



RTU Course "Heat Supply Optimization"

11509 Vides aizsardzības un siltuma sistēmu katedra

General data

Code	EAS708
Course title	Heat Supply Optimization
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Post-graduate Studies
Course type	Academic
Field of study	Environmental Engineering and Management
Responsible instructor	Mārtiņš Gedrovičs
Academic staff	Ivars Bekmanis
Volume of the course: parts and credits points	1 part, 3.0 Credit Points, 4.5 ECTS credits
Language of instruction	LV, EN, RU
Possibility of distance learning	Not planned
Abstract	The subject deals with the analysis and optimizing possibilities of the heat supply system and its components - heat source, network and consumer. The parameters to be optimized are discussed as well as the equations, inequalities and constraints needed for mathematical realization of the optimization. The basics of the mathematical realization of the optimization are presented.
Goals and objectives of the course in terms of competences and skills	To get the knowledge on the analysis and optimizing possibilities of heat supply system and its components - heat source, network and consumer. To learn to choose the parameters to be optimized as well as to write down the mathematical model of the problem. To acquire the methodology to solve optimizing problems and mathematical realization of the problems.
Structure and tasks of independent studies	Literature review regarding characteristics of heat supply systems and mathematical modeling. Development of course works regarding heat supply system optimization and simulation.
Recommended literature	1. Dzelzītis E. Siltuma tehnoloģijas vadības pamati, 2001. 2. M. Rubīna, Siltumapgāde, 2002. 3. Širaks Z. Siltuma apgāde. 1973. 4. Соколов Е. Теплофикация и тепловые сети. 2001. 5. Cengel, Yunus A. , Heat transfer, 2004
Course prerequisites	Knowledge of heat transfer and thermodynamics.

Course outline

Theme	Hours
The basics of the optimization. Heat supply as the example of optimized system.	2
The parameters to be optimized in the heat supply system. The local extreme and the global extreme.	4
The types of heat supply systems and characteristics.	4
The equations, inequalities and constraints for the mathematical realization of the optimization.	4
The description of the heat source, the optimizing possibilities.	6
The network as the subject of optimization. Optimized quantities.	6
Municipal heat consumer. The optimizing possibilities.	6
Industrial heat consumer. The optimizing possibilities.	6
The mathematical realization of the optimization.	6
The analysis of the results from the economical and environmental point of view.	4

Learning outcomes and assessment

Learning outcomes	Assessment methods
To be able to analyse the heat supply system in total and the significance of the components.	Examination: exam, course work. Assessment criteria: is able to identify the components of the heat supply system where is necessary to implement the optimization.
To be able to estimate the influence of different quantities to the heat consumption.	Examination: exam, course work. Assessment criteria: is able to estimate quantitatively the influence of different factors to the heat consumption.
To be able to describe mathematically the simplest optimization examples.	Examination: exam, course work. Assessment criteria: is able to define the objective of the optimization, is able to describe the optimization example mathematically.
To be able to carry out the simplest optimization examples as well as to analyse the results.	Examination: exam, course work. Assessment criteria: is able to carry out the optimization example of the heat supply system, to analyse the results.

Study subject structure

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	3.0	4.5	3.0	0.0	0.0		*	