



## RTU Course "Mathematics"

12021 Inženiermatemātikas katedra

### General data

Code	DIM108
Course title	Mathematics
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Undergraduate Studies
Course type	Academic
Field of study	Mathematics and Statistics
Responsible instructor	Volodko Inta
Academic staff	Biezā Līga Karpinska Ilze
Volume of the course: parts and credits points	2 parts, 4.0 Credit Points, 6.0 ECTS credits
Language of instruction	LV, RU
Possibility of distance learning	Not planned
Abstract	Matrixes and determinants. Systems of linear equations. Scalar and vectorial product. Plane analytic geometry. Functions. Limits. Derivative and its applications. The indefinite and definite integral. First order differential equations. Functions in several variables, partial derivatives.
Goals and objectives of the course in terms of competences and skills	Deliver basic mathematical concepts that are necessary to understand processes and algorithms in professional subjects. Develop students' logical thinking and skills to analyze basic aspects of special subjects with the objective to analyze more complicated problems.
Structure and tasks of independent studies	Six homework assignments are given during the course. The topics of these assignments are: linear algebra, differentiation of a function of one argument, analysis of functions, indefinite integral, applications of a definite integral, differential equations. Homework assignments are submitted before the deadline indicated by a professor. Student has an opportunity to re-submit the work once after it has been corrected by the professor. The grades for homework assignments are taken into account for the calculation of the final grade for the course.
Recommended literature	<ol style="list-style-type: none"> <li>1. Inta Volodko. Augstākā matemātika. Īss teorijas izklāsts. Uzdevumu risinājumu paraugi. I daļa, Rīga, Zvaigzne ABC, 2007, 294. lpp., 2. daļa, Rīga, Zvaigzne ABC, 2009, 396 lpp.</li> <li>2. Andrejs Koliškins, Inta Volodko, Maksimilians Antimirovs. Matemātika I tehnisko augstskolu studentiem. RTU, 2004, 337 lpp., Matemātika II tehnisko augstskolu studentiem. RTU, 2005, 244 lpp.</li> <li>3. Kārlis Šteiners, Biruta Siliņa. Augstākā matemātika. Lekciju konspekts inženierzinātņu un dabaszinātņu studentiem. 1. daļa, Zvaigzne, 1997, 96 lpp., 2. daļa, Zvaigzne ABC, 1998, 115 lpp.</li> <li>4. Kārlis Šteiners. Augstākā matemātika. Lekciju konspekts inženierzinātņu un dabaszinātņu studentiem. 3. daļa, Zvaigzne ABC, 1998, 192 lpp., 4. daļa, Zvaigzne ABC, 1999, 168 lpp., 6. daļa, 2001, 208 lpp.</li> <li>5. Kronbergs E., Rivža P., Bože Dz. Augstākā matemātika. 1. un 2. daļa, Rīga, Zvaigzne, 1988, 534 lpp., 527 lpp., 2. daļa, Rīga, Zvaigzne, 1988, 527 lpp.</li> <li>6. Biruta Siliņa, Kārlis Šteiners. Rokasgrāmata matemātikā. Zvaigzne ABC, 2006, 367 lpp.</li> <li>7. Dz. Bože, L. Biezā, B. Siliņa, A. Strence. Uzdevumu krājums augstākajā matemātikā. Zvaigzne ABC, 1996, 328 lpp.</li> <li>8. Inta Volodko. Tipveida uzdevumu krājums matemātikā I. RTU, 2001, 2003, 2005, 206 lpp.</li> <li>9. I. Volodko, A. Āboltiņš, L. Biezā. Tipveida uzdevumu krājums matemātikā II. RTU, 2002, 2005, 288 lpp.</li> </ol>
Course prerequisites	Course is based on knowledge that is acquired in secondary school.
Courses acquired before	

### Course outline

Theme	Hours
Elements of linear algebra: Determinants. Matrices, operations on them. Solution of systems of linear equations.	8
Introduction to calculus: Elementary functions. A limit of a function.	4
One-variable differential calculus: Derivative of functions. Applications of derivatives in an analysis of functions.	18
Integral calculus: Indefinite integral. Definite integral and its applications.	18
Ordinary differential equations: First order and second order differential equations, methods of their solution.	12
Review.	4

### Learning outcomes and assessment

Learning outcomes	Assessment methods
After successful completion of the course students will be able to solve systems of linear equations and perform operations on matrices.	Evaluation of students' work is based on the results of homework assignments, tests and the final exam.
Can plot graphs of elementary functions, find the interval of definition for elementary functions, determine whether the given function is even or odd, determine the points of intersection with axis.	Students' knowledge and abilities are assessed using homework assignments, tests and final exam.

Can find derivatives of functions; can analyze the behavior of a function using derivatives and plot the graph of a function.	Two tests, two homework assignments and several problems on the final exam are used to assess students' knowledge on these topics.
Can integrate simple functions; find the area of a plane figure, length of a curve and volume of a body of revolution using definite integral.	Evaluation of students' work is based on the results of homework assignments, tests and the final exam.
Can solve simple first and second order ordinary differential equations.	Students' knowledge and abilities are assessed using homework assignments, tests and final exam.

***Study subject structure***

Part	Semester			CP	Hours per Week			Tests		
	Autumn	Spring	Summer		Lectures	Practical	Lab.	Test	Exam	Work
1.	*			2.0	1.0	1.0	0.0		*	
2.		*		2.0	1.0	1.0	0.0		*	