

Please comment on the elements of the course you found particularly effective. -

- The assignments.
- The flow of contents were really good. Moreover the lectures were very engaging and it was made sure that all the doubts from students were cleared. Moreover professor encouraged a constructive competition which I think helped everyone in some way or the other.
- Assignments of the course help in leaning a lot.
- In this course i learned how abstract ideas translated to multitude of design and implementation alternatives in field of operating system whose fruit we are enjoying today and had a chance to work on programming assignments which allowed me to test some of these ideas and play with them.
- The ASSTs were very effective in making us learn C and letting us figure out how to code an operating system. They were challenging, but once completed it was a rewarding experience. The professor's enthusiasm for the course material was also helpful since otherwise the lectures would probably be quite dull.
- Assignments
- The TA and ninjas are excellent. The lectures are fun and interesting.
- The projects. They were well organized, well specified, and the always available online auto-grader made life so much better. Also, the last quarter of the course, dealing with reading research papers was great.
- The lectures were very much provocative and the assignments were challenging which together induced an interest in the field of systems programming.
- With the autograder in place, we get several chances at improving our points on the assignments. This makes it a great experience for us to learn from our mistakes and see the difference each thing makes! Sufficient concepts are covered in class and course staff offer great support. Overall, a very intellectually satisfying and rewarding course. Not to forget mentioning that students inevidently become great fans of Geoff!
- Assignments teach us a lot.
- The projects are very effective. The slides posted as a webpage is easy to read and the summary (Table of contents) to the right of each slide page is good. The projects are challenging and with the help provided by the staff, it is a very good learning experience.
- Assignments were the highlight. Learning by practically implementing the ideas learnt in the class. Being a graduate student most of the concepts were not new to me, however, I never implemented those concepts in my undergraduate degree.
- Programming Assignments Awesome Experience.
- The website is quite well put together, has all of the lecture slides up there for review.
- The help of the Ninjas, in addition to the TAs which ensured that we got the required support during office hours. Recitations which well explained the assignments. The blog by the TA which was very helpful for completing the assignments. The marathon office hours. The video lectures and many more. This is the best course that I have taken ever in my life.
- The project assignments were quite challenging. They related to the course content directly and were thus really helpful in understanding various course concepts.
- .
- The projects were extremely exciting and pushed our limits further.
- The projects offered by Prof. Challen are really interesting and is keeping me engaged. Also, the content material presented in the slides are enough to understand the concepts, plus the Prof. takes the extra efforts to make the lectures all the more interesting. All in all, a great course!
- Too hard.
- The course was though challenging it was all enjoyable and a major reason for this was the assignments.
- Amazing course. You will start loving systems programming after taking this course.
- I loved this course. The projects were just amazing. The teaching even better.
- Solid Assignments. This is the best part about the course. I have learnt so much over the last 3 months
- Learning the theory Programming Assignments
- 1. Course website - Properly organized and timely updating of slides and videos 2. Piazza discussions 3. TAs & Ninjas - very friendly, helpful and importantly patient to answer our dumb doubts 4. Exams - Questions are thought provoking
- programming assignments, teaching, website
- The programming assignments helped me learn A LOT. The discussions in class and the questions the professor poses makes you really think about the choices, the design decisions taken, the trade offs made, during system design. Also, toward the end, the professor assigns academic papers for us to read. The course helps to align yourself to the way of thinking in the industry and in research.
- The TAs and Ninjas were great. The projects were challenging.
- Projects, Faculty and Staff are very proactive and supportive.
- All the lectures and materials were top notch. Lot of help available from Ninjas n TAs. Video recording all the classes was also very helpful.
- The assignments were very effective in applying practically the things that we learnt in the class.

- TA office hour, video
- The professor is very capable of teaching the concepts and ideas necessary to do the assignments. I felt the course grading was hard but as a student we leave with a better understanding. It is just unfortunate that the only current way to motivate students to learn is the threat of a poor grade.
- Code reading, recitation videos and teaching staff were highly effective
- The project based on OS161 was great and helped me learn a lot. Also the excellent support system with TAs and Ninjas was awesome. The project is hard and couldn't have been done without the support system.
- The assignments were excellent first hand experience of the concepts learned in class. Structure of the course covered end to end basics of Operating Systems
- None.
- Extremely well organized, nicely laid out website and auto grader with (almost) instant feedback on your score, many teacher assistants and ninjas, 16 office hours every week, all extremely helpful
- The assignments were most undoubtedly the most effective learning tool in this class. Struggling through these assignments not only improved my implementation skills, but helped me get a grasp on the basic OS concepts which are emphasized in this class. (Indeed, this includes the code reading questions part of each assignment as well.)
- Having the lectures recorded and the slides put up allowed me to study a lot better. Also, there were many resources available to me. However, I still bombed the midterm, after trying my best... I guess that's my fault though.
- I felt like the Lectures were only focusing on the Theory part of the course while in the Assignments we were expected to somehow implement whatever vague theory we learned in lecture. For people who had no outside Linux coding experience, this course was a nightmare as far as I know.
- Lecture videos
- Assignments are the hardest part, but they are the most useful part. I corrected most of my misconceptions while doing the assignments.
- The assignments are very effective in helping you get hands on experience. Plus covering popular papers in the systems domain, in addition to the legacy course structure gives us a peek into the current trend.
- -Great Professor -Good course structure
- Online Grading. Infinite attempts.
- The lectures were good and helped to give a high-level explanation of some of the concepts I was may have been a little fuzzy on, and when I wanted to learn how they might be implemented it was nice to have the code available to look through. As a commuter student I also appreciate the lecture and recitation notes being posted online. Although lecture was usually both interesting and entertaining, it's not always easy to attend them all. I thought the assignments in particular were an extremely good introduction to operating systems internals. Despite having several years experience in C/C++ programming coming into this course, I had never really needed to use a debugger before. I didn't find the programming for the assignments particularly difficult, but debugging was another story. I soon discovered that completing the assignments without using GDB would be very difficult, and the time I spent learning how to use GDB was well worth it. I also did not have much experience with *nix-esque operating systems, so having the chance to work with one that's so well organized, documented and written at such a low level was very interesting and rewarding. It was very interesting to see and even implement some of the abstractions provided to applications programmers on a lower level. I can understand why a lot of people would find this course challenging, but I'm convinced now after working through it myself that it's probably the most valuable course a new programmer can take. Piazza also turned out to be very helpful and I'm glad it was available and that the course staff/ninjas answered the questions so quickly and thoroughly. Also the autograder was great, I wish all of my classes had something like that.
- Lectures were helpful/
- Challenging but rewarding made it feel like it was worth putting in the time.
- The lecture slides and taping videos was very useful.
- I especially liked the class website, it had all of the relevant material for the course in one, easily-accessible place. Lectures were interesting, and it was nice that they were all taped and provided on YouTube. Assignments were challenging but interesting.
- Recording of lectures and presentation availability was helpful.
- I loved the professor's lectures and lecturing style, and the amount and availability of the TAs/ninjas proved invaluable.
- The assignments were fairly challenging, which gives us room to learn.
- Lectures were well organized.
- The implementation of the Operating System functionality really forces the students to understand the functionality of the OS system calls.
- It is very informative
- The programming portions of the assignment are graded automatically and we can submit them as often as we like, using the autograder output to improve our submission.
- The assignment auto-grader, piazza, and online lecture are useful.
- The "Learning by doing" approach was particularly beneficial to me.
- Tough assignments with lots of help provided to help the students complete them.
- The course was hard. Trial by fire, baby. But I learned a hell of a lot.
- The amount of TA's/ninjas was very helpful and the course was very well organized thanks a lot to the course

website.

- The course was well organized. The assignments were challenging but interesting. The TAs were knowledgeable and effective. Lecture is by far the most interesting and helpful CSE lecture I've had so far.
 - All but nothing.
 - good stuff
 - The surplus amount of T.A. and ninja (helpers) office hours were extremely helpful.
 - The timing scheme for assignment due dates seemed very effective.
 - Jing hao blog
 - Assignments and TAs.
 - I've probably learned more doing these assignments than in any other course combined. The recitations are very helpful for doing the assignments. The class is extremely well organized, and the online videos are a great resource.
 - The online lectures were a great way to duplicate what we learned in class.
 - Even though I went to class most days, it was still beneficial to have the lectures posted.
 - Office hours are really helpful with our projects
 - The lectures and recordings of the lectures were extremely helpful. The amount of office hours were helpful as well.
 - The first few assignments were fun, but having no previous programming experience in C I struggled with the later assignments.
 - By not giving us direct code help and instead leading us in the right direction, I was able to learn a lot more than I normally would in another class. The taped lectures helped a lot. Also, Geoff is an awesome teacher.
 - TA hours/ Assignments/ Lectures
 - I found the large number of office hours helpful. I also liked the discussions on papers and other real world examples to get a better understanding of why the topics we discuss are still relevant. Having videos and lecture notes available online was also very useful.
 - The online lectures posted were quite informative.
 - I loved the assignment! ... For many of us (especially those who have not interned anywhere big) this was the first time working with a large code base. At first it was scary. But once you started to understand how things fit together it was an amazing feeling.
 - The content of the course was effective at teaching the required competencies.
 - This shit is stupid hard. Which is unfortunate because it's probably the course you can learn the most from.
 - The extensive office hours.
 - Effective lecturing Recorded lectures Ambitious projects
 - Assignments were tough but fair, grading was fair and based on good metrics, one of the best CS classes at UB, although it is very tough
 - The lectures gave me a good basis of the knowledge for the course and the assignments expanded and solidified the material
 - The best part about this course was the abundance of help available from having a large number of office hours every week, with the TA's and ninjas both being very helpful. The programming assignments are excellent and I especially like the auto grading and unlimited submissions. It is also clear that Geoff is passionate about the material which goes a long way towards keeping students interested.
 - Operating system was great to know how program and process working it was great class.
 - The lecture videos are good.
 - The programming itself was very instructive. I learned most from what I implemented.
 - Video recordings were super helpful to be able to refer to while ill, and I'm really glad he got lecture slides up as well.
 - The project was incredibly helpful, if also frustrating
 - Lectures and readings.
 - Professor Challen is a great lecturer and I have learned a lot from going to class. I particularly am grateful for the fact that he would occasionally mention ideas that are frequently brought up in job interviews.
 - The course sure put a whole new level of challenge to my major and basically threw everything that I have learned about Java and C++ with all these "useful" data structures out the window.
 - Assignments
 - Lectures available online for rewatching outside of the classroom. Assignment questions and write up is useful.
 - Programming Assignments, Office Hours, Video Lecture
 - Geoff is a fantastic professor - makes it interesting, and the interaction online was superb.
 - I believe when it comes to learning nothing beats personal experience. The projects in this course have taught so much about the functionality of an operating system and as a bonus, got me a lot more comfortable with C.
-

Please comment on course improvements you would suggest. -

- Nothing major. If I had to think of one, maybe splitting up the assignments into several smaller ones? the professor did advise us to start earlier, so I have no excuse but I did end up underestimating the time required for assignment 2.
- Perhaps some way of making the lectures more relevant to the (very difficult) assignments.
- Some of the questions asked in the exams and code reading part of the assignments are ambiguous. There can be multiple answers for such questions, which are not accepted.
- Make programming more of the grade.
- More resources for programming assignments.
- I think lectures and assignments should be more connected...
- The midterm was brutal. I studied for weeks on end only to be "rewarded" with a lower score than expected. Some of the questions were elaborate enough to be long answers than short ones and therefore, I ran out of time. This is the hardest course I have ever taken. I did not enjoy this at all!!!!
- N/A
- The first exam was immensely difficult (class average: 39%), but Professor Challen apologized for making it so difficult and promised that the final wouldn't be anywhere near as brutal, so in that regard, he recognized that he had to improve mid-semester and hopefully will make the adjustment for the final exam. I would like to comment extensively on the assignments. I admit that there is some senioritis on my end, but the projects were very difficult, and I admittedly did not get very far on the third assignment's implementation and flat-out did not do any of the final assignment's implementation at all, instead choosing to focus my time on studying the lecture material for the final exam. I figured that in the interest of time, with everything else I had going on, to focus all my efforts on something worth 25% of my overall grade instead of on something worth 9% and which would take up all my time. Another complication for me was the loss of my partner before the two "big" assignments. I do not mean to imply that my partner would have done all the work, as I firmly believe in pulling my own weight, but it would have been immensely helpful to have someone to collaborate on ideas with for the tough assignments. As such, I felt incredibly lost for a good part of the semester, even though I knew I wasn't responsible for the completing the assignments "fully" like those who worked in pairs. I received help from the TAs/"ninjas", but I still felt really lost. Knowing what I know now, I think it would've been better for me to either: take the class over the summer so that I could have focused on it without worrying about other classes, or tried harder to find another partner in the short window between when he dropped the class and when the first "big" assignment started (I don't blame him at all; he didn't need the class to graduate). So for improvements, I suppose it would be beneficial for the professor to either talk more in lectures about the assignments, instead of just on the overarching concepts, or modify the assignments to not be as time-consuming. Additionally, I personally would make it mandatory for everyone to have a partner (not sure how to do that if there's an odd number of students, though).
- I would suggest the instructor to use a mic in a classroom of this size. It's not very hard to hear him but videos are much better.
- I would suggest more time in ASST2, I found myself really struggling to get that done in time.
- Nothing, I mean this class is perfect for students
- I would suggest that Geoff reconsider the steepness of the penalty for the ASST2 solution. I think that with the current penalty there is basically little to no incentive for students who didn't come close to finishing ASST2 before the deadline to even attempt ASST3, which in my opinion is an obvious shortcoming with regards for the learning objectives for the course. I know several students who gave ASST2 a good honest effort but still didn't come very close to finishing it. What I have observed is that these students continue to work on ASST2 during the time that they really need to be working on ASST3 in order to have any hope of finishing it, and eventually come to the realization that they have no chance to finish ASST3, and just give up pouring their time into an assignment that they are no longer even getting any points for. This is, frankly, just a bad situation. I understand the rationale for the steep penalty, but I am fairly confident that with a more reasonable penalty, say 20 points, a non-negligible number of students would give ASST3 a crack who otherwise would not have, which in my opinion should trump any arguments in favor of the currently massive penalty.
- Some information needed to complete projects was difficult find. Project specification page could have more info.
- More time for assignments.
- Thing is I don't even know. The course work for the class is just hard. The teacher offers plenty, and I mean, plenty of assistance.
- The workload of this course was unreasonable.
- It sucks that the class moves so far ahead of the assignments. While working on assignment 2 we were already done with memory and the stuff for assignment 3. Also, many of us depended on the TAs and ninjas for that extra bit of help. A lot of the times they would not show up. Or only one would show up and there would be 20+ students. If they are scheduled on the calendar then they should show up! It was very frustrating.
- The assignments could be given a little more time to complete as well as more information as to how each assignment can be undertaken and completed.
- Edit: I thought about it more, and I feel that one area that this class is really lacking in is the design documents. In their current form, they are largely useless since we receive no meaningful feedback on them. I suppose that it's inevitable with the current size of the class. One possible solution I was thinking of is that maybe you could have some sort of peer reviews on the design documents. That way, the students could evaluate each other and possibly get new ideas on how to handle the problem. I don't really know if it's feasible or how risky it would be regarding plagiarism, but it's just a suggestion. I think there should be a design segment though since planning before programming is important.

- None as such. May be some reading materials might let us gel well with the lectures
- I felt like I spent all of this semester focusing on this class and neglecting others.
- Maybe make CSE321 a requirement for taking this course.
- Easier assignments or a better explanation on what we have to do for the assignments.
- Better split the project into some small part, also the due days. it will helpful for us to complete it step by steps.
- I would have liked if we could have discussed parts about the assignments in class.
- Way too much work
- The midterm was obviously a trainwreck, but aside from that, the idea of open ended long answer questions attached to keyword-style rubrics doesn't mesh well. The papers given at the end of the course for reading are interesting, but I feel it would be better if these were more spread out throughout the length of the course, as giving many papers that can take a couple hours to fully appreciate, on top of the assignment that is active alongside it, during the crunch weeks of the semester... it can certainly be overwhelming.
- Exam was extremely difficult.
- too much work load that makes me didn't even want to start
- less ambiguity in coding assignments
- It is far far too easy to cheat on the code reading questions. Students could create dummy accounts on ops-class.org and then submit the code reading questions under the dummy account just to obtain the answers. Also, students can just look at the answers after a fellow group has submitted the answers. There are too many ways to easily cheat points on the code reading questions. This is an even greater problem because the code reading questions are worth such a significant portion of the total assignment grade. I think that the answers to the questions shouldn't be given until after the assignment is due. Another option would be to keep the system like it is, but make the code reading questions worth less. Another change that I would suggest would be to split up the code reading questions and design doc due dates. I think that the planning time that went into my group's design doc suffered because we had only 1 week to complete it along with the code reading questions. The implementation due dates worked out really well though! I felt like I had just the right amount of time for each of the assignment implementations.
- This is an introduction course but I felt like there was way too much material that we had to rush through slides. I cannot soak in 25+ slides of knowledge in less than 1hr, especially with no prior experience in OS. It would have helped me a LOT more if we could have been able to remain on each slide longer so that I could get a good understanding of that slide's material. I understand we are supposed to read a lot outside of class but I also have other classes that I need to read for.
- Professor is very zealous. Maybe too much at times.
- Nothing.
- The projects were pretty difficult and the midterm seemed to be much more difficult than the years passed.
- The midterm was too long for the time provided.
- There was not a course text, which was fine. However, there was recommended reading material. It might be helpful to sometimes highlight what sections of the recommended text would be useful with respect to our current assignment.
- There is some grading mistake in Code Reading questions, but we can't get points back.
- It is possible to get a passing grade without completing a large part of implementation.
- Assignments were almost impossible to complete.
- Maybe shorten the material/assignments. Considering this is a 400-level course, most students would be taking other 400-level courses. Sometimes deadlines could be stressful for some. Exams were a bit too tough.
- I personally thought the course was too hard. CSE 421 was easily the most difficult course I've ever taken - furthermore, this current semester was the most trying semester I've ever had, despite taking only three courses, entirely on merit of this one. I personally felt that there was not enough direction in assignments - while I understand that the point of this was to mirror the 'real world' in a way, so to speak, I wasn't prepared for this at all. The course assumed I knew much more about C code and terminal use than I actually did at the outset (knowing C really should have been a prereq of this course), and the lectures dealt purely with theory instead of helping at all with implementation. I personally would have preferred more, smaller assignments than having two enormous ones (asst2 and 3); their sheer size and scope made it difficult to find a solid place to start and keep track of all the things that needed doing. Lack of clarity/direction also hurt my time management for these projects simply because I couldn't figure out everything that needed to be done in the outset; reading the problem description rarely gave me a good idea of what I was trying to do. I personally don't think I should have had to rely on a supplemental blog to have any idea of what I was supposed to do - that sort of thing should have been on OPS-CLASS.org. It is, however, worth noting that I was essentially working alone, and didn't get the support/idea-bouncing that comes with a partner (I had one early on, but she was even more confused than me, didn't want to do work, and I ended up working alone at the end of ASST2 when she gave up trying at all.) If I'd had a different partner, I might have had a better - and closer to the intended - experience with the assignments, because somebody to share ideas with and fill in gaps in my understanding would have been incredibly helpful. As it was, my coding process really consisted of 'consult blog, code, troubleshoot, jot down problems I can't solve, continue coding something else until I hit an absolute standstill, visit office hours to ask about problems, repeat', and was not effective at all. The end of the course really threw me for a loop. Supplemental papers are fine, and I'm not asking they be removed because they really do give a great scope of the field and applications of the things we learned in lecture, but having the 'threat' of having them appear on the final exam turned me into more of a gibbering mess where this class was concerned than I'd already been (and that is an accomplishment). Essentially, I and any other average student can only hold so much information at once, and suddenly there was -way too much- information. I personally would have gotten more out of the papers if I hadn't felt so pressured - because past experience with the midterm showed that I needed to both fully understand and know examples of concepts instead of just having a passing knowledge/conceptual understanding of what they were (i.e., I can't scrape by with knowing what an

exokernel is and how it differs from microkernels and monolithic kernels; the test is going to ask me something like how to implement a library operating system. I can get the former level of understanding out of every paper - I definitely cannot get the latter amount of understanding out of every paper), I read the papers frantically trying to /memorize everything/ instead of taking them for what they were and going 'huh, that's a cool concept' or 'that's a good idea and I should remember it next time I start a project'. I had to apply the same deranged policy to all of the papers because I didn't know which/how many would end up being relevant on the exam, and because the long-answer questions are so make-or-break (and I am very sure that this is long-answer material). It's also distracting me from studying/cementing/remembering the earlier material of the course, which I really need to go over. I write this before the final exam, but I know- this is going to end badly on my part - I'm very sure the end result of 'understand and memorize everything' is going to be 'understand and memorize nothing' with this much information, but casual reading isn't going to be enough to survive the final exam either. It's either this, or only study the core information of this course and just give up whatever questions relate to the course reading. I just don't know how to deal with this. I'm sorry if this sounds whiny or like I'm expecting to be babied... I really don't consider myself a stupid person, and this was the first course to ever bring me to tears (which it did multiple times). I never felt properly prepared for what I was trying to do. While I understand that this is meant to be a hard course, and curves exist for a reason, I feel like a class where everyone passes simply on merit of the curve is sort of failing the point of being a class - to impart an education. Certainly this course was interesting, and I very much liked the instructor, but the assignments were far too difficult. The lecture material itself was well-paced and of what I'd consider an average difficulty, but they didn't do very much to alleviate the haze of confusion surrounding the assignments.

- Less disconnect between lecture and assignments, more guidance through examples and course material to reinforce assignment goals, smaller assigned readings for the end of semester material.
- At times I felt a little lost during assignments, like I didn't know where or how to start. Perhaps in the future you could give a little more of a push for students starting the assignments.
- Take a little bit of the workload away.
- Assignments are very frustrating to do with a partner, especially if the work doesn't end up getting split evenly. Make the assignments for individual students instead of doing group assignments.
- The code reading / design doc should not be worth the same amount as the assignments when we have 1/3rd as much time to do them.
- Assignments need better guiding besides just recitations.
- No real complaints worth mentioning; I thought this was an excellent course. I do wish there was an option to work alone, though.
- A teeny bit more spoon feeding for students amateur at C.
- -More detail in slides -More examples of that explain the concepts -More help on the projects/codebase
- Something more on Virtualization in addition to papers. Maybe a short assignment.
- none
- The group project is unreasonable for people who have to work 40 hours to pay tuition and have a pattern that won't write a single line of code. I am probably going to fail this course because I got buried under doing the project alone. There should be a system in place that allows people with bad partners to have some kind of lifeline rather than some crazy policy where admitting to not doing 50/50 with partner results in an automatic F for an academic integrity violation. Fuck that policy, seriously.
- Please in the future kindly make sure in the lectures the implementation is actually demonstrated. I pretty much learned nothing from this course and 2 people I know who were doing pretty well actually dropped out of the CS major because that's how lost they felt with this course. I understand we're not supposed to get spoon-fed but at the same time the difficulty level of this course and the vagueness discouraged a lot of people that I know of and made them feel utterly incompetent. May not have anything to do with the Professor, may just be the way the course is designed.
- This course was the only course I've ever taken that made me temporarily feel that all of my efforts would be inadequate because I don't have the ability. The assignments and midterm were harder than anything I've done before.
- For assignments 1-2, I utilized Kernel Development by Robert Love which was extremely helpful compared to the assigned text for this course. Additionally, I made a mistake going into this course without securing a qualified partner before hand. I ended up doing the most work myself (our current repository has 200 total commits; 10 of them are from my partner.) It would be great if you could implement a mechanism to: (1) prevent a slacking partner from getting a grade that the other partner earned; (2) and/or a way to terminate the partnership. I honestly would have done so much better in this class grade wise had I just chose to work alone from the beginning, or had the foresight to find a reliable partner before registering for the course.
- Perfect the way it is, more professors in UB should be like him.
- Ridiculous workload, often expecting students to commit up to 30 hours a week to the class. As a reward for doing well, the professor offered to be our friend on Facebook... he is an insufferable douche. I've never met anyone as arrogant or into himself as this guy.
- Considering that the assignments are time consuming, possibly more checkpoints might help students plan out the assignments with respect to other courses during the semester. For example, instead of having one and a half months for implementing assignment 3, it would have been beneficial if there was an interim submission which included everything upto swapping. This is not a shortcoming of the course in itself but just a method that might help students like me context switch between multiple heavy courses more efficiently.
- I feel this is a perfectly balanced course as it stands now.
- More interactive questions/sessions on design would be helpful.
- I feel the questions and design documents for the assignments are meant to encourage students to read the code and understand what is needed for the actual implementation. To me these were inadequate. We did the questions and went on to do the design document, but for the most part were not as involved as I think we should have been. For example in assignment 2 we were caught off guard when we had to alter run program.

It would be better if there was a guideline for the design document to motivate students to look far ahead and be able to plan for new functions they need to implement. This is more of a pure suggestion but perhaps it would be easier if the projects were divided into parts and due accordingly. So instead of 3 projects there would be 6 halves each having parts due to make it easier to manage time since 4 weeks seems like a lot but 2 weeks feels more pressing.

- more hint on homework
- There can be at least one individual assignment rather than a group assignment.
- Some more discussion about projects in class could help provide more clarity in theory perspective as well.
- Prof Geoff need to be student friendly. I feel hesitant to contact him. The usage of more pictures in the slide will give better understanding.
- The midterm exams could have been easier. Although it was fair, it was really lengthy for a midterm.
- exams can improve
- Nothing much. It is already too good and keep doing the same good work.
- Using the mic in the class. In NSC , sound is not audible even if we sit at the front
- Nothing. The course is perfect!
- The coding assignments can be provided with a little more formal documentation about direction and content.
- Flawless coursework. I dont think one can expect anything more
- The assignments are well handled and covered with ample amount of timing. Code reading and design phase was a major plus. Improvements could be, the design evaluation should be done quickly so that we could realize if we did anything wrong
- Too hard.
- The project deadline policy keeps changing every year. Hope the the policy adopted this year does not continue the next year. The strict deadline for assignment submission is restricting in some sense and adds undue pressure. If we could only have deadlines for code reading questions and design documents, they also it would fulfill the purpose of getting students to start the assignments on time.
- .
- Maybe some sample problems to be solved on your own would be helpful, although this is not a necessity. I would not like them to be ungraded because I would not like to add to the assignments already designed by the Professor, which although interesting, are somewhat difficult and takes time.
- But the sad part is, there was not much help offered both in Piazza as well as in TA hours for project-3(VM). Though TA's tried their best, they weren't able to show us what we are doing wrong and so we had to figure out ourselves. And this took us long time though the change was very trivial.
- The exams were a bit hard. Sometimes I have felt that if a TA/Ninja is helping a particular person, when that person is compiling/testing the TA/Ninja should help somebody else rather than waiting for that person to finish.
- A bit more "help" for the assignments (lost quite a bit of points on code reading questions because of the open-ended nature of the topic)
- I hope the midetern to be a bit less difficult. It was difficult.
- The assignments, course description and even slides are all designed in such a way that when you read it, you get the feel that the staff is explaining them to you orally. Though it's good, we have to read a huge paragraph to obtain small information. Instead I would prefer them to be concise and to the point. It's a small suggestion, other than this the course is super cool. Thanks GWA and course staff!
- Go more slowly at the start of the course.
- Its perfect the way it is!
- Maybe A2 needs some more time like A3.
- Can't think of anything...
- The part of the lectures that required us to read the research papers. It is difficult to read so many of them in a short period of time and get the maximum out of it.
- I, along with most people I would guess, would suggest giving a little more direction for the ASSTs. The ninjas were great, better then the TAs I think, but there are only so many times to contact them. Piazza solves this somewhat, but it is still the case that we are dumped into the middle of these projects and basically told "do it". The blog is the only saving grace here, and I wish Geoff would make something like it for the students. Since there is no special section for the TAs, I'll put them here. All of the ninjas were great. Better than the TAs I think. The TAs, in my opinion weren't nearly as helpful in person, especially Guru. He often talked down to us as if we were stupid for doing things certain way, even though this is the first time most of us are doing anything like this. I found him to be very arrogant. He is without a doubt very intelligent, and has the capability to help us, which he does. But I always walk away feeling very stupid because his "help" usually ended up being him telling me what I did was obviously wrong, and then either giving some vague hint about what to do, or if it was actually close, he would tell us how to fix it. In which case, it wasn't completely wrong, so would have appreciated if he didn't open with that. I understand that he is smarter then me, but in my opinion, a little humility would be greatly appreciated. I never interacted with Zihe much, and Jinghao was great, especially during recitations and his blog was invaluable.
- a little more detail on specifics of particular topic will certainly help get more in-depth insight into subject.
- Best course till now in my graduation.
- Sometimes the professor gets into long sentences and that too in a reduced voice which makes it very difficult to understand.

For what primary reason did you enroll in this course? - Other (please specify)

- Other (please specify) Interest
 - Other (please specify) Required but I wanted Geoff as my professor.
 - Other (please specify) It was required, but I wanted to take the "Challen Challenge"
 - Other (please specify) I heard it was an enjoyable class
 - Other (please specify) An engineer is incomplete without the knowledge of Operating Systems
 - Other (please specify) Interest in the subject
 - Other (please specify) Interest
 - Other (please specify) Professor and interest in the course
 - Other (please specify) Interest
 - Other (please specify) Interested in OS
 - Other (please specify) the professor
 - Other (please specify) Interest and important for my area of interest
 - Other (please specify) Interested me
 - Other (please specify) Out of Interest
 - Other (please specify) I heard a lot about the professor and the course structure.
 - Other (please specify) Interest
 - Other (please specify) Challenging course with good encouragement and rewards
 - Other (please specify) Interest
 - Other (please specify) Because its Operating Systems. Plus super feedback from seniors about Prof. Chaallen
 - Other (please specify) Interest and because Geoffery Challen
 - Other (please specify) Wanted to learn more on OS
 - Other (please specify) I heard from my seniors that this is an excellent course so I didnt want to miss.
 - Other (please specify) How can I miss the Harvard experience.
 - Other (please specify) Mainly for learning details of Virtual Memory
 - Other (please specify) Curiosity
 - Other (please specify) Learn systems programming
 - Other (please specify) Wanted to learn about OS
 - Other (please specify) i like challenges
 - Other (please specify) Interesting Course
 - Other (please specify) Interest in the course
 - Other (please specify) Challenging
 - Other (please specify) Interest
 - Other (please specify) Heard great things about the course and the professor.
-

If you were dissatisfied with any of the instructional facilities, please explain: -

- The acoustics in NSC lecture halls suck. Hoch 114 or Cooke 121 like in the previous years would have been MUCH better.
-

Please comment on how effective the instructor was in teaching this course. -

- One of the best professors I've had
- Challen is the best professor I've had at UB
- Extremely Effective
- Thanks!
- Very effective in teaching the course. Could have presented more material on how to approach the programming assignments.
- Fantastic. No suggestions.
- Challen is very enthusiastic and approachable. He stressed the importance and relevance of the class in and outside of the classroom.
- I can't blame him on the not so good acoustics from the lecture hall.
- Maybe it is just me, but this guy went way too fast for me to even comprehend what is going on. Most of the things he taught, I didn't even see on the midterm and I sure as hell want to see them on the final!! Overall, he was utterly confusing.
- Was very enthusiastic about the material, very informative, and was very detailed during lectures.
- Very effective
- He has been great at covering the materials, but sometimes I feel like he is showing too much love for the "good students".
- Very effective.
- After this course, Geoff is my favorite CSE professor at UB.
- I always enjoyed the lecture, they very pretty engaging.
- Best teacher in CSE
- Geoff was awesome! I wish more professors in the CS department cared as much as he does
- Very clear and organized. Lectures well worth their time.
- Great professor. Very smart. Very reasonable. Overall just a great professor deserving of respect.
- The instructor has in depth knowledge of OS concepts and he very well presented them in the class. He took care to answer questions in the class. Overall this was an excellent course.
- Very effective.
- Best lecturer in UB computer science department
- he is excellent at what he does and goes out of his way to help students achieve excellence.
- Extremely.
- Geoff is a great guy. He appears very passionate about the subject and that makes the students, or at least me, want to learn it. The lectures are never boring which great. He knows the material extremely well and is well read in the research of this field. However, I for one would say that he is a bit intimidating to seek out outside of class. He is seems like an approachable kind of guy, but whenever I see him outside of class he often seems very annoyed, as if our questions are wasting his time. It's clear to me that he is smarter then at least the majority of students in the class, especially myself, but it sometimes appears that he isn't aware of this knowledge gap and unintentionally patronizes us when we have a problem that he can fix in 10 seconds even though we have been stuck on it for days. The few times my partner and I have received help from him, I was left feeling quite stupid in his wake since he kind of laughed off our problem as something simple and chastised my partner for not figuring it out. I can't say too much about how his help outside of class was though since I had another class during his office hours so I could never go to them. That is another suggestion, if he could maybe have more then one block of office hours. It doesn't have to be two hours each time, maybe just an hour on one day and another hour on another. I would have liked to go to his office hours sometimes, but I never had the chance since he only had one block. The ASSTs are difficult, and he knows it, which is nice, but a little more direction from him, akin to the TA's blog, would have been very much appreciated. As it stands now, he basically tells us to go do the ASSTs without much else. The midterm was also very difficult, but he already knows that. He could also loosen up a bit about his test policies. Especially the exact 50 minute time limit. Some people take longer to take tests and pressuring them just makes them do worse. Also, because of this, we don't actually get 50 minutes for the test, since we need to walk down and get in line to hand in the test before the 50 minute mark. This line can get kind of long. I've never had another teacher as exceptionally paranoid and picky about tests.
- He is an excellent faculty. Learnt a lot from his course. Maybe because the class room was very big, his voice was not audible clearly in class. There was no problem in following his lecture videos though.
- Very. His lectures are always interesting, informative, and has bits of humor thrown in.
- Very effective! Classes were like an interactive discussion. It was fun.
- Mildly effective.
- He was brilliant!..the right blend of clarity, humor, depth in concepts, the list goes on ..
- Pretty good
- Very, went to one office hour and my understanding for the assignment increased drastically.
- It was good and well organized course.

- Very effective.
- The instructor is quite effective in teaching the course and is enthusiastic enough to get a student interested in learning the concepts of Operating Systems.
- Too hard.
- .
- I guess if you were a little less strict and disciplined about the stuff, it would be better.
- Very effective. He is one of the best teachers I have had the chance to learn from.
- The primary reason for many to choose the course was Geff. Nonetheless it was a good decision to be made as he is a very enthusiastic professor clearly transferring knowledge to the students with a well structured course.
- Geoffrey is an excellent teacher. I love the lectures, presentation is very clear organised and easy to follow. Course material is very thoughtfully organised. The website, resources such as lecture videos, practice problems all are very helpful to students, The midterm was a bit too hard. I was harder than I had expected and previous years. Overall the course is very interesting and effective. Glad I took this course, It has been a great learning experience.
- Hardest course I ever took. Not because the materials are hard, but there are not enough support to complete the assignment. I know there are many helpful TAs and Ninjas, but there are too many details we have to figure out. Recitations only give a big picture of the assignment, no details are provided.
- The instructor tends to lower his voice when finishing off a sentence. It would be great if that is avoided.
- He was amazing. I loved his enthusiasm the best course I have taken so far.
- GWA has designed an amazing course. Best part about it is that all assignments are auto graded and released way ahead of time. This prevents any delays from the part of the teaching staff and hands over the onus on the students to work on them. Definitely my favorite professor and favorite course at UB.
- Amazing prof
- Thank you for being such a passionate and engaging Professor! I think the deadlines during this semester have been very appropriate.
- very good teaching skills
- Great man. Course is too hard though.
- He put his thoughts across very clearly. (Although his speech could be really fast at times, and (sometimes) muffled). He knows his stuff and did a very good job teaching this course.
- One of the best in UB!!
- He is a very passionate teacher and takes pleasure in teaching to his students. One of the best professor I've ever had.
- funny, teaching us lots of aspects of os
- Very effective.
- Very effective.
- Awesome
- The instructor was highly effective with a good reward system.
- Geoff is the coolest professor I have seen in UB. He knows how to put concepts across so that they are much more interesting than they might actually be if read outside of the classroom.
- He sucks.
- He is very helpful and chooses his TAs and Ninjas carefully, expectations are clear and you have access to every bit of information online through the website.
- Very good at teaching what was on the slides. Would appreciate more links to projects during the lecture.
- of course, Geoff is one of the best at UB
- Excellent! I have nothing against him.
- He presents the lectures clearly and answers questions both in lecture and on Piazza. But, the results of exam #1 are indeed concerning...
- Great Professor. Went over concepts well however. Felt rushed at times when he skimmed over some stuff.
- Teaching style was effective if only a bit asynchronous in skimming over many aspects of the presentation on the projector. Pace was an issue at times with long drawn out periods spent on some sections, and a complete fly by of other sections.
- Professor Challen was fantastic all semester. Very engaging lectures and welcoming to students who ask help at office hours.
- He presented material in a concise manner, an was enthusiastic during class. He expected a little bit too much from the students however.
- Geoffrey was great; always very friendly and approachable. I've heard people say that the lectures should cover more about implementation details, but the recitations covered most of that and teaching new programmers how to design and implement these sorts of systems themselves is probably the most valuable part of the course. Overall the lectures were interesting and engaging and the course was well laid out.
- Geoff explained the concepts in a concise and clear fashion with great enthusiasm.
- He is nice and make things very interesting.
- video lecture will allow the student revise better for exam

- Great professor! Brings lots of energy and passion for the material. Very friendly and approachable.
 - Again, Lectures are well done but his methods need some adjusting mainly how brutal his assignments are.
 - Fairly effective.
 - Great guy. Very friendly, helpful, and approachable. Never made me feel like an idiot despite how utterly lost I was in the course.
 - He seemed very helpful and an all around good professor who cared about his students. But it didn't help me or most other people I know at all. Strongly suggest changing the structure/work-load of the course and actually do some implementations/examples in class.
 - He was okay, but expected a bit too much from us.
 - One of the best professors I've had!
 - His lectures were very enjoyable compared to most CS professors I have had. He is very engaging and really wants the students to succeed.
 - very effective
 - Geoff is extremely effective. It's a great course!
 - He was knowledgeable about the topics and taught at a level that was appropriate, however the midterm as a wreck.
 - Very effective.
 - The energy and presentation were good, I just wish he would have slowed down. The rushed pace of learning new material is one of those things where most students will learn it temporarily then forget it over break.
 - Yo
 - The instructor did an acceptable job of presenting the material in class. In person, he could be somewhat abrasive.
 - The instructor did well for the lecture part of the class. However, there could have been more clarification given by the instructor during the assignment parts of the class.
 - He is the best professor I have had (and I can confidently say that I will have) throughout my school career. He not only knows the information, he explains it well. Along with this, he is enthusiastic and convinces me to want to learn the material versus needing to.
 - I felt that he was very effective at teaching the course. He has a lot of enthusiasm about the subject matter and is one of the professors that both seems to like teaching and is good at it.
 - I talked about this in my previous comments.
 - Very effective.
 - Geoff was enthusiastic and made sure we had plenty of resources for learning outside of class time.
 - Dr.Clallen, I love your class and I hope I can get an A after this semester.
 - I would venture to say that Professor Challen was the most effective instructor I have had to this date. Very engaging, and passionate about the material being presented.
 - Great guy and down to earth. Probably the most knowledgeable professor I've had so far.
 - He is passion, also clearing answer the question reall well. But sometimes, I really dont understand what he said.
 - The teacher was clearly able to show understanding and presented most topics easily
-

Please comment on how effective the teaching assistants(s) were in helping you meet the learning outcomes of the course. -

- They all knew the topics well and were able to help with misunderstandings
- guided us into starting the project.
- The TAs (and ninjas) were helpful.
- I feel that recitations could have been a little more in-depth, considering the difficulty of the assignments.
- There were numerous office hours to go to and ask questions at. They understood and were able to help me walk through any issues I had. The recitations were very informative
- Guru and Jinghao were two of the best TA's I've had in my time at UB. ZiHe seemed to be absent from a lot of office hours she was scheduled for.
- Recitation was great to know what is basic for doing assignments
- They were extremely helpful and CRUCIAL to being able/coming close to finishing assignments.
- Very helpful.
- All TAs were very knowledgeable and helpful to the students.
- Hay
- really helpful. without their help i wouldn't be able to finish 1st assignment.
- Super available, super helpful, really knowledgeable.
- Very effective.
- They were very dedicated and helpful to their job. Some parts of assignments would be impossible without their help.
- I did not think that Zihe was a good TA. Most of the time she did not seem very eager or willing to help, and when I did get her attention her conversational English skills just did not seem up to par. She did not seem familiar with the course material either. I was rarely, if ever, able to get any useful information from her. All of the other TA's and ninjas were helpful.
- It would have been better if he could speak a little clearer.
- Faculty
- Some of them were very helpful while a few others were very condescending and not helpful. GC Geoffrey W
- I did not attend recitation or office hours, but they always answered the questions on Piazza quickly and thoroughly which was a big help. Jinghao's blog was also a big time saver.
- I would not have managed to get anywhere without the TAs and ninjas. I am incredibly grateful.
- They do provide great help. Except there was this one time the TA did not show up at office hour, my partner and I couldn't get help from TAs. Though the ninjas were there, so we got some help at least.
- If anything they were the only reason I could do any of the assignments. They give helpful advice while not just blatantly giving you the answer.
- They didn't grade the midterm fairly, but they (along with the Ninjas) were *extremely* helpful in office hours. By the way - Guru deserves a raise!!!!
- He explained the material well
- There are many office hours and we can seek for help in any time.
- They were pretty good at helping teach the material. They could be a little bit nicer to the students during office hours who are asking for help though.
- TAs had lots of hours and were open to helping.
- Very knowledgeable, plenty of availability.
- TA's helped a lot and were awesome. Some of the ninjas though had an attitude. Don't be a Ninja if you are not willing to help or be understanding.
- Well prepared lectures and lecture slides. Answers questions. Enthusiastic. Very satisfied.
- All TAs are so smart and helpful. Never felt bad about bugging them with tons of questions, in some instances I've walked to ninjas when it was not during their office hours and they were still extremely nice and willing to help. Also Guru rules!
- The TA's were extremely good. Some ninjas made some students including me feel "retarded".
- They were cocky, condescending and unhelpful. Guru would often scoff and yell at students who came to him asking for help. Office hours were a hostile, unwelcome environment.
- Guru and Jinghao were nothing short of spectacular ... Zihe sucked! She is not qualified. Please replace her
- Did not spend enough time with TAs to answer.
- Recitations are really helpful especially when we were doing ASST1 and ASST2.
- Very effective. Always available and many available
- I had a hard time understanding a few of them, but overall they taught me quite a bit.
- The TAs went above and beyond, and I think they are the main reason so many students did so well on the programming assignments.

- They did quite well in assisting with attempting to understand each assignment.
 - All were great help during the projects.
 - Very helpful in regards to the programming assignments.
 - The recitations were useful for getting a better understanding of the material and the project. There were also many office hours with both the TAs and the 'ninjas' to get help when needed.
 - Gave helpful hints for homework assignments and tips on improving for future reference.
 - Extremely Effective
 - If it hadn't been for the teaching assistants, I would have most definitely sucked at this course. The assignments were completely brutal and required damn near 24/7 work time to fully understand them. Cheers to all of them. They clearly stated what the problems were and how to fix them.
 - Very good TAs.
 - I would have to say finishing assignments without the TAs/ninjas may have been impossible. That being said I feel some TAs/ninjas were definitely more helpful than others.
 - Jinghao's blog saved many of us from much frustration.
 - Recitations presented useful information for the assignments.
 - Very effective.
 - The teaching staff was very active in the course.
 - They were completely necessary. Without their help, I'm not sure if anybody would have been successful in the course - the course is essentially two separate courses, and they were fantastic at teaching the assignment half of it.
 - Jinghao and Guru are awesome! Ninjas really helped to
-