

I. Institution	
1. Institution name	Bauman Moscow State Technical University
2. Faculty (department)	Fundamental Sciences
3. Postal address E-mail Web-Homepage	5, 2-nd Baumanskaya St, Moscow, 105005, irina@interd.bmstu.ru www.bmstu.ru
4. Contact person/coordinator (name, phone, e-mail, position)	Liudmila A. REZCHIKOVA Head of the Centre for International Academic Mobility. Phone: (095) 263-6676, fax: (095) 267-9893; Tel/Fax: (095) 263-6673; E-mail: oir@bmstu.ru
II. Course's profile	
5. Course title	Qualitative Theory of Ordinary Differential Equations
6. Course profile (please, give some key words to specify the focus)	Stability, bifurcation, limit cycle, attractor, nonlinear dynamics, chaos.
7. ECTS points available (Yes/No)	No
8. Class hours/week	4-6
9. Integrated Russian language course for beginners (Yes/No)	Optional (6-8 hours/week provided by the Russian language chair of BMSTU)
10. Language of instruction	English
11. Integrated practical training/ research program (Yes/No)	No
12. Integrated cultural program: excursions etc. (Yes/No, brief description)	Yes, sightseeing tours around Moscow and Moscow region as well as around Kaluga and Kaluga region
13. Number of students	10-25
14. Tuition fees (Euro/month/person)	400/month/person (with 10 students in the group)
15. Course duration	1 month
III. Accommodation	
17. Accommodation conditions: student hostel (description of accommodation facilities, incl./excl. food, costs (0/month/person)	Hostel: 1. Lodging in a 10 m ² single room and a 20m ² twin room with a bathroom and a lavatory to be shared by 3 persons costs 70-100 and 45-60 per month, respectively. 2.Lodging in a single room with a bathroom and a lavatory costs 110-140 per month. Food is excluded in both cases
18. Accommodation conditions: guest family (optional): Yes/No, incl./excl. food, costs (0/month/person)	No

Additional description of the course

The lecture course may be interesting for advanced students, specializing in engineering, applied mathematics or mathematical economics. They should know basic concepts of mathematical analyses and linear algebra. Elementary acquaintance with differential equations is desirable, but not necessary.

The course contains 8-12 lectures (2-3 per week) and includes the items:

The principal theorems on differential equations (the Cauchy theorem, continuous dependence of the solution on initial conditions and parameters). Stable and unstable equilibria of a single differential equation with parameters. The catastrophe of elimination of two equilibria with opposite stability.

Singular points of linear differential equations on a plane, their bifurcations in the linear class. Engineering (and, possibly, economical) applications.

Nonlinear systems on a plane. The Hartman theorem on the local linearization. Nonlinear bifurcations of singular points on a plane.

Limit cycles on a plane. Poincaré theory. The Andronov-Hopf bifurcation. "Soft" and "hard" loss of stability. Models with nonlinear oscillations.

Singular points and invariant manifolds in n-dimensional space. Quasi-periodic motion.

The Lorenz system. Strange attractors and chaos.

Lector – **Vitaly V. Stanzo**, specialist in nonlinear dynamics and mathematical economics, having experience of work in BMSTU, Moscow State University and National University of Mexico, publications in Russia and USA.