DEPARTMENT OF MATHEMATICS

ORAL EXAMINATION

Major area: TOPICS FOR DIFFERENTIAL GEOMETRY

Reading material:

Do Carmo:	Differential Geometry of Curves and Surfaces (all)
Do Carmo:	Riemannian Geometry (chapters 1-9)
Cheeger-Ebin:	Comparison Theorems in Riemannian geometry (pp.65-68 - Riem. submers.)

Topics:

Riemannian Metrics
Levi Civita connections
Curvatures (Sectional, Ricci, Scalar)
Gauss Equations for Submanifolds (second fundamental form)
Geodesics
Gauss Lemma
Hopf Rinow Theorem
Jacobi Fields
First and second variation of arc length & energy
Spaces of constant curvature
Bonnet-Meyers Theorem
Hadamard's Theorem
Surfaces in $\mathbf{R}^3$
Surfaces of revolution
Geodesics on surfaces of revolution (Clairaut's relation)
Gauss-Bonnet Theorem
Cut Points & Conjugate Points: cut locus; conjugate locus
Synge Lemma
Riemannian submersions
Complex projective space