

## REQUIREMENTS, BME TTK, Mathematics BSc, Differential Equations 1

**Code:** BME TE93AM15. Lecture, practical lecture, exam /6 ECTS

**Semester:** 2023/24/2. **Language:** English. **Lecturer:** Peter Moson PhD. **Office hour:** **Wednesday 10:30-11:30.**

**Attendance requirements for the signature.** Lectures, practical lectures 50%.

*Curriculum (general remarks).*

Main objectives (i) introduction to the theory of ordinary differential equations, (ii) knowledge and application of the method of linearization, (iii) solution of separable, linear first order, and linear second order equations, 2 dimensional systems (iv) looking out to the qualitative theory of more complicated (nonlinear) systems.

*Literature.*

Thomas' CALCULUS 2. The Hungarian variant can be downloaded (0 HUF): [http://www.interkonyv.hu/konyvek/Thomas\\_kalkulus\\_2](http://www.interkonyv.hu/konyvek/Thomas_kalkulus_2) .

**Test 1.** Week 6. **March 20, 2024.**

**Program (planned).** Ordinary differential equations (ODE). Initial value problem. Existence, uniqueness, continuous dependence on initial values. Separable, linear, exact first order equations. Second order equations. Laplace transformation (application for ODEs). Approximate methods.

**Test 2.** Week 13. **May 14, 2024.**

**Program (planned).** Systems of ODEs. Linear systems, variational system. Introduction to the stability theory. Lyapunov stability by the first approximation. Phase portraits of planar autonomous systems. Laplace transformation (application for systems of ODEs). Approximate methods.

**Weeks 13-14.** Looking out to the qualitative theory of more complicated (nonlinear) systems.

**Signature.** Attendance conditions: Results of both tests must be greater than 6 points.

**Retakes.** Retake 1. Week 8. Retake 2. Week 14. Last Retake. One test can be repeated on May 28, 2024 (Tuesday). Registration in NEPTUN is necessary.

### Final marks (at the end of the semester)

Tests  $2 \cdot 20 = 40\%$ , 90 minutes written exam (first 15 minutes theory (10%), 75 minutes remaining time exercises (50%).

0 - 39 points	fail (1),
40 - 54	pass (2),
55 - 69	satisfactory (3)
70 - ...	good (4)

If the sum of midterm tests and written exam is more than 78% then the student can take part at an oral exam for the mark excellent (5).

**Written exams:** June 4, 18, 25, 2024 (Tuesdays).

Budapest, February 6, 2024. / **Modified on February 28, 2024.**

Peter Moson