

ARITHMETIC COMBINATORICS

(ECTS) 7,5 COURSE CREDITS

1. COURSE DESCRIPTION

The aim of this course is to give an introduction to some classical, as well as more modern, results in the recently revived and currently very active research field of Arithmetic Combinatorics.

The first part of the course will be concerned with expansion and structure of sums of subsets of integers, and most of the proofs of the relevant results for this part will not require any advanced mathematical tools beyond basic (finite) graph theory.

During the second part of the course we will introduce techniques from Fourier analysis and topological dynamics to study patterns in large subsets of the integers. Among other things, we shall study partition-regularity of linear equations and prove the celebrated theorems of Schur and van der Waerden.

2. AIM OF THE COURSE

After finishing the course, the student should understand and master some of the basic techniques which are used in Arithmetic Combinatorics.

3. DURATION

The course will span over LP1 and LP2 of 2014, meeting once a week for a two-hour lecture.

4. PREREQUISITES

Basic knowledge of Fourier analysis and topology will be useful, but is not necessary, for the second part of the course.

5. LECTURERS AND COURSE ORGANIZER

- Michael Björklund, micbjo@chalmers.se (Course organizer/lecturer)
- Peter Hegarty, hegarty@chalmers.se (Lecturer)
- Maria Roginskaya, maria.roginskaya@chalmers.se (Lecturer)

6. LECTURES AND EXAMINATION

One two-hour lecture every week during the fall of 2014, starting in mid-september. During the course there will be home work assignments. At the end of the course there will be an oral exam.

7. LITERATURE

Suggested reading:

- Book: Additive Combinatorics (Cambridge Studies in Advanced Mathematics) by T. Tao and V. Vu. ISBN-13: 978-0521136563
- Lecture notes: Sumsets and structure by I. Ruzsa
<http://tensen.net/research/static/gc-data/sumset/Additive-Combinatorics.pdf>

Lecture notes will also be written and distributed. Possibly complemented by other hand-out materials.

8. REGISTRATION

Please email the course organizer for registration.