Spring 2010 MA521 Classical Complex Analysis
last updated: Feb 22nd (Monday)

Course Name: Classical Complex Analysis

Class Time/Location: MWF 11:00~11:50 at Science Center 340
Office: Science Center 385
Office Hours: MWF 9:15~11:00 or by appointment (just send me an email in advance).

Instructors:
Jie Sun (Weeks 1~8)
[course webpage: www.sunjie1984.com/MA521/MA521Syllabus.pdf]
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Ye Chen (Weeks 9~16)

Textbook:
Complex Analysis, 4th edition, by *Serge Lang*.

Prerequisites: MA 321 or equivalent.

Main Topics: Complex number system, Cauchy-Riemann Equations, Analyticity and Power Series, Cauchy's Theorem, Winding Numbers, Cauchy's Integral Equation, Calculus of Residues, Conformal Mappings, The Riemann Mapping Theorem.

Homework: Assigned after each section and will be collected *every Monday in class*.

Exams: Closed book.

Grading Scheme:

Homework:	60%	
Midterm Exam:	20%	**Feb. 24th (Wed) 7pm**
Final Exam:	20%	(TBA)

Letter grades for course are assigned as follows:
90~100:A, 85~89:B+, 80~84:B, 75~79:C+, 70~74:C, 65~69:D+, 60~64:D, <60:F.

Course Learning Objectives:
Student are expected to acquire graduate level/professional mathematical skills such as presenting rigorous proofs, and gain a solid understanding of classical complex analysis. Those will be achieved through hard/efficient work by both us (instructors) and you (the students).

Schedule:

Date	#	Section	Contents	Assignments
Jan. 8 (Fri)	L0	1.1	Definition of Complex Numbers	**HW1(A): Ex. 1.1 (p. 7)** #1(a~d), #3, #6, #8, #10(a,e).
Jan. 11 (Mon)	L1	1.2,1.3	Polar Form Representation, Complex Valued Functions	**HW1(B): Ex. 1.2 (p. 11)** #1(a~d), #2(a~d), #6, #11, #12. **Ex. 1.3 (p. 17)** #1, #2, #3.
Jan. 13 (Wed)	L2	1.4	Limits and Compact Sets	**HW1(C): Ex. 1.4 (p. 26)** #1, #4, #6, #7.
Jan. 15 (Fri)	L3	1.4,1.5, 1.6	Compact Sets (cont.), Complex Differentiability, & Cauchy-Riemann Eqs	**HW1 Due: Jan. 18 (Mon).**
Jan. 18 (Mon)	L4	1.6, 1.7	Cauchy-Riemann Eqs proof. (cont.)	In class presentation on Cauchy-Riemann Eqs. in polar form. *Bonus: Andrew Davis*
Jan. 20 (Wed)	L5	1.6, 2.1	Angles under Holomorphic Maps & Formal Power Series	**HW2(A): Ex. 2.1 (p. 46)** #1(a,c,f), #3, #4. *[Hint of #3: multiply both sides by (e^z-1) and expand in power series.]*
Jan. 22 (Fri)	L6	2.2	Convergent Power Series	**HW2(B): Ex. 2.2 (p. 58)** #3, #4, #5, #7, #9(*), #10, #11. (This is a lot...) **HW2 Due: Jan. 27(Wed)**
Jan. 25 (Mon)	L7	2.3, 2.4	Formal vs Convergent Power Series & Analytic Functions	None!

Date	#	Section	Contents	Assignments
Jan. 27 (Wed)	L8	2.4, 2.5	Analytic Functions & Differentiation of Power Series	**HW3(A): Ex. 2.3 (p. 68)** #2, #5. [Hint: #2(a) apply Theorem 3.2(p.62) on uniqueness.] **HW3(B): Ex. 2.4 (p. 71)** #1, #2 **HW3(C): Ex. 2.5 (p. 75)** #2, #3, #6.
Jan. 29 (Fri)	L9	2.6, 2.7	Inverse and Open Mapping Theorems & Local Maximum Modulus Principle	**HW3(D): Ex. 2.6 (p. 83)** #1, #2, #3, #4, #5. **Due: Feb. 1(Mon)**
Feb. 1 (Mon)	L10	3.1	Connectedness and Holomorphic Functions on Connected Sets	**HW4(A): Ex. 3.1 (p. 93)** #1, #2, #3.
Feb. 3 (Wed)	L11	3.2	Integrals over Paths	**HW4(B): Ex. 3.2 (p.102)** #1, #2, #5, #7, #9, #10.
Feb. 5 (Fri)	L12	3.3	Local Primitive for a Holomorphic Function	**HW4(C): Ex. 3.2 (p.102)** #11. [To be presented in next Monday's class, by **?**] **Due: Feb. 10(Wed)**
Feb. 8 (Mon)	L13	3.4	Another Description of the Integral Along a Path	*Ex. 3.2 #11 presented by Sean Kramer in class.*
Feb. 10 (Wed)	L14	3.5	The Homotopy Form of Cauchy's Theorem	**HW5: Ex. 3.4 (p.118)** #1, #2, #3, #4. **Due: Feb. 15(Mon)**
Feb. 12 (Fri)	(no)			Pick your favorite special function and study it.
Feb. 15 (Mon)	L15	3.6	Existence of Global Primitives. Definition of the Logarithm	*Polylogarithm function presented by Dillon Ethier.*

Date	#	Section	Contents	Assignments
Feb. 17 (Wed)	L16	3.7	The Local Cauchy Formula	**HW6: Ex. 3.6 (p.125)** #1(c,f,g,h), #2(c,d,e,h), #3, #4, #6(*), #7, #8. (*): bonus problem. **HW6: Ex. 3.7 (p.132)** #1, #2, #3. **Due: Feb. 22(Mon)**
Feb. 19 (Fri)	L17		Review of Mid-term Exam	
Feb. 22 (Mon)	L18	4.1	The Winding Number	**HW7: Ex. 4.2 (p.149)** #1, #2, #3. **Due: March. 1(Mon)**
Feb. 24 (Wed)	L19	4.2	The Global Cauchy Theorem	
Feb. 26 (Fri)	L20	4.2	(cont.) The Global Cauchy Theorem	