

MATH-523

**Introduction to dynamical systems**

Krieger Joachim

Cursus	Sem.	Type
Ing.-math	MA1, MA3	Opt.
Mathématicien	MA1, MA3	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**

An introduction to some key concepts and theorems from dynamical systems, including discrete dynamical systems as well as flows.

**Content**

- abstract dynamical systems
- ergodicity
- Poincare recurrence
- Birkhoff theorem
- invariant manifolds and hyperbolicity
- Conjugation problem
- Poincare-Bendixson theory.

**Learning Prerequisites****Required courses**

Analysis I - IV, Algebre Lineaire I and II.

**Recommended courses**

Analysis I - IV, Algebre Lineaire I and II.

**Important concepts to start the course**

Understand key concepts of real analysis, such as measure and Lebesgue integral. Some familiarity with Fourier series and ordinary differential equations. Be able to construct a rigorous mathematical argument.

**Learning Outcomes**

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

- Analyze abstract dynamical systems
- Examine issues concerning the local and global behavior of dynamical systems
- Prove basic results, such as Poincare recurrence.
- Contrast different dynamical behaviors.

**Assessment methods**

Written exam

### Supervision

Office hours	No
Assistant.e.s	Yes
Forum	No

### Resources

**Virtual desktop infrastructure (VDI)**

No

### Moodle Link

- <https://go.epfl.ch/MATH-523>