Math 428/518 : Topics in Complex Analysis
Fall 2012

There will be 28 lectures. Here is a rough plan for what I will cover in each of them. This is subject to change. There are two lectures that are "open", which will either be used to complete lectures that take longer than I think they will or to cover additional topics.

1. Ch I.1-2. Definition of a Riemann surface and some basic examples.
2. Ch I.3, Ch II.1. Projective curves, holomorphic and meromorphic functions.
3. Ch II.2. Examples of meromorphic functions.
4. Ch II.3. Holomorphic maps between Riemann surfaces.
5. Ch II.4. Global properties of holomorphic maps, Hurewitz's theorem.
6. Ch III.1. More examples of Riemann surfaces (conics, gluing together Riemann surfaces, hyperelliptic curves).
7. Ch III.2. Even more examples (plugging holes, resolving singularities, cyclic covers of line).
8. Ch III.5. Basic projective geometry.
9. Ch IV.1. Holomorphic, meromorphic, and smooth differential forms.
10. Ch IV.2. Algebraic structure of the set of differential forms.
11. Ch IV.3. Integration, Stoke's theorem, and residues.
12. Ch V.1. Divisors.
13. Ch V.2. Linear equivalence of divisors.
14. Ch V.3. Spaces of functions and forms associated to a divisor.
15. Ch V.4. Divisors and maps to projective space.
16. Ch V.4 (continued).
17. Ch VI.1. Algebraic curves.
18. Ch VI.2. Laurent tail divisors.
19. Ch VI.3. Riemann-Roch and Serre duality.
20. Ch VII.1. First applications of Riemann-Roch.
21. Ch VII.2. The canonical map.
22. Ch VII.2 (continued).

23. Ch VIII.1-2. Jacobians and the Abel-Jacobi map.

24. Ch VIII.3. Trace operations and the necessity in Abel's theorem.

25. Ch VIII.4. Sufficiency in Abel's theorem.

26. Ch VIII.5. Curves of genus 1