

DEPARTMENT OF MATHEMATICS

ORAL EXAMINATION

**Minor area: TOPICS IN ALGEBRAIC TOPOLOGY**

There is a general emphasis on examples!

- 1) Classification of surfaces  
Covering spaces
- 2) Fundamental group & Van Kampen's theorem & calculations in many examples.
- 3) Basic homology theory
  - Cell complexes
  - Singular & simplicial homology
  - Long exact homology sequences
  - Mayer-Vietoris sequence
  - Coefficient sequences
  - Künneth formula for products
- 4) Cohomology ring
  - Examples
  - Cup & Cap products
  - DeRham cohomology & differential forms
- 5) Poincare Duality
- 6) Brouwer fixed point theorem
- 7) Lefschetz fixed point theorem