IASystem
The Course Evaluation Standard

COURSE SUMMARY REPORT
Numeric Responses

University of Washington, Seattle
College of Engineering
Computer Science & Engineering
Term: Autumn 2020

CSE 421 A
Introduction To Algorithms
Course type: Online

Evaluation Delivery: Online
Evaluation Form: A
Responses: 56/143 (39% moderate)

Taught by: Alex Fang, Anup Rao, Liangyu Zhao, Oscar Sprumont, Savanna Yee, Siddharth Iyer Vaidyanathan, Svetoslav Kolev, Zhaofeng Wu
Instructor Evaluated: Anup Rao-Assoc Prof

Overall Summative Rating represents the combined responses of students to the four global summative items and is presented to provide an overall index of the class's quality:

Combined Median	Adjusted Combined Median
4.5	4.8

(0=lowest; 5=highest)

Challenge and Engagement Index (CEI) combines student responses to several *IASystem* items relating to how academically challenging students found the course to be and how engaged they were:

CEI: 5.3
(1=lowest; 7=highest)

SUMMATIVE ITEMS

	N	Excellent (5)	Very Good (4)	Good (3)	Fair (2)	Poor (1)	Very Poor (0)	Median	Adjusted Median
The course as a whole was:	56	43%	41%	12%	4%			4.3	4.7
The course content was:	56	48%	39%	11%	2%			4.5	4.7
The instructor's contribution to the course was:	56	57%	30%	9%	4%			4.6	5.0
The instructor's effectiveness in teaching the subject matter was:	56	52%	30%	12%	4%	2%		4.5	4.9

STUDENT ENGAGEMENT

Relative to other college courses you have taken:	N	Much Higher (7)	(6)	(5)	Average (4)	(3)	(2)	Much Lower (1)	Median
Do you expect your grade in this course to be:	54	4%	13%	22%	48%	11%	2%		4.3
The intellectual challenge presented was:	54	26%	48%	13%	11%	2%			6.0
The amount of effort you put into this course was:	54	19%	35%	22%	19%	6%			5.6
The amount of effort to succeed in this course was:	54	13%	41%	30%	15%	2%			5.6
Your involvement in course (doing assignments, attending classes, etc.) was:	54	19%	31%	17%	30%	2%		2%	5.5

On average, how many hours per week have you spent on this course, including attending classes, doing readings, reviewing notes, writing papers and any other course related work?

Class median: 9.9 Hours per credit: 3.3 (N=52)

Under 2	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22 or more
		8%	12%	27%	17%	10%	21%	6%			

From the total average hours above, how many do you consider were valuable in advancing your education?

Class median: 8.2 Hours per credit: 2.7 (N=52)

Under 2	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22 or more
	4%	15%	23%	21%	17%	6%	12%	2%			

What grade do you expect in this course?

Class median: 3.6 (N=52)

A (3.9-4.0)	A- (3.5-3.8)	B+ (3.2-3.4)	B (2.9-3.1)	B- (2.5-2.8)	C+ (2.2-2.4)	C (1.9-2.1)	C- (1.5-1.8)	D+ (1.2-1.4)	D (0.9-1.1)	D- (0.7-0.8)	F (0.0)	Pass	Credit	No Credit
21%	58%	10%	6%	4%	2%									

In regard to your academic program, is this course best described as:

(N=52)

In your major	A core/distribution requirement	An elective	In your minor	A program requirement	Other
90%		8%	2%		

STANDARD FORMATIVE ITEMS

	N	Excellent (5)	Very Good (4)	Good (3)	Fair (2)	Poor (1)	Very Poor (0)	Median	Relative Rank
Course organization was:	55	51%	36%	11%		2%		4.5	4
Clarity of instructor's voice was:	54	70%	26%	2%	2%			4.8	7
Explanations by instructor were:	55	56%	22%	18%		4%		4.6	5
Instructor's ability to present alternative explanations when needed was:	55	53%	35%	5%	4%	4%		4.6	14
Instructor's use of examples and illustrations was:	55	49%	29%	16%	5%			4.5	17
Quality of questions or problems raised by the instructor was:	54	59%	30%	7%	4%			4.7	2
Student confidence in instructor's knowledge was:	54	78%	20%	2%				4.9	1
Instructor's enthusiasm was:	55	56%	29%	13%	2%			4.6	18
Encouragement given students to express themselves was:	54	56%	30%	7%	7%			4.6	16
Answers to student questions were:	54	57%	33%	7%	2%			4.6	10
Availability of extra help when needed was:	54	57%	30%	11%	2%			4.6	12
Use of class time was:	54	52%	39%	6%	4%			4.5	8
Instructor's interest in whether students learned was:	54	59%	30%	6%	6%			4.7	13
Amount you learned in the course was:	55	49%	35%	13%	2%	2%		4.5	11
Relevance and usefulness of course content were:	55	60%	31%	9%				4.7	3
Evaluative and grading techniques (tests, papers, projects, etc.) were:	54	48%	33%	13%	6%			4.4	15
Reasonableness of assigned work was:	54	56%	33%	9%	2%			4.6	9
Clarity of student responsibilities and requirements was:	54	59%	30%	6%	6%			4.7	6

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STANDARD OPEN-ENDED QUESTIONS

Was this class intellectually stimulating? Did it stretch your thinking? Why or why not?

1. Very difficult class, so it does stretch my thinking a lot.

2. That's all this class was.

3. Yes, I thought this class was a great extension of 311 and 332 because it forced me to formalize how I came up with algorithms and reasoned about their correctness.

5. Yes, it was beyond the concepts I know and the homeworks were quite challenging. Had to study, think and try out different approaches before submitting a solution.

6. Yes! This class really stretched my thinking because the problems were hard. The course material was abstract and was difficult to wrap my head aroud.

7. This class introduces some interesting algorithms and ways to solve problems.

8. Not really. I already had lots of algos experience

10. Yes, fantastic lecturer and great problem sets. Difficult problems, but doable.

12. This class was very intellectually stimulating. I never felt that I was bored in a lecture because it seemed like we were always talking about important and complex topics with practical applications. I felt that the class encouraged me to think deeply.

13. Yes, definitely really intellectually stimulating and got me to think outside the box when designing algorithms

15. The interesting problems

16. Yes, I was required to think outside of the box and learn how ot think from start to finish

17. I think I learn a lot of algorithm patterns and more importantly how to come up with them. I definitely feel more comfortable writing proofs and seeing how the same idea can be applied to different problems after this class.

18. Professor Rao gave a lot of examples when it comes to explaining algorithms, and making sure that every student understood the algorithm as well as the steps in proving the algorithm through the use of the examples.

19. Yes, this course was intellectually stimulating and I learned a lot about algorithms. The homeworks were well done and I liked the overall structure of the course

20. Yes, I learned a lot more about different types of algorithms and how to write proofs. It was really helpful to talk about common algorithm paradigms like greedy, dynamic programming, etc.

21. Yes, it definitely was. Often times too much so, concepts were very abstract even though the concrete application was provided. I wish it was shown more in practice or that we had more programming/industry oriented assignments

23. This class was definitely intellectually stimulating. We learnt a lot of algorithms that are very applicable and the homework definitely challenged me to think in ways I wouldn't have expected.

24. Yes, this course taught me new ways of thinking about problems which I think fundamentally stretches my thinking. The course content, especially the more theoretical portions, was uniquely intellectually stimulating.

25. It was, I learned a lot about interesting algorithms and I had a lot of fun learning about them and how to properly convey that information.

26. It was extremely intellectually challenging and stimulating. After taking 311, I've noticed theory classes seem to be the hardest and also most rewarding classes in the program. The homeworks are definitely the most difficult item on the weekly agenda, and you always leave the lectures feeling like you learned something significant.

27. Absolutely, the concepts presented were challenging and thought-provoking.

28. It was because we went over some really difficult problems and techniques for solving them.

29. Yes, it was very interesting to learn about algorithm design strategies and practice applying them.

30. Yes, the content was great as a resource to prepare for interviews.

31. Yes, I definitely understand many common problems in computer science and algorithms to solve them a lot better. However, the course content was presented in a kind of boring way that made it easy to be distracted from class.

32. Yes. I really enjoyed learning the applications and implementations of the many algorithms. Dr. Rao's passion for the topic and his overall positive mood/vibes helped.

33. Yes. Breaking down approaches to different algorithms was really interesting and gave me new tools to approach problems.

What aspects of this class contributed most to your learning?

1. The lecture.

2. Lecture

3. Doing the problem sets helped me understand the topics in lecture both because they helped me realize what I needed to review and discover new things on my own.

5. The lecture notes and recorded videos were very helpful. Also, the homeworks were very interesting and thought-provoking

6. Working on the homework assignments contributed most to my learning. These assignments gave me the opportunity to apply what I learned in lecture and it made sure I had to understand the material to do the actual assignment.

7. Lectures!

8. Topics covered in lecture helped fill the gaps in my knowledge

10. Lecture and homework assignments were both fantastic.

11. - The homework deadline being moved to Saturday relieved a lot of stress; the Friday deadline was very challenging. - I am glad we learned interval scheduling early in the quarter because I have encountered many interview problems about it.

12. I really appreciated the opportunity to ask questions during class and after lecture. I also think office hours was a huge help for my learning in this class.

14. Anup Rao is a great professor!

15. instructor's style of teaching

16. I think the lecture structure of not receiving the right answer initially was the best part.

17. Lecture time helps a lot and I like how Anup really takes the time to make sure we understand what is being covered in class. Most of the TAs and professor's OH are also very helpful.

19. Anup gave clear explanations and the TAs and Anup were pretty active on Ed. I also really appreciated the flexibility in homework deadlines

20. I really appreciated how you used the chat very well! It was awesome to see all the student participation with suggesting algorithm ideas and asking/answering questions. I thought that format was very effective. I also liked the structure of the class as whole and how we went through different types of algorithms. The homework problems were a good level of challenge and talking to my classmates was really helpful to my learning!

21. homework

22. I thought the lecturers explanations were really concise and clear. I also really liked how he made sure to answer all student questions during lecture.

23. I think the homework because it held me accountable for the content we learned. I also really liked that collaboration was allowed for the homework because it made it much easier to reach solutions when you're able to talk through it with other people.

24. Lecture

25. I would say learning to deconstruct algorithms to smaller pieces and building those neural pathways to do so when I'm in the industry.

26. The lecture were amazing. Professor Rao does a great job explaining complex material in a way that feels like a conversation. It's still technical and rigorous, but paced well and doesn't make very many major leaps that lose the audience.

27. The flexibility of responses to the Homework questions, as well as the course content being very interesting.

28. Descriptions of algorithmic methods and problems where they can be applied, good questions raised by instructor.

29. Attending lectures

30. Lectures and discussion board.

31. Office hours because I could clarify my understanding about things I was confused about

32. I learned the most from the homework assignments for sure.

33. I have a love-hate relationship with the proof of correctness portion of the homework, but I think it ultimately helped me to articulate my ideas and concretely assert their validity.

What aspects of this class detracted from your learning?

1. None.

2. The zoom format. Stopping lecture for every question was a distraction.

3. Class content was a little rushed. Sometimes it felt like we sped up a lot in the last 20 minutes to finish before 2:20.

5. None, every lecture was 1hr solid learning

6. Nothing really detracted from my learning.

7. Sometimes lectures can be bogged down by student questions and turn into a long Q&A session.

8. Slides are a bit confusing when reviewing them, lots of slides dedicated to animating examples (which I didn't find useful), and a bit confusing what is where and what slide deck a topic is in. Also, some of the proof/examples were a bit messy. Some proofs looked more like something in a student's homework than the gold standard that I expect a lecture to have

10. N/A

11. - Sometimes the slides can have a lot of text and it can be overwhelming; I prefer learning visually while the professor writes everything out on a whiteboard screen. - The chat during class can be a bit overwhelming.

15. None

16. I think the lack of a section really hurt

17. I wish some of the examples on the lecture slides can be less complicated so it is easier to see the features of the problems and follow the execution of the algorithm. Some of the induction proofs are not as detailed and my brain struggled to fill in the missing gaps during lecture.

20. I got pretty frustrated in the middle of the quarter because a lot of the feedback I was getting on my homework was "-2: incorrect explanation". I would really have appreciated more specific feedback on why my proof was incorrect, and reviewing the proofs in the key didn't help either! It's kind of hard to figure out how to write better proofs if I don't know what I'm doing wrong :))

21. extensive explanation of proofs, without critical thinking practice of how to formulate these proofs

24. N/A

25. I would argue sometimes it wasn't entirely clear as to how clear we needed to be in homeworks, and that ended up causing undue stress and producing many regrade requests from many of us, including me.

26. Lecture content was by definition difficult. More precise visuals or explanations on slides could've aided understanding. If you didn't quite follow the prof's point, it would take some pondering over the slide before you could figure out what it was trying to say, let alone piece it into the lecture's topic.

27. Proof writing has always been difficult for me and it proved an obstacle to learning at times.

28. Sometimes because the material was so complex it was easy to get really lost and just give up on paying attention; two lectures I remember this happening were the ones on Fast Fourier Transform and Computational Biology (Dynamic Programming).

29. n/a

31. The lectures were very confusing and it was easy to get lost with all the proofs, so I think some more alternate explanations or spending a bit more time clarifying proofs could help. I also think the exams weren't run very well. The exam feels like a homework but is worth so much more, which doesn't really make sense. Moreover, many of the questions are things that you can check in the lecture slides which doesnt make sense for an open not exam.

32. Nothing

33. The homework was definitely difficult, and sometimes hinged on one or two specific ideas that weren't obvious. I often had to discuss the problems with other students or in office hours to even begin to solve them. Also, taking classes online makes it much harder to focus on class content, haha.

What suggestions do you have for improving the class?

1. I do think that the explanation given by the professor is a little bit too general, so sometimes it is difficult to follow. Luckily I watch the recorded lecture, so it does allow me to pause the video to think whenever I don't fully understand the professor explanation. The way he explain the problem needs to be more detailed. Maybe including some visuals can help. Just to clarify, it's not like I don't understand what he says, in fact I fully understand, but it takes a bit of time for me and I can pause the video whenever I like. This might be hard for students when the in-person lecture returns.

2. I wish there had been set time to ask/answer questions.

3. Maybe a better system to take questions during lecture. In general I thought the questions we had during lecture ended up in a tangent unless they were clarifying some main detail.

4. More animations in the slides to walk through the proofs in a more clear manner since sometimes it was overwhelming to see all the text at once. I really liked it when you wrote out a proof by hand since I was really able to follow it. Having more pictures is also always a plus for the proofs for understanding it. Thanks again :))

5. Excellent content, and very detailed explanations from Professor; please continue the same.

6. Some times I felt like the proofs done in lecture were very hand wavy but the proofs expected on the homework were more scrutinized over. Like if the TA's graded a proof from one of the slide decks, I feel like it would not get full points. Not sure. Otherwise, the class was great.

7. Add a quiz section to answer students' questions.

8. Maybe refine the slides more? Some slide decks are great, but the quality varies a bit

9. Probably a good solution can be provided after homework is graded. I felt TA could do a little better while giving feedback on the assignment. They could explain and also give a good example. I got feedback a few times that the problem definition in the algorithm is not clear. it would have helped if TA could have pointed out what is not clear and how I can improve it.

10. auto-enrolling students into Gradescope and message board might be helpful.

11. - Add more visuals to the slides. - I would have appreciated a quick review about induction in the first lecture. Although we learned it in 311, I haven't used it much since then; a quick refresher would be helpful since it is used so often in this course. - If possible, arrange the course calendar in a table format; sometimes the links can be confusing to navigate.

12. Maybe a little bit more clarity about how assignments are graded.

13. Sometimes lecture material went by really fast

15. None

16. Add a section

17. More worked examples for problems covered in class in the format of the homework would help a lot initially.

19. More peer-to-peer interaction embedded in lecture, since there isn't a section

20. I would really appreciate more diagrams in class and written out proofs in lecture! We would often talk about the general intuition for proofs and write out some short hand, but this was hard to translate to the homework. I doubt you have any control over this but this class should definitely not be just 3 credits :\\ It's a great class, but also a lot of work!

21. better use of lecture time - working through practice problems and practical application oftaught concepts

24. I found the instructor's use of electronic whiteboard style teaching very helpful and easy to follow. I'd recommend incorporating it more often and earlier in the quarter.

25. Just being a little more clear on what's expected from the algorithms we submit (what is obvious and what isn't) Pseudocode is fine and whatnot, but there are times that I thought it was obvious what I was referring to and the TAs disagreed. Not sure exactly how, but it would be nice.

26. I think some of the slides could be made less dense to include more explanation. They're generally at the right level of specificity, but raising it just a bit could be a better failsafe for various topics that students might find particularly difficult.

27. A lecture or two on just proof writing, or maybe some supplementary material to help students get their feet wet in a low-stress environment.

28. Maybe have breakout room sessions or time in class to brainstorm approaches to a problem before learning the actual solution. This way the problem will be fresh in our minds and we will be able to follow different approaches more clearly. The lecture on interval scheduling was very good because we got to brainstorm solutions and see why some of them were wrong, but we should do more of that. We may lose class time, but I think some problems could be pushed into supplemental slides or readings.

29. n/a

31. In other CSE classes professors have assigned groups for the quarter and put students into those groups to answer polling questions. This keeps students accountable to pay attention and contribute to their group, and also tests understanding. I think something like this would help.

32. Definitely would be nice to have a few examples of what a complete homework solution looks like before attempting the assignment. Earlier in the quarter, the question was always, did I write enough? Just having a sample problem and solution (by the professor currently teaching the course, not the one from 2008) would have been very useful.

33. It would be really helpful to have a few more examples of homework responses. I definitely realized in the middle of the quarter that I was way more detailed than I needed to be, but without a frame of reference it was difficult to gauge by how much.

IASystem Course Summary Reports summarize student ratings of a particular course or combination of courses. They provide a rich perspective on student views by reporting responses in three ways: as frequency distributions, average ratings, and either comparative or adjusted ratings. Remember in interpreting results that it is important to keep in mind the number of students who evaluated the course relative to the total course enrollment as shown on the upper right-hand corner of the report.

Frequency distributions. The percentage of students who selected each response choice is displayed for each item. Percentages are based on the number of students who answered the respective item rather than the number of students who evaluated the course because individual item response is optional.

Median ratings. *IASystem* reports average ratings in the form of item medians. Although means are a more familiar type of average than medians, they are less accurate in summarizing student ratings. This is because ratings distributions tend to be strongly skewed. That is, most of the ratings are at the high end of the scale and trail off to the low end.

The median indicates the point on the rating scale at which half of the students selected higher ratings, and half selected lower. Medians are computed to one decimal place by interpolation.[1] In general, higher medians reflect more favorable ratings. To interpret median ratings, compare the value of each median to the respective response scale: *Very Poor, Poor, Fair, Good, Very Good, Excellent (0-5); Never/None/Much Lower, About Half/Average, Always/Great/Much Higher (1-7); Slight, Moderate, Considerable, Extensive (1-4).*

Comparative ratings. *IASystem* provides a normative comparison for each item by reporting the decile rank of the item median. Decile ranks compare the median rating of a particular item to ratings of the same item over the previous two academic years in all classes at the institution and within the college, school, or division. Decile ranks are shown only for items with sufficient normative data.

Decile ranks range from 0 (lowest) to 9 (highest). For all items, higher medians yield higher decile ranks. The 0 decile rank indicates an item median in the lowest 10% of all scores. A decile rank of 1 indicates a median above the bottom 10% and below the top 80%. A decile rank of 9 indicates a median in the top 10% of all scores. Because average ratings tend to be high, a rating of "good" or "average" may have a low decile rank.

Adjusted ratings. Research has shown that student ratings may be somewhat influenced by factors such as class size, expected grade, and reason for enrollment. To correct for this, *IASystem* reports **adjusted medians** for summative items (items #1-4 and their combined global rating) based on regression analyses of ratings over the previous two academic years in all classes at the respective institution. If large classes at the institution tend to be rated lower than small classes, for example, the adjusted medians for large classes will be slightly higher than their unadjusted medians.

When adjusted ratings are displayed for summative items, **relative rank** is displayed for the more specific (formative) items. Rankings serve as a guide in directing instructional improvement efforts. The top ranked items (1, 2, 3, etc.) represent areas that are going well from a student perspective; whereas the bottom ranked items (18, 17, 16, etc.) represent areas in which the instructor may want to make changes. Relative ranks are computed by first standardizing each item (subtracting the overall institutional average from the item rating for the particular course, then dividing by the standard deviation of the ratings across all courses) and then ranking those standardized scores.

Challenge and Engagement Index (CEI). Several *IASystem* items ask students how academically challenging they found the course to be. *IASystem* calculates the average of these items and reports them as a single index. *The Challenge and Engagement Index (CEI)* correlates only modestly with the global rating (median of items 1-4).

Optional Items. Student responses to instructor-supplied items are summarized at the end of the evaluation report. Median responses should be interpreted in light of the specific item text and response scale used (response values 1-6 on paper evaluation forms).

[1] For the specific method, see, for example, Guilford, J.P. (1965). Fundamental statistics in psychology and education. New York: McGraw-Hill Book Company, pp. 49-53.