T E C H N I C A L U N I V E R S I T Y O F G A B R O V O
FACULTY OF MECHANICAL AND PRECISION ENGINEERING

Endorsed with Academic Council resolution
Record № 9 dated 01.06.2010

Approved by
Rector /s/

Q U A L I F I C A T I O N R E F E R E N C E

Degree course: **HYDRAULIC, PNEUMATIC AND HEAT ENGINEERING**
Educational –qualification degree**: BACHELOR**
Field of higher education: **TECHNICAL SCIENCES**
Professional trend: **5.1**.**MECHANICAL ENGINEERING**
Professional qualification: **MACHINE ENGINEER**

ANNOTATION

This degree course meets contemporary industrial requirements in the area of hydro-pneumatic and heat engineering, hydro-thermal power engineering , heating, ventilation and air-conditioning equipment and renewable energy sources. Training is carried out in compliance with endorsed curriculum which corresponds to the standards adopted for the acquisition of degrees in higher education and in accordance with the EU standards in that particular field.

VOCATIONAL PURPOSE

Successful graduates of the course in "Hydraulic, pneumatic and heat engineering" (HPHE) should be able to perform well in the following activities:

- design , development, operation and maintenance of hydraulic, pneumatic and thermal equipment, heating systems, ventilation, air-conditioning and hydro-pneumatic drives;
- design and operation of systems in heat and hydro-power equipment, gas supply and renewable power energetics.

REQUIRED TRAINING

Training in Hydraulic, Pneumatic and Heat Engineering is carried out according to Bachelor degree course curriculum. Successful course graduates are eligible to continue their training in Master's degree and later on in doctoral degree courses.

It comprises a wide scope of scientific, theoretic and practical fundamentals. The first four semesters offer studies in "Calculus", "Physics", "Infromatics" , "Mechanics", " Fluids mechanics", "Heat and mass transfer", "Technical documentation", "Materials science", "Machine elements", "Strength of materials", "Thermodynamics", "Electrical engineering and electronics", etc. Language training and humanities are also studied intensively.

Students have the opportunity to further build up on their general engineering knowledge through subjects taught during semester V and VI such as "Measurement of hydraulic, pneumatic and heat values, "Bulk hydraulic and pneumatic machines", "Continuous media mechanics", "Hydro-pneumatic drive", „ Turbo pumps ,compressors and fans"," Renewable energy sources".

These provide a good ground for transition to studies in compulsory subjects such as " Theory of automated adjustment and control", "Water turbines", "Hydro-pneumatic automation", „Industrial heating installations" , etc which allow to complete the level of knowledge corresponding to Bachelor degree. Training closes with thesis work during the last semester.

AREAS OF PROFESSIONAL REALIZATION

Bachelor degree holders are well qualified to occupy positions as:

- designers of hydraulic, pneumatic and heat machines;
- designers of systems for heating ventilation and air-conditioning;
- operators/attendants in hydro-electric, thermal and nuclear power plants;
- engineers in charge of maintenance and operation of refrigerating and cryogenic machines and systems;
- technical experts in the field of renewable energy sources;
- specialists in maintenance and operation of hydraulic, pneumatic drive systems and hydraulic transmissions;

This qualification reference was endorsed by the Faculty Council, Record № 4 dated 27.05.2010.

Department Chair /s/ Dean /s/

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FACULTY OF MECHANICAL AND PRECISION ENGINEERING

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C U R R I C U L U M

Degree course: **HYDRAULIC, PNEUMATIC AND HEAT ENGINEERING**
Academic degree: **BACHELOR**
Higher education area: **TECHNICAL SCIENCES**
Professional trend: **MACHINE ENGINEERING**
Professional qualification: **MACHINE ENGINEER**
Form of training: **FULL-TIME**
Duration of training: **8 (EIGHTH) SEMESTERS**

№	SUBJECTS TAUGHT	FORMS OF ASSESSMENT **E - EXAMINATION CA – CONTINUOUS ASSESSMENT**	COURSE-WORK	WORKLOAD IN NUMBER OF ACADEMIC HOURS				WEEKLY DISTRIBUTION L + SC + LC	TYPE OF SUBJECT	ECTS CREDITS
				LECT-URES	SEMI-NAR CLASS-ES	LABO RATO RY CLAS S-ES	TOTAL			
1	2	3	4	5	6	7	8	9	10	11
	First Semester									
1.	Calculus, part 1	E		30	30	0	60	2+2+0	C	5/2.3
2.	Informatics	E	CW	30	0	30	60	2+0+2	C	6/2.3
3.	Chemistry	E		30	0	15	45	2+0+1	C	4/1.7
4.	Engineering Graphics I	CA		15	0	30	45	1+0+2	C	5/1.7
5.	Materials Science	E		30	0	30	60	2+0+2	C	6/2.3
6	Placement			0	0	30	30	0+0+2	C	1/1
7	Foreign Language			0	30	0	30	0+0+2	E	3/1.1
8.	Physical Education			0	(30)	0	(30)	(0+2+0)	E	(3/1.1)
	First year, first semester	***4E 1CA***	***CW***	***135***	***60***	***135***	***330***	***9+4+9=22***		***30/12.4***

1	2	3	4	5	6	7	8	9	10	11
	Second Semester									
9	Calculus, part 2	E		30	30	0	60	2+2+0	C	5/2.3
10.	Physics	E		30	0	30	60	2+0+2	C	5/2.3
11.	Mechanics, part 1	E	CW	30	30	0	60	2+2+0	C	6/2.3
12.	Technology of Engineering Materials	E		30	0	30	60	2+0+2	C	6/2.3
13.	Engineering Graphics II	CA	CW	0	0	30	30	0+0+2	C	4/1.1
14.	Placement			0	0	30	30	0+0+2	C	1/1
15.	Foreign Language	CA		0	30	0	30	0+2+0	E	3/1.1
16.	Physical Education			0	(30)	0	(30)	(0+2+0)	E	(3/1.1)
	First year, second semester	***4 E / 2 CA***	***2 CW***	***120***	***90***	***120***	***330***	***8+6+8***	***=22***	***30/12.4***
	Third Semester									
17.	Calculus, part 3	E		30	30	0	60	2+2+0	C	5/2.3
18.	Mechanics, part 2	CA		30	0	30	60	2+0+2	C	5/2.3
19.	Strength of Materials	E	CW	30	15	15	60	2+1+1	C	6/2.3
20.	Fluid Mechanics	E		30	0	30	60	2+0+2	C	5/2.3
21.	Thermodynamics	E		30	0	30	60	2+0+2	C	5/2.3
22.1	Projects Management	CA		30	15	0	45	2+1+0	E	4/1.7
22.2	Industrial Marketing	CA		30	15	0	45	2+1+0	E	4/1.7
23	Physical Education			0	(30)	0	(30)	(0+2+0)	E	(3/1.1)
24	Foreign Language	CA		0	60	0	60	0+4+0	O	5/2.3
	Second year, third semester	***4 E 2 CA***	***1 CW***	***180***	***60***	***105***	***345***	***12+4+7=23***		***30/13.2***
	Fourth Semester									
25.	Electrical Engineering and Electronics	CA		30	0	15	45	2+0+1	C	4/1.7
26.	Quality Management Systems	CA		30	15	0	45	2+1+0	C	5/1.7
27.	Metrology	E		30	0	30	60	2+0+2	C	5/2.3
28.	Heat and Mass Transfer	E		30	0	30	60	2+0+2	C	5/2.3
29	Machine Elements	E	CW	30	0	30	60	2+0+2	C	6/2.3
30	Computer Aided Design (CAD)	E		30	0	30	60	2+0+2	C	5/2.3
31	Physical Education			0	(30)	0	(30)	(0+2+0)	E	(3/1.1)
32	Work Placement			0	0	0	(60)		C	(2/0)
	Second year, fourth semester	***4 E 2 CA***	***1 CW***	***180***	***15***	***135***	***330***	***12+1+9***	***=22***	***30/12.6***
	Fifth Semester									
33.	Selected Chapters of Uninterrupted Continua Mechanics	CA		45	15	15	75	3+1+1	C	6/2.8
34.	Technology of Production of Hydraulic and Pneumatic Equipment	E		30	0	30	60	2+0+2	C	5/2.3

1	2	3	4	5	6	7	8	9	10	11
35.	Volumetric Hydraulic and Pneumatic Machines	E		45	0	30	75	3+0+2	C	7/2.8
36.	Measurement of Hydro, Pneumatic and Heat Quantities	E		30	0	30	60	2+0+2	C	5/2.3
37.	Fundamentals of Ventilating and Air-Conditioning	E		30	15	15	60	2+1+1	C	5/2.3
38	Project on subject 33, 34,36, 37								C	2/0
39	Physical Education			0	*(30)*	0	(30)	(0+2+0)	O	(3/1.1)
	Third year, fifth semester	***4 E 2 CA***		***180***	***30***	***120***	***330***	***12+2+8=22***		***30/12.5***
	Sixth Semester									
40	Heat Exchangers	E		30	0	30	60	2+0+2	C	5/2.3
41.	Turbo-Pumps, Turbo-Compressors and Fans	E		45	15	15	75	3+1+1	C	6/2.8
42	Water Turbines	E		30	15	15	60	2+1+1	C	5/2.3
43	Hydro and Pneumatic Drives	E		45	0	30	75	3+0+2	C	6/2.8
44	Volumetric Hydraulic and Pneumatic Machines - project	CA							C	2/0
45.	Renewable Energy Resources	CA		45	0	15	60	3+0+1	C	6/2.3
46	Physical Education			0	(30)	0	(30)	(0+2+0)	O	(3/1.1)
47	Vocational Placement			0	0	0	(60)		C	(2/0)
	Third year, sixth semester	***4 E 2CA***		***195***	***30***	***105***	***330***	***13+2+7=22***		***30/12.5***
	Seventh Semester									
48.	Control System Engineering	E		45	0	30	75	3+0+2	C	7/2.8
49.1	Economics of Enterprise	CA		30	15	0	45	2+1+0	E	4/1.7
49.2	Company Management	CA		30	15	0	45	2+1+0	E	4/1.7
50	Hydraulic Transmission	E		30	15	15	60	2+1+1	C	5/2.3
51	Refrigeration Engineering	E		45	15	15	75	3+1+1	C	7/2.8
52	Hydro and Pneumatic Drives - Project	CA							C	2/0
53	Electric Drives and Equipment	E		30	0	30	60	2+0+2	C	5/2.3
54	Physical Education			0	(60)	0	(60)	(0+4+0)	O	(5/2.3)
	Fourth year, seventh semester	***4E 2CA***		***180***	***45***	***90***	***315***	***12+3+6=21***		***30/11.9***
	Eighth Semester									
55.	Thermal Equipment for Industrial Application	E		30	0	30	60	3+0+3	C	5/2.3
56.	Hydro and Pneumatic Conveying Systems and Special Pumps	E		30	0	20	50	3+0+2	C	4/1.9
57.	Safety Engineering	CA		20	0	10	30	2+0+1	C	2/1
58	Hydraulic and Pneumatic Automation	E		40	0	20	60	4+0+2	C	5/2.3
59.	Graduation Practice									4/0
60	Graduation Thesis									10/0
	Fourth year, eighth semester	***3 E 1 CA***		***120***	***0***	***80***	***200***	***12+0+8=20***		***30/7.5***
	Total for the entire course of study	***31E 14CA***	***5CW***	**1290**	***330***	***875***	***2495***			***240/94.4***

PRACTICAL TRAINING

Practical placement – 60 hours after the sixth semester;
The duration of training during the eighth semester is 10 weeks.

ABBREVIATIONS USED

C – compulsory subjects according to the curriculum
E – elective subjects
O – optional subjects

SUBJECTS		WORKLOAD	
Type	Number	Hours	%
C	46	2 360	93,00
E	5	150	7,00
TOTAL:		2510	100
O	4	180	

Endorsed with Faculty Board resolution, Record No 4 dated 04.05.2010.

Department Chair /s/ Dean /s/