Can we plant $n$ trees in an orchard, not all along the same line, so that every line determined by two trees will pass through a third? This was raised by Sylvester and has generated interest among mathematicians. It led to the birth of combinatorial geometry with ties to convexity and graph theory.

**Content**
The course offers an introduction to this rapidly developing field, where combinatorial and probabilistic (counting) methods play a crucial role.
Topics: Extremal graph theory, Repeated distances in space, Arrangements of lines and curves, Geometric graphs, Epsilon nets, Discrepancy theory, Applications in computational geometry.

**Keywords**
forbidden graph, hypergraph, incidence, arrangement, Vapnik-Chervonenkis dimension, random sampling

**Learning Prerequisites**
Required courses
Discrete Mathematics

Recommended courses
Probability Theory

Important concepts to start the course
graph, planar graph, random variable, expected value, variance

**Teaching methods**
Lectures, exercises

**Expected student activities**
Solving homework problems, answering questions during lecture and exercise sessions

**Assessment methods**
Written
Supervision
Office hours  Yes
Assistants  Yes

Resources

Bibliography
J. Pach and P. Agarwal: Combinatorial Geometry,
J. Matousek: Lectures on Discrete Geometry

Ressources en bibliothèque
• Combinatorial Geometry / Pach & Agarwal
• (electronic version)
• Lectures on Discrete Geometry / Matousek