Math 6833: **Topological Methods in Group Theory**
Reference list

Here is where some of the course material can be found.

The main reference for differential topology is

- Morris Hirsch, *Differential Topology*, Springer-Verlag, 1976.

This book is very concise and is not so easy to read. The book

- V. Guillemin and A. Pollack, *Differential Topology*, Prentice-Hall, 1974

is very readable, and it has the basic results on things like the inverse function theorem, the local descriptions (in terms of coordinates) of smooth maps, and the transversality/preimage results. The theorem on finding compatible tubular neighborhoods is only done in Hirsch's book, however.

Transversality for cell complexes and generalized handle decompositions were first done in

- S. Buoncristiano, C. Rourke, and B. Sanderson, *A geometric approach to homology theory*, LMS lecture notes series # 18, 1976.

Their discussion is *very* concise. The case of transverse maps of a disk into a 2-complex is explained more clearly in the paper

- C. P. Rourke, *Presentations and the trivial group*, Springer Lecture Notes in Math. vol. 722, 1979, pages 134–143.

Most of the material on amalgams, HNN extensions, and graphs of groups is from the paper

- Peter Scott and Terry Wall, *Topological methods in group theory*, LMS lecture note series # 36, 1979. pages 137–203.

A few of the results on G-trees are in the books

- J.-P. Serre, *Trees*, Springer-Verlag, 1980,
- H. Bass and A. Lubotzky, *Tree Lattices*, Birkhäuser, 2001.

Some of the embedding theorems and the results on one-relator groups are from the book

- R. Lyndon and P. Schupp, *Combinatorial Group Theory*, Springer-Verlag, 1977.

Levin's theorem (on *positive* equations over groups) is directly from his paper:

- F. Levin, *Solutions of equations over groups*, Bull. Amer. Math. Soc. vol. 68, 1962, pages 603–604.

The Gerstenhaber-Rothaus theorem is from

- M. Gerstenhaber and O. Rothaus, *The solution of sets of equations in groups*, Proc. Nat. Acad. Sci. USA vol. 48, 1962, pages 1531–1533.

Their proof is different from the one I gave, which seems to be folklore (and is similar to a proof attributed to Andrew Casson).

James Howie has a nice survey article

- J. Howie, *How to generalize one-relator group theory*, in the book *Combinatorial Group Theory and Topology*, Ann. of Math. Studies vol. 111, Princeton University Press, 1987, pages 53–78.

The material on locally indicable groups is from there and also from the papers

- J. Howie, *On pairs of* 2*-complexes and systems of equations over groups*, J. Reine Angew. Math. vol. 324, 1981, pages 165–174,

- J. Howie, *On locally indicable groups*, Math. Z. vol. 180, 1982, pages 445–461.

The theorem of Adams we used is a mild generalization of Proposition 1 (proved in the same way) from the paper

- J. F. Adams, *A new proof of a theorem of W. H. Cockcroft*, J. London Math. Soc. vol. 30, 1955, pages 482–488.

Relative asphericity is discussed in

- M. Forester and C. Rourke, *Diagrams and the second homotopy group*, Comm. Anal. Geom. vol. 13, 2005, pages 801–820.

The asphericity result of Stallings is from

- John R. Stallings, *A graph-theoretic lemma and group-embeddings*, in the book *Combinatorial group theory and topology*, Ann. of Math. studies # 111, Princeton University Press, 1987, pages 145–155.

Klyachko's original paper on his theorem has many errors, making it hard to read. A very readable account is given in

- R. Fenn and C. Rourke, *Klyachko's methods and the solution of equations over torsion-free groups*, L'Enseignement Mathématique vol. 42, 1996, pages 49–74.