SPRING 2023
MATH 660 COMPLEX ANALYSIS
Professor David Hamilton

OFFICE: MATH 3212 **LECTURES**: MWF 2.00-2.50 MATH 0307
OFFICE HOURS: open from 3.00 Monday until no students or 4.00 whichever comes first,
(also separately by appointment email dhh@math.umd.edu).
Our primary text is: *David Hamilton COMPLEX VARIABLES (lecture notes)*
and three very fine textbooks, all called *COMPLEX ANALYSIS*, by
Lars Ahlfors (published by Chelsea), Donald Marshall (Cambridge UP), Serge Lang (Springer)
The word ``complex", from the Latin for braid together, announces the mixture of algebra, geometry, topology applied to analysis which make up the subject. To quote Carleson (the greatest analyst of the 20th century):

> ``Complex analysis can be considered the heart of mathematics.
> This is where all the branches of mathematics come together:
> physics, number theory, geometry and all aspects of analysis.
> It is also one of those beautiful and mysterious areas where
> miracles happen. To be a true complex analyst you must be an artist
> and a wizard, you must only accept the beautiful and simple
> which you see with your intuition..."

We give a basic theory leading to some big results: the Fundamental theorem of Algebra, Prime Number Theorem and the Riemann Mapping Theorem. Unfortunately there is no ideal text book. Ahflors is closest to the mix that characterizes the subject, but his writing is old fashioned. Lang is easy to read but not even really an analyst (let alone one of the stature of Ahfors who won both the Fields Medal and Wolff Prizes). Marshall is less famous but closest to what is needed.
FORMAT: This is a graduate course, it is time consuming and difficult, taking at least 12 hours of focused time per week. This means attending lectures, followed up by reading corresponding sections of the notes, main definitions and theorems should be memorized. The collected homework is just a little of the homework you should be doing, in CV problem solving is everything.
HOMEWORK: is collected about every two weeks (usually Monday). No late homework accepted. These count 25 pts each (except for #4). There are 6 collected HW, the worst one will have its score dropped, and the best score doubled, give a max ~200 pts. Do not ask about allocated homework in private, I am happy to discuss these in class with everyone.
BONUS QUIZZES: frequently given, scores just added on the top.
Grades:
1. **Midterms**: a Midterm on Mon. Feb 20, 100 pts. Two weeks later, Mon. March 6, is reserved as makeup midterm for those who asked for excused absence for Feb 20 no documentation is required and anyone who took the Feb 20 test can ask. However if you take the March 6 makeup its grade always replaces that for Feb 20 This makeup covers almost same material as the midterm. Anyone who is absent for BOTH Feb 20, March 6 requires full documentation of excused absence for both dates in order to have a makeup .
2. **FINAL** Exam Wed. May 17, is worth 200 pts. If FINAL grade is higher than the midterm than 0.5*FINAL score may replace the midterm.
3. Letter grades. Total possible 500 pts. Grades awarded
A > 85%;B > 75%;C > 65%;D > 55%.
(for exceptional performance there is an A+, no other +/- as this is a graduate course)

POLICY ON MAKE UPS see http://www.ugst.umd.edu/courserelatedpolicies for \legitimate excuses" : if you missed both midterms we require a typed letter with appropriate documentation that the absence was caused by a serious illness (e.g. signed statement from a physician), death in the immediate family. Typed letters in advance for expected recognized religious observance (from your religious advisor) or University authorized activities (see coach). No make ups for quizzes.
ADA If you are UM recognized ADA please see me immediately.

DISCLAIMER : This information is subject to revisions which will be announced by email.

SYLLABUS:

Showing sections covered from lecture notes H , Ahlfors A:

Week	Monday	Wednesday	Friday	Office Hr:3-4+Fri
1 (Jan 23)		H 1.1-1.5	H 1.6-1.9*	
2 (Jan 30)	**HW1** H2.1-2.2	**	H2.3-2.6 A2.1, 2.3	
3 (Feb 6)	H2.7 A2.4	H2.8 A3.3	H2.9* A4.1	
4 (Feb 13)	**HW2** H3.1-3.3, A4	H3.4-3.5 A4	Preview	SOH
5 (Feb 20)	MIDTERM	Discussion	H3.6-3.7* A4	
6 (Feb 27)	H3.8-3.9	****	H3.10	SOH
7 (Mar 6)	Xmakeup	**HW3** Discussion	H4.1-4.4*	
8 (Mar 13)	H4.5-4.6	H4.7-4.9 A4.3	*XXX*	
9 (Mar 20)	*SPRING BREAK*	*SPRING BREAK*	*SPRING BREAK*	
10(Mar 27)	H5.1-5.3	H5.4-5.5	H6.1-6.3	SOH
11(Apr 3)	**HW4** H6.4-6.5	**	H6.6-6.8*	
12(Apr 10)	H6.9-6.10	H6.11	H6.12	SOH
13(Apr 17)	**HW5** H7.1-7.2	H8.1-8.2	H8.3*	
14(Apr 24)	H8.4	H8.5	H9.1-9.4	SOH
15(May 1)	H9.5-9.6	**	H10.1*	
16(May 8)	**HW6** H10.2-10.3	H10.4		

** No lecture: as first Wed of every month I participate in an international 3 hour ZOOM conference,
as compensation I offer an extra special office hour (SOH) Friday 3.00-5.00 (or last student).
I suggest students get together for a problem session in the classroom.

Homework Projects(all refer to notes **H**)

HW #	due	Do any 5 problems, except for #4 where you do 10.
1(25 pts)	Jan 30	**P9**:2 **P11**:2,3**P13**:2,**P15**:2**P17**:1,2,3**P26**:2
2(25 pts)	Feb 13	**P31**:3 **P33**:1 **P36**:3 **P40**:2 **P41**:3 **P46**:1 **P51**:6,7 **P54**:2
3(25 pts)	Mar 8	**P58**:4 **P60**:6,7 **P61**:2 **P66**:1 **P68 P70**:3,5 **P71**:3 **P72**:2
4(50pts)	Apr 3	**P81**:3 **P83**:2 **P84**:3 **P91**:2 **P94**:2,4 **P96**:4 **P102**:3 **P104**:2 **P107**:3 **P111**:2 **P115**:2 **P114**:1 **P116**:2,3 **P118**:1 **P119**:1,2,5 **P127**:1,2,4 **P130**:1,3 **P131**:1,2,4
5(25 pts)	Apr 17	**P137**:1,3 **P141**:1 **P144**:1,2 **P148**:1,2 **P151**:1,2 **P155**:2,4 **P160**:1 **P116**:4 **P118**:2
6(25 pts)	May 8	**P166**:2 **P168**:2 **P169**:3 **P172**:1 **P174**:1 **P181**:3,4 **P183**:3 **P187**:7