MATH 6321 (McCuan) Spring 2022
Some Administrative Details

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I have tried to record here some information related to the course *Complex Analysis* given Spring semester of 2022 at Georgia Tech. This information is organized in two sections entitled "Stuff" and "Non-Stuff." Perhaps the most important thing for actually taking the course, if one is going to take the course in order to learn complex analysis, is the course page, which I hope remains available to students. This "course page" is made available, at least at the moment, through the long nightmare commonly known as the internet, and the url (or internet address) is

`http://www.math.gatech.edu/~mccuan/courses/6321/`

I'm really excited about teaching complex analysis this semester, and I think there is an opportunity for you to learn many interesting and exciting things. It should be fun.

Euclid said there is no royal road to geometry, and I think this applies probably even more to complex analysis. It's a subject that requires one to think and think hard about it. There's no way to make it easy, but you should be able to make some progress if you give it a shot. I'll do everything I can to help.

The basic message of the second section "Non-Stuff" is a kind of request: If you anticipate asking me questions about any of the topics discussed in this section during the semester, then please login to OSCAR (or wherever you register for classes) and remove this course from your schedule. You can perhaps take the same course from a different instructor or if that is not possible, you can take the same course another semester. It is not particularly that I am "offended" by such questions, but rarely if ever am I able to offer the kind of answer a student who asks such questions finds satisfying. On the contrary, my answer to students who ask such questions tends to make such students uncomfortable and sometimes leads them to pursue behaviors which can potentially make me uncomfortable. So why should any of us deal with all this discomfort? Just sign up for a different course now. If you have seen the movie "The Matrix," then you can perhaps understand my request. I'm sort of like the glitch in the matrix. If you want to maintain the illusion of the matrix and keep the wool pulled down tightly over your eyes, then you should avoid people like me.

1 Stuff

1.1 The Textbook

I am planning to use (primarily) a textbook on Complex Analysis by Stein and Shakarchi. Stein is a famous mathematician and I assume a really good one, but I'm mostly familiar with his work in partial differential equations. I've used Ahlfors, which is a favorite of mine in the past, but to be honest it's not generally a favorite with students. Ahlfors, however, really did a lot of significant research in complex analysis and wrote the book (probably) to give some insight or angle related to that particular work. Stein and Shakarchi is much newer, and seems to take an updated and much broader perspective. It seems to be

a great book and should be much more popular with students. There's one thing I find a little unfortunate. I started to type up some solutions of the exercises in Ahlfors. There are several published collections of solutions for the exercises in Ahlfors, but none of them are complete, I think most of them have some errors, and certainly lack some additional explanation or perspective I think I can offer. I think I will try to continue my solutions, but I'm going to primarily try to stick to Stein and Shakarchi. So that's, more or less, that.

There are a couple sort of critical comments about Stein and Shakarchi that can be made. One is that the presentation is a bit "slick" in contrast to Ahlfors. This means that the book can make you think you've "learned" more than you've actually learned because details are swept under the rug—in contrast to Ahlfors, which makes Ahlfors a book that's more difficult for most students to deal with. It's not such a big deal. I can probably make up for it by confusing you with various details from time to time as we go along. Secondly, Stein takes the point of view that there are two "directions." One is results about classes of functions especially analytic functions, and the other is results about specific functions. The latter is especially of interest with respect to number theory, e.g., the gamma, zeta and theta functions. This approach, it seems to me, sort of overlooks what has historically been called "conformal mapping," or the geometric side of the subject. This geometric side, by the way, is the strong point of Ahlfors. In practice Stein certainly doesn't overlook the geometric side completely—that really wouldn't be good, but he doesn't put it forth at the beginning as one of the basic directions of the subject. I would add it.

1.2 The Assignments

I'm planning to type up homework assignments. Some of them will be designated "exams" simply because there is some "regulation" that I'm required to give exams. There is really no difference between exams and other homework assignments. If you want to learn the subject, you need to work problems. You need to think about things. You need to write down an expression of your thinking clearly and see if someone else can understand what you've written. It also helps to talk about what you are thinking—if you can express it in some kind of relatively comprehensible way in speech. You will have a chance to do that in the classroom during the "lectures." But the assignments give you a chance to write things down and have someone try to read it.

1.3 The Lectures

I hope to not lecture too much, but I expect I will at least some. Ideally, I would like to have you working at the board most of the time when we meet. I'm thinking about organizing this in the following way: We'll have something called **Complex Idol**. You can volunteer to be a "participant," and I'll designate another student to be a "judge." Then you can go up to the board and tell us what you're thinking about (hopefully something about complex analysis). I guess this will be mostly exercises and problems. It can certainly be problems on the assignments, but I hope you can also take up some things beyond that. I certainly plan to do so. Every student will be required to be a judge and give a score, say 1 to 3 points or something like that. Then we'll keep a tally and see who gets the most points. You don't have to be a participant, but I hope you will. If you have nothing to say, this probably means you are not thinking. If you are not thinking, you are not learning. If you want to learn, it is your responsibility to do so. I can't do that for you. You may be used to and enjoy courses in which the instructor makes you "feel" like you've learned something from listening to an entertaining lecture. This course won't be like that. That kind of instruction mostly just tricks you into thinking you are learning rather than actually giving you an opportunity to think and learn. More generally, any instructor who makes you feel like you've learned something because you can jump through a bunch of hoops using mindless techniques and formulas is tricking you and actually **"training" you to be unable to think**. Organizing courses built around this sort of mindlessness, you may notice, is what passes for "good teaching." It makes students feel good and write nice things on student satisfaction surveys.

The uncomfortable truth is that, for most students, thinking is an unfamiliar and unwelcome activity. I don't know what else to say about that. I think it's important for people to think and to think critically. For me, that's the primary reason to teach courses. It's not really about complex analysis or partial differential equations—it's about being able to think—mathematics is just a tool to offer the opportunity to think. That's why I'm here: To give you the opportunity (other instructors have not) to think. But I can't do it for you. For one who can think (and think critically) the aggregate effect of being "trained" not to think and to embrace every technology and whatever is regulated and mandated is pretty obvious. There are people working in labs to make viruses more contagious and more deadly; there are people in labs developing nuclear bombs and nuclear reactors which can kill tens of thousands of people within seconds and pollute areas on the earth for generations. There are people who devote themselves to training to pull a trigger (or whatever other destructive behavior is on the agenda) to kill or otherwise torment whatever stranger they are told to kill or torment. It is clear that the "training" students receive in mindless hoop-jumping and non-thinking has produced this situation. I don't know if getting some people to think can reverse the direction, but I can't think of a better idea at the moment.

Of course, maybe you think everything is lollipops and skittle colored unicorns and things are just getting better and better and better (through technology and compliance with regulations and people doing what they are told to do), and you are going to go out and make the lives of all people better and better and better...through mindless hoop-jumping and the "knowledge economy"...of the future. Well, we just have a difference of opinion. But perhaps if you're really committed to the mindless hoop-jumping you should find a different instructor.

Returning to Complex Idol, I hope you are thinking about things and are enthusiastic to talk about what you're thinking about intelligently. First you should think carefully about what you want to say. Cover any background you think those listening to you might need to know. If you are a listener, and there is something you need to know, you should ask about it. Given the background, or the statement of your problem or exercise or whatever, then you should try to express what you have to say about it clearly. If you're in the Idol competition, then you'll want to write it down beforehand. This will give you good practice for the homework assignments. I hope it will be fun. So that's more or less what I'm thinking about for the course.

2 Non-Stuff

2.1 Caronavirus

If you're sick, stay home. Don't pass what you've got around to others. If you want an instructor who is hysterical concerning the scamdemic, perhaps I'm not your guy. I would hope you're not going to complain about me not wearing a mask. I hope you're not going to complain about me not being injected with experimental pharmaceuticals. A little bit of critical thinking would save you from such pitfalls.

2.2 Grades

There is a "regulation" that I give you a "grading scheme." You can find such a thing on the course page. There is a "regulation" that I assign you a grade that appears on your transcript at the end of the semester. I will probably do that. I don't really care about that. I'm not going to let it be a big part of my course. I'm not going to waste time on it, and I can't imagine why you would want to do so either. That, of course, assumes you can and have actually thought about grades. There are many different ways to think about grades. One component of "grades" is clearly pretty closely tied to the hoop-jumping I mentioned above. The actual connection between grades and thinking and learning is clearly very tenuous, and the connection with "training" is very obvious. In view of these things I suggest, we all just forget about them, more or less.

The fact remains, of course, that I will (or at least plan to) assign you a grade for your transcript at the end of the semester. I would like for you to think about that and specifically what grade you want me to assign. Here is a rough outline of how I am thinking about that:

1. If you can't live with getting a "C" on your transcript, then probably you should take another course. It's not likely to happen (statistically), but it's possible, and I wouldn't want to be responsible for giving you a grade you don't want.

2. Just about any student who takes my course and gives an honest attempt to think and learn something—just about anything—is going to get an "A." Also, any student who actually tries to think and learn—who relaxes and just gives it a try—will almost inevitably learn, and learn a lot. Such a student will get an "A." I've found that students who calculate their "grade" according to the grading scheme but actually get a "better" grade on their transcript, don't complain. Why a student would ever look at the grading scheme and calculate such a grade is something that I cannot understand—but obviously some students do it. A LOT of students do it, and I know because they write me emails and come to me at the end of the semester to tell me about it. These students still have their minds stuck deep in the matrix and can make no sense of what I've written above. Don't be one of these students.

3. I have little or no motivation to assign you a grade other than the grade you want. I've thought about this for a while, and I think there are students who don't want to just get an "A" on the transcript for the course unless they feel like they "deserve" it. These are students, of course, whose mind is to a certain extent still stuck pretty deeply in the matrix. Such a student really believes grades are serving some "greater good." That's fine. If you want a lower grade than the one you are assigned, just let me know. I'm happy to comply on that. The more common (and yes very contradictory) behavior is represented by a student who thinks grades are very important but who is incapable of thinking or learning, but still wants an "A" on his transcript. If you're such a student, you should have figured out that you should drop my course by now. I don't want to teach students like you. If you do persist, then the following discomfort is likely to take place. At the end of the semester you will have learned very little, but you probably turned in some assignments and "did something." So you get a "B" in the course on your transcript, and you're not happy about that. So you come to me and, as usual, I attempt to talk to you about complex analysis—about which you will be unable to say anything intelligent. So, you will be made uncomfortable because I will make it painfully clear that you haven't learned much of anything. I will be uncomfortable for having to do it and for having wasted my time dealing with you. (If you weren't going to try to learn complex analysis, why did you take my course?) At this point, I'll probably change your grade to an "A," which of course is consistent for me because I really don't care about the whole grade scam/sham.

4. Now you may ask: Why don't I just give all students "A" for the course grade and call it a day. I've asked myself the same question. I've even done it. I get very few complaints from students about that. There are a few who complain about other students getting grades that are better than they "deserve," and a student every now and then who complains about getting a grade he did not deserve—and wanting a "B" instead of an "A." But it's really the administrators who are rather upset about all "A" grades. Those jokers are really beyond redemption when it comes to having their heads stuck up their matrices. So practically speaking (between you, me, and the wall) it works like I've described above: The scores for assignments may be used for feedback, but don't go calculating up points and worrying about how they effect your transcript grade. Just don't do it. If you think about complex analysis, you will learn complex analysis, and get an "A." If you really somehow manage not to learn very much and get disgusted with the whole idea of thinking about the subject, you might get a "B." If you do something really strange, like at the end of the semester you didn't turn in any assignments or something like that, you'll get a "C." And hopefully everyone will be happy, or at least tolerably happy.