

Course description

Course abbreviation:	KKE/TPPS	Page:	1 / 3
Course name:	Combined Heat and Power Generation		
Academic Year:	2023/2024	Printed:	03.06.2024 09:09

Department/Unit /	KKE / TPPS			Academic Year	2023/2024
Title	Combined Heat and Power Generation			Type of completion	Exam
Accredited/Credits	Yes, 4 Cred.			Type of completion	Combined
Number of hours	Lecture 3 [Hours/Week] Tutorial 1 [Hours/Week]				
Occ/max	Status A	Status B	Status C	Course credit prior to	YES
Summer semester	3 / -	0 / -	0 / -	Counted into average	YES
Winter semester	0 / -	0 / -	0 / -	Min. (B+C) students	10
Timetable	Yes			Repeated registration	NO
Language of instruction	Czech			Semester taught	Summer semester
Optional course	Yes			Internship duration	0
Evaluation scale	1 2 3 4			Ev. sc. – cred.	S N
No. of hours of on-premise					
Auto acc. of credit	Yes in the case of a previous evaluation 4 nebo nic.				
Periodicity	K				
Substituted course	None				
Preclusive courses	N/A				
Prerequisite courses	N/A				
Informally recommended courses	N/A				
Courses depending on this Course	N/A				

Course objectives:

The purpose of the subject is to inform about bases of process designing and planning for boiler rooms, power and heating plants, boiler rooms, condensing power plants with heat extraction, incineration plants, alternative heat sources and distribution networks.

Requirements on student

Active participation in lectures and tutorials, final test and oral exam.

Content

Topics of lectures according to weeks :

1. Introduction, central heating systems, heat sources of central heating systems
2. Basic principles for the design, needs and consumption of heat in a central heating systems, of thermal load
3. Basic energy relationships, energy conversion, heat transfer and heat exchange
3. Power and heating plants with steam turbines diagrams, choice of steam parameters, choice of the heating coefficient
4. Layout and basic design of power and heating plants, heat accumulation, heat transfer to heat piping networks
6. Condensing power plants with heat extraction, water treatment for heating and power plants

7. Power and heating plants, heating plants and boiler houses, choice of boiler type and number of boilers
8. Power and heating plants with gas turbines, combination of power plants with steam and gas turbines (layouts and diagrams)
9. Nuclear power and heating plants (layouts and diagrams)
10. Waste incineration plants, utilization of heat from waste, choice of waste incinerator type and size
11. Diagrams and dimensioning of the heat distribution network, interchange stations in steam and water networks, heat exchangers, consumer heat systems, space heaters, heating radiators
12. Measuring and regulation of heat consumption, heat meters, protecting and signalling devices for interchange stations and heating systems
13. Technical, environmental and economic evaluation of heating systems, heat and fuel consumption, basic design criteria

Fields of study

Guarantors and lecturers

- **Guarantors:** Doc. Ing. Petr Eret, Ph.D. (100%)
- **Lecturer:** Doc. Ing. Petr Eret, Ph.D. (100%), Ing. Vladimír Křenek (100%)
- **Tutorial lecturer:** Doc. Ing. Petr Eret, Ph.D. (100%), Ing. Vladimír Křenek (100%)

Literature

- **Basic:** Vlach, Josef. *Zásobování teplem a teplotní technika*. 1. vyd. Praha : SNTL, 1989.
- **Recommended:** Příhoda M., Řeďr M. *Sdílení tepla a proudění*. Ostarva, 2008. ISBN 978-80-248-1748-4.
- **Recommended:** Cikhart, Jiří. *Soustavy centralizovaného zásobování teplem*. Vyd. 1. Praha : SNTL, 1977.
- **Recommended:** Polach V. *Teplotní technika a potrubní sítě. tabulky*. ZČU, FS-KKE Plzeň, 1993.

Time requirements

All forms of study

Activities	Time requirements for activity [h]
Graduate study programme term essay (40-50)	40
Preparation for an examination (30-60)	50
Preparation for formative assessments (2-20)	20
Total:	110

assessment methods

Knowledge - knowledge achieved by taking this course are verified by the following means:

Oral exam

Skills - skills achieved by taking this course are verified by the following means:

Test

Competences - competence achieved by taking this course are verified by the following means:

Oral exam

prerequisite

Knowledge - students are expected to possess the following knowledge before the course commences to finish it successfully:

independently use theoretical fundamentals from branch of fluid mechanics, thermomechanics, mechanics of solids bodies, elasticity and strength of materials for solution and design real technological equipments

Skills - students are expected to possess the following skills before the course commences to finish it successfully:

to apply gained knowledges from branch of fluid mechanics, thermomechanics, mechanics of solids bodies, elasticity and strength of materials in the practice for solution and design real technological equipments

Competences - students are expected to possess the following competences before the course commences to finish it successfully:

N/A

teaching methods

Knowledge - the following training methods are used to achieve the required knowledge:

Lecture

Skills - the following training methods are used to achieve the required skills:

Practicum

Competences - the following training methods are used to achieve the required competences:

Lecture

learning outcomes

Knowledge - knowledge resulting from the course:

to describe and explain basic diagrams and disposal solution of the heating plants, heat distribution network, interchange stations in steam and water networks and secondary heat networks including all technological equipments

Skills - skills resulting from the course:

to design diagrams and disposal solution of heat and power plant, heat distribution network, interchange stations in steam and water networks and secondary heat networks including all technological equipments

Competences - competences resulting from the course:

N/A

N/A

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Design of Power Machines and Equipment	Postgraduate Master	Full-time	Design of Power Machines and Equipment	1	2020	2023	Compulsory courses	A	1	LS