

Course title: Differential equations

ECTS credit allocation (and other scores): 5

Semester: spring

Level of study: ISCED-6 - first-cycle programmes (EQF-6)

Branch of science: Natural sciences

Language: English/Polish

Number of hours per semester: 30 lectures + 30 classes = 60 hours

Course coordinator/ Department and e-mail: Mariusz Bodzioch / WMil, mariusz.bodzioch@matman.uwm.edu.pl

Type of classes: classes and lectures

Substantive content

CLASSES: The concept of an ordinary differential equation and its solution. Initial problem. Geometric interpretation. Differential equations with separable variables. Homogeneous and quasi-homogeneous equations. Bernoulli equations. The Peano and the Picard-Lindelöf theorems. Linear equation systems. Wronskian and Liouville's theorem. Systems of linear equations with constant coefficients. Higher-order differential equations with constant coefficients. Solutions in the form of power series. Elements of operational calculus. Laplace transform.

LECTURES: The concept of an ordinary differential equation and its solution. Initial problem. Geometric interpretation. Applications of differential equations. Differential equations with separable variables. Homogeneous and quasi-homogeneous equations. Bernoulli equations. The Peano and the Picard-Lindelöf theorems. Linear equation systems. Wronskian and Liouville's theorem. Systems of linear equations with constant coefficients. Higher-order differential equations with constant coefficients. Solutions in the form of power series. Elements of operational calculus. Laplace transform.

Learning purpose: To learn the basic concepts of ordinary differential equations, the methods for solving selected classes of equations and ordinary differential equation systems, and how to apply them.

On completion of the study programme the graduate will gain:

Knowledge: The student knows the basic concepts of ordinary differential equations; existence and uniqueness theorems for ordinary differential equations; the significance and applications, as well as methods of solving selected classes of ordinary differential equations and their systems.

Skills: The student can solve the basic types of differential equations and differential equation systems; provide a geometric interpretation of differential equations and differential equation systems; indicate the applications of ordinary differential equations in typical practical problems.

Social Competencies: The student is prepared to make use of scientific literature; precisely formulate questions to enhance one's understanding of problems relating to differential equations; recognise the importance of exact sciences for the maintenance and development of other fields of science; continue to learn independently; observe the customs and rules governing academia.

Basic literature: 1) A. Palczewski, Równania różniczkowe zwyczajne, PWN, 2017.

Supplementary literature: 1) V. I. Arnold, Ordinary Differential Equations, Springer, 1992.

The allocated number of ECTS points consists of:



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Contact hours with an academic teacher: 2.56 ECTS points.

Student's independent work: 2.44 ECTS points.