MATH 313 – Daily Syllabus (updated as we go) – SPRING 2016

Lecture 1 (Jan 20): Complex numbers: algebra, geometric interpretation, properties, inqualities.
Lecture 2 (Jan 22): Euler's formula: polar representation, Euler's, algebra in exponential form.
Lecture 3 (Jan 25): Powers and roots. Fundamental Theorem of Algebra.
Lecture 4 (Jan 27): Sets of numbers in the complex plane (open, closed, bounded, interior points, etc)
Lecture 5 (Jan 29): Functions of a complex variable: mappings form z- to w-plane, level curves.
Lecture 6 (Feb 1): Exponential function e^z. Multivalued $\log(z)$ and principal branch Log(z).
Lecture 7 (Feb 3): Finite limits: definition and examples.
Lecture 8 (Feb 5): Infinite limits, limits at infinity. Limit laws.
Lecture 9 (Feb 8): Continuity and Differentiability.
Lecture 10 (Feb 10): Cauchy Riemann Equations.
Lecture 11 (Feb 12): Cauchy-Riemann in polar coordinates. Analytic functions.
Lecture 12 (Feb 15): Harmonic functions.
Lecture 13 (Feb 17): Review.
Lecture 14 (Feb 19): EXAM 1.
Lecture 15 (Feb 22): Integrals $\int_a^b f(t)dt$, where $f = u(t) + iv(t)$
Lecture 16 (Feb 24): Review of line integrals of real valued functions. Green's theorem.
Lecture 17 (Feb 26): Line Integrals $\int_C f(z)dz$
Lecture 18 (Feb 29): Cauchy-Goursat. Path-independence of line integrals of analytic functions.
Lecture 19 (Mar 2): Antiderivatives and path-independence.
Lecture 20 (Mar 4): Cauchy integral theorem.
Lecture 21 (Mar 7): Using the Cauchy integral theorem.
Lecture 22 (Mar 9): Derivatives of analytic functions.
Lecture 23 (Mar 11): Evaluating integrals. Maximum principle.
SPRING BEAK
Lecture 24 (Mar 21): Convergence of sequences and series. Taylor series.
Lecture 25 (Mar 23): Examples. Resulting properties of analytic functions.
Lecture 26 (Mar 25): Review
Lecture 27 (Mar 28): EXAM 2
Lecture 28 (Mar 30): Derivation of Laurent series.
Lecture 29 (Apr 1): Examples.
Lecture 30 (Apr 4): More Examples.
Lecture 31 (Apr 6): Division of series. Zeros of analytic functions. Singular points.
Lecture 32 (Apr 8): The Residue Theorem.
Lecture 33 (Apr 11): Methods to find residues. Principal value integrals.
Lecture 34 (Apr 13): Order of zeros and poles. Convergence of integrals $PV \int_{\infty}^{\infty} f(x)\,dx$.
Lecture 35 (Apr 15): Finding real integrals using residues.
Lecture 36 (Apr 18): Finding real integrals of functions with sine x or cosine x using residues.
Lecture 37 (Apr 20): Jordan's Inequality. Mappings: Linear Maps. 1/z
Lecture 38 (Apr 22): Linear Fractional transformations. Conformal Maps.
Lecture 39 (Apr 25): Review
Lecture 40 (Apr 27): EXAM 3
Lecture 41 (Apr 29): Applications.
Lecture 42-44 (May 2-6): Catch-up and review.
Wednesday May 11, 12:30-2:30pm : Final exam.