

MATH-360

**Graph theory**

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Cursus	Sem.	Type
Data Science	MA1, MA3	Opt.
Mathematics	BA5	Opt.

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	Written
Workload	150h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

The course aims to introduce the basic concepts and results of modern Graph Theory.

**Content**

In this course we will cover the following topics:

- trees
- connectivity
- Eulerian and Hamiltonian cycles
- matchings
- planar graphs
- graph colouring
- Ramsey theory
- extremal problems

**Keywords**

Graph, isomorphism, complement, complete, bipartite, connected, path, circuit, cycle, planar, tree, spanning, Eulerian, Hamiltonian, colouring, Ramsey theory, forbidden subgraph, extremal graph.

**Learning Outcomes**

By the end of the course, the student must be able to:

- Illustrate simple examples of graphs satisfying certain properties
- State definitions and results of graph theory
- Verify hypotheses of theorems for applications
- Prove theorems and other properties
- Justify the main arguments rigorously
- Apply relevant results to solve problems
- Modify the main proofs if needed, to solve similar problems

**Teaching methods**

In-person lectures + in-person exercise classes covering weekly exercise sheets.

**Expected student activities**

The students are expected to attend the lectures and the exercise classes. In addition, they are expected to attempt the problems on the exercise sheets and to submit their solutions of a selected subset of the exercises for grading.

### Assessment methods

Written final exam

### Supervision

Office hours	No
Assistant.e.s	Yes
Forum	Yes

### Resources

#### Bibliography

- Diestel : Graph Theory (Springer)
- Bollobas : Modern Graph Theory (Springer)
- West: Introduction to Graph Theory

#### Ressources en bibliothèque

- [Find the references at the Library](#)

#### Notes/Handbook

Lecture notes will be provided.

#### Moodle Link

- <https://go.epfl.ch/MATH-360>

#### Prerequisite for

MATH-467: Probabilistic methods in combinatorics  
MATH-526: Algebraic methods in combinatorics