



## RTU Course "Numerical Methods"

15325 Teorēt.mehānikas un materiālu pretestības katedra

### General data

Code	MMP441
Course title	Numerical Methods
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Post-graduate Studies
Course type	Academic
Field of study	Mechanics, Mechanical Engineering, Machine Building
Responsible instructor	Krasņikovs Andrejs
Academic staff	Auziņš Jānis
Volume of the course: parts and credits points	1 part, 4.0 Credit Points, 6.0 ECTS credits
Language of instruction	LV, EN, RU
Possibility of distance learning	Not planned
Maximum auditorium capacity	30
Maximum number of students per semester	30
Abstract	Numerical simulations. Numerical calculation errors. Calculations stability. Approximation of analytical functions. Estimation of accuracy. Solution methods for algebraic and differential equations systems. Computational peculiarities. Numerical methods' accuracy. Mathematical models.
Goals and objectives of the course in terms of competences and skills	The aim of the study course is to teach students: to analyze the design of flexible, viscoelastic materials and to teach students to: make a function of numerical approximation, numerically solve the equations, for numerical integration, numerically solve differential equations, use the final margin and the final element methods engineering tasks.
Structure and tasks of independent studies	During the course students should perform the independent work on the themes: 1). functions in numerical approximation, 2). algebraic equations numerical solving, 3). numerical integration, 4). numerical differential equation solving, 5). GEM application design calculations.
Recommended literature	1). Н.С.Бахвалов, Н.П.Жидков, Г.М.Кобельков. Численные методы. М.2001. 2). А.А.Самарский. Введение в численные методы. М.2002. 3). А.А.Самарский. Введение в теорию разностных схем. М.2001. 4). O.C.Zenkevich and R.L. Taylor The finite element method, Elsevier, 2005.
Course prerequisites	mathematics

### Course outline

Theme	Hours
Function approximation. Spline functions	8
The numerical resolution of algebraic equations	10
Numerical Integration	15
Numerical differential equation solving	10
A final difference methods	11
Finite element method (GEM)	10

### Learning outcomes and assessment

Learning outcomes	Assessment methods
Knowledge of the functions of numerical approximations.	Test work
Knowledge of the numerical solution of algebraic equations.	Test work
Knowledge of the numerical integration.	Test work
Knowledge of the numerical differential equation solving.	Test work
Knowledge of the final difference method.	Test work
Knowledge of finite element method (GEM).	Test work

### Study subject structure

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	4.0	6.0	2.0	2.0	0.0		*	