



RTU Course "Thermodynamics and Gas Dynamics"

15016 Siltumenerģētisko sistēmu katedra

General data

Code	MSE432
Course title	Thermodynamics and Gas Dynamics
Course status in the programme	Compulsory/Courses of Limited Choice; Courses of Free Choice
Course level	Post-graduate Studies
Course type	Professional
Field of study	Heat Engineering, Heat, Gas and Water Technology
Responsible instructor	Turlajs Daniels
Academic staff	Cars Ainārs Jaundālders Sigurds
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	Planned
Maximum auditorium capacity	30
Maximum number of students per semester	30
Abstract	The subject "Thermodynamics and Gas Dynamics" covers different thermodynamic systems and their characteristics. Energy transition types. Simple and complicated thermodynamic systems.
Goals and objectives of the course in terms of competences and skills	To acquire thermodynamic research methods and mathematical apparatus. To cover complicated thermodynamical systems with their properties and calculation methods. To acquire irreversible thermodynamical processes and cycle calculation methods. To describe gas flow and gas dynamic basic laws, their use in technical systems.
Structure and tasks of independent studies	Work with literature sources, home work, and their completion in time.
Recommended literature	1. T. Ķīrsis, P. Lielpēters. Fluidu mehānika. Rīga, 1999., 84 lpp. 2. И.П.Базаров. Термодинамика М., "Вышая школа" 1976, 448 с. 3. В.В. Сычев. Сложные термодинамические системы. М., Энергоиздат, 1986, 208 с. 4. Л. А. Вулис. Теплоэнергетика газовых потоков М. –Л., Энергоиздат. 1950, 304 с. 5. В.В. Сычев. Дифференциальные уравнения термодинамики. М., 1981, 195 с. 6. А.И. Андрищенко. Основы технической термодинамики реальных процессов. М., 1975, 264 с. 7. Г.Н. Абрамович. Прикладная газовая динамика. М., 1969, 824 с.
Course prerequisites	Knowledge in thermodynamics and thermal engineering.

Course outline

Theme	Hours
Thermodynamic systems and their properties.	3
The mathematical apparatus of thermodynamics. Differential equations.	3
The first law of thermodynamics for simple and complicated systems.	3
Processes of ideal gasses with attrition.	3
Processes of real gasses with attrition.	3
The characteristic functions of thermodynamical systems. Balance conditions.	3
Chemical potential.	3
Maxwell equations for complicated systems.	3
Thermodynamical processes on surfaces. Capillarity. Two faze system balance properties.	3
Gas, steam and liquid in gravitation field and weightless state.	3
Systems with changeable amount of matter.	3
Thermodynamic processes in magnetic field. Radiation thermodynamics.	3
Main laws of gas dynamics.	3
Mixing of gas and steam.	3
Flow of gas and steam. Nozzles and difuzors.	3
The transition of gas flow to supersonic velocities.	3

Learning outcomes and assessment

Learning outcomes	Assessment methods
To be able to complete calculations of complicated thermodynamical systems, irreversible thermodynamic process calculation and gas flow calculation in design of nozzles.	Practical work, home work, exam.

Study subject structure

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