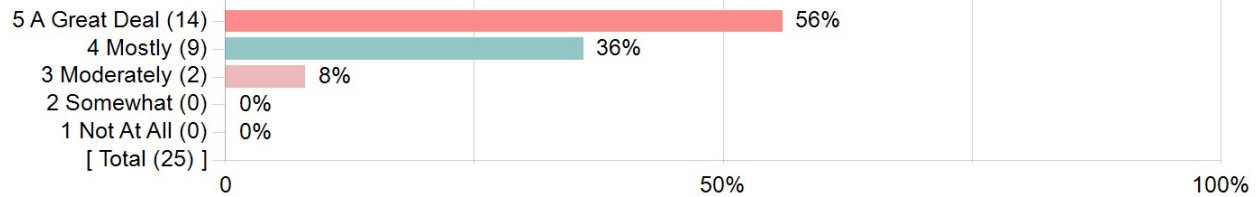


Statistics	Value
Mean	3.8
Median	4.0
Mode	3
Standard Deviation	0.8

Part B. Divisional Items

The instructor (**Harry Sha**) generated enthusiasm for learning in the course.

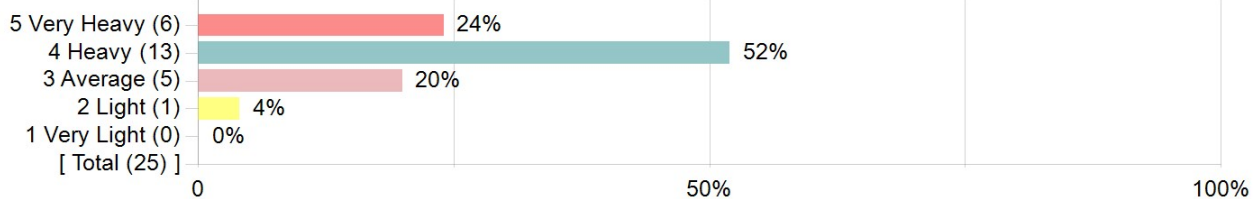
FAS001 The instructor (**Harry Sha**) generated enthusiasm for learning in the course.



Statistics	Value
Mean	4.5
Median	5.0
Mode	5
Standard Deviation	0.7

Compared to other courses, the workload for this course was...

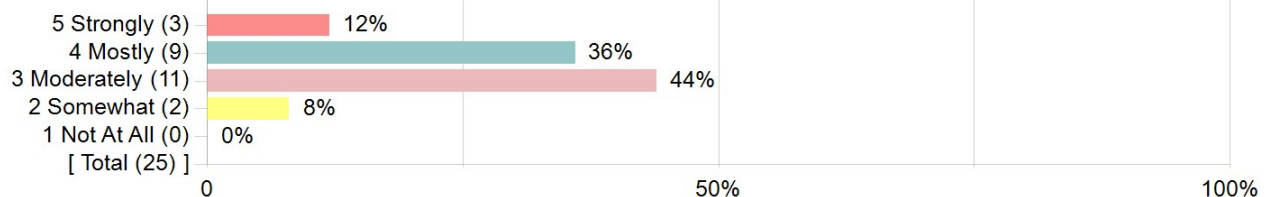
FAS002 Compared to other courses, the workload for this course was...



Statistics	Value
Mean	4.0
Median	4.0
Mode	4
Standard Deviation	0.8

I would recommend this course to other students.

FAS003 I would recommend this course to other students.



Statistics	Value
Mean	3.5
Median	3.0
Mode	3
Standard Deviation	0.8

Section 3. Comparative Data

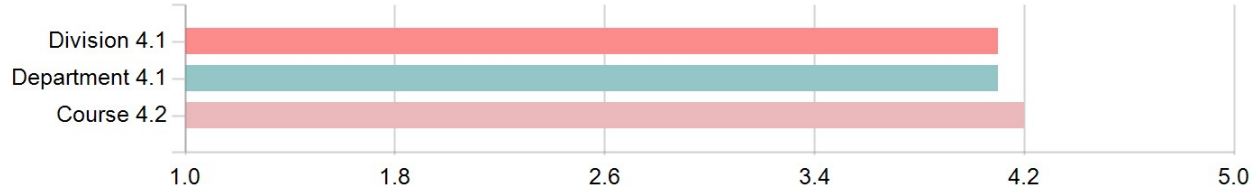
This section provides overall means for given comparators (e.g., division, department) alongside the mean values for a given course. Note that the comparators are calculated by pooling together all individual student survey responses (e.g., student responses for all of the courses in a department are pooled together and the departmental mean responses calculated from that). The provided comparators are thus a measure of the 'average' student experience for a unit or division; they are not a measure of the 'average' course in a unit or division. This calculation has the effect of giving large courses more 'weight' in the calculation of the comparator means. The effect of this on the calculated comparator varies depending on the relative proportion of large or small courses within a unit or division. As such, the departmental and divisional comparative mean values provided on course evaluations should not be regarded as an absolute and definitive benchmark.

For example, if a department offered only two courses, one with 1000 students who all answered 3.5 and the other with 10 students who all answered 4.5 (so that the means would be 3.5 and 4.5 respectively), then the departmental mean provided on the course evaluations would be 3.51 since the calculation would be $[(3.5 \times 1000) + (4.5 \times 10)] / 1010 = 3.51$ and not $(3.5 + 4.5) / 2 = 4$.

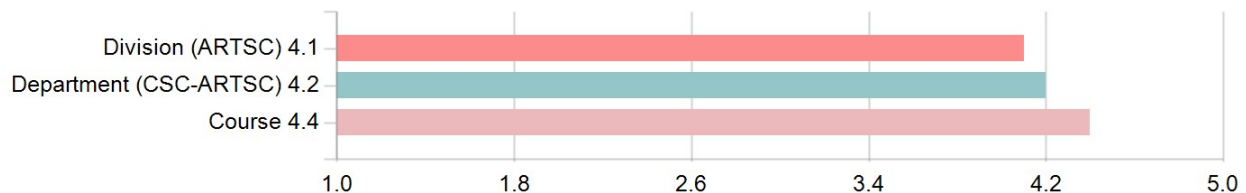
Part A. Core Institutional Items

Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

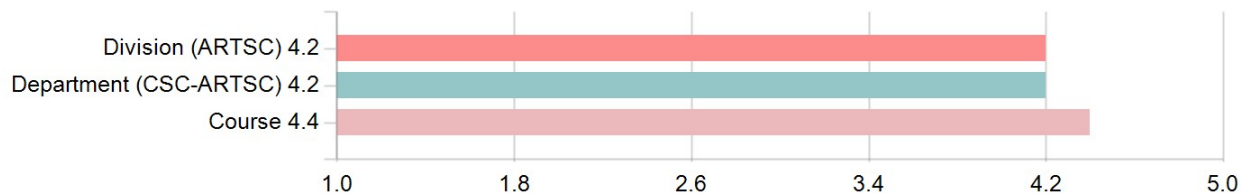
Institutional Composite Mean



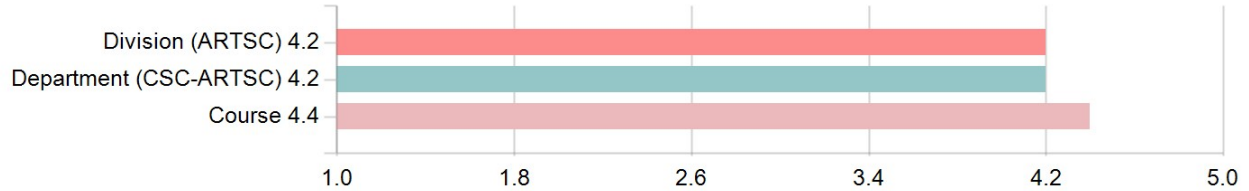
1. I found the course intellectually stimulating.



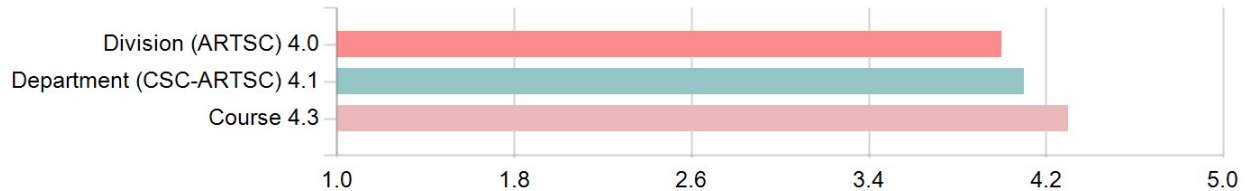
2. The course provided me with a deeper understanding of the subject matter.



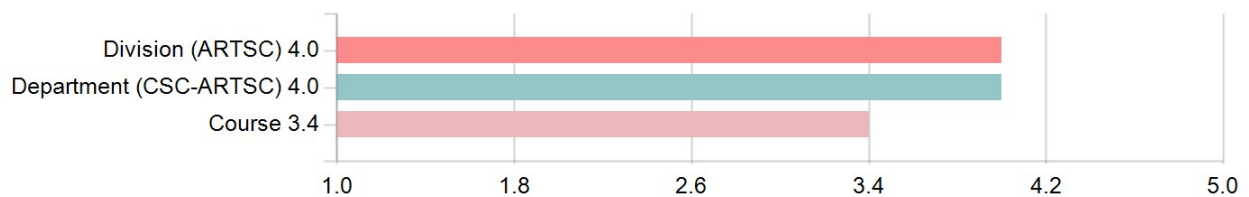
3. The instructor (**Harry Sha**) created an atmosphere that was conducive to my learning.



4. Course projects, assignments, tests, and/or exams improved my understanding of the course material.

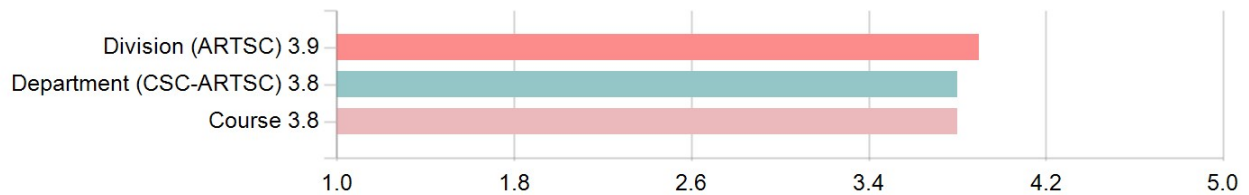


5. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.



Scale: 1 - Poor 2 - Fair 3 - Good 4 - Very Good 5 - Excellent

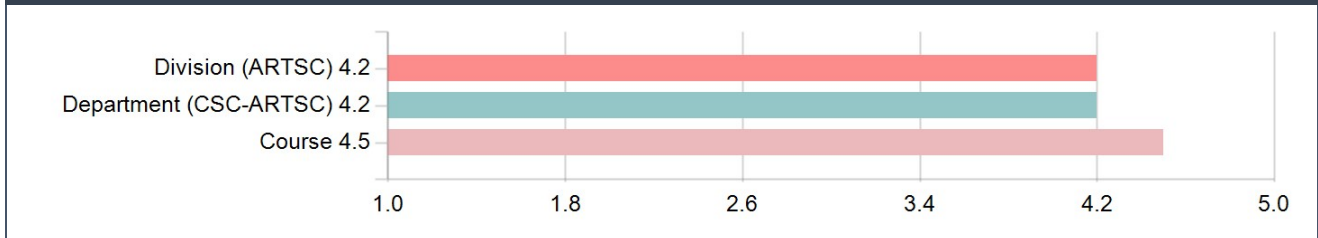
6. Overall, the quality of my learning experience in this course was:



Part B. Divisional Items

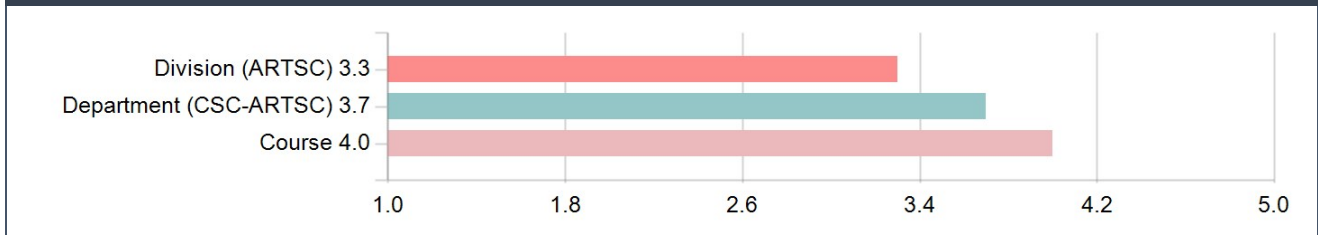
Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - A Great Deal

9. The instructor generated enthusiasm for learning in the course.



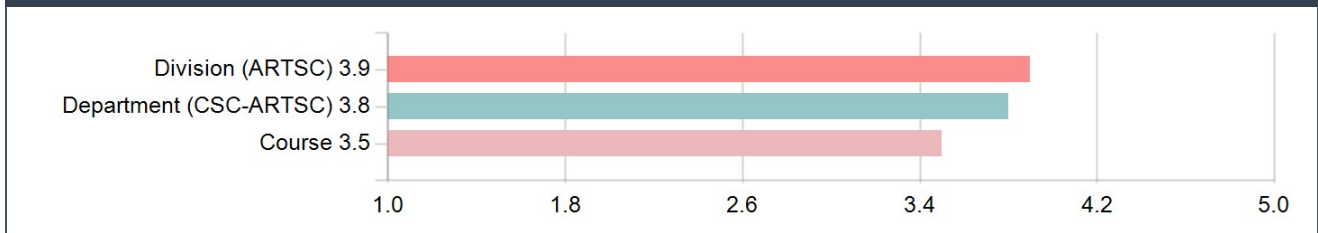
Scale: 1 - Very Light 2 - Light 3 - Average 4 - Heavy 5 - Very Heavy

10. Compared to other courses, the workload for this course was:



Scale: 1 - Not At All 2 - Somewhat 3 - Moderately 4 - Mostly 5 - Strongly

11. I would recommend this course to other students.



6.5 CSC373 – Algorithms Design and Analysis – Winter 2025

FAS Winter 2025 UG Course Evaluation Report

Please review the [Step-by-Step Guide to Reviewing Your Course Evaluations](#) for instructors to assist with interpreting your report(s).

Content of Course Evaluation Reports

The University of Toronto's Cascaded Course Evaluation Framework (CCEF) offers the opportunity for students to provide feedback on their own learning experiences. The CCEF comprises institutional items, divisional items, departmental items as well as instructor-selected items. More information about the CCEF is available on the [course evaluations website](#).

While interpreting course evaluation results, it is important to keep the following in mind:

Course evaluations provide student perspectives on their learning experiences in the course and experts on teaching evaluation advise that no individual method gives the complete picture of an instructor's teaching effectiveness. Moreover, in the U of T context, other factors such as class size and class level were found to cause small variations in the numerical ratings.

This report contains four sections:

Section 1: Quantitative Data Results of institutional, divisional, and departmental rating-scale items.	Section 2: Instructor-Selected Items Results of rating-scale items you have selected during the Item Selection period this term .	Section 3: Comparative Data Comparative results of this course vs. all courses evaluated in the department and/or division this term .	Section 4: Qualitative Comments Unedited student responses to the institutional open-ended questions.
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Statistical Terms Used in this Report

Mean: The mathematical average.	Median: The middle value when all responses are ordered. Less sensitive to extreme and/or divergent scores.	Mode: The most frequently occurring score.	Standard Deviation: A measure to indicate the "spread" of the scores.
The Institutional Composite Mean (ICM): A mathematical average of the first five institutional rating scale items (Ins01-05), which represent institution-wide teaching and learning priorities. The 2018 Validation Study established the reliability and validity of using the ICM as a metric to understand students' collective experiences.		% of Endorsement: The percentage of respondents that selected the two most positive response options ("A Great Deal" and "Mostly" combined in Ins01 to Ins05; "Excellent" and "Very good" combined in Ins06).	

FAS Winter 2025 UG Course Evaluation Report for Harry Sha

Course Name: Algo Design & Analysis CSC373H1-S-LEC0201
Delivery Mode: INPER

Division: ARTSC
Department: CSC-ARTSC

Raters	Students
Responded	26
Invited	116
Response Ratio	22%

Section 1: Course Evaluation Results - Quantitative Data

This section provides a figure and statistical information about institutional, divisional, and departmental rating-scale items. Please see Section 4 for open-ended responses.

For the 6 institutional items (Ins01 to Ins06), the two sets of scales and the associated numerical values are:

Ins01-Ins05	Ins06
Not at all-1	Poor-1
Somewhat-2	Fair-2
Moderately-3	Good-3
Mostly-4	Very Good-4
A Great Deal-5	Excellent-5

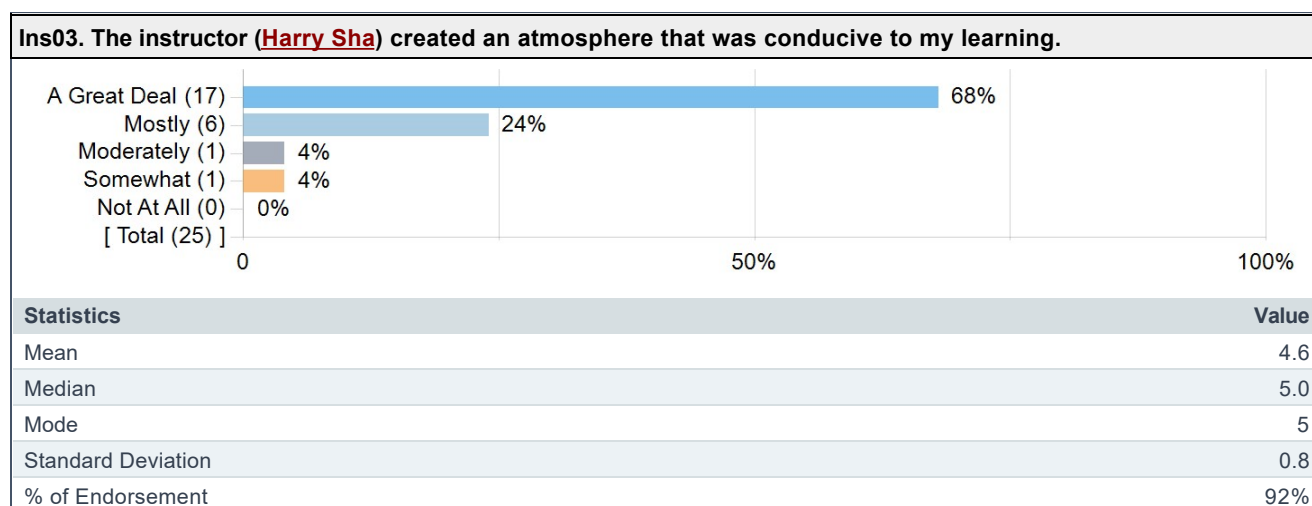
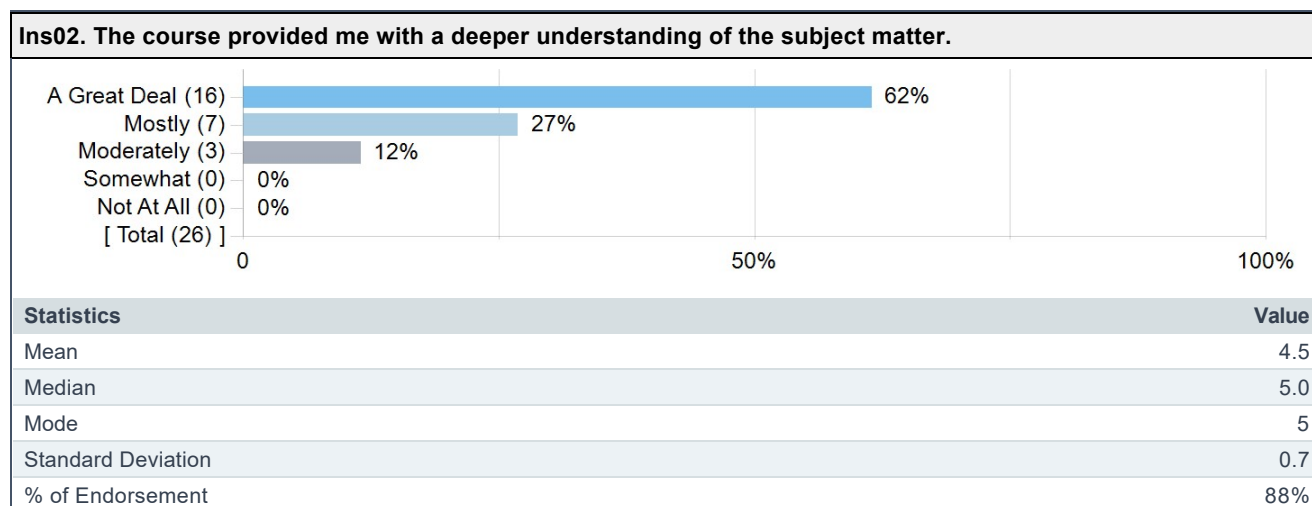
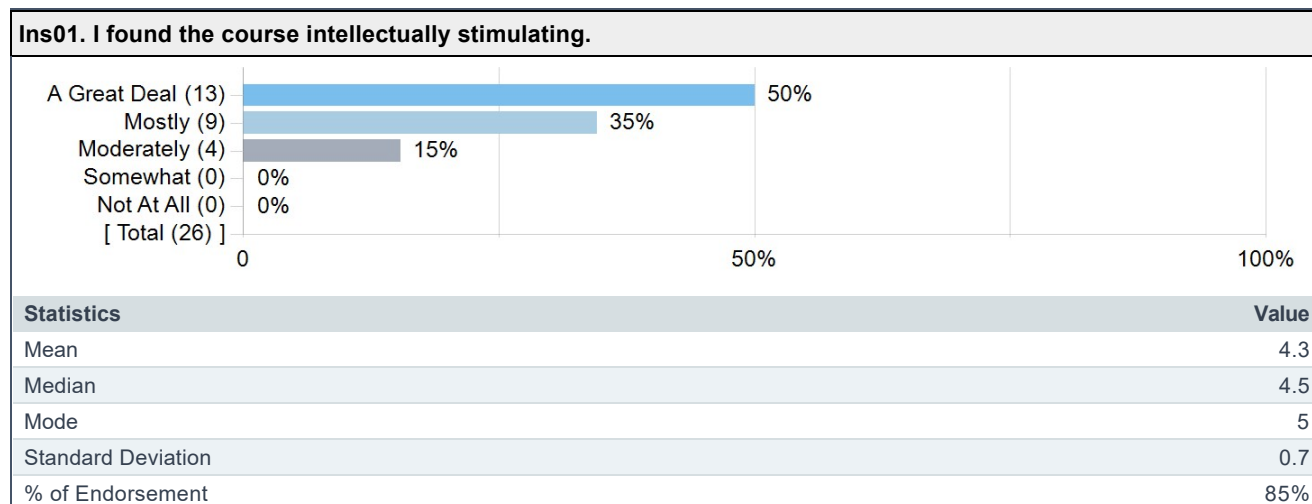
Divisional and departmental items may use scales different than the two noted above.

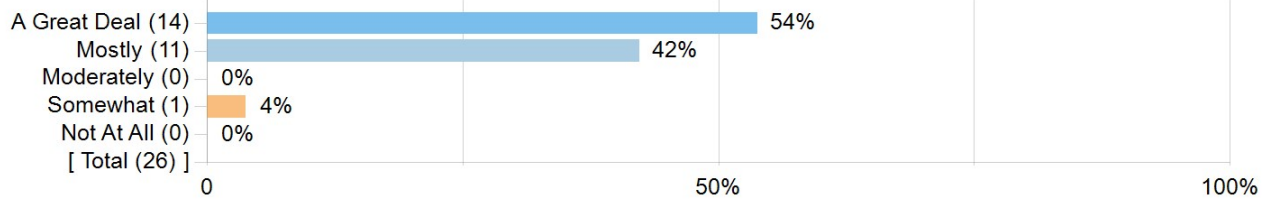
The bar graphs provide the number and percentage of respondents selecting each answer option for each item. The distribution of answer options in the bar graphs gives the most complete information about the typical student response and the variability in the distribution of responses. When interpreting course evaluation results, the bar graph provides more nuanced information than any summary statistic alone.

Mean, Median, Mode and Standard Deviation are calculated from the numerical values of each answer option.

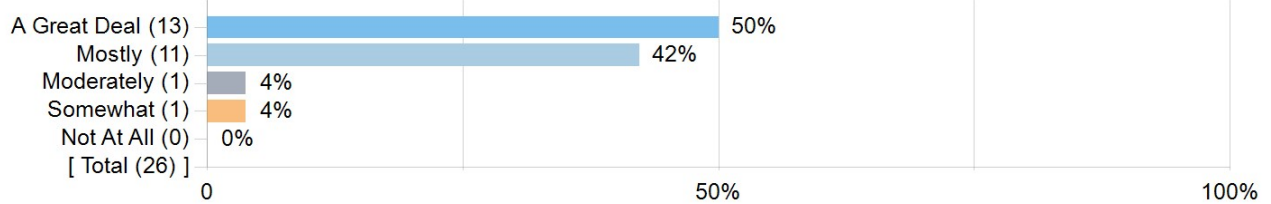
“% of Endorsement” indicates the percentage of respondents that selected the two most positive response options (“A Great Deal” and “Mostly” combined in Ins01 to Ins05; “Excellent” and “Very good” combined in Ins06). Please note that divisional and departmental items might use scales that are not in ascending order and thus “% of Endorsement” is only provided for institutional rating-scale items.

Institutional Items

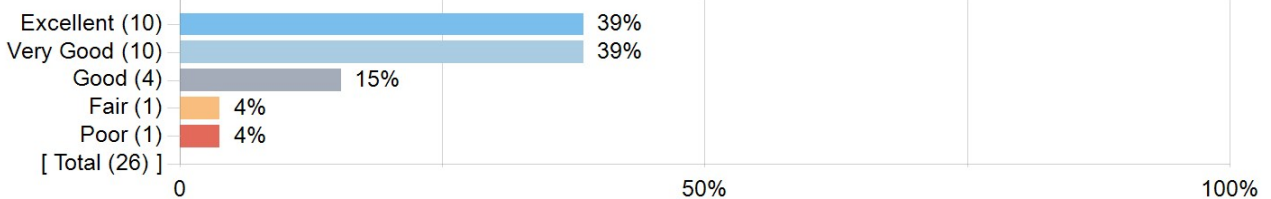


Ins04. Course projects, assignments, tests, and/or exams improved my understanding of the course material.

Statistics	Value
Mean	4.5
Median	5.0
Mode	5
Standard Deviation	0.7
% of Endorsement	96%

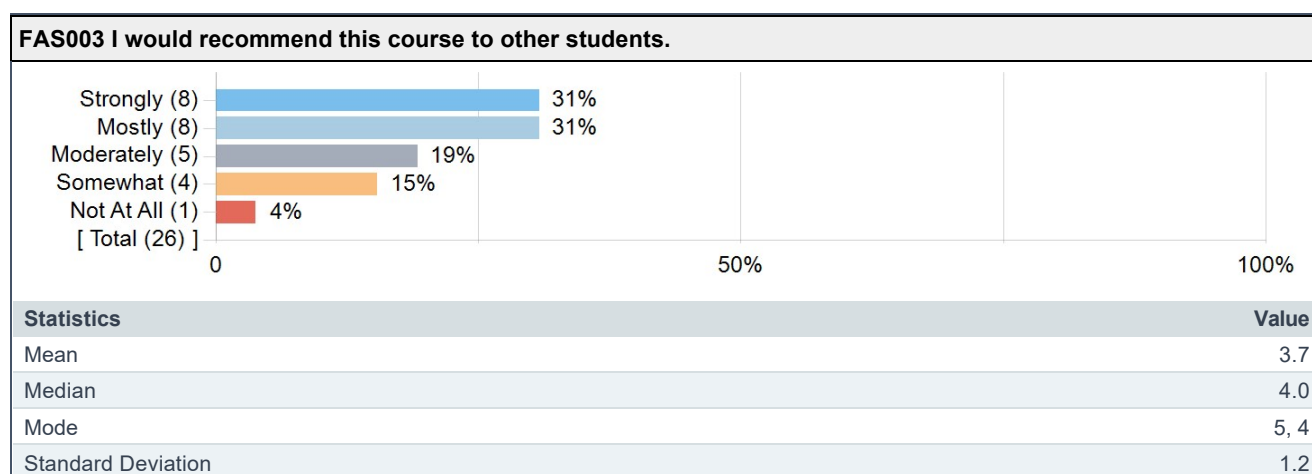
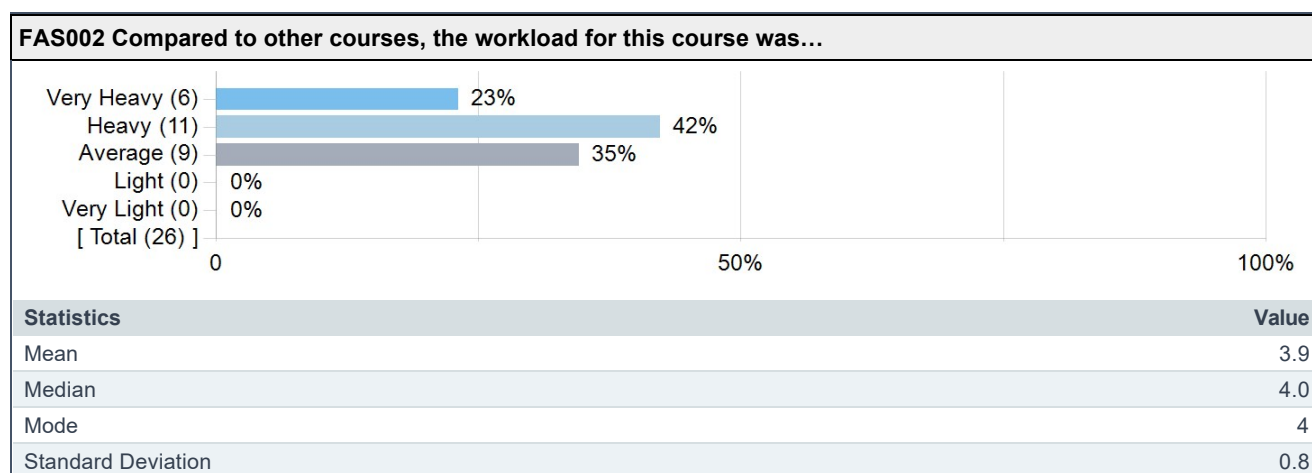
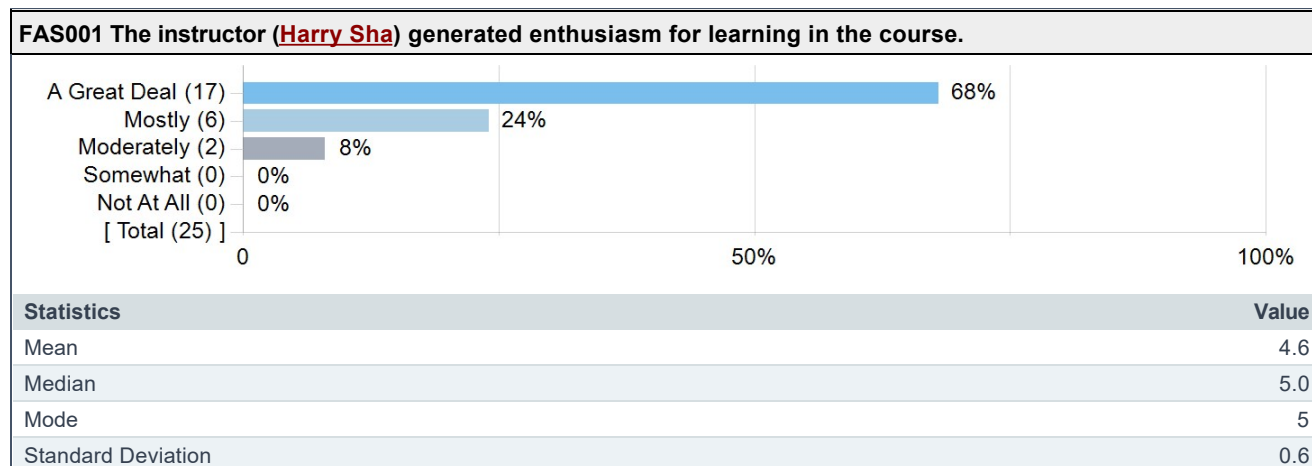
Ins05. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.

Statistics	Value
Mean	4.4
Median	4.5
Mode	5
Standard Deviation	0.8
% of Endorsement	92%

Ins06. Overall, the quality of my learning experience in this course was:

Statistics	Value
Mean	4.0
Median	4.0
Mode	5, 4
Standard Deviation	1.0
% of Endorsement	77%

Divisional Items



Section 2: Instructor-selected Items

This section provides the results of the quantitative items you selected from the item bank during the question personalization period. These results are available only to you as they serve for personalized formative feedback.

Please note instructor-selected items are *not included* in the administrative report provided to your department.

Section 3: Comparative Data

This section provides comparative information (i.e., means and medians) between the results of this course and those of all courses evaluated in the department (if applicable) and/or in the division **in this term**.

Please note that means for the department/division are weighted by the number of respondents so courses with higher numbers of respondents carry more weight in the calculation of the departmental/divisional mean values.

The departmental and divisional median values are the middle values when responses from all courses are ordered.

Departmental/divisional mean and median values are provided for comparison but due to other course factors that may influence the responses for a course, they should not be regarded as definitive benchmarks.

Institutional Composite Mean (ICM): A mathematical average of the first five institutional rating scale items (Ins01-05).		
Course	Department	Division
4.5	4.2	4.1

Institutional Items	Course Mean	Dept Mean	Div Mean	Course Median	Dept Median	Div Median
Ins01. I found the course intellectually stimulating.	4.3	4.1	4.1	4.5	4.0	4.0
Ins02. The course provided me with a deeper understanding of the subject matter.	4.5	4.3	4.2	5.0	5.0	5.0
Ins03. The instructor (Harry Sha) created an atmosphere that was conducive to my learning.	4.6	4.3	4.2	5.0	5.0	5.0
Ins04. Course projects, assignments, tests, and/or exams improved my understanding of the course material.	4.5	4.1	4.0	5.0	4.0	4.0
Ins05. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.	4.4	4.1	4.1	4.5	4.0	4.0
Ins06. Overall, the quality of my learning experience in this course was:	4.0	3.9	3.9	4.0	4.0	4.0

Divisional Items	Course Mean	Dept Mean	Div Mean	Course Median	Dept Median	Div Median
FAS001 The instructor (Harry Sha) generated enthusiasm for learning in the course.	4.6	4.3	4.3	5.0	5.0	5.0
FAS002 Compared to other courses, the workload for this course was...	3.9	3.5	3.3	4.0	3.0	3.0
FAS003 I would recommend this course to other students.	3.7	3.9	3.9	4.0	4.0	4.0

Section 4: Qualitative Comments

Please note that unedited student responses are presented here in random order.

When reviewing student responses, look for common themes and focus on actionable feedback. For assistance interpreting your report(s), please see details on the [Step-by-Step Guide to Reviewing Your Course Evaluations for Instructors](#).

Ins07. Please comment on the overall quality of the instruction in this course.

Comments
good
Decent enough, but I usually watched the recordings of the other professor because I felt that they were more engaging.
I found the course was quite disorganized and the instruction was treated as an afterthought. The quality of instruction was poor. The lectures did not teach the material since there was quite a lot of slides to go through, and both instructors would read off the slides. The course was not structured well enough to teach the material. The only way to learn in this course was to avoid the lectures and to read the three textbooks in depth. The way this course is taught needs to be seriously reassessed.
Harry Sha is a great professor, very good at explaining things and also a very passionate prof
The instruction in this course was overall quite strong. Harry Sha, in particular, was a great instructor—he consistently brought a positive and upbeat attitude to class, which made lectures enjoyable. He clearly cared about his students and made a real effort to help us succeed. While there were some complex concepts that didn't always come across clearly (which is understandable given how tough some topics were), Harry did his best to explain them and would patiently repeat or rephrase things to make sure we had the chance to understand.
He was also very helpful during office hours. Rather than just giving answers away, he guided us with useful hints and helped us think through the problems ourselves, which was a great way to learn. On top of that, the instructors were understanding and flexible when it came to deadlines and extensions, which helped alleviate stress and showed that they genuinely cared about student well-being.
That said, there were some organizational issues. The Quercus page was confusing to navigate, and it didn't help that lecture slides were hosted on Dropbox instead of being directly embedded or linked clearly on Quercus. This made it harder to keep track of materials. Piazza was okay, but there were often conflicting responses from instructors, which sometimes led to more confusion than clarity.
One other issue was the assignment scheduling. There was a three-week gap between Assignments 2 and 3, which left only about 10 days to complete Assignment 3. Then, Assignment 4 ended up being much shorter than expected—about half the length of a typical assignment. It would have been more helpful to spread things out more evenly and keep the final assignment at full length to reinforce key concepts.
Despite those issues, the instructors overall did a pretty good job of teaching the course and supporting student learning, especially considering how hard some of the course content is.
Quality of teaching was great. Topics are hard but there is plenty of office hours and Piazza answers if I have any questions or things I am confused about. Overall the course feels difficult, but fair due to the supports we are given. The only criticism I have is the speed of marking, as assignments in a lot of cases are taking a long time to get returned to us, which makes getting feedback slow.
Harry Sha was really kind and patient! He was very willing to take questions from us and lectures never felt rushed.
The lectures were very helpful in understanding new and complicated ideas.
Structured but had to be changed fairly far from the initial Syllabus. However, the professors accommodated well and adapted well to the new pace. Overall, great course with extremely good professors
The prof (Sha) was very clear with explanations, especially for such difficult concepts. I wish there were more text explanations on the slides though, especially for proofs.
The lectures were mostly clear, however, I would have appreciated there would be proofs that went into as much depth as is required for assignments and midterms as reference.
Harry is a really good instructor. He explains things really clearly.
Harry is a superb lecturer. It is clear that he cares a lot about the material and wants his students to succeed. He explained the material in a very clear and understandable way, which allowed me to spend most of my revision time approaching practice problems/assignments rather than retroactively trying to decipher lecture material (as I did for 236 and 263). I also really appreciated that Harry did a good job of summarizing concepts so I could intuitively understand them and not memorize as much.

Comments
I really enjoyed the fill-in-the-slides structure of the lectures, where a "blank" copy of the slides was provided. I tried going without them for one lecture (my iPad died) and my learning experience was diminished compared to when I was using them. I did find that in the beginning of the course (first 4–5 weeks), some of the lectures went at a (perhaps too) slow pace, and then nearing the end of the lecture the rest of the material and explanations were quite rushed. I also found that for the complexity portion of the course Harry's explanations were not as effective for me. I feel as though this may have been because it was his domain of expertise, and thus the simpler concepts that were intuitive to him were not for me. I also found that the tutorials were immensely helpful. However they did end up losing attendance after the first week due to the lack of structure of the first tutorial (which admittedly I didn't gain much from; the tutorials after were the most helpful). One suggestion would be to host the first tutorial in the same way the ones after would be held (ie. the TA takes more lead in asking questions from the tutorial assignment and explaining how certain ideas are on the wrong path).
very good

Ins08. Please comment on any assistance that was available to support your learning in the course.

Comments
no
Office hours, slides, recordings, recordings are nice
The assistance available throughout the course was generally helpful. Office hours, especially with Harry Sha, were a great resource—he explained concepts clearly, gave helpful tips for assignments, and guided students without giving away full answers, which really supported learning. Beyond that, just being able to ask Harry questions during or after class was also really useful. He was approachable and always willing to take the time to explain things, even outside of formal office hours.
Piazza was somewhat helpful, though there were times when responses from instructors conflicted or weren't entirely clear, which made it harder to rely on. Still, it was a decent tool for quick clarifications.
Overall, between office hours, in-class help, and Harry's general availability and willingness to support students, the learning support in this course was solid—especially on the instructor's end.
Plenty of office hours with professors and TAs, as well as a Piazza
I wish solutions were released for the assignments and the test, as it would help students gauge a fully correct response.
Office hours were available with TAs and instructors every week. I would have appreciated seeing profs more active on online forums available for students who were not able to make it to a ton of in person office hours.
Accommodations and office hours
Piazza, office hours
Piazza and office hours were good.
There were 3 different TAs that ran the tutorial section I attended throughout the semester. The one who started and ended the semester, Ben, was very helpful and had clear explanations, but sometimes would get spoken over by students' conversations because of the more laid back structure of his tutorials (ie. he waited for questions). I learned most from Ben when he called everyone together to try and figure out the answers.
I don't know the name of the TA whose tutorial I enjoyed the most. He filled in many weeks while Ben was gone and ran tutorials in a way that really worked well for me. He would cold call on people (scary, but very helpful!) and allow them to give ANY answer. If it was right, he would ask for an explanation, but if it was wrong, rather than just saying "no" he would actually explain where it went wrong. This was really helpful for me as someone who is not super talented at proofs, as it helped me figure out patterns to investigate to debunk/prove my algorithm ideas.
I also routinely attended Harry's office hours (I treated them like a third lecture). These were a really great resource for me to clarify lecture material and assignment questions.
Piazza was a mixed bag, with most of the helpful answers coming from students. I found a lot of the TA answers to be either misleading (maybe my reading comprehension is not great) or stress inducing (they sometimes had a condescending tone combined with a non-answer that did not clarify anything and made me feel more confused/discouraged).
I also think the lack of assignment and midterm solutions was detrimental, because the TA comments given often just said "wrong proof" and didn't explain what was wrong, or where to begin to get the right answer.
very good

6.6 CSC236 – Introduction to the Theory of Computation – Summer 2025

FAS Summer 2025 UG Course Evaluation Report

Please review the [Step-by-Step Guide to Reviewing Your Course Evaluations](#) for instructors to assist with interpreting your report(s).

Content of Course Evaluation Reports

The University of Toronto's Cascaded Course Evaluation Framework (CCEF) offers the opportunity for students to provide feedback on their own learning experiences. The CCEF comprises institutional items, divisional items, departmental items as well as instructor-selected items. More information about the CCEF is available on the [course evaluations website](#).

While interpreting course evaluation results, it is important to keep the following in mind:

Course evaluations provide student perspectives on their learning experiences in the course and experts on teaching evaluation advise that no individual method gives the complete picture of an instructor's teaching effectiveness. Moreover, in the U of T context, other factors such as class size and class level were found to cause small variations in the numerical ratings.

This report contains four sections:

Section 1: Quantitative Data Results of institutional, divisional, and departmental rating-scale items.	Section 2: Instructor-Selected Items Results of rating-scale items you have selected during the Item Selection period this term .	Section 3: Comparative Data Comparative results of this course vs. all courses evaluated in the department and/or division this term .	Section 4: Qualitative Comments Unedited student responses to the institutional open-ended questions.
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Statistical Terms Used in this Report

Mean: The mathematical average.	Median: The middle value when all responses are ordered. Less sensitive to extreme and/or divergent scores.	Mode: The most frequently occurring score.	Standard Deviation: A measure to indicate the "spread" of the scores.
The Institutional Composite Mean (ICM): A mathematical average of the first five institutional rating scale items (Ins01-05), which represent institution-wide teaching and learning priorities. The 2018 Validation Study established the reliability and validity of using the ICM as a metric to understand students' collective experiences.		% of Endorsement: The percentage of respondents that selected the two most positive response options ("A Great Deal" and "Mostly" combined in Ins01 to Ins05; "Excellent" and "Very good" combined in Ins06).	

FAS Summer 2025 UG Course Evaluation Report for Harry Sha

Course Name: Intro to Theory Comp CSC236H1-Y-LEC5101
Delivery Mode: INPER

Division: ARTSC
Department: CSC-ARTSC

Raters	Students
Responded	20
Invited	117
Response Ratio	17%

Section 1: Course Evaluation Results - Quantitative Data

This section provides a figure and statistical information about institutional, divisional, and departmental rating-scale items. Please see Section 4 for open-ended responses.

For the 6 institutional items (Ins01 to Ins06), the two sets of scales and the associated numerical values are:

Ins01-Ins05	Ins06
Not at all-1	Poor-1
Somewhat-2	Fair-2
Moderately-3	Good-3
Mostly-4	Very Good-4
A Great Deal-5	Excellent-5

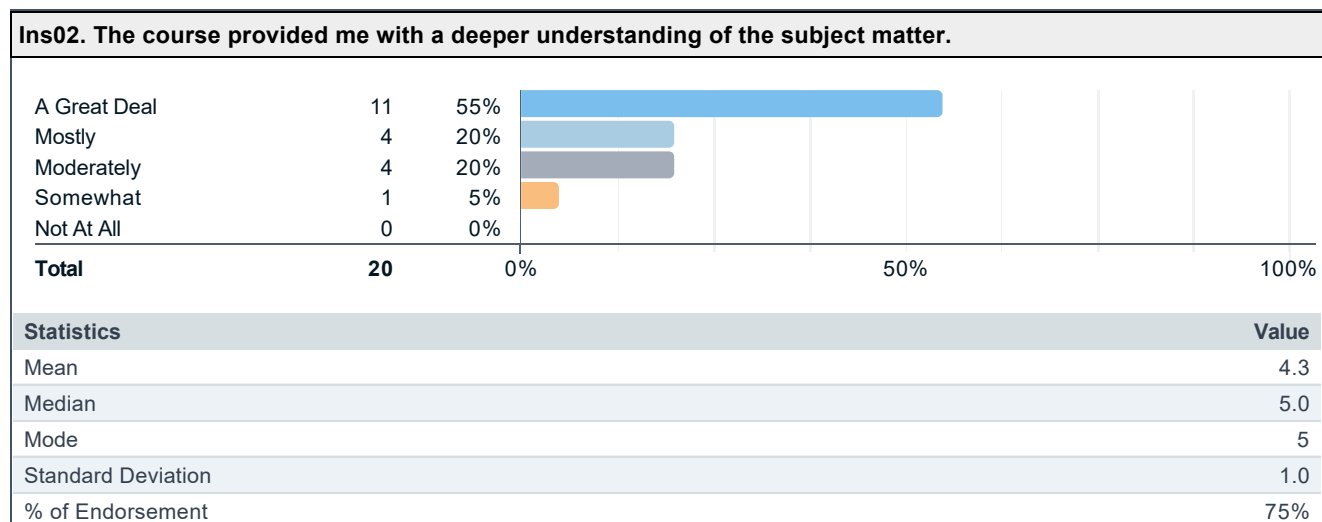
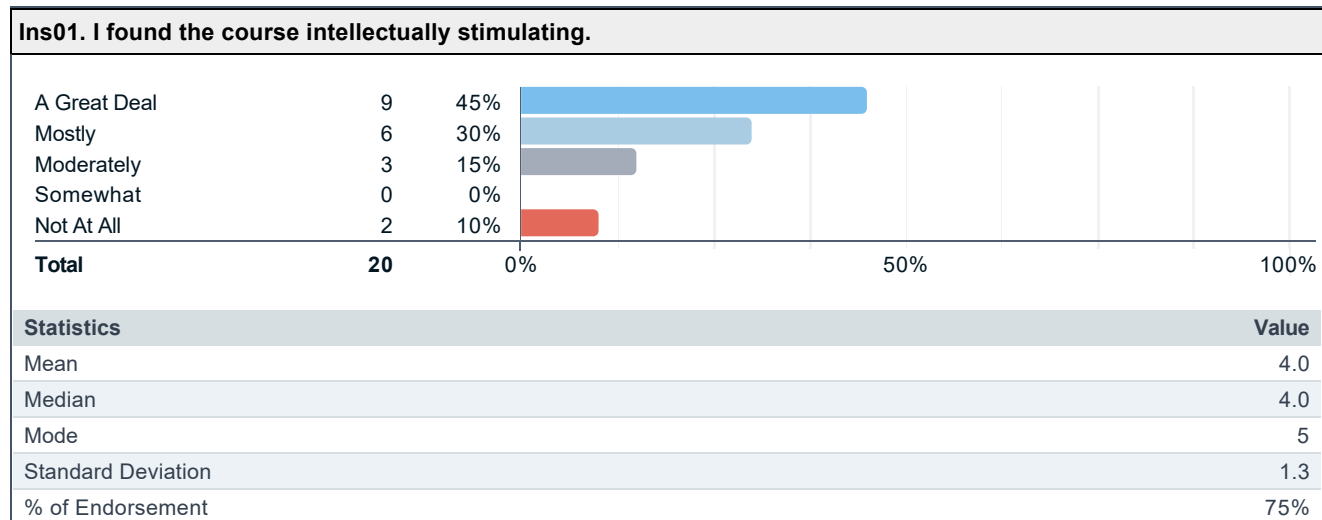
Divisional and departmental items may use scales different than the two noted above.

The bar graphs provide the number and percentage of respondents selecting each answer option for each item. The distribution of answer options in the bar graphs gives the most complete information about the typical student response and the variability in the distribution of responses. When interpreting course evaluation results, the bar graph provides more nuanced information than any summary statistic alone.

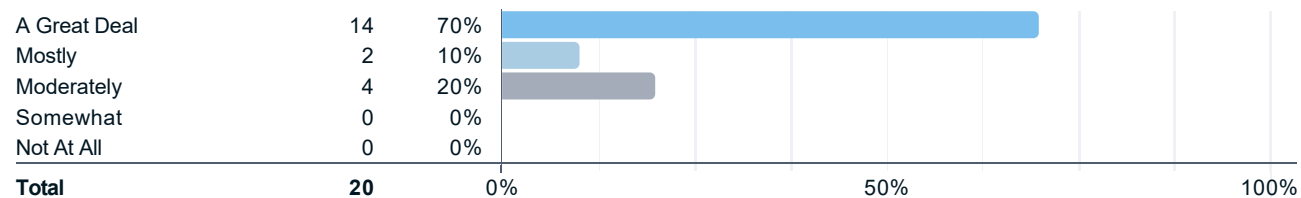
Mean, Median, Mode and Standard Deviation are calculated from the numerical values of each answer option.

“% of Endorsement” indicates the percentage of respondents that selected the two most positive response options (“A Great Deal” and “Mostly” combined in Ins01 to Ins05; “Excellent” and “Very good” combined in Ins06). Please note that divisional and departmental items might use scales that are not in ascending order and thus “% of Endorsement” is only provided for institutional rating-scale items.

Institutional Items

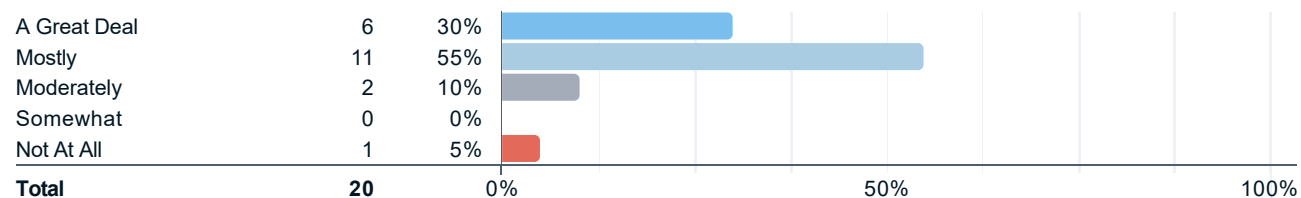


Ins03. The instructor (Harry Sha) created an atmosphere that was conducive to my learning.



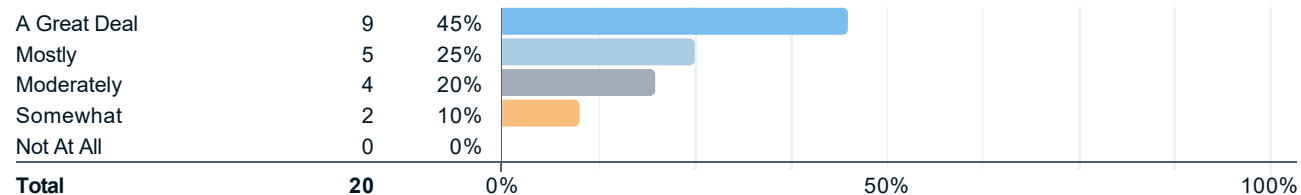
Statistics	Value
Mean	4.5
Median	5.0
Mode	5
Standard Deviation	0.8
% of Endorsement	80%

Ins04. Course projects, assignments, tests, and/or exams improved my understanding of the course material.

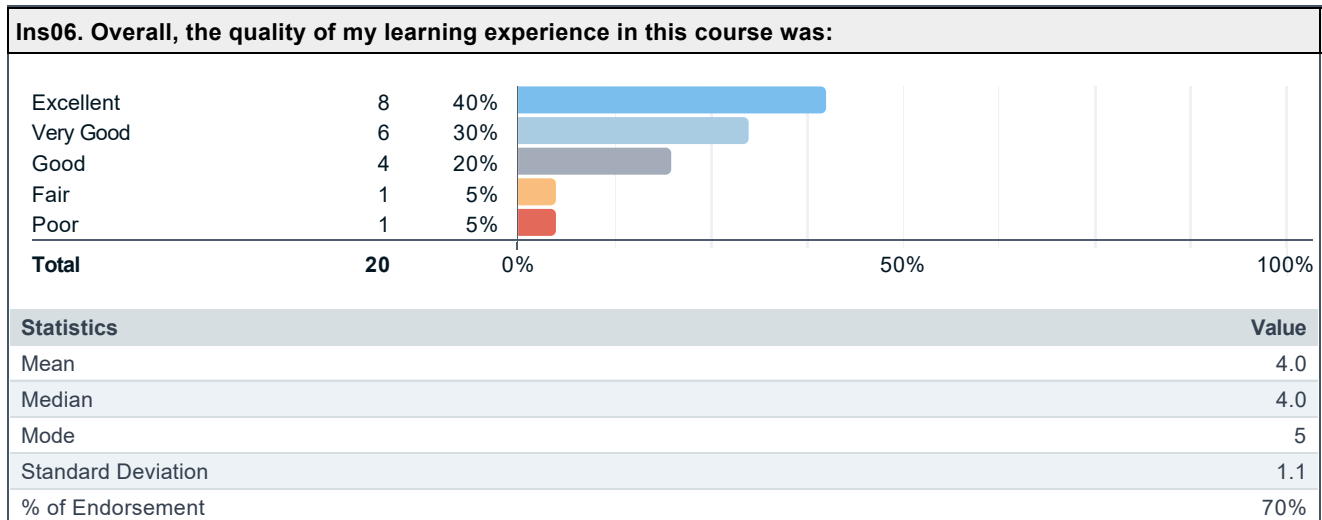


Statistics	Value
Mean	4.1
Median	4.0
Mode	4
Standard Deviation	0.9
% of Endorsement	85%

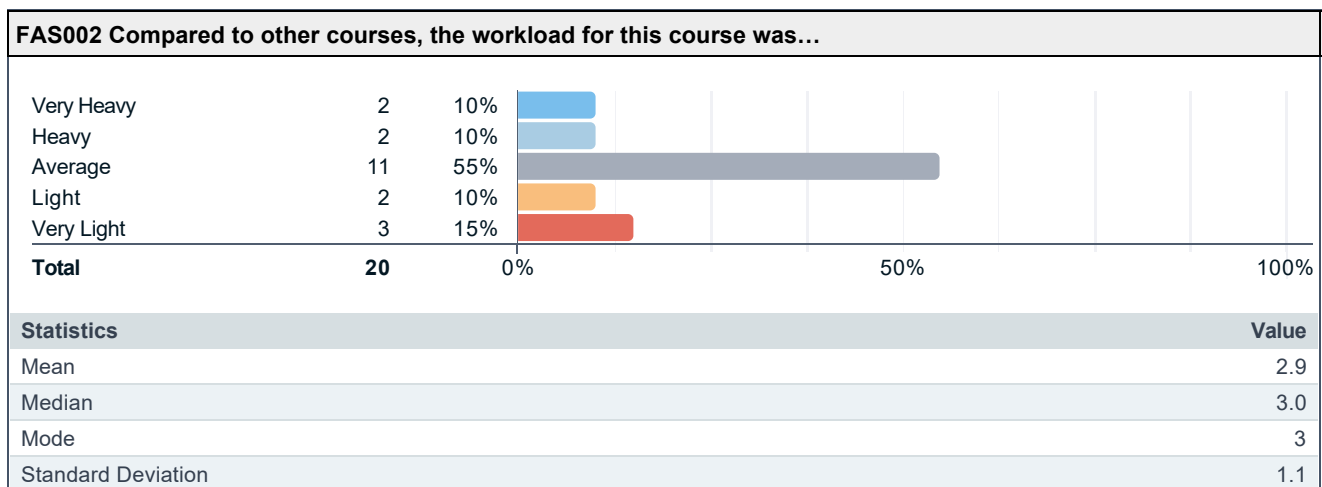
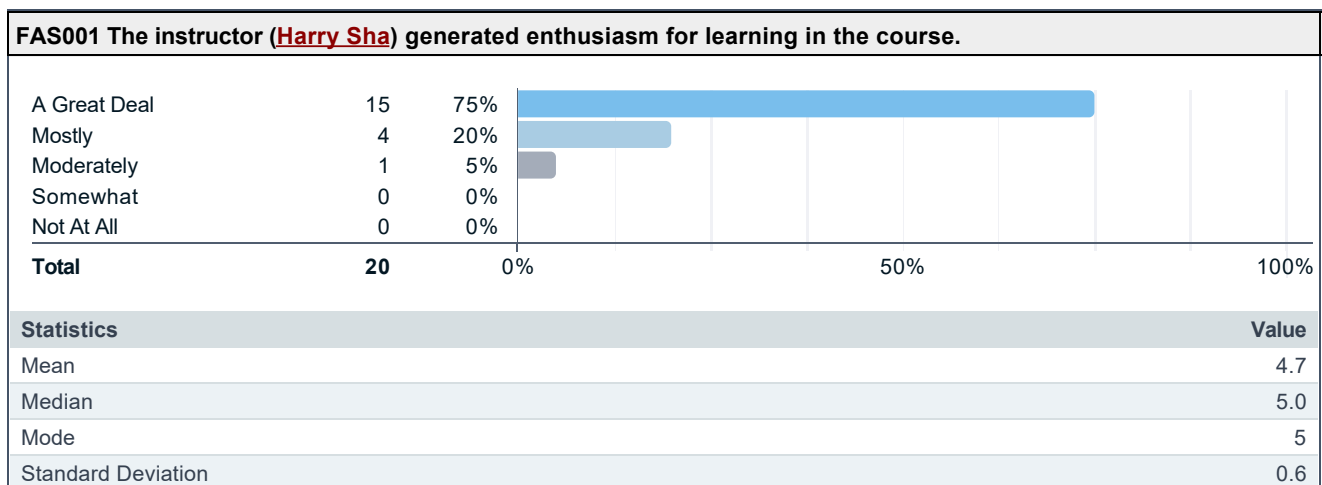
Ins05. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.

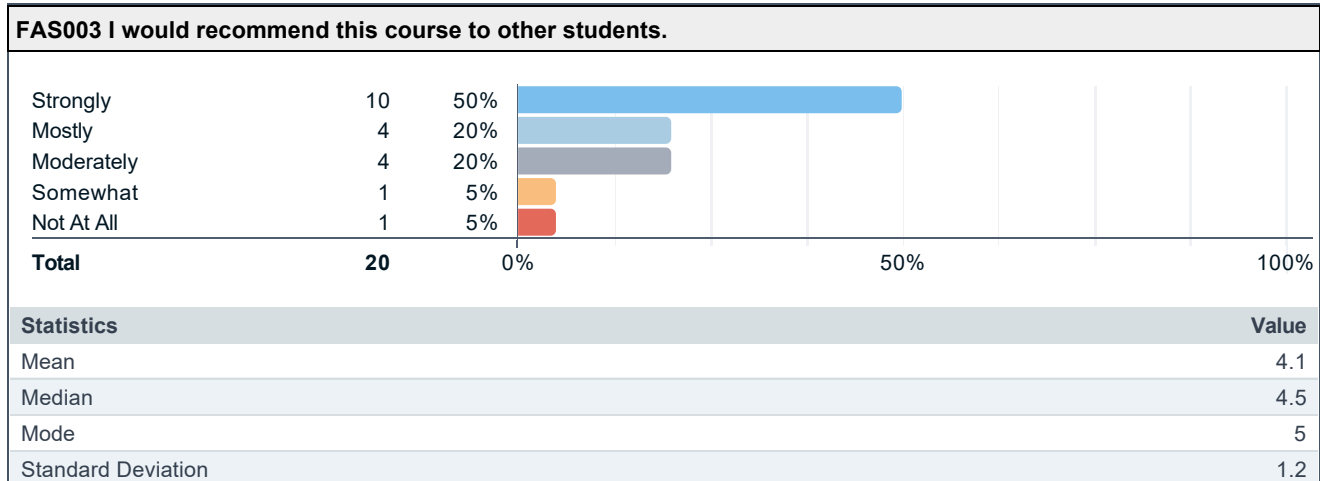


Statistics	Value
Mean	4.1
Median	4.0
Mode	5
Standard Deviation	1.1
% of Endorsement	70%



Divisional Items





Section 2: Instructor-selected Items

This section provides the results of the quantitative items you selected from the item bank during the question personalization period. These results are available only to you as they serve for personalized formative feedback.

Please note instructor-selected items are *not included* in the administrative report provided to your department.

Section 3: Comparative Data

This section provides comparative information (i.e., means and medians) between the results of this course and those of all courses evaluated in the department (if applicable) and/or in the division **in this term**.

Please note that means for the department/division are weighted by the number of respondents so courses with higher numbers of respondents carry more weight in the calculation of the departmental/divisional mean values.

The departmental and divisional median values are the middle values when responses from all courses are ordered.

Departmental/divisional mean and median values are provided for comparison but due to other course factors that may influence the responses for a course, they should not be regarded as definitive benchmarks.

Institutional Composite Mean (ICM): A mathematical average of the first five institutional rating scale items (Ins01-05).		
Course	Department	Division
4.2	4.1	4.2

Institutional Items	Course Mean	Dept Mean	Div Mean	Course Median	Dept Median	Div Median
Ins01. I found the course intellectually stimulating.	4.0	4.0	4.2	4.0	4.0	4.0
Ins02. The course provided me with a deeper understanding of the subject matter.	4.3	4.2	4.3	5.0	4.0	5.0
Ins03. The instructor (Harry Sha) created an atmosphere that was conducive to my learning.	4.5	4.0	4.2	5.0	4.0	5.0
Ins04. Course projects, assignments, tests, and/or exams improved my understanding of the course material.	4.1	4.1	4.1	4.0	4.0	4.0
Ins05. Course projects, assignments, tests and/or exams provided opportunity for me to demonstrate an understanding of the course material.	4.1	4.2	4.1	4.0	4.0	4.0
Ins06. Overall, the quality of my learning experience in this course was:	4.0	3.9	4.0	4.0	4.0	4.0

Divisional Items	Course Mean	Dept Mean	Div Mean	Course Median	Dept Median	Div Median
FAS001 The instructor (Harry Sha) generated enthusiasm for learning in the course.	4.7	4.2	4.3	5.0	4.0	5.0
FAS002 Compared to other courses, the workload for this course was...	2.9	3.5	3.3	3.0	3.0	3.0
FAS003 I would recommend this course to other students.	4.1	4.0	3.9	4.5	4.0	4.0

Section 4: Qualitative Comments

Please note that unedited student responses are presented here in random order.

When reviewing student responses, look for common themes and focus on actionable feedback. For assistance interpreting your report(s), please see details on the [Step-by-Step Guide to Reviewing Your Course Evaluations for Instructors](#).

Ins07. Please comment on the overall quality of the instruction in this course.

Comments
Harry is an excellent instructor and very approachable and enthusiastic
excellent
The prof and the TAs are nice, the course website is well-constructed and extremely helpful. But I feel like it is a bit too easy and brief for a computation theory course. We could have done more on proofs and motivation behind theory. But considering there's CSC240, I suppose that's why this course is so light.
I would rate the instruction quality around 90/100. The instructor explained concepts very clearly, and the accompanying practice problems covered a wide range of difficulty levels. The exams were interesting and fair, without being overly difficult. Overall, this course was well-taught and I would highly recommend it.
Harry is a good instructor who explains concepts clearly. In-class examples were well-chosen to illuminate the subject matter. He brings a good sense of energy to the class and keeps things moving at a good pace.
The class at times had a wonderful informal vibe, where people seemed to feel empowered to ask questions. I would encourage taking more moments for class participation and/or for students to work on problems on their own, as this was engaging when it happened.
great, harry was very friendly
The most thing i feel in the course was the course does not sound fun at all. I was not failing to get the idea, conversely, I got over 95% average on my three term tests. I felt the course material did help me , but mostly i was doing problem sets and preparing for tests. I dont develop any skills in the course and i might just forget all the stuff when i finish this course. The instruction is fine, i sometimes attend lectures.
The instructor was very enthusiastic and presented information well. He was very approachable and answered questions in an encouraging manner. I liked the commentary tying the material to future endeavors and related fields in computer science and STEM applications. Problem sets and tutorial questions were critical in solidifying understanding of lecture content. Tutorial videos solving problems were a great add.
The one thing I would like to see improved is the grading approach to term tests. Actually very specifically, the way that points are allocated to questions and total points available: in general, the total number of points available are very low and since there are only a handful of questions, each question is worth a very large part of the mark for the test. So if for whatever reason you mess up on one question, you could instantly lose like 20%+ on the test which I don't think is a fair assessment of one's knowledge. I think the ratio of points per question/part of a question to total points on the term tests should be lower so that the penalty for a mistake is not so exaggerated. Also, I will mention that even if marks are adjusted at the end of the course to reflect students' actual understanding (i.e. if term tests have deflated marks and an adjustment is done after exams), the lower term test marks can have a serious negative influence on our confidence in the course and the subject area in the meantime and affect our future learning (thankfully, didn't happen in my case but just a general observation).
Lectures were very interactive, professor was friendly and stayed to talk after lectures, TAs were helpful and cared about instruction of the course.
the quality of the course was good and the concepts were easier to understand as well as the prof was very helpful. Having tests with no assignments was a little harsh though, it would have been better if the tests weren't the only assessment.
None

Ins08. Please comment on any assistance that was available to support your learning in the course.

Comments
Piazza OHs
The course website, YouTube on the master theorem
The learning support for this course was excellent. The practice problems, tutorials, and explanations provided ample opportunities to reinforce the material. The instructor and TAs were approachable and provided helpful guidance whenever questions arose. Piazza was also used very effectively, with questions being answered promptly.
Tutorial questions were interesting and helped deepen understanding. I would have preferred the opportunity to work through the problems independently for a few minutes before they were taken up, but it was still, largely, a good experience.
The teaching team seemed to be quite active in answering Piazza questions, which was great.
I feel that answers to problem set and tutorial questions were sometimes bare-bones or hard to understand. It might help simply to present them better: in point-form or in separate paragraphs, rather than a large block. Skipping steps in solutions can also make them hard to follow, when it is a question you are struggling with. The video tutorials, when available, did a lot to alleviate this.
After a full semester, I see why this course has its own website: the website is superior to Quercus in just about every way. However, I do wish that important administrative announcements could have been made through Quercus, since, being available only on Piazza, they were easy to miss.
The decision to make the tests 80 minutes straddling the lecture and tutorial caused some administrative issues. Couldn't the course afford to block off extra time for tests? Most students in the summer don't have a heavy course-load.
office hours, piazza was great
100% percent tests is not good. I felt like I was out of school, i dont attend any in-person activities because there's no need, I just review problem sets before tests. The grade should be based on more staff, like assignments, quizzes.....
Tutorial videos were very helpful in demonstrating how to solve problems. Instructor and TAs were available for questions. Piazza board was very active and helpful and the bonus incentive for piazza contributions made for a very active and helpful community of peers.
The TAs were very helpful and they explained very well. One think I would say is it would be better to give time to the students to work on the tutorial a bit as well before jumping into explaining.
None

7 Appendix – Course Documents from CSC236 – Summer 2023

7.1 Guide to Homeworks

CSC 236 Guide to HWs

Summer 2023

- 1.) Main goals for the HWs:
 - Practice solving problems and using techniques developed in the lectures.
 - Solidify understanding of the course material.
 - Connect topics from the course to applications and other fields.
 - Have some fun :)
- 2.) Homework in this class should be considered very low pressure. You're not asked to produce a correct solution, just to try your best to understand the problems. With that in mind, I hope you approach the problems with a relaxed mindset. The problems are not there to test you - rather, they are there to help you learn. Don't be discouraged if you get stuck or can't solve a problem - see that as an opportunity to learn!
- 3.) Since I ultimately care about whether or not you eventually understand the problems and solutions, I do not care HOW this happens. In particular, you may use any resources you like to help you. However, generally, people learn much better if they actively try to solve the problem first rather than searching for a solution immediately. Therefore, I recommend you struggle with a problem for at least one hour before you seek help.
- 4.) A deep understanding of the problems and solutions will help you on the midterm and final (in which at least 20% of the points are heavily based on the hw).
- 5.) Work with other people! Seeing how others think is invaluable, and having to explain your ideas helps you retain them better and may expose misunderstandings. As a reminder, TA check ins are to be done in pairs, but that doesn't mean you can't collaborate with more people.
- 6.) Show up to office hours!
- 7.) Prepare questions for the TA check ins.
- 8.) Generic math tips:
 - Draw things out
 - Try to make a problem concrete in a certain way by perhaps trying out small examples.
 - Review the lecture and tutorial. Read the relevant chapters of the textbook.

7.2 Guide to Check-ins

CSC 236 Guide to Check Ins

Summer 2023

Basic Facts

- 1.) There will be a TA check in for each of the five homeworks.
- 2.) Each check in is worth 2% of your grade (for a total of 10%).
- 3.) Check ins should be done in pairs. Pairs may change throughout the semester.
- 4.) Check ins are 15 mins long and NOT on U of T time. That is, they start on time.
- 5.) You may sign up to check in with any available TA.
- 6.) Though check ins are worth some points, they are mainly an opportunity for YOU to interact with the TAs and ask them questions.

Signing up

- 1.) We will be using Calendly. Each TA will have their own link, which you can find on the website.
- 2.) **Important:** In the description box, put the UTorID of both you and your partner. Note that UTorIDs are not the same as your Student ID Number. If you don't know your UTorID, you can ask us on Ed.

Format

- 1.) First 5 minutes: Your TA will select several problems from the homework and ask you to talk through your attempt at them.
- 2.) Remaining 10 minutes: If your TA identifies a misunderstanding in the first 5 minutes, they will bring it up. Otherwise, this is your chance to ask the TA any questions about the course (including about previous homeworks).

Grading for Check Ins

- 1.) TLDR: You will get full credit for convincing your TA that you made a fair attempt on all the HW problems.
- 2.) There are three possible grades for each check in: +, -, 0, corresponding to 2%, 1%, 0%. Here is what each grade corresponds to
 - +: You made a fair attempt at all the homework problems.
 - -: You showed up but did not demonstrate that you made a reasonable attempt at the homework problems.
 - 0: You didn't show up.
- 3.) Demonstrating "A fair attempt".
 - Any (correct or incorrect) solution.

- An incomplete solution with specific ideas attempted and an explanation of where you got stuck or why the idea doesn't work.

Examples:

- "I tried to solve the problem using induction on n but could not finish the proof."
This is insufficient for full credit since you did not demonstrate WHAT you tried.
- "I tried to solve the problem using induction on n but could not finish the proof. In particular, I couldn't get the algebra to work out in the inductive step. Here is where I got to [shows scratch work], and I'm unsure how to proceed from here..."
This IS sufficient for full credit since you demonstrated that you tried the homework problem. In this scenario, your TA will suggest ideas and help you get unstuck in the second half of the check in.

7.3 Syllabus

CSC 236 - Introduction to the Theory of Computation

Syllabus

Summer 2023

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1 Course Description

The official course code for this course is CSC236H1 Y LEC5101 20235. The title is *Introduction to the Theory of Computation*.

The prerequisite for this class is CSC165 (or equivalent).

See [here](#) for the learning outcomes of this course.

2 Course Delivery

Lectures and tutorials are on U of T time. That is, they start 10 minutes late.

Lectures are in person at BA1130 in the Bahen Building. They are on Wednesdays from 18:00-20:00.

Tutorials are in person at BA2165, BA2195, BA2159, BA2139. They are immediately after the lecture, i.e. Wednesdays from 20:00-21:00.

3 People

The instructor is Harry Sha. The TAs are Matthew Hagan, Lawrence Li, Lily Li, and Logan Murphy.

4 Communication

The primary method of communication will be through announcements on Ed, which will send email notifications - make sure you check your emails frequently, so you don't miss any important announcements!

The best way to get in touch with course staff is to post on Ed (they can be private).

The second best way is to email me shaharry@cs.toronto.edu.

5 Office Hours

The instructor will hold weekly (starting week 2) office hours in person. See the course calendar (on the course website) for the most up-to-date times and locations.

6 Course Materials

All lecture slides, lecture recordings, tutorial handouts, and tutorial solutions will be available on the course website:

<https://www.cs.toronto.edu/~shaharry/csc236/>

There are additional suggested readings posted on the course website.

7 Platforms

We will use Ed as the discussion board.

We will use Crowdmark for grading.

8 Tech Requirements

You will be required to have access to a computer to find all the course materials.

9 Coursework and Grading Breakdown

- 1.) TA check-ins: 10% ($5 \times 2\%$)
- 2.) Midterm: 40%
- 3.) Final: 50%
- 4.) Ed Contributor Prize 2%

There might extra credit opportunities related to the homeworks throughout the semester.

Note your grade will be clipped at 100%.

TA check-ins

There will be 5 homeworks throughout the semester and a TA check-in for each homework. Homeworks and TA check-ins are to be done in pairs.

The TA check-ins serve two purposes.

- 1.) Check that you have made an honest attempt on the homework
- 2.) Provide opportunity for you to ask specific questions to your TA.

You will get full credit for the Check-in if you demonstrate 1.)

You do not need a correct solution to get full marks. However, you should still be sure to complete and understand the solutions to each homework since it will help you in the exams. (See the note in the next section)

Exams

The midterm is June 28th, 6-9PM at EX100, will count for 40% of your grade.

The final (date TBD) will count for 50% of your grade.

Note that at least 20% of each exam will be based on problems from the homework. The idea is to motivate you to understand the homework problems, and to mitigate the fact that the exams count for a large percentage of your grade.

Ed Contributor Prize

There is an additional 2% grade boost for the top 3 contributors on Ed.

In particular, the prizes will go to those who have the most instructor endorsed answers, with ties broken by number of questions asked.

Regrade requests

Regrade requests are possible for the midterm. If you would like to request a regrade, make a private post on Ed explaining why you think your solution deserves more points. We will take a look at it and regrade the question.

Regrades must be submitted within 7 days from when marks are released.

10 Special Considerations

If you find that illness or other emergency is preventing you from being able to complete a check in or write a test, please follow these two steps:

- a.) Fill in the [Absence Declaration Form](#). on ACORN
- b.) Complete the [SpecialConsiderationForm.pdf](#) and email it to csc236-2023-05@cs.toronto.edu.

You will be required to affirm that you are abiding by the [Code of Behaviour on Academic Matters](#). In particular

it is an offense to engage in any form of cheating, academic dishonesty or misconduct, fraud or misrepresentation not herein otherwise described to obtain academic credit or another academic advantage of any kind

That is, that you are truly experiencing an emergency and acknowledge that to claim so falsely is an academic offense. Please note that a heavy workload or coinciding due dates do not constitute an emergency. Applying does not guarantee that you will be granted special consideration.

Important: Submit your request soon as possible if you find yourself in such a situation. It is easier to resolve situations earlier rather than later. If your emergency will affect

your ability to complete coursework for more than a few days or in multiple courses, we recommend you also talk to your registrar.

11 Use of the Discussion Board

Please use Ed! Ask and answer many questions! Please remember to be respectful when interacting on the discussion board - we are all here to learn!

12 Participation

Participation is encouraged at both lectures and tutorials. However, it is not required for your grade. It would be helpful to show up for the first tutorial for partner finding purposes.

13 Academic Integrity

The midterm and final exams are strictly no collaboration. They will be administered in person.

In general, you should follow the policies found [here](#).

8 Appendix – Tutorial Slides

While we wait...

- ▶ Are there problems that we can solve in $O(n^2)$ but not $O(n)$?
- ▶ What about $O(n^3)$ but not $O(n^2)$?
- ▶ What about $O(n^{100})$ but not $O(n^{99})$?
- ▶ What about $O(n^{1.00001})$ but not $O(n)$?
- ▶ What about $O(n \cdot \log(\log(n)))$ but not $O(n)$?
- ▶ What are some resources other than time that are useful in computation.

CS 463 Tutorial 9: Time Hierarchy Theorem and Randomness

TA: Harry Sha (shaharry@cs.toronto.edu)

November 22th, 2024

Time is precious

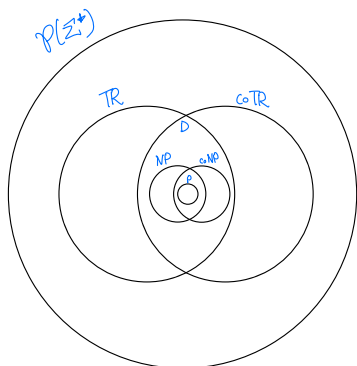
The big question for the first part of today is:

Can I decide strictly more problems given more time, and how much more time do I need?

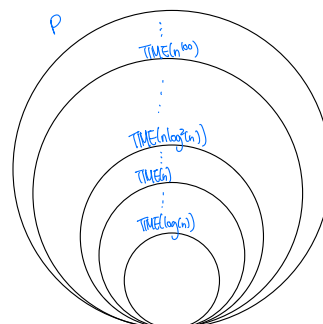
Let $\text{TIME}(f(n))$ be the class of decision problems that can be solved in $O(f(n))$ time on a (deterministic) TM.

Note that using this notation, $P = \bigcup_{c \geq 0} \text{TIME}(n^c)$.

The picture



Zoomed in



Time Hierarchy Theorem

The answer to our question is yes (sort of).

Theorem (Time Hierarchy Theorem)

If f, g are functions such that $f(n) \log(f(n)) = o(g(n))$. Then

$$\text{TIME}(f(n)) \subsetneq \text{TIME}(g(n))$$

For example, this shows $\text{TIME}(n^9) \subsetneq \text{TIME}(n^{10})$ since

$$n^9 \log(n^9) = 9n^9 \log(n) = o(n^{10})$$

Proof of the Time Hierarchy Theorem

Two lemmas

Lemma (Nice representation of TMs)

There is a way to represent TMs such that

- Every string in Σ^* corresponds to some TM.
- Every TM is represented infinitely many times.

Lemma (Efficient universal TM)

There is a universal TM U that simulates any TM M on any input x such that if M runs for T steps on x , the simulation runs for $CT \log(T)$ steps.

Proof of the Time Hierarchy Theorem

The plan is to use diagonalization to find some language L st. $L \in \text{TIME}(g(n))$ but $L \notin \text{TIME}(f(n))$.

$D(w)$:

run M_w on w using the universal TM for $g(|w|)$ steps.
 if M_w halts:
 | return the flipped result.

** stops on U_w , not M_w !*
** else case not important*

Let $L = L(D)$. Note D runs in time $O(g(n))$. By contradiction, assume there is some $O(f(n))$ decider M st. $L(M) = L$.

Proof of the Time Hierarchy Theorem

For any input of length n , M runs for at most $c \cdot f(n)$ steps. On the universal TM, this takes at most $c' \cdot f(n) \log(f(n))$ steps. Since $f(n) \log(f(n)) \in o(g(n))$ by assumption, for large enough n , $g(n) > c' \cdot f(n) \log(f(n))$.

Pick some α such that $|\alpha| > n$, and $M_\alpha \equiv M$. One exists b/c of lemma 1. Now consider running D on α .

Since $g(|\alpha|) > c' \cdot f(n) \log(f(n))$, the simulation halts. Then $L(D) \neq L(M_\alpha)$ since α is in exactly one of them. But this is a contradiction.

Corrolaries

- ▶ $\text{TIME}(n^k) \subsetneq \text{TIME}(n^{k+\epsilon})$ for any $k \geq 0, \epsilon > 0$
- ▶ $P \subsetneq \text{TIME}(2^n)$

What are some other useful resources for computation?

Randomness

What are some uses of randomness?

Some examples

- ▶ Quicksort
- ▶ Find an 1 in an length n array with half 1s and half 0s.

Probabilistic TMs

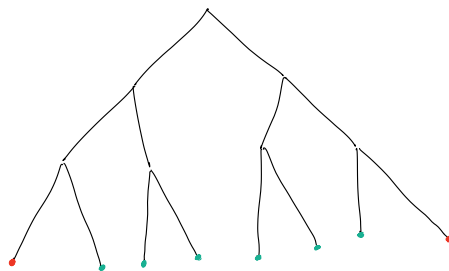
Like non-deterministic TMs, except the branching factor is at most 2. When the execution hits a non-deterministic step, the TM flips a fair coin to decide which path to follow.

Note that a branch of height k is taken with probability 2^{-k} .

The probability that a TM, M , accepts w is

$$\sum_{b, b \text{ is an accepting branch}} \Pr[b]$$

Picture



Errors

	$x \in L$	$x \notin L$
M accepts x	True positive	False positive
M rejects x	False negative	True negative

Complexity Classes

Let **BPP** (bounded-error probabilistic polynomial time) be the set of problems L for which there exists a polynomial time probabilistic TM such that for all $x \in \Sigma^*$, the TM errs on x with probability most $1/3$.

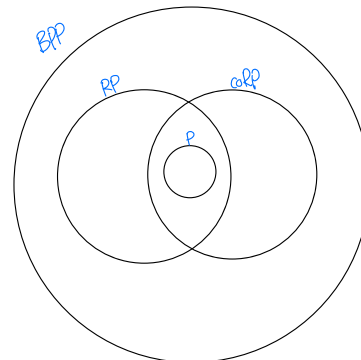
- **RP** $\subset$ BPP is the subset that doesn't allow false positives.
I.e. for every $x \notin L$, the TM rejects with probability 1.
- **coRP** $\subset$ BPP is the subset that doesn't allow false negatives.
I.e. for every $x \in L$, the TM accepts with probability 1.

Comparison

Class	$x \in L$	$x \notin L$
BPP	$\geq 2/3$	$\leq 1/3$
RP	$\geq 2/3$	$= 0$
coRP	$= 1$	$\leq 1/3$
NP	> 0	$= 0$

Accept probability

Picture



FAQ

1. How does randomness compare with non-determinism? I.e. what is the relationship between RP and NP or BPP and NP?
2. Does having error on both sides help? I.e. is $RP = BPP$?
3. What if we relax the requirement of polytime to expected polynomial time?
4. Can we buy accuracy with more randomness and time?
5. Does randomness actually help? I.e. does $BPP = P$? Or how much time does randomness cost?

FAQ answers

1. $RP \subset NP$ (see the comparison slide and observe that a RP decider is a NP decider), but the relationship between BPP and NP is unknown. I.e. we don't know if $BPP \subseteq NP$ or the other way around or both.
2. Unknown!
3. We can relax to this definition and the classes don't change!
4. Yes! Run the algorithm independently many times and output the majority answer
5. Unknown! But, surprisingly, currently people believe everything can be derandomized i.e. $BPP = P$!

There a lot unknown about randomized complexity classes. For all we know right now, it might be the case that $BPP = EXP$!