THE UNIVERSITY OF CHICAGO

MATH 18500 51 - Mathematical Methods in the Physical Sciences III - Instructor(s) Alexander Strang

Project Title: **College Course Feedback - Spring 2021**

Number Enrolled: **31**
Number of Responses: **20**

Report Comments
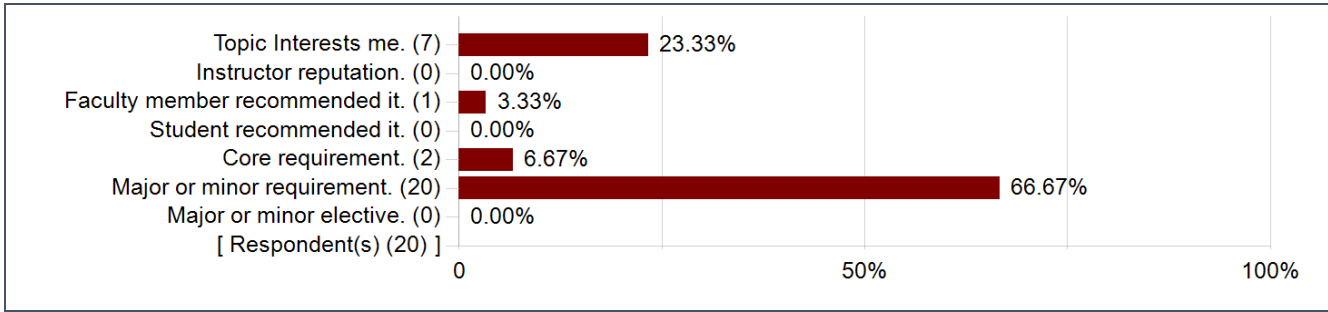
Opinions expressed in these evaluations are those of students enrolled in the specific course and do not represent the University.
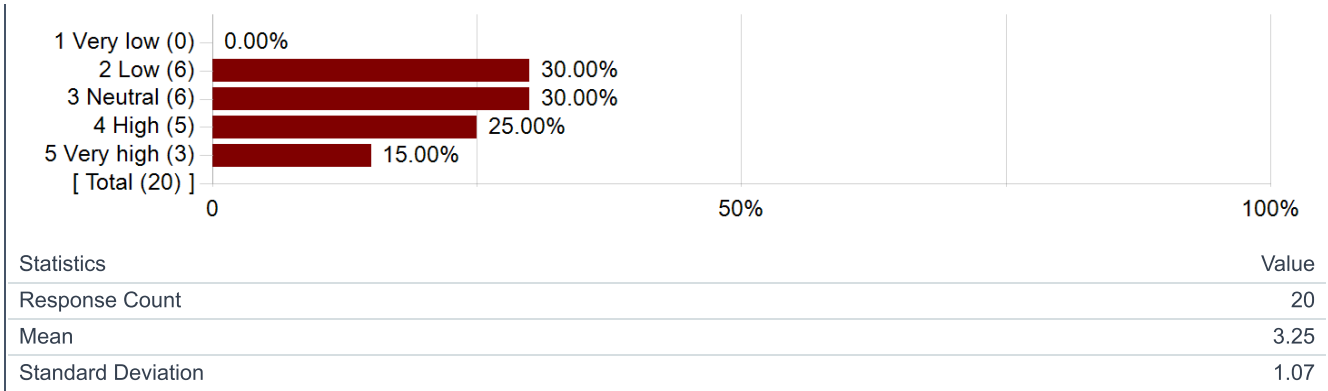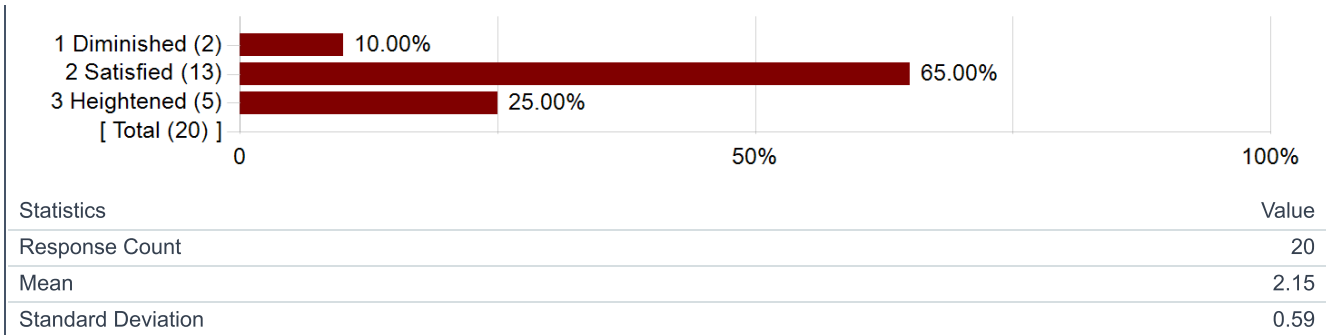
Creation Date: **Monday, June 28, 2021**

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Why did you choose to take this course? (Select all that apply)

Option	Percentage
Topic Interests me. (7)	23.33%
Instructor reputation. (0)	0.00%
Faculty member recommended it. (1)	3.33%
Student recommended it. (0)	0.00%
Core requirement. (2)	6.67%
Major or minor requirement. (20)	66.67%
Major or minor elective. (0)	0.00%
[Respondent(s) (20)]	

Prior to starting this class, your interest level was?

Option	Percentage
1 Very low (0)	0.00%
2 Low (6)	30.00%
3 Neutral (6)	30.00%
4 High (5)	25.00%
5 Very high (3)	15.00%
[Total (20)]	

Statistics	Value
Response Count	20
Mean	3.25
Standard Deviation	1.07

Now that this class is over, your interest is?

Option	Percentage
1 Diminished (2)	10.00%
2 Satisfied (13)	65.00%
3 Heightened (5)	25.00%
[Total (20)]	

Statistics	Value
Response Count	20
Mean	2.15
Standard Deviation	0.59

What are the most important things that you learned in this course? Please reflect on the knowledge and skills you gained.

Comments
I learned pretty important math concepts for my major
Solutions to first and second order ODE's, PDE's, Fourier series and transforms, Laplace transforms, and delta functions.
How to solve differential equations
Mostly diff eqs (including Fourier series and Laplace transforms)
solving various differential equations
Fundamentals of differential equations, Fourier and Laplace transforms
This course is basically just differential equations for 9 weeks, going into Fourier and LaPlace towards the end. It's a vibe.
How to rigorously and graphically solve separable & autonomous differential equations, and first order linear systems of ODEs. We also learned how to solve second order ODEs (homogeneous and inhomogeneous) and how to apply them to oscillator problems with exponential, sinusoidal, or arbitrary forcing terms. Resonance, and Fourier series, Fourier Transforms, Laplace Transforms, and Delta functions made up the remainder of the course.
the process for differential equation solving in general
Methods for solving differential equations.
How to solve differential equations
This was a course in differential equations but the most important thing I learned was how to manage my time studying for a remote class.
How to solve ODEs
This course was an overview of some topics involving differential equations, including how to solve ODEs, systems of ODEs, and PDEs. The analytic mathematical skills I learned to approach several types of problems was the most important knowledge I gained.
Fourier Analysis
fourier series
We learned A LOT in this course. Basically, everything differential–equations related. We learned how to approach many of the differential equations we would see in other fields, which was particularly useful as I was taking Waves/Heat/Optics concurrently with this course. To sum up, we learned how to solve linear first–order and second–order (and I guess third–order and nth–order) autonomous, homogenous, and inhomogeneous ODEs and PDEs using a number of methods such as isoclines, separation of variables, integrating factors, Ansantz expressions, Fourier Series and Transforms, and Laplace Transforms. We also spent a bit of time on damped and forced harmonic oscillators.
How to solve various types of differential equations and how to apply them to physical systems.

Describe how aspects of this course (lectures, discussions, labs, assignments, etc.) contributed to your learning.

Comments
I think the lectures were most helpful because they provided examples
Strang's synchronous lectures were very helpful for learning the material. The provided weekly notes and videos also helped with completing the problem sets.
I preferred the shorter asynchronous videos to the longer ones, but either way this was the main source of my learning the material for the class.
The lectures were the most helpful
Synchronous lectures, weekly note packets, and psets were the most helpful
recorded lectures on YouTube were relatively helpful but not as thorough as the online notes PSETs definitely very helpful in solidifying understanding
The video lectures were typically very helpful in introducing material for the class. Synchronous meetings were really the best place to get a full understanding of the material though, as Professor Strang made it a point to fully break down each concept.
Professor Strang was an incredibly organized professor who wrote class notes in real time with plenty of proofs/example problems that could later be used to study for exams. Th pre–lecture videos were a great way to introduce ourselves to topics that would be taught in class so that we wouldn't be as confused; that, and it left us more time to work on examples rather than going over derivations/cold cut material. The problem sets were very involved and challenging, but if you go to office hours and have a study group, they become manageable and a great study tool for exams!
the method with which we proceeded was very good
Went to lectures after watching lecture videos and did problems. Then worked on homework and tests.
psets, classtime, and lectures positively contributed to my learning in that order
Synchronous lectures were very helpful while asynchronous lecture videos did not cover all of the content.
Pests and lectures helped the most
Asynchronous lectures and the notes given to students helped me gain a base understanding of the material, while the synchronous lectures along with the problem sets helped me to apply the knowledge.
I learned almost exclusively from weekly lecture notes.
psets contributed most although could not have done it without help from office hours and peers
I felt as though the lecture videos on Youtube were the most concise and helpful towards my learning. They packed in a lot of information but definitely helped. The live lectures were sometimes good, sometimes ineffective/difficult to focus on. The problem sets were often pretty long but not terribly difficult if you put in the time. The problem sets were probably the most conducive to my learning. The lecture and typed week notes were definitely very good in summing up everything we learned.
At least in the online–only pandemic class, the class material was spread over Zoom lectures, prerecorded lectures on YouTube, and lecture notes published to Canvas. Compared to 184, I sometimes felt the lecture notes were not as thorough (and therefore not quite as useful) as they could have been, but the prerecorded lecture videos were very good and made up for this gap. In–class lecture was generally pretty good, and even though they didn't explicitly solidify any material in the course, the optional applications talks were very interesting and a cool look into how the math we were doing actually translated into real world problems (beyond mass–and–spring systems).

The Instructor(s) . . .

	Mean	Median	N/A	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total Responses
Provided a syllabus that allowed you to plan your learning and study time effectively.	4.40	5.00	0.00%	0.00%	5.00%	5.00%	35.00%	55.00%	20
Explained clearly the course objectives and expectations.	4.40	5.00	0.00%	0.00%	5.00%	5.00%	35.00%	55.00%	20
Stimulated your interest in the core ideas of the course.	3.95	4.00	0.00%	0.00%	5.00%	20.00%	50.00%	25.00%	20
Was available and helpful outside of class.	4.60	5.00	0.00%	0.00%	0.00%	0.00%	40.00%	60.00%	20
Overall, the instructor made a significant contribution to your learning.	4.65	5.00	0.00%	0.00%	0.00%	0.00%	35.00%	65.00%	20

What aspect of the instructor's teaching contributed most to your learning?

Comments
I think his lectures were really great
He is good at summarizing the important information. Made helpful outlines of problem solving techniques.
Strang is one of the best professors I have had at this school. His lectures were particularly informative as he actually takes his time to make sure we understand the concepts and is willing to explain the details to us. Due to this, he does go a bit slower than the other professors in the class, but I think it's a good tradeoff for the additional understanding I gained. He is always very helpful and receptive to questions during office hours, which I also found very helpful.
Prof Strang was very organized, clear, and meticulous when working examples out in class. Also very approachable in office hours
lectures were very in depth and thorough (sometimes even a little too slow), very helpful office hours and good at explaining concepts
Synchronous class meetings were the most helpful in gaining an understanding of material.
Professor Strang was born to teach. He speaks and writes very clearly, so you never get lost because of pacing in his class. I don't know how he managed to squeeze in so many proofs and example problems in 50 minutes without going overtime or speaking too fast such that he becomes incomprehensible, but he did it! I especially enjoy his incredibly detailed notes because seeing him use multiple colors and draw out diagrams representing solutions to example problems makes it the best way to learn topics that may be too abstract to visualize. He also used MATLAB to create animations that simulated solutions, like the Fourier series! His diligent, versatile, and approachable nature inside and outside of the classroom made being his student an honor and a privilege. Professor Strang is the best mathematics professor I've ever had in my academic career!
the lecture videos
Very clear at explaining things and gave good examples.
Professor Strang is very good at explaining complicated ideas clearly, calmly, and simply.
Dr. Strang had fantastic office hours and was always willing to help.
So kind, hellpful, and available for outside help. Really was considerate of the learning environment.
Professor Strang is the best instructor I have come across at UChicago thus far: approachable, clear, and great at explaining the material. The instructor was available outside of class time and always made sure that students intuitively understood the material.
Professor Strang is great at communicating ideas and flushing out discrepancies. He is also very composed which I appreciated.
Strang office hours are super helpful I wish I had gone to more of them he is very clear in explanations and doesn't expect you to be able to skip steps like some other professors. His class notes were also extremely helpful for psets and exams.
Professor Strang was genuinely a fantastic professor. He explained things clearly during lectures and in response to any questions we had. He was understanding if we didn't fully understand a concept and took the time to explain it. He had very long and helpful office hours, so combined with the other instructors, there were basically perpetual office hours throughout the afternoons Monday–Thursday. He would consistently be there to answer any questions about the problem sets or general topics that you may have. You can tell that Professor Strang is excited by the material we were covering. Also, his lecture style was somewhat nice. The long windows of time to take the midterms and final were really helpful. In general, the course felt very structured, which was good.
Prof. Strang would very explicitly outline the goals of each class at the beginning of class and remind us of any upcoming problem sets/exams. The class was always very organized. Lectures were a good combination of teaching new material and working through practice problems to engage with new concepts. Prof. Strang always worked through problems extremely meticulously, but sometimes it took a bit too long to the point that class would end before we could get to every item on the itinerary. However, since lecture material was also separately recorded and posted to YouTube in concise videos, this wasn't really an issue.

What could the instructor modify to help you learn more?

Comments
I think the structure of this class could be improved. Many days the class material did not correspond with the lecture video we were supposed to watch for that day, and it was frustrating.
Around halfway through the quarter, the problem sets became very difficult compared to the first few (these covered the Fourier series and transforms).
none
The in–class content was sometimes not alighned with the syllabus, or the online lecture videos, which could make the pacing a little confusing.
Absolutely nothing. Keep being the phenomenal professor that made me love Math 185!
probably time the videos better
n/a
Dr. Strang could be more clear with requirements on exams and have assignments / lectures better reflect what is covered in the videos.
Honestly nothing, Strang was a great professor.
Sometimes, the in–class material did not match with the material presented in the asynchronous lectures, and this wasn't helpful.
The clarity of the weekly lecture notes was variable, and I wish that they were more detailed. Additionally, the synchronous breakout rooms were unhelpful because people would turn off their cameras and not talk.
nothing
I think that Professor Strang could have been a little more concrete during lectures, first off. I think that it was nice to deal with arbitrary variables and more complicated notation, but dealing with more concrete examples would probably have been better. Second, the problem sets were often too long and had many parts to them. Third, the course was structured a bit weirdly. The first four to five weeks were pretty easy, and then we just went into overdrive mode with Fourier and Laplace. I think possibly condensing weeks one through five into four weeks, then spending an extra week on Fourier and Laplace (and those monster problem sets) would have been better. Perhaps making those problem sets a week and a half long instead of a week? Fourth, please please post the midterm and final practice solutions. It literally makes no sense to not be able to check our work. I understand that it is Dr. Culler who is responsible for that, but what's the point of the problems if we can't check them. I understand that we can go to office hours to check, but some of us are really busy throughout the week (or are working on the problem sets that are ~still~ due right before the exams) and by the time we get around to the questions, there are no office hours. It seemed as though their primary concern with these is that people would just look at the solutions and not do the questions, but even if that was the case, so what? The practice questions are optional and not even graded. Oh no — giving us more examples to look at and learn from outside of the problem sets is just ~so terrible~. Also, maybe being a bit more generous with grading/partial credit. Lastly, and this isn't something with Professor Strang as he didn't teach last quarter, but why do we ~still~ have such long midterms and finals? If it weren't for COVID, these wouldn't be a thing. They were draining in 184 and still draining now. I get that you want to fit a lot of material into the exams, but seriously who gives a four–hour timed exam for an introductory–math course midterm? It's nice having extra time, but it's not like the extra time is used to check over our work or any of that — no I would often work to the very last minute. A lot of this feedback is aimed towards the course in general and not Professor Strang. I thought Professor Strang did a fantastic job and I really enjoyed being in his class. The class wasn't terribly difficult, there were just a lot of annoying things about it that they haven't improved on since 184 or 183.
I feel like there needs to be a balance struck for questions the professor asks the class: too hard and nobody knows the answer, too easy and people will be embarrassed to answer. Usually this wasn't a problem, but a few times per class Prof. Strang's questions to the class would be too far on the "too easy" side, usually during one of the steps of working through an example problem. The silence that would ensue after asking something to the effect of "5 + 3 is ....?" would disrupt the flow of the lecture. This is a super nit–picky complaint, though, because Prof. Strang was a great teacher, very good at explaining difficult concepts, and helpful in class and out.

Remote Course Questions

How effective were the different modes of remote teaching in this course?

	Mean	Median	N/A	Very Ineffective	Ineffective	Neutral	Effective	Very Effective	Total Responses
Synchronous Lectures	4.68	5.00	5.00%	0.00%	0.00%	0.00%	30.00%	65.00%	20
Asynchronous (prerecorded) Lectures	4.40	4.00	0.00%	0.00%	0.00%	5.00%	50.00%	45.00%	20
Large Discussions (everyone in the class)	3.83	4.00	40.00%	0.00%	0.00%	20.00%	30.00%	10.00%	20
Small Discussions (zoom breakout rooms)	3.06	3.00	15.00%	0.00%	30.00%	30.00%	15.00%	10.00%	20
Short Quizzes	5.00	5.00	95.00%	0.00%	0.00%	0.00%	0.00%	5.00%	20
Laboratories	N/A	N/A	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	20
Timed Exams	3.47	4.00	0.00%	5.26%	10.53%	26.32%	47.37%	10.53%	19
Written Work (take home exams, papers, problem sets, etc.)	4.00	4.00	0.00%	5.00%	10.00%	5.00%	40.00%	40.00%	20
Scheduled Faculty Office Hours	4.61	5.00	5.26%	0.00%	0.00%	0.00%	36.84%	57.89%	19
Scheduled TA Office Hours	4.50	4.50	78.95%	0.00%	0.00%	0.00%	10.53%	10.53%	19

Please elaborate on the above.

Comments

The problem sets were not beneficial. They often took over 10 or even 15 hours each week, and there were some assignments that multiple students were unable to finish because it was too difficult. There were 2 dropped grades in this course which I appreciated, but I would much rather have reasonable assignments and no dropped grades because not being able to complete psets does not help us learn the material.

Sometimes the questions on the problem sets were very unreasonable and did not foster learning.

The psets for this class and in general the 180s sequence can get a bit ridiculous in difficultly and time spent

office hours were twice a week and very helpful for general questions or just working through the PSET
break–out rooms not very beneficial because half of the time, no one turns on their camera or microphone

For some reason, every few weeks there would be a PSet that everyone just found impossible. It wasn;t fun. However, I will say going to office hours was a good way to oversome the difficulty.

Exams were well written and structured, so that time constraints weren't an issue. Problem sets were involved but rewarding. Pre–lecture videos were a great way to study outside of the classroom. Professor Strang was incredibly helpful during his Office Hours. If you ever get so lucky as to have him as your professor, don't waste your time by struggling with a problem by yourself. Get his help!

I thought most everything was helpful

Timed tests were very long and could have been improved by making take home exams with a 24 hour window so that we didn't have to sit down and take the exam for so long.

This is a well–constructed online course

The exams were incredibly difficult and problem topics often were not covered in class. The same can be said about problem sets. That was very detrimental to the experiences of myself and my classmates and must be addressed immediately.

All the information of the course was delivered to us through synchronous and asynchronous lectures Our problem sets helped to reinforce that learning. therefore, those were effective. I said neutral for discussions because often times i was a lost in class so the discussions were dominated by a few who understood. I put ineffective for the exams only because i felt that they were extremely difficult but perhaps it is because i didn't have a great grasp. In terms of scheduled office hours, they are extremely effective. The profs want to help us and are available to ask any questions..

In a math class like this, applying the concepts to problems is the most effective way to learn.

Office hours for all the professors of this class were necessary to completing psets, material moves a little fast

I think I summed up everything in the last few sections. Live lectures were nice, the Youtube lectures were fantastic, the exams were annoyingly long like last quarter but summed up the material well. The problem sets were decently long but definitely did a good job with the material. The instructor office hours were basically perpetual and were very helpful.

Synchronous and asynchronous lectures were both very good. It sometimes seemed that we had to separately scour the three sources of material (synchronous lectures, asynchronous lectures, written lecture notes) to get a full picture of the material. Problem sets were usually pretty reasonable but extremely time consuming, especially in the latter half of the quarter. The first 4 or 5 weeks of the quarter were well–paced (maybe even a little slow) and the problem sets could be started and finished in a single day, but in the second half of the quarter, the speed at which we were expected to learn new (and harder) material went way up, and problem sets suddenly took three times as long to complete.
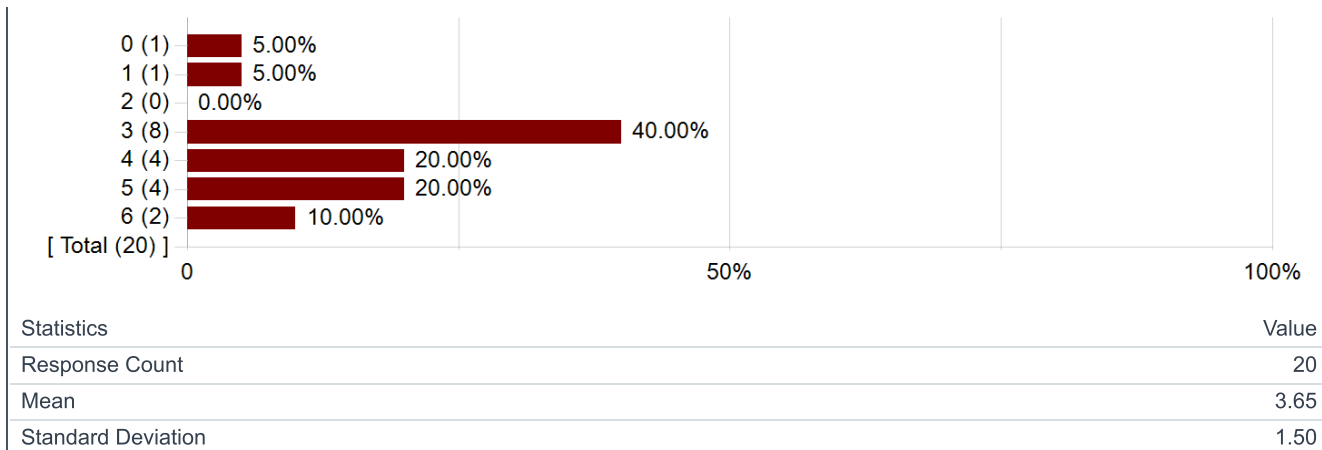
Did the instructor make adjustments to the course mid-quarter? If so, please comment on the effectiveness of those adjustments.

Comments
No
yes, listened to feedback about the difficulty of PSETs, but then the PSETs got harder (#6 and #7 in particular)
Nope.
no
yes. Professor Strang helped the students by changing the latework policy because of feedback from the students
No
No
n/a
N/A

Please describe any element of this course, including specific actions by the instructor, that improved your remote learning experience.
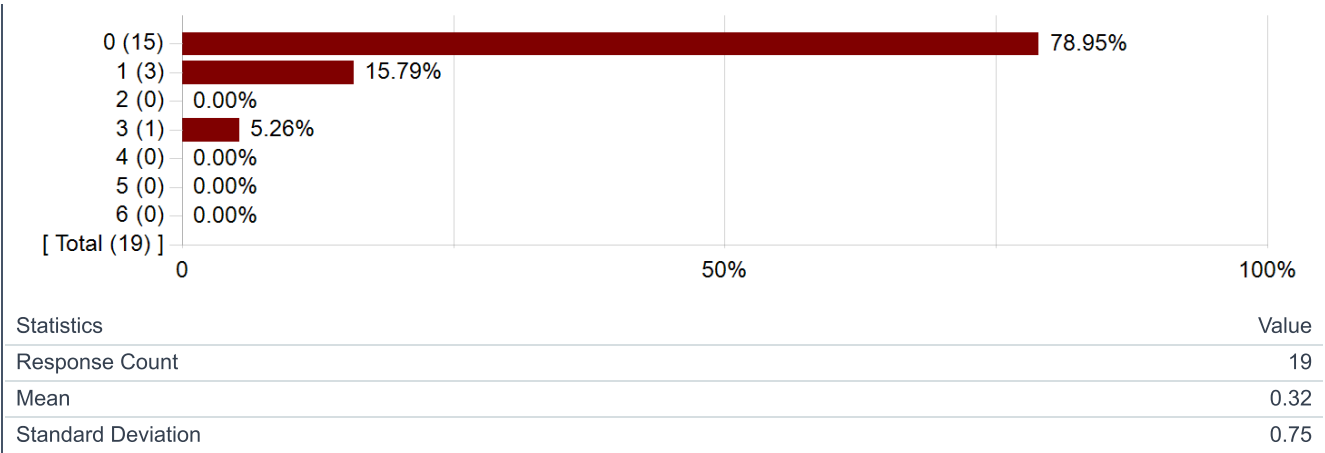
Comments
I think the synchronous lectures and prerecorded lectures were great. The instructor was extremely organized and did a great job of posting the lectures, keeping very organized and clear notes, and going at a good pace.
Already did! Professor Strang is the best!
the office hours
write out notes with us in class and then posting those same notes to Canvas
Office hours are so helpful.
The instructor was very accommodating to students throughout the whole course, and even changed the course requirements given the COVID–19 crisis.
The optional lectures were super interesting and improved my experience in the course.
The Youtube Lecture Series were really great.

How many hours per week did you spend in lectures for this course (synchronous or asynchronous)?

0 (1)		5.00%
1 (1)		5.00%
2 (0)		0.00%
3 (8)		40.00%
4 (4)		20.00%
5 (4)		20.00%
6 (2)		10.00%
[Total (20)]		

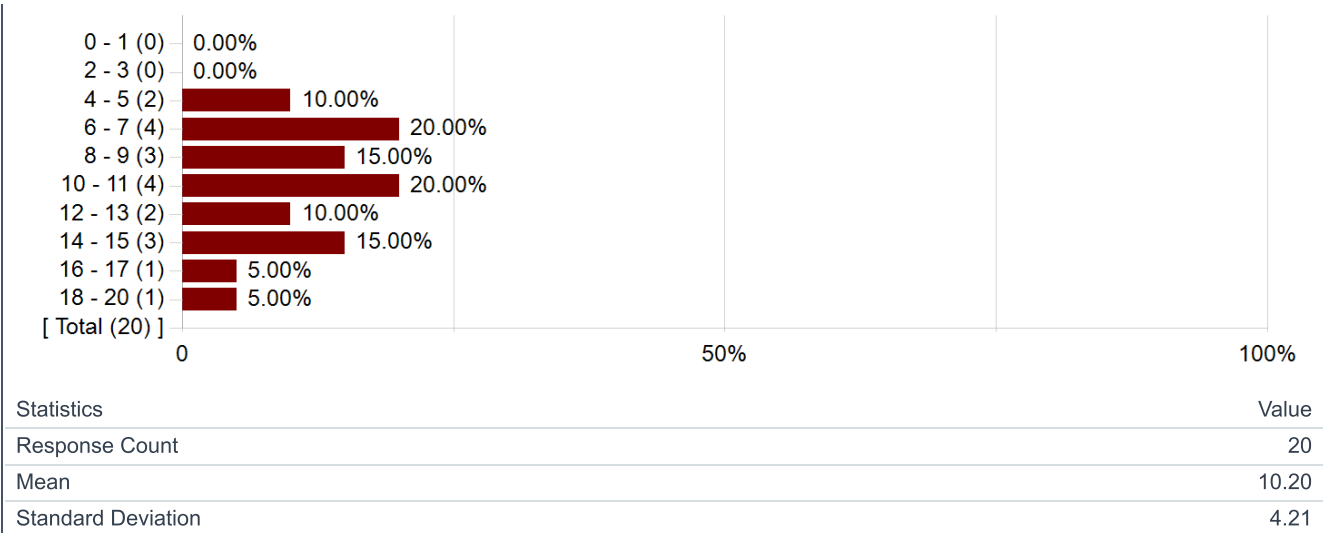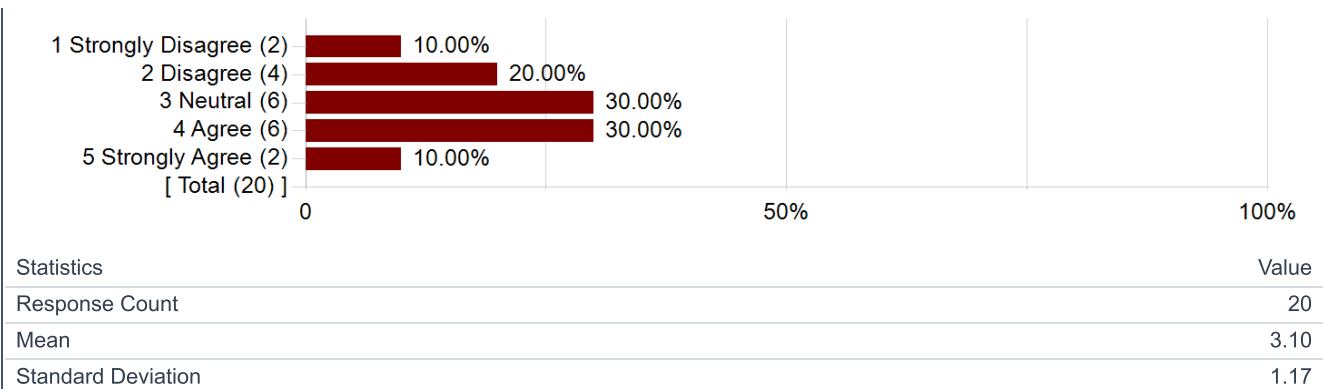| Statistics	Value
Response Count	20
Mean	3.65
Standard Deviation	1.50

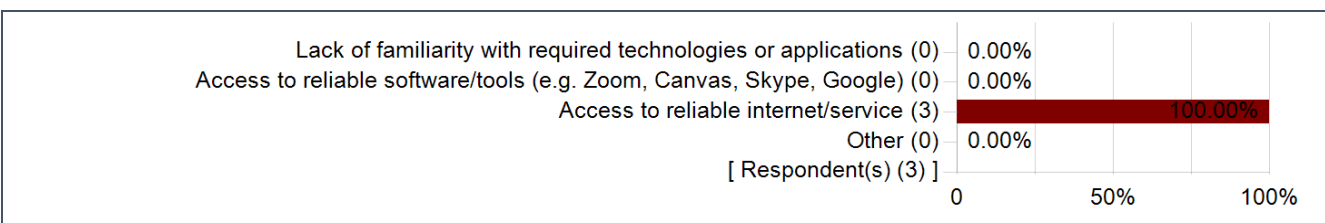How many hours per week did you spend in other scheduled activities for this course (labs, discussions, etc.)?

0 (15)	78.95%
1 (3)	15.79%
2 (0)	0.00%
3 (1)	5.26%
4 (0)	0.00%
5 (0)	0.00%
6 (0)	0.00%
[Total (19)]	

Statistics	Value
Response Count	19
Mean	0.32
Standard Deviation	0.75

How many additional hours per week did you spend on this course (reading, problem sets, writing, etc.)?

0 - 1 (0)	0.00%
2 - 3 (0)	0.00%
4 - 5 (2)	10.00%
6 - 7 (4)	20.00%
8 - 9 (3)	15.00%
10 - 11 (4)	20.00%
12 - 13 (2)	10.00%
14 - 15 (3)	15.00%
16 - 17 (1)	5.00%
18 - 20 (1)	5.00%
[Total (20)]	

Statistics	Value
Response Count	20
Mean	10.20
Standard Deviation	4.21

The overall workload of the course was appropriate.

1 Strongly Disagree (2)	10.00%
2 Disagree (4)	20.00%
3 Neutral (6)	30.00%
4 Agree (6)	30.00%
5 Strongly Agree (2)	10.00%
[Total (20)]	

Statistics	Value
Response Count	20
Mean	3.10
Standard Deviation	1.17

Which of the following technological issues continue to be a challenge for you? (check all that apply)

Lack of familiarity with required technologies or applications (0)	0.00%
Access to reliable software/tools (e.g. Zoom, Canvas, Skype, Google) (0)	0.00%
Access to reliable internet/service (3)	100.00%
Other (0)	0.00%
[Respondent(s) (3)]	

Which of the following learning/educational issues continue to be a challenge for you? (check all that apply)

Finding time to participate in synchronous classes (e.g., live streaming or video co… (2) — 14.29%
Unclear expectations around course/assignment requirements (2) — 14.29%
Course lessons or activities that haven't translate well to a remote environment an… (1) — 7.14%
Difficulty focusing or paying attention to remote instruction or activities (8) — 57.14%
Instructor availability/responsiveness (0) — 0.00%
Other (1) — 7.14%
[Respondent(s) (10)]

0   50%   100%

TA/CA/Intern Questions

Assignments and Participation

	Mean	Median	N/A	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total Responses
The assignments in the course were reasonable.	2.95	3.00	0.00%	0.00%	35.00%	35.00%	30.00%	0.00%	20
The assignments and classroom activities served the course objectives.	4.05	4.00	0.00%	0.00%	5.00%	10.00%	60.00%	25.00%	20
Instructor's feedback/comments on your assignments were clear, specific, and helpful.	4.30	4.00	0.00%	0.00%	0.00%	5.00%	60.00%	35.00%	20
Assignments were returned to you in a timely manner.	4.20	4.00	0.00%	0.00%	0.00%	10.00%	60.00%	30.00%	20
The class met regularly, on time, and for the entire period.	4.75	5.00	0.00%	0.00%	0.00%	0.00%	25.00%	75.00%	20
If the class did not meet at the regularly scheduled time, were the changes and reasons behind them explained clearly.	4.63	5.00	55.56%	0.00%	0.00%	0.00%	16.67%	27.78%	18
You were prepared for classes and attended regularly.	4.30	4.50	0.00%	0.00%	10.00%	0.00%	40.00%	50.00%	20