

## SYLLABUS

**1. Course title:**

FUNDAMENTALS OF POWER MACHINES

**2. Code:**

**3. Cycle of study:**

I

**4. ECTS credits:**

3

**5. Type of course:**

Elective

**6. Prerequisites:**

None

**7. Class restrictions:**

None

**8. Duration / semester(s):**

I

VI

**9. Weekly contact hours and student workload:**

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)
	VI	-		
9.1. Lectures	2	-		Classes: 33,75
9.2. Seminars	0	-		Individual work: 53,5
9.3. Laboratory / Practice classes	1	-		In total: 87,25

**10. Faculty:**

Faculty of Mechanical Engineering

**11. Department/study program:**

Mechatronics

**12. Lecturer:**

Midhat Osmić, Associate Professor

**13. Course aims:**

The aim of this course is to acquire basic theoretical knowledge and practical skills in the field of pumps, compressors and fans, namely: the basics of their construction, characteristics and their use, regulation and maintenance. During the class, participants will learn about the types, characteristics, importance, application, advantages and disadvantages of pumps,

compressors and fans.

#### 14. Learning outcomes:

At the end of the course, the student is expected to acquire basic knowledge about the characteristics, construction, use and maintenance, as well as the development of the aforementioned systems, which can be found today in almost all industries, including various industrial systems and plants, various control and regulation systems, refrigeration technology of which they are an inseparable part.

#### 15. Course content:

Within the scope of the course, the following thematic units will be studied:

1. Introduction, classification of pumps, turbopumps,
2. Basic characteristics of machines for transporting liquids and gases, working in conjunction with pipelines,
3. Centrifugal pumps, Euler's equation, theoretical and working effort,
4. Degrees of utilization, similarity theory, specific number of revolutions,
5. Regulation and testing of centrifugal and axial machines, damping, changing the number of revolutions..., flooding of pumps, irregularities in operation, example of testing,
6. Single-stage and multi-stage pumps,
7. Test.
8. Axial pumps and fans, basics of the theory,
9. Cavitation in pumping systems, balancing tanks,
10. Other types of pumps (piston, rotor, hybrid, current, self-priming)
11. Coupling of pumps and fans,
12. Pump stations,
13. Basic characteristics of fans, application
14. Basic characteristics of the compressor, application
15. Test

#### 16. Learning methods:

Lectures are conducted in a classical way, using multimedia resources and techniques of active learning and student participation. Preparation and presentation of individual seminar papers, consultations.

#### 17. Assessment methods:

During the semester, students continuously listen to lectures from the subject teaching units. Halfway through and at the end of the semester, students pass the material in the form of a written knowledge test. Evaluation is done by two tests that carry 40 points, of which the student must score at least 50% of the points per test. The tests consist of theoretical questions. In both cases, theoretical questions carry 20 points each. In addition to tests, during the semester, students prepare an individual or group seminar paper, the submission of which can earn the student 25 points. The student can also get part of the points based on the attendance at lectures and exercises in the amount of 5. The student must have a minimum of 3 points to get the teacher's signature after completing the course. The final exam carries 30 points. In order to pass the course, the student must obtain a minimum of 54 cumulative points, of which 15 points in the final exam.

Grading system:  $(5) + (40) + (25) + (30) = (100)$  points

Descriptive grades For the number of points achieved

Grade	Described	Letter grade	Points
5 (five)	Does not satisfy the minimum criteria	F, FX	<54
6 (six)	Sufficient minimum criteria	E	54-64
7 (seven)	Overall good, but with some significant flaws	D	65-74
8 (eight)	Average, with noticeable flaws	C	75-84
9 (nine)	Above average	B	85-94
10 (ten)	An exceptional success	A	95-100

#### 18. Assessment components:

Grading will be based on the following activities

Pre-exam obligations:

- Active participation during class -5 points
- Tests - 40 points

-Seminar paper-25 points

Final exam.

- Written/oral exam -30 points

Total points 100

### 19. Mandatory reading list:

Delalić S., Buljubašić I.: Pumpe, ventilatori, kompresori, Tuzla, 2007.

Krsmanović Lj., Gajić A.: Turbomašine, MF Beograd, izdanja 1998 ili 2005 ili 2015.

Marc Borremans, Pumps and Compressors, WILEY, 2019.

Tony Giampaolo, Compressor Handbook, CRC Press, 2010.

### 20. Additional reading list:

Zbirka riješenih zadataka za PVK, Tuzla, 1997.

Željko Jambrošić, Pumpe i Pumpne stanice,

### 21. Web sources:

[https://www.pfri.uniri.hr/web/dokumenti/uploads\\_nastava/20191216\\_103156\\_bernecic\\_Kompresori.pdf](https://www.pfri.uniri.hr/web/dokumenti/uploads_nastava/20191216_103156_bernecic_Kompresori.pdf)

<https://www.researchgate.net/publication/354270113>

### 22. Applicable from the academic year:

2025/2026

### 23. Adopted in the Faculty/Academy session: