King Fahd University of Petroleum & Minerals

Department of Mathematics

Syllabus of the Comprehensive Exam

MATH 521 General Topology I

Topics

- **Set Theory**: Sets, function, inverse image, direct image, cardinality, cartesian product, quotient set.
- **Topological spaces**: Spaces, subspaces, metric spaces. Closure, interior, frontier, exterior, derived set and their properties.
- **Continuous functions** : local continuity, global continuity, open maps, closed maps, homeomorphisms, sterographic projection, quotient spaces, product spaces.
- **Connected spaces**: connectedness, local connectedness, path connectedness, product of connected spaces, Intermediate value theorem.
- **Compact spaces**: compact spaces in $\mathbb{R}^n$, characterization of compact subsets of a metric space, local compactness, one-point compactification.
- **Separation axioms and countability axioms**: T_0-spaces, T_1-spaces, T_2-spaces, first countable spaces, second countable spaces, separable spaces.
- **Metric spaces and metrization theorems**: Complete metric spaces, completion of a metric space, Uryshon metrization Theorem, Tietze theorem

References

- J. Munkres, *Topology*, 2nd edition, Pearson Education Limited (2014)