Syllabus for Oral Qualifying Exam

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I. **Several Complex Variables**

1. Cauchy integral formula and its applications:

- Cauchy integral formula in polydiscs, Cauchy estimates;
- Bochner-Martinelli formula;
- Hartogs extension Theorem;
- Bochner's extension Theorem.

2. Subharmonicity and convexity:

- Properties of subharmonic functions and plurisubharmonic functions;
- Domain of holomorphy, Continuity Principle;
- Pseudoconvexity, Levi pseudoconvexity;
- Oka's Theorem.

3. L^2 theory for $\bar{\partial}$ on pseudoconvex domains:

- Morrey-Kohn-Hormander Theorem;
- L^2 Existence Theorem for $\bar{\partial}$ operator;
- $\bar{\partial}$-Neumann problem;
- The Levi problem.

4. Kodaira's Embedding Theorem:

- Kodaira-Bochner formula;
- Vanishing theorem;
- Hodge manifolds and embedding;

II. **Riemannian Geometry**

1. Riemannian metrics and connections
2. Curvature
3. Jacobi fields
4. Hopf-Rinow Theorem and Hadamard Theorem

References

[C] Do Carmo, Riemannian Geometry.

[CS] So-chin Chen, Mei-chi Shaw, Partial Differential Equations in Several Complex Variables.

[M-K] Morrow, Kodaira, Complex Manifolds.

[Kr] Steven G. Krantz, Function Theory of Several Complex Variables.