MATH 551: Complex Analysis (Spring 2012)

Meetings: MWF 2–3pm, 1-139 Wilson Hall

Instructor: Lukas Geyer, 2-254 Wilson, Tel. *5342, geyer@math.montana.edu

Office Hours: MWF 1–2pm, or by appointment.

Text: Theodore W. Gamelin, *Complex Analysis*, Springer 2001.

Additional Texts: Lars V. Ahlfors, *Complex Analysis*, McGraw-Hill; John B. Conway, *Functions of One Complex Variable I*, Springer; Walter Rudin, *Real and Complex Analysis*, McGraw-Hill.

Prerequisites: MATH 505

This course will give a rigorous introduction to the theory of complex analytic functions in the plane. Topics covered will include

- Elementary Functions (powers, logarithms, exponential, trigonometric functions)
- Riemann Sphere, Stereographic Projection, Möbius transformations
- Analytic Functions, Cauchy-Riemann Equations, Harmonic Functions, Conformal Mappings
- Mean Value Property, Maximum Principle, Open Mapping Theorem
- Line Integrals, Cauchy's Theorem, Cauchy Integral Formula, Liouville's Theorem, Fundamental Theorem of Algebra
- Power Series, Analytic Continuation, Laurent Series, Isolated Singularities, Residue Calculus
- Argument Principle, Rouché's Theorem, Hurwitz's Theorem, Winding Numbers
- Schwarz Lemma, Hyperbolic Geometry (maybe)
- Reflection Principle
- Montel's Theorem, Riemann Mapping Theorem (maybe)

The course grade will be comprised of the grades on weekly homework assignments (30%), a midterm exam (30%), and a final exam (40%). Every student should write up their own homework solutions, but collaboration on solving the problems is encouraged.