Stanford University
Fall 2023 Course Feedback

Course: F23-EE-114-01/F23-EE-214A-01: FUND OF ANLG INTEGRTD CIRC DES

Instructor: Ajay Singhvi * ,Amin Arbabian

Response Rate: 47/57 (82.46 %)

Question		5	4	3	2	1	B1	B2	Mean	Std	Median
How well did you achieve the learning goals of this course?	n	19	13	11	3	0	4.06	4.10	4.04	0.97	4.00
	%	41.30%	28.26%	23.91%	6.52%	0.00%					

Scale: 5 = Extremely well, 4 = Very well, 3 = Moderately well, 2 = Slightly well, 1 = Not well at all

B1 = School, B2 = Department

Question	About what percent of the class meetings (including discussions) did you attend in person?	n	%
0		1	2.27%
5		1	2.27%
20		2	4.55%
30		1	2.27%
33		1	2.27%
35		1	2.27%
50		3	6.82%
60		3	6.82%
70		2	4.55%
75		1	2.27%
78		1	2.27%
80		3	6.82%
85		2	4.55%
90		7	15.91%
95		2	4.55%
96		2	4.55%
98		1	2.27%
99		1	2.27%
100		9	20.45%
B1	School	69.45	
B2	Department	75.06	
Mean		74.66	
Std		28.46	
Median		87.50	

Question	About what percent of the class meetings did you attend online?	n	%
0		8	21.62%
2		1	2.70%
5		3	8.11%
10		6	16.22%
15		2	5.41%
20		3	8.11%
22		1	2.70%
40		1	2.70%
50		3	8.11%
60		1	2.70%
65		1	2.70%
70		1	2.70%
79		1	2.70%
80		2	5.41%
95		1	2.70%
100		2	5.41%
B1	School	35.80	
B2	Department	26.52	
Mean		29.95	
Std		33.13	
Median		15.00	

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Question		5	4	3	2	1	B1	B2	Mean	Std	Median
How much did you learn from this course?	n	29	12	3	1	0	4.18	4.30	4.53	0.73	5.00
	%	64.44%	26.67%	6.67%	2.22%	0.00%					

Scale: 5 = A great deal, 4 = A lot, 3 = A moderate amount, 2 = A little, 1 = Nothing

B1 = School, B2 = Department

Question		5	4	3	2	1	B1	B2	Mean	Std	Median
Overall, how would you describe the quality of the instruction in this course?	n	18	14	13	0	0	4.29	4.28	4.11	0.83	4.00
	%	40.00%	31.11%	28.89%	0.00%	0.00%					

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

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What skills or knowledge did you learn or improve?

• Intuitive analysis of circuit elements and the equivalent model for small signals or high-frequency regions.

• My intuition in analyzing a circuit has improved a good deal

• I improved on my analog design approach and circuit solving approaches.

• Analog Circuits concepts and design

• Learned how to analyze and design analog circuits

• Analog device intuition, circuit design processes in application

• Design with MOSFETs, analog analysis techniques

• Learnt a lot of insights that go in analog IC design. This course would be a foundation for the following analog courses. Looking forward to the excellent standards from Stanford.

• Analog design, Hspice, Transistor level design,Feedback Stability and Distortion.

• Basic MOSFET amplifier configurations, current mirrors, differential circuits, frequency response, and feedback. HSPICE simulation.

• I learned all about analog circuit design. I learned how to analyze amplifier circuits, second order first and second order analysis of transister circuits and stages. I learned how to analyze feedback circuits, and learned how to optimize and design my own multistage amplifier circuit.

• Fundamentals of ICs, including NMOS and PMOS.

• A lot of fundamnetal knowledege required for Analog Circuits.

• MOSFETs, noise and feedback analysis, design fundamentals and tradeoffs, basic circuit theory review, node/pole fundamentals, HSPICE review.

• Despite being a grad EE, I had very weak circuit foundations. I still do to be honest but it has greatly improved. I feel like I mastered only 40% of the course material but that 40% is still a huge amount. MOSFETs used to scare me and KCL/KVL was pretty rusty as well, but now I at least have intuition when looking at large FET circuits and can deconstruct them into different blocks or stage and conceptually understand their function. I think I still suck at the actual doing the computation part but life goes on. I'm not a circuits-track person but I have a better holistic understanding of ICs and some of their design tradeoffs that I think will be useful as a systems integration or hardware engineer.

• Understanding of single-stage MOSFET amplifiers, intuition surrounding input and output impedance, design trade-offs between gain, bandwidth, and power, differential circuits, current mirrors, and feedback.

• I learned about circuit design at the transistor level. I learned about the uses for different stages, different circuit analysis tools, and how to design circuits as well as different trade-offs for design.

• noise analysis, amplifier design and analysis, abstraction of circuit

• Integrated circuit analysis -- just knowing how to look at a circuit and figure out what it does, and how to analyze it.

• I learned specifics on how to analyze complex circuits into more digestible pieces in many ways. We learned about basic circuits but also about noise and other cool transistor parameters.

• I greatly improved my amplifier analysis skills. I also learned how to handle noise in a circuit and analyze more complex feedback circuits.

• Intuitive understanding of circuits, noise, feedback analysis

• analog circuit analysing.

• Fundamentals of analog circuit, Common Source, Common Drain, and Common Gate circuits as well as design considerations.

• transistors, small signal, second order effects, analog circuit design

• All things analog circuits.

• Identifying tradeoffs in circuit design, common amplifier stages, multi-stage amplifier design, and design intuition

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Question	How many hours per week on average did you spend on this course (including class meetings)?	n	%
10		3	7.32%
12		2	4.88%
13		1	2.44%
14		1	2.44%
15		7	17.07%
17		2	4.88%
18		4	9.76%
20		13	31.71%
24		1	2.44%
25		2	4.88%
30		3	7.32%
32		1	2.44%
36		1	2.44%
B1	School	12.28	
B2	Department	13.76	
Mean		19.12	
Std		6.03	
Median		20.00	

Question		5	4	3	2	1	B1	B2	Mean	Std	Median
How organized was the course?	n	22	18	4	0	0	4.11	4.03	4.41	0.66	4.50
	%	50.00%	40.91%	9.09%	0.00%	0.00%					

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What would you like to say about this course to a student who is considering taking it in the future?All comments are subject to Stanford's Terms of Use for Sites. Answers to this question will be viewable by other students, as well as instructors.

• Review all the concepts learned in the previous circuit and signal processing courses. Otherwise, one may have a hard time catching up during the first half of the quarter.

• I would let this student know to go to office hours and to keep up with the material because everything builds.

• A really great course, coming from taking similar courses elsewhere, the course is highly recommended

• This course will get you to design a lot of analog circuits. Professor is very good at lecturing, and the homeworks are challenging yet doable. There's a thinking shift right after the first midterm which makes a lot of the more tedious processes of the first half much easier. The final project is interesting, and not too much work.

• This class is intense for 10 weeks. There is a lot of material covered and not much time to "sit with it" and feel comfortable with one topic before moving onto the next. This can be challenging so I would plan accordingly and prepare to spend 25+ hours per week.

• This course as this course is foundation for the future analog design courses and Professors and TAs are excellent.

• EE214A is one of the best introduction course for anyone who want to pursue Analog/Mixed Signal design. Prof.Amin gives good examples and references during the course which help give better understanding. Home-works are designed very well for the students to understand the concepts and use them in the final project. Ajay and other TAs did a great job in addressing all the doubts and queries students had. Thanks a lot Prof.Amin and the teaching team.

• This class is extremely time consuming and not a great class for a PhD student (unless you're working in circuits). Be prepared to spend a minimum of ~15-20 hours/week, unless you already have a strong analog circuits background. Personally, I did not, and found myself dedicating ~20-30 hours weekly to assignments/studying. While the lectures are well-organized, the homework assignments require extensive individual effort. The final week compounds pressure with the project deadline, a lengthy final homework assignment, and new lecture material, making it quite overwhelming. Starting the project early on and working on it during Thanksgiving break is advisable to avoid additional last-minute stress. If possible, attending all of the optional review sessions live, is incredibly helpful -- unfortunately, I rarely could due to a reoccurring scheduling conflict, which was frustrating. A poll to schedule these sessions at convenient times for optimal participation would be helpful. Regardless, I strongly suggest watching all review sessions and taking advantage of office hours. I wish I'd been more proactive in seeking assistance, especially considering the avalanche of new content after the midterm, which felt like an entirely different course. Professor Arbabian is very knowledgeable on the subject matter and a competent instructor. However, there seemed to be a collective hesitancy among students, myself included, in asking questions. I would guess only 1-2 questions were asked per week (2 lectures/week). I'd urge future students not to repeat this mistake and ask questions early on to establish a more engaging learning environment.

• If you've taken 101A and 101B and still feel like you don't really have a good intuition of analog circuits and circuit techniques (especially MOSFET circuits), but you still have a craving to understand circuits, 114A will definitely give you a much better feel of how to analyze circuits in a intuitive and methodical way. You will finish the class knowing an extreme amount of knowledge about transister stages and amplifier circuits, as well as feedback design. The final project is pretty fun and rewarding. Make sure you have a good partner. The first couple homeworks will take a long time to finish, but don't be scared away as I thought the class got easier after the first couple weeks, and then you get into a groove. The grading is pretty also pretty fair with ample amount of bonus problems on hw and extra credit for the project.

• Get prepared to spend a lot of effort to complete the homeworks if you do not have previous experience in the topic.

• Prof. Arbabian did a great job at introducing the basic concepts about analog circuits. His examples are easy to understand and follow. The slides are well made as well. The workload is moderate, though there is homework every week, I think most homework can be finished in few hours.

• This is quite a challenging course for someone who hasn't taken any analog circuits class before. However, if the effort is put in, you will learn a lot, but it is definitely quite challenging.

• Definitely a must-take course for analog designers. Do the readings and prepare for each lecture if you want to get the most out of the class. The instructor was excellent and good at answering questions. Homework assignments are not too difficult, but they do take a lot of time.

• Definitely have a solid understanding of Thevenin/Norton and KCL/KVL already coming in. Having some sort of exposure to FETs beforehand is also good since the course material and assignments were fair but that pace of the class is just fast by nature of the quarter system. Computationally, I think the class gets easier over time since you start avoiding traditional circuit analysis techniques and have formulas for various stages and input/output impedances but it just gets hard to keep up since all your other classes also get harder later in quarter. Also, start the project early.

• This is a challenging class. Be prepared to spend a lot of time in this course, especially in the last few weeks when there are both problem sets and the final project. In addition to the final project, there was also a final exam, which made weeks 9 and 10 especially brutal. Take advantage of office hours! My workload would've been a lot of worse had I not received help from the awesome TAs. The teaching staff were very supportive and responsive on Ed, so the only "bad" part about this class is the workload. Be sure to understand basic amplifier toplogies and MOSFET port resistance before the midterm; the sooner you gain the intuition the better.

• I really enjoyed this class. It's a very valuable class to take for circuit design, which helps not only learn the theory of how things work, but also tradeoffs between different design components. The course is very back heavy, having homework, a final project, and a final early in finals week. However, the teaching staff (especially Ajay) were super helpful and office hours really helped to fully understand concepts.

• This course is a very steep learning curve for anyone who isn't already comfortable with circuit analysis. It's a major step up from ee101, and requires looking at circuits in a much different, more abstract way. It's also a lot of work -- it has a midterm, a final, a pretty extensive project, and hard problem sets. Lectures are fine, but are often more about the wider motivation and state of the field not as practically useful for solving problems sets. Probably worth taking if you think you'll need to be really comfortable with analyzing integrated circuits for your future career, but think twice otherwise.

• I though this class was very enjoyable but it is a lot of work. Definitively plan on it challenging you as the topics are taught very quickly and there is a lot due at the end of the quarter.

• This course really strengthened my knowledge from EE101A and EE101B. I also learned new methods of analysis and how to handle things like noise. (That being said, you will be working with amplifiers almost the entire term). You don't really learn how to "design" anything besides amplifiers. You also don't really design the layout of the circuit, design in this case means choosing parameters for a given circuit to meet certain specs). However, it was also incredibly time consuming. The homeworks take a long time and effectively require you to attend office hours and work with a partner. The exams are very hard (though they are graded relatively nicely, as are the homeworks). The project is also very time consuming and tedious. It was a cool class from a high level, but it was also exhausting.

• Amin is a great professor, and the teaching team was amazing too. This is definitely a challenging course, but the first course that felt intellectually challenging and not just hard because of an insane workload. Don't get me wrong, it's a lot of work, but if you have someone to study with, and go to office hours, it's a fun experience. It does leave you feeling like you've only scratched the surface of circuit design, so if you're going to take the class, be prepared to commit to taking additional courses!

• If you're interested in analog circuits, you should absolutely take this course. I didn't like the teaching style or pacing of the class, but this class has no substitute, so it's something you have to live with. The course covers a lot of important topics but sometimes rushes through concepts without properly motivating/explaining them (like return ratio and Blackman's impedance formula at the end). The homework assignments are very long but most of the time you only have to do around 2/3 of them, strictly speaking, because the rest is extra credit. In fact, crazy grade inflation is really a theme of this class with tons of extra credit being thrown around all over the place. The amount of time this class will take for you really depends on your level of prior experience. If you're already familiar with some of all of the concepts mentioned in the course summary, then it probably won't be too bad, but if this is all new to you, then you might need to put in a lot of time to keep up with the firehose of new concepts. Also, the class was backloaded with one deadly five-day period in which the last homework assignment and the project are due and the final exam takes place, so beware.

• Definitely a must-take for an EE major. This course is very informational for students interested in analog circuits, as well as a great for designing analog circuits. Amin is an amazing professor, and is always very willing to help. This class is a bit heavy in the end in terms of homeworks, projects, and final. One of my favorite classes so far!

• START ON FINAL PROJECT EARLY

• If you are coming into this course with minimal analog circuit background, this class will be tough. Although the course begins with the first four weeks going over basic core components to begin analog circuit learning, after this time frame the course will progress very quickly. Exams are extremely long and felt more of an exam to test how fast you can recognize analog concepts and apply them to new circuit problems. If you require longer time to fully understand new topics and application, this class will be very time consuming. But if you put in the work, you will learn a lot.

• This course is fast paced but it'll help you develop lot of intuition about the common amplifier stages, robust multi-stage amplifier design, and first-order design analysis techniques. Homeworks are lengthy but they are significant components of learning. About 20% of homework is extra credit that also serves as practice of course material. Flow of the class is to learn concepts in lecture, practice in homework, and become comfortable in applying the intuition you've built in the final project. My advice: Ask questions in class and slow down its pace if you need clarification!

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Would you like to provide any other comments about this course?

• The course assistants helped a lot. Thanks for their review sessions and office hours.

• I did find at times a big jump in difficulty between homeworks and lecture/textbook examples. I also would have appreciated having all of the equations for each amplifier stage given to us after the midterm to make sure everyone was on the same page moving forward into more advanced topics. Also, the time crunch in 10 weeks did take away from my learning in this class, in my opinion.

• Ajay deserves a bonus. He was absolutely fantastic. His knowledge of the subject material is very comprehensive and he is an outstanding teacher. Additionally, the review sessions are incredibly helpful; unfortunately, I rarely could attend them live due to a reoccurring scheduling conflict, which was frustrating. I think future students would benefit from taking a poll to schedule these sessions at convenient times for optimal participation.

• Great teaching staff that honestly carried the course for me and understanding the homework for solidifying concepts. I have never gone to so many office hour sessions in my life. Shoutout to all the TAs (Ajay, Nazneen, Felipe)--I hope y'all keep slaying.

• Course content and dicussions during lecture were really great. I learnt a lot over quarter.

• Overall great course

• I think the lectures would benefit from a bit more structure. While there is clearly an outline in the slides that the professor follows, he tends to ramble and then rush through important concepts that I think deserve a more detailed treatment. I also don't think it is productive to have homework assignments and a project as the same time (with a final exam to cap everything off). I think the project distracts from the important concepts covered toward the end of the course, like feedback and noise analysis, and prevents students from dedicating time to doing the associated homework assignments with care and forming a deep understanding of the material. I think the second quarter of the class would be a more suitable time for a project, one which is more open-ended wherein the students are also responsible for choosing the topology and not just component parameters.

• Great class!

• The TAs were probably one of the best TA team I have had before. I was very surprised by how on top of grading the team was as well as how helpful their office hours were. I appreciate their hard work this quarter, especially Ajay's.