



The Hebrew University of Jerusalem

Syllabus

TOPICS IN GROUP THEORY - STABILITY - 80939

Last update 24-02-2020

HU Credits: 2

Degree/Cycle: 2nd degree (Master)

Responsible Department: Mathematics

Academic year: 0

Semester: 2nd Semester

Teaching Languages: English and Hebrew

Campus: E. Safra

Course/Module Coordinator: Prof. Avinoam Mann

Coordinator Email: alex.lubotzky@mail.huji.ac.il

Coordinator Office Hours: By appointment

Teaching Staff:

Prof Alex Lubotzky

Course/Module description:

This semester I'll give a course titled "Topics in group theory - growth". It will take place in room 209 on Tuesdays, 11-13. It will follow broadly my book "How groups grow", but the details may be different.

Given a group G generated by a finite set $x(1); \dots; x(d)$, we form all products of n of the generators and their inverses, and let $a(n)$ be the number of distinct group elements obtained by this. $a(n)$ is the growth function of G . It is at most exponential, and if G is infinite, at least linear. We are interested in properties of this function, and its relation to the structure of G . Two seminal results in this topic are

1. M.Gromov - the growth of G is (at most) polynomial iff G contains a nilpotent subgroup of finite index.

2. R.I.Grigorchuk - there exist groups whose growth is intermediate, i.e. faster than any polynomial and slower than any exponential.

After several preliminary chapters we will concentrate on the proof of Gromov's theorem.

Course/Module aims:

same as in learning outcomes.

Learning outcomes - On successful completion of this module, students should be able to:

Ability to prove and apply the theorems presented in the course.

Ability to apply correctly the mathematical methodology in the context of the course.

Acquiring the fundamentals as well as basic familiarity with the field which will assist in the understanding of advanced subjects.

Ability to understanding and explain the subjects taught in the course.

Attendance requirements(%):

100

Teaching arrangement and method of instruction: Lecture

Course/Module Content:

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- 1. M.Gromov - the growth of G is (at most) polynomial iff G contains a nilpotent subgroup of finite index.*
- 2. R.I.Grigorchuk - there exist groups whose growth is intermediate, i.e. faster than any polynomial and slower than any exponential.*

After several preliminary chapters we will concentrate on the proof of Gromov's theorem.

Required Reading:

none

Additional Reading Material:

Lecturer's book

Course/Module evaluation:

End of year written/oral examination 50 %

Presentation 50 %

Participation in Tutorials 0 %

Project work 0 %

Assignments 0 %

Reports 0 %

Research project 0 %

Quizzes 0 %

Other 0 %

Additional information:

none