Introduction to Ordinary Differential Equations

Università della Svizzera italiana, Faculty of Informatics
Instructor: Francisco Richter **Email:** francisco.richter@usi.ch
Location: Lugano, Switzerland **Meeting time:** Fridays, 09:00–11:00 (Sep 19 – Dec 19, 2025)
Office hours: TBD (announced on course page)
Course page: https://search.usi.ch/it/corsi/35275460/introduction-to-ordinary-differential-equat

Course Description

This course covers the core concepts and techniques of ordinary differential equations (ODEs), with emphasis on modeling, analysis, and computation. We develop qualitative intuition, analytical methods, and numerical techniques to understand and solve ODE models arising in science and engineering.

Learning Outcomes

By the end of the course, students will be able to:

- Model time-dependent phenomena using first-order, higher-order, and systems of ODEs.
- Apply analytical techniques (e.g., linear methods, Laplace transforms) to solve ODEs.
- Analyze stability and qualitative behavior via phase portraits and linearization.
- Implement and assess numerical solvers for initial value problems.
- Communicate mathematical reasoning effectively in written solutions.

Schedule (14 weeks)

One meeting per week on Fridays. After every pair of lectures there is an Exercises + Quiz session (first half TA Q&A, second half quiz). After Quiz 4 there is one last lecture and a final Exercises session before the exam.

Week	Date	Type	Topic
1	2025-09-19	Lecture	Introduction, modeling, IVPs
2	2025-09-26	Lecture	First-order ODEs
3	2025-10-03	Exercises+Quiz 1	TA Q&A; Quiz 1
4	2025-10-10	Lecture	Linear ODEs (higher order)
5	2025-10-17	Lecture	Systems of ODEs
6	2025-10-24	Exercises+Quiz 2	TA Q&A; Quiz 2
7	2025-10-31	Lecture	Qualitative analysis, phase plane
8	2025-11-07	Lecture	Numerical methods for ODEs
9	2025-11-14	Exercises+Quiz 3	TA Q&A; Quiz 3
10	2025-11-21	Lecture	Laplace transforms
11	2025-11-28	Lecture	Nonlinear systems and stability
12	2025-12-05	Exercises+Quiz 4	TA Q&A; Quiz 4
13	2025-12-12	Lecture	Boundary value problems / advanced topics
14	2025-12-19	Final Exercises	Comprehensive review and exam preparation

Assessment

- Quizzes (4) 40%
- Exercises participation/attendance 20%
- Final exam 40%

Exact grading cutoffs and exam details will be announced in class and on the course page.

Policies

Collaboration. Discussing ideas is encouraged; submitted work must be your own.
Academic integrity. Follow USI policies on academic honesty. Any breach may result in failing the course.
Late work. Quizzes occur in-class; late or make-up quizzes require documented justification.
Accessibility. Students requiring accommodations should contact the instructor early.

Resources

Recommended texts and references will be posted on the course page. Computational examples will be provided alongside lecture notes and code.

This syllabus is subject to minor adjustments. Updates will be communicated in class and on the course website.