

CSE 431 A  
Introduction To Theory Of Computation  
Course type: Face-to-Face

Evaluation Delivery: Online  
Evaluation Form: A  
Responses: 19/31 (61% high)

Taught by: Anup Rao, Sivaramakrishnan Natarajan Ramamoorthy  
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
4.6	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:

<b>CEI: 5.9</b>
(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:	18	44%	39%	11%			6%	4.4	4.6
The course content was:	18	50%	33%	11%			6%	4.5	4.7
The instructor's contribution to the course was:	18	61%	22%	11%			6%	4.7	4.9
The instructor's effectiveness in teaching the subject matter was:	18	56%	17%	22%			6%	4.6	4.9

### STUDENT ENGAGEMENT

	N	Much Higher (7)	(6)	(5)	Average (4)	(3)	(2)	Much Lower (1)	Median
<b>Relative to other college courses you have taken:</b>									
Do you expect your grade in this course to be:	18	22%		6%	39%	17%	11%	6%	3.9
The intellectual challenge presented was:	18	56%	28%	6%	6%			6%	6.6
The amount of effort you put into this course was:	18	33%	44%	11%	6%			6%	6.1
The amount of effort to succeed in this course was:	18	39%	39%		17%			6%	6.2
Your involvement in course (doing assignments, attending classes, etc.) was:	18	28%	33%	17%	11%	6%		6%	5.8

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: 8.6 Hours per credit: 2.9 (N=16)**

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
		6%	12%	56%	12%			12%			

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

**Class median: 7.5 Hours per credit: 2.5 (N=16)**

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
		19%	31%	38%	6%			6%			

What grade do you expect in this course?

**Class median: 3.5 (N=15)**

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
13%	40%	40%	7%											

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

**(N=16)**

In your major	A core/distribution requirement	An elective	In your minor	A program requirement	Other
81%		19%			

**STANDARD FORMATIVE ITEMS**

	N	Excellent (5)	Very Good (4)	Good (3)	Fair (2)	Poor (1)	Very Poor (0)	Median	Relative Rank
Course organization was:	18	39%	28%	22%	6%		6%	4.1	14
Clarity of instructor's voice was:	18	67%	11%	17%			6%	4.8	8
Explanations by instructor were:	18	61%	11%	22%			6%	4.7	3
Instructor's ability to present alternative explanations when needed was:	18	61%	17%	17%			6%	4.7	5
Instructor's use of examples and illustrations was:	18	67%	11%	11%	6%		6%	4.8	2
Quality of questions or problems raised by the instructor was:	18	67%	11%	17%			6%	4.8	1
Student confidence in instructor's knowledge was:	18	72%	17%	6%			6%	4.8	6
Instructor's enthusiasm was:	18	67%	11%	17%			6%	4.8	9
Encouragement given students to express themselves was:	18	61%	17%	11%	6%		6%	4.7	10
Answers to student questions were:	18	50%	22%	22%			6%	4.5	12
Availability of extra help when needed was:	18	39%	22%	33%			6%	4.0	18
Use of class time was:	18	56%	17%	17%	6%		6%	4.6	4
Instructor's interest in whether students learned was:	18	56%	17%	17%	6%		6%	4.6	11
Amount you learned in the course was:	18	50%	17%	28%			6%	4.5	7
Relevance and usefulness of course content were:	18	39%	28%	28%			6%	4.1	16
Evaluative and grading techniques (tests, papers, projects, etc.) were:	18	44%	22%	28%			6%	4.2	13
Reasonableness of assigned work was:	18	28%	39%	22%	6%		6%	3.9	17
Clarity of student responsibilities and requirements was:	18	44%	17%	33%			6%	4.2	15

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## STANDARD OPEN-ENDED QUESTIONS

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

1. Yes and yes. To be honest, I didn't know what I was getting myself into when I signed up for the course. Like the lectures are interesting and gives me a new perspective on how to think about problems. Learning how everything works together is actually really cool and the way that you teach the class and the things you say in the class that aren't actually related to the course are really entertaining.
2. Yes, it was very interesting! Although I didn't understand everything that we discussed I grasped the general ideas of most of the topics and I thought it was all very cool :) All the parts of 311 that were difficult to understand back when I took 311 make more sense now. Also, it was just a different style of cse class, which I really enjoyed.
3. This class was straight up hard. It was awesome, but also hard. I'm not much of a theory person, but I took this class because I really want to expand my horizons within CSE. Mission accomplished for sure, I've never felt so hopelessly challenged in a course, in a good way.
4. Yes, interesting problems and concepts were raised every class, and the homeworks were challenging but doable given enough time.
5. Yes
7. This was my first upper-level computer science class. Since I come from a background in mathematics rather than computer science, it took some adjustment to get used to proof conventions for computer science problems. The subject matter could also be very mind-bending at times, which made it all the more fun.
8. Very. It certainly presented ideas that were new and required new ways of thinking and new argumentation.
9. Absolutely. It mixed my previous math experience with completely new ways to describe and use functions (i.e. complexity classes). It applied and rounded out my relationship to combinatorics problems. It discussed computability / theoretical open questions, and linked them to what's still feasible and actually being done to solve these problems in practice.
10. Very much so. It was an incredible survey about reasonably deep topics at a sufficiently shallow level to allow significant breadth. I learned a lot that not only exposed me to new ideas, but also significantly solidified knowledge of probability, cryptography, and a variety of other areas.
11. Very stretchy thinking -- in fact a lot of the things covered seemed downright bizarre at first.

### What aspects of this class contributed most to your learning?

1. Your teaching style is actually really good! The lectures are entertaining and the homework really makes me try to understand what I'm actually doing or how much I actually know about what's going on. The examples you go over for when something is useful to outline an idea or concept are really cool! It seems like a lot of that gets lost in the lecture notes though, so maybe point to some resources in the notes for people who are curious to learn more. I like how the solutions to problems on assignments are generally pretty short as long as you understand how to do them.
2. Lectures were really interesting. The proofs were sometimes hard to follow but really exciting when they worked. I also thought it was great how we were able to work together and discuss the problems with other people, but that we had to write out our own answers. That's the way I learn best, since discussing with others helps me to get started (because often I don't understand what the question is asking in the first place) but also forces me to be able to write it out in my own words.
3. The homeworks, and asking questions in class. I thought lecture was incredible, in that the explanations were stellar and that the instructor was so clearly a god-like genius who was willing to repeat the same thing several times over to confused students like myself without getting impatient.
4. The lectures were very clear and interesting, explained topics well, and Anup was able to answer questions very well.
5. Homeworks
7. Very clear lectures, availability of help outside of class, and the lecture notes from classes available on the class webpage.
9. Anup took the time to explain proofs slowly enough to keep us on the same page, presenting select results that built up a timeline and a big picture of a lot of important complexity-related topics/questions. Anup - you're so good at patiently explaining things. Definitely an instructing role model. You took a risk with covering SO many topics in this course, but you did a good job with linking the whole calendar together, and with emphasizing that we don't have to remember ALL the details, but rather the bigger picture. Office hours were great, I wish I were more present to their times / frequency throughout the week. Asking questions right at the end of class was effective for me to wrap up things I didn't quite understand during lecture. The 2 1.5 hour sections per week was an effective way to break up the class.
10. The homework, as always. Prof. Rao's lectures and lecture notes were incredible, but working through problems was optimal for developing understanding. Similarly, office hours were always incredibly helpful.
11. Homework. During lectures I would bounce between "this totally makes sense!" and "uhhhh what is this madness" but by working through the problems it would stabilize on "this seems reasonable and I think I get what's going on, sort of." Also office hours were super helpful for getting hints on where to even start either through direct questions or hearing what other people were thinking.

### What aspects of this class detracted from your learning?

1. This class reminds me of 311, but more. If you don't show up to the lecture, you might miss information that you need to finish the homework, which is a little sad for people who have to miss it because of other obligations, but is a good way to get people to show up. You said that there weren't a lot of practical applications to this course, which is definitely a downside, but what we're learning is really cool! Only having 3 office hours during the week is a little hard for people who have other assignments due during the week and can't make it to those office hours.
3. Honestly nothing, if I had to take this class again though, I would take it with minimal other obligations.
4. It was a little hard in my experience to find help outside of lecture, since the office hours were not at an ideal time for me.
5. Nothing
7. N/A
9. I really appreciated the hw solution writeups. Please have them available online as soon as possible - a long wait time makes them less effective.
10. While the notes were concise and clear, they sometimes did not provide sufficient depth and skipped over some important ideas presented in class. Similarly, they occasionally had typos that were quite confusing, especially when it came to homework and midterm problems that really stretched our thinking.

#### What suggestions do you have for improving the class?

1. I think the class is actually just great! There's only a few things that come to mind for things that can improve, like following the lecture notes more or going back to edit the lecture notes to include things that you mentioned in class but weren't on the lecture notes. I really liked the class and I was really confused a lot of the time, but it was sort of fun to be confused and working through that confusion. I think you did a really good job and continue to teach!
2. The homeworks were really difficult, but the midterm in particular was extremely hard. It would have been helpful to mention earlier that we could go to office hours for help because many of us thought we weren't supposed to talk to anyone at all. Also, it was difficult to understand some of the TA/instructor comments on the homeworks, and I wish we could have briefly gone over the correct answers in class afterwards.
3. Let Anup teach more often! He's incredible.
4. Some sort of lecture recordings in addition to the notes would be very helpful, I find that I learn things much much better from listening to lecture than the notes (which are helpful, but it's hard to parse if you don't already know the gist of what's going on).
6. A class about fundamentals of Turing machines, Languages, before this class is needed. Half of the time I can't do the problem in HW is because I don't understand or know the precise definitions of terms.
7. N/A
9. I'd appreciate a deeper textbook / pool of examples that we could access. The midterm was pretty jarring, since I didn't know how to solve many of the problems, and also couldn't access resources that would hint me towards how to approach them.
10. 2 things: more holistic and fleshed out notes. Though I appreciate the conciseness, I felt as if there were topics that could have been better explained and even more direct references to lecture. The other thing would be more reference to the textbook, at least as alternate explanations for the ideas covered in lecture and referenced on the homework. External resources were useful when the textbook could have been this relevant supplement. Similarly, since Prof. Rao's office hours were so useful, maybe 2 sections of that per week could have been useful. Overall, though, I loved the class and really appreciated Prof. Rao's teaching style.

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.<sup>1</sup> 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).

<sup>1</sup> 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.