Oral Qualifying Exam Syllabus

Sushmita

Topic 1 : Symplectic Geometry

1. Symplectic Manifolds

2. Lagrangian Submanifolds

3. Moser and Darboux Theorem

4. Almost Complex Structures

5. Dolbeault Cohomology

6. Kahler Manifolds

7. Moment maps

Reference: Ana Cannas da Silva *Lectures on Symplectic Geometry*

Topic 2 : Algebraic Topology

1. Fundamental Group

   - The van Kampen Theorem
   - Covering Spaces

2. Homology

   - Simplicial and Singular Homology
   - Exact Sequences and Excision
   - Cellular Homology
   - Mayer-Vietoris Sequence
   - Eilenberg-Steenrod axioms for homology

3. Singular Cohomology

   - Universal Coefficient Theorem
   - Cup Product
   - Kunneth Formula

4. DeRham Cohomology

   - Mayer Vietoris Sequence
   - Agreement of de Rham and singular cohomology of manifolds
   - Orientation and Integration
   - Poincaré duality

Reference:

- Allen Hatcher *Algebraic Topology*

- Raoul Bott, Loring W.Tu *Differential Forms in Algebraic Topology*