Course Guide Complex Analysis: Fall 2018:

Date	Topic	Fisher	Assignment
M: 8-27	complex numbers and properties[construction, algebra, conjugation, properties of norm]		
W: 8-29	complex numbers and properties[polar form, exponential and logarithm, principal argument, principal logarithm]		
F: 8-28	other abstract number systems[construction, regular representation, zero divisors, submultiplicative norm, select examples]		
M: 9-3	limits and topology of functions on number systems		
W: 9-5	limits and topology of functions on number systems		Mission 1 due
F: 9-7	real differentiability and differentiability w.r.t. an algebra[continuously differentiable implies real differentiable, definition of A-derivative]		
M: 9-10	differential calculus over an algebra		
W: 9-12	Cauchy Riemann Equations and the conjugate calculus		Mission 2 due
F: 9-14	harmonic functions and conjugates		
M: 9-17	inverse function theorem, conformal maps		
W: 9-19	extended complex plane and fractional linear transformations		Mission 3 due
F: 9-21	on solving boundary value problems via conformal mapping		
M: 9-24	complex integral, path independence and FTC		
W: 9-26	complex integral, path independence and FTC		Mission 4 due
F: 9-28	Morera & Goursat’s Theorems, Cauchy Integral Theorem		
M: 9-31	Test 1: covers everything before integration		
W: 10-3	Mean Value Property, Maximum Properties		
	Fall Break: no class on 10-4 & 10-5		
M: 10-8	Cauchy’s Integral Formula		
W:10-10	Cauchy’s Estimate and Liouville’s Theorem		Mission 5 due
F: 10-12	concerning why the complex integral is rather special		
M: 10-15	infinite series, sequences and series of functions		
W: 10-17	theory of power series		Mission 6 due
F:10-19	power series expansion of holomorphic function, power series at infinity		
M:10-22	zeros of an analytic function and extension theorems		
W:10-24	analytic continuation and the monodromy theorem		Mission 7 due
F: 10-26	some introductory comments on Riemann Surfaces		
M:10-29	theory of power series on an algebra		

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W:10-31	theory of power series on an algebra and the N-Pythagorean Theorem		
F:11-2	Laurent Decomposition and Laurent Series Decomposition		
M:11-5	the three types of isolated singularities		Mission 8 due
W:11-7	Test 2: covers integration and power series		
F: 11-9	isolated singularity at infinity, partial fractions		
M: 11-12	Cauchy's Residue Theorem		
W: 11-14	residue calculations		
F: 11-16	contour integration		Mission 9 due
	Thanksgiving Break: no class 11-19 to 11-23.		
M: 11-26	contour integration		
W:11-28	the argument principle		
F:11-30	Rouche's Theorem and the Fundamental Theorem of Algebra		
M:12-3	something more		Mission 10 due
W:12-5	Reading Day		
	Final Exam: To be announced, do not plan to leave early.		

1. The primary text is my Lecture Notes for this course in the Fall 2018 semester. These notes are based on many sources. I asked you get a copy of Complex Variables by Stephen D. Fisher primarily so you would have a convenient source of simple practice problems. If I assign required homework from a text it is likely to be from Fisher. It is probably that I write new problems just for this course. In addition, I intend to follow a rather non-standard path in a certain regard this semester. My notes will reflect this new path.

2. There are many texts I recommend. The following two had primary influence on my previous course notes: *Complex Analysis* by Theodore Gamelin and Reinhold Remmert's masterpiece *Theory of Complex Function.* The chapter and sections in the Guide to Gamelin directly mirror Gamelin (my old lecture notes for this course are titled "Guide to Gamelin").

3. Each lecture is important. I expect you to attend. In addition, I expect you to study as the course progresses. I have many office hours where I can help you understand things that might not have made sense the first time in lecture.

4. Certain proofs in lecture have been relegated to the homework. This course is about computations and proofs. You've not had a course like this. Complex analysis, in contrast to much of calculus, makes use of theorems to perform calculations. Perhaps it is analogous to

linear algebra in that regard, however, the deeper problems of complex analysis are not so simple as solving a system of equations. The theorems we'll discover together this semester are shockingly simple, yet far from intuitive.

5. The methods of analysis we cover have application beyond the complex domain. I hope the discussions we have concerning sequences, series and power series help prepare you for real analysis. I also hope they give you further ownership of calculus, being able to use a theorem is good, being able to prove a theorem is better.

6. Homework is really important. I've divided the homework into a series of Missions. Homework in upper level math courses should be attempted during multiple sessions. Ideally, I'd like to see you working with a group, but, also alone. The best way a homework group works is when all the participants attempt the homework on their own **before** meeting. Remember, homework is designed in my courses is intended to provoke you to think. Think for yourself. It's ok to check answers, strategies etc… but, remember, eventually you must make the material your own.

7. Be aware of the resources available on the website. I have posted old homework and tests from some past years.

8. Grading: usual 1000pt scale with:
   Test 1 = 200pts,
   Test 2 = 200pts,
   Quizzes = 80pts, (typically take-home, will have a short time to finish, may or may not warn in advance)
   Missions = 200pts, (posted at start of course, take a look you can work ahead)
   Class Participation & Survey = 20pts, (if everyone completes the survey then I allow a page of notes for final)
   Final = 300pts. (comprehensive)