

**Math 655 – Fall 2002**  
**Topics in Complex Analysis and Complex Geometry**  
**Pit-Mann Wong**

This is a course on Einstein Manifolds following the book by A. Besse (Einstein Manifolds, *Ergeb. Math.* volume 10, 1987). Unfortunately this book is, at the moment, out of print so I shall also use the following books:

- (1) Gauge Field Theory and Complex Geometry by Y. I. Manin (*Grud. Math. Wiss.* Vol. 289, 1988)
- (2) Semi-Riemannian Geometry by O'Neill, Academic Press.

These 3 books will be placed on the reserve shelf in the fall and (1) and (2) will be available in the book-store.

Topics that will be included:

- (1) Basic formulas in Semi-Riemannian (Lorenta), Riemman and Kahler Geometry (Gauss, Codazzi equations, Weitzenbock-Bochner formulas.)
- (2) Relativity
- (3) Ricci curvature and Scalar curvature as PDEn
- (4) Einstein manifolds and Topology
- (5) the Kahler Einstein and Hermitian Einstein conditions
- (6) Generalization of the Einstein condition.

It is likely that we will not be able to cover all of these in one semester so it will be continued in the second semester in a seminar (non-credit).

Prerequisite: Basic complex analysis and some knowledge of manifolds and cohomology groups. The book by Besse is very well written even though the subject matters are quite sophisticated (covers many deep results. The book by O'Neill is a very well-written introductory book. Mannin's book is more abstract and difficult to read (knowledge of sheaf cohomology groups are required); results are incomplete and "experimental" in nature, i.e., futile ground for further exploration.