

Topics in Topology 2 (106933):  
Decompositions of Groups and 3-Manifolds  
פירוקים של חבורות ויריעות תלת מימדיות

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**Goal:** To learn about the decomposition theory of groups and 3 dimensional manifolds, and explore the connections between them.

**List of topics:**

- Splittings of groups and manifolds: Graph of spaces. Tracks and patterns. (Co)Homology over  $\mathbf{F}_2$ .
- Bass-Serre Theory: group actions on trees, graph of groups.
- Decomposition theory of groups: Theorems of Grushko, Stallings and Dunwoody.
- Constructions and examples of 3-manifolds: Heegaard splittings, Seifert fibered spaces, fibered manifolds, connected sums, knot complement, Dehn fillings and Dehn surgery.
- Dehn's Lemma and the Sphere, Loop and Torus Theorems, Scott's Core Theorem.
- Decomposition theory of 3-manifolds: Kneser Prime Decomposition, JSJ decomposition.
- Geometries of 3-manifolds: Thurston's 8 geometries and Geometrization.

**Prerequisites:** A course on fundamental groups and covering space theory (e.g Topology 104144). Relevant parts of the courses on algebraic topology, smooth manifolds and differential geometry will be covered in the course, and are therefore not required.

**Teaching method:** Most of the course will be taught using Moore's method: the participants will be given worksheets containing the content of the course (i.e, the definitions and theorems) which they will solve at home and present to each other in class. While other parts of the material will be given as lectures.

**Evaluation method:** The final grade will be based on your active participation in class, and the quantity and quality of the exercise solutions presented.