List of Topics for the Topology/Geometry Qualifying Exam

NOTE TO THE STUDENT: *This list of topics together with the references given belowconstitutes a study guide for the Topology/Geometry Qualifying Exam. While Math 636 (Topology I) and Math 622 (Differential Geometry I) cover a bit more than this material, the exam is separate from the courses. The courses may cover other material at the discretion of the instructor.*

(1) **General topology**
- Topological spaces (general), metric spaces
- Subspaces, product spaces, quotient spaces
- Separation axioms
- Compactness, local compactness, paracompactness
- Connectedness

(2) **Differentiable manifolds**
- Implicit Function Theorem
- Basic concepts of differentiable manifolds: (local coordinates, orientation, tangent vectors, differentiable vector fields, flows)
- Tangent bundle

(3) **Differential geometry**
- Differentiable functions and mappings, rank of a mapping, immersions
- Submanifolds
- Classical theory of surfaces in Euclidean three-space (first and second fundamental forms, fundamental theorem of surface theory, Gauss map, curvature, classical surfaces (revolution, ruled, minimal))
- Differential forms, tensors, and tensor fields