Mathematics 655 Au	**4 cr.**	**Each Elementary Topology I**
656 Wi		**Elementary Topology II**
657 Sp		**Elementary Topology III**

Prerequisite:

Permission of Department. Reasonable undergraduate background in calculus in Euclidean spaces - for example H540/H541 and/or an undergraduate course in topology or differential geometry, eg. 560. Some background in linear algebra (eg. 568) is desirable. For 656 and 657 an introductory course in undergraduate algebra along the lines of 580 is required (may be taken concurrently).

Catalog Descriptions:

655:
Continuity, compactness, connectedness in metric and general topological spaces, completeness in metric spaces.

656:
Continuation of 655; products, quotients, separation axioms, convergence, metrization and compactifications for general topological spaces.

657:
Continuation of 656; fundamental group and covering spaces.

(NOTE: The catalog description is obsolete. See below.)

Purpose of Course:

The 655-656-657 sequence is an introduction to topology for beginning graduate students and advanced undergraduates. 655 is a quick introduction to basic concepts of point set topology: compactness, connectedness, quotient spaces, manifolds (particularly surfaces). 656 is devoted to the fundamental group and covering spaces, while 657 is an introduction to homology theory.

Follow-up Courses:

Math 860-861-862 for algebraic topology; Math 866-867-868 for differential topology

(over for topics list and texts)

Possible Texts:

An Introduction to Algebraic Topology, Rotman
Basic Topology, by M. A. Armstrong, Springer-Verlag, 1994.
A Basic Course in Algebraic Topology, by W. S. Massey, Springer-Verlag, 1991.
Elements of Algebraic Topology, by J. R. Munkres, Addison-Wesley, 1993.
Algebraic Topology: A First Course, by M. J. Greenberg & J. R. Harper, Addison-Wesley, 1982.
Depending on the background of the students and how much point set topology you want to cover, you might supplement Armstrong with:
Topology, 2nd ed., by J. R. Munkres, Prentice-Hall, 1999.

Topics List for Math 655/656/657:

Metric and topological spaces and continuity
Connectedness and path-connectedness
Compactness, Tychonoff's Theorem
Quotient spaces
Topological manifolds
Classification of closed surfaces
The fundamental group
Seifert-Van Kampen theorem
Covering spaces
Simplicial complexes
Homology groups
Mayer-Vietoris sequence and excision
Brouwer fixed point theorem, degree of a map
Jordan-Brouwer separation theorem
Euler characteristic

Possible Additional Topics:

Metrization theorems
Space-filling curves
Branched covers
Knots and knot groups
Fundamental theorem of algebra & extensions to quaternions & octonions
Borsuk-Ulam theorem
Lefschetz fixed point theorem
See also: http://www.math.ohio-state.edu/~fiedorow/math655

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