

Math 419, F2017, Tentative Semester Schedule

Mon	Wed	Fri
Sep 4, 2017	Sep 6, 2017	Sep 8, 2017
Labor Day	Intro to Course	Ch. 1 Overview: Calculus in the Plane Due today: RQ 1.1
Sep 11, 2017	Sep 13, 2017	Sep 15, 2017
1.1 Domains in the Plane Due today: RQ 1.2, D 1.1	1.2 Plane Curves Due today: RQ 1.3, D 1.2	1.3 Differential Calculus in Two Variables Due today: RQ 1.4, D 1.3
Sep 18, 2017	Sep 20, 2017	Sep 22, 2017
1.4 Integral Calculus in the Plane Due today: RQ 2.1, D 1.4	2.1 Basic Properties of Harmonic Fcns Due today: RQ 2.2, D 2.1	2.2 Steady State Temperatures Due today: RQ 2.3-2.4, D 2.2
Sep 25, 2017	Sep 27, 2017	Sep 29, 2017
2.3-2.4 Mean-Value Properties and The Maximum Principle Due today: RQ 2.5-A2.1, D 2.3-2.4	2.5-A2.1 Liouville's Theorem and Smoothness of Harmonic Fcns Due today: RQ 3.1, D 2.5-A2.1, W Ch1&2	Exam 1 <i>Next class: RQ 3.2, D 3.1</i>
Oct 2, 2017	Oct 4, 2017	Oct 6, 2017
3.1 The Complex Numbers Due today: RQ 3.2, D 3.1	3.2 Complex Analytic Functions Due today: RQ 3.3, D 3.2	3.3 The Cauchy-Riemann Equations Due today: RQ 3.4.1, D 3.3
Oct 9, 2017	Oct 11, 2017	Oct 13, 2017
3.4.1 The Exponential Function Due today: RQ 3.4.2, D 3.4.1	3.4.2 The Logarithm Due today: RQ 3.3.3-3.4.4, D 3.4.2	3.4.3 Complex Trig Functions and 3.4.4 Complex Exponents Due today: RQ 3.5, D 3.4.3, 3.4.4
Oct 16, 2017	Oct 18, 2017	Oct 20, 2017
3.5 The Harmonic Conjugate Due today: RQ A3.1, D 3.5	A3.1 The Riemann Surface for $\log z$ Due today: D A 3.1	Ch. 4 Overview: Integrals of An. Fcns. Due today: RQ 4.1, W Ch 3
Oct 23, 2017	Oct 25, 2017	Oct 27, 2017
Exam 2 <i>Next class: RQ 4.2, D 4.1</i>	4.1 The Complex Line Integral Due today: RQ 4.2, D 4.1	Fall Break
Oct 30, 2017	Nov 1, 2017	Nov 3, 2017
4.2 The Cauchy Integral Theorem Due today: RQ 4.3, D 4.2	4.3 The Cauchy Integral Formula Due today: RQ 4.4 and 4.10, D 4.3	4.4, 4.10 Higher Derivatives and Morera's Theorem Due today: RQ 4.5-4.7, D 4.4 and 4.10
Nov 6, 2017	Nov 8, 2017	Nov 10, 2017
4.5-4.8 Harmonicity and Corollaries Due today: RQ 4.9 and 4.11, D 4.5-4.8	4.9, 4.11 Liouville's Theorem and The Cauchy Inequalities Due today: D 4.9 and 4.11	Ch. 5 Overview: Power Series Due today: RQ 5.1-5.2, W Ch 4
Nov 13, 2017	Nov 15, 2017	Nov 17, 2017
5.1, 5.2 Sequences, Series, P.S. Due today: RQ 5.3, D 5.1-5.2	5.3 Analytic Functions Yield P.S. Due today: RQ 6.1, D 5.3	Exam 3 <i>Next class: RQ 6.2, W Ch 5</i>
Nov 20, 2017	Nov 22, 2017	Nov 24, 2017
6.1 The Three Types of Isolated Singularity Due today: RQ 6.2, W Ch 5	Mathematica Project	Thanksgiving Break
Nov 27, 2017	Nov 29, 2017	Dec 1, 2017
Discuss Exam 3, Mathematica Project, and future directions for the course Due today: Mathematica Project	6.2 Laurent Series Due today: RQ 6.3, D 6.2	6.2, 6.3 Laurent Series and Poles Due today: RQ 6.4
Dec 4, 2017	Dec 6, 2017	Dec 8, 2017
6.3 Poles Due today: D 6.3	6.4 Essential Singularities Due today: RQ 7.1, D 6.4	7.1 The Residue Theorem Due today: D 7.1
Dec 11, 2017	Dec 13, 2017	Dec 15, 2017
Z.1 The Infinitude of Primes Due today:	Z.2 The Basel Problem Due today: W Ch 6&7	Z.3 The Distribution of Primes Due today:

Section	Paragraph	Discussion	Challenge
1.1	1.1.2 Distance in R^2	4	
	1.1.3 Domains in R^2	1, 2, 3, 6	4, 5
	1.1.4 Boundaries and Boundedness	1, 2	3
1.2	1.2.1 Parametrization	2, 3	
	1.2.2 Length of a Curve		
	1.2.3 Param. by Arc Length	1, 3	5
	1.2.4 Jordan Curves and Domains	1, 4	
	1.2.5 Remarks on Dot Product	2	3, 4
	1.2.6 The Outward Normal Vector	1	2
1.3	1.3.1 Continuously Diff'ble Functions	1a	3*
	1.3.2 Directional Derivative	1b, 2	3*
	1.3.3 The Gradient Vector	1, 2b	3
	1.3.4 The Outward Normal Vector	1, 2, 3, 5	
	1.3.5 Derivatives of Higher Order	1ab	2
1.4	1.4.1 Line Integrals	1, 4	2, 5*, 7
	1.4.2 Double Integrals, Iterated Integrals	1	
	1.4.3 Green's Theorem	1, 2	5
	1.4.4 Green's Identities		2*, 3
2.1	Basic Properties of Harmonic Functions	1ef, 3, 6	
2.2	2.2.1 Steady State Temperatures	1, 2, 3, 4, 7	5, 6
	2.2.2 A Charzn. of Harmonic Fcns		
	2.2.3 Conjectures about Harmonic Fcns		
2.3	Mean Value Properties of Harmonic Fcns	2, 3, 4, 5	
2.4	2.4.1 The Strong Maximum Principle	3	
	2.4.2 The Weak Maximum Principle	2, 3	
	2.4.3 Application	2	
2.5	2.5.1 Harnack's Inequality		
	2.5.2 Liouville's Theorem	2	
A2.1	On Differentiation Under the Integral	(none)	
3.1	3.1.1 Basic Definitions	2, 4, 5, 6	
	3.1.2 The Complex Plane	1, 2, 3, 4, 5	
	3.1.3 Division by Complex Numbers	4	
3.2	3.2.1 Preliminaries	2, 3	
	3.2.2 The Complex Derivative		2*, 6*
	3.2.3 Definition of Analytic Function	1, 2, 3	11, 14
3.3	The Cauchy-Riemann Equations	1, 2, 7, 8	5, 6
3.4	3.4.1 The Exponential Function	6, 8, 10, 11	12
	3.4.2 The Logarithm	2, 3, 4, 5, 6	8, 9

Section	Paragraph	Discussion	Challenge
	3.4.3 Complex Trig. Functions	1, 2, 3, 6a	9, 10, 11, 12
	3.4.4 Complex Exponents		
3.5	The Harmonic Conjugate	3, 4	
A3.1	The Riemann Surface for log	in-line Qs	
4.1	4.1.1 Basics of Complex Line Integrals	1, 2	3, 4
	4.1.2 Evaluating Complex Line Integrals	2, 3, 4, 5, 6	
	4.1.3 The ML-Inequality	1	2
4.2	The Cauchy Integral Theorem	1, 2abcd	4, 5
4.3	The Cauchy Integral Formula	1, 4, 5	
4.4	Higher Derivatives of Analytic Functions	2, 3, 4	7
4.5	Harmonicity of $u(z)$ and $v(z)$	1, 6	
4.6	Circumferential and Solid Means	1, 2, 3, 5	
4.7	The Maximum Modulus Principle	5	7
4.9	Liouville's Theorem	4	5, 6
4.10	Morera's Theorem	1	2
4.11	The Cauchy Inequalities		2, 3, 4
5.1	5.1.2 Series of Complex Numbers	1, 2	
	5.1.3 Absolute Convergence	1, 2	
	5.1.4 Further Properties of Series	3, 4	
5.2	5.2.1 The Disc of Convergence	2, 3	
	5.2.2 Uniform Conv. of Power Series		
	5.2.3 Uniform Conv. and Analyticity	7, 8	
5.3	5.3.1 The Coefficients	1abc	6*
	5.3.2 The Taylor Expansion	3	
	5.3.3 Expanding Fcns. in Taylor Series	1abc	3*
	5.3.4 App'n: Zeros of an Analytic Fcn.		3
	5.3.5 A Topological Bonus	7	1*
6.1	6.1.1 Isolated Singularities	1, 2, 6	3
	6.1.2 Removability of Removable Sing.	1, 4	
6.2	6.2.1 The Laurent Expansion	3, 5	6
	6.2.2 How to Compute Laurent Series	1, 2	3
6.3	Poles	2, 4a?	3, 4, 5, 6
6.4	Essential Singularities	1, 7, 11	5, 6, 10, 12,
7.1	7.1.1 Residues and the Residue Theorem	1, 2	
	7.1.2 How are Residues Computed?	1, 2, 3	
7.2	7.2.1 Counting Zeros and Poles	1, 2, 3	
	7.2.2 The Winding Number	1, 3	
	7.2.3 The Complete Statement		