SYLLABUS

1. Course title:

DIAGNOSTICS OF ENERGY SYSTEMS

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 VIII

9. Weekly contact hours and student workload:

	Semester (1)	Semester (2)	(for two-semester courses)	Workload: (hours)
9.1. Lectures	2		Classes:	22,50
9.2. Seminars	0		Individual work:	67,42
9.3. Laboratory / Practice classes	0		In total:	89,92

10. Faculty:

Faculty of mechanical engineering

11. Department/study program:

Energetics and thermo-fluid engineering

12. Lecturer:

dr.sc. Indira Buljubašić, Prof.

13. Course aims:

• Acquiring the necessary engineering knowledge to identify technical problems in plant operation, identify critical parts and define a methodology for eliminating the causes of plant malfunctions.

• Getting to know the range of equipment and methods for engineering diagnostics and developing skills for their application. Understanding the position and costs of technical diagnostics in the maintenance of technical systems.
• Getting to know the factors that influence the design of maintenance organizations based on technical diagnostics. Practical determination and analysis of the reliability of diagnostic methods in energy.

14. Learning outcomes:

• Possession of engineering skills to analytically approach a specific facility and, based on available documentation, relevant measurement results, visual inspection, draw a conclusion on the correct operation of the facility, identify deficiencies and prescribe a methodology for resolving the observed defect.
• Acquired knowledge and skills for using models, optimization procedures, familiarization with measuring equipment, information system settings for application in the organization of maintenance systems for complex technical systems.

15. Course content:

Dynamics of processing teaching units by weeks:
1. Definitions, classification, application stages and objects of technical diagnostics.
2. Processes of changing the state and properties of energy systems.
3. Analyzing diagnostic models, optimization according to the hierarchical importance of the energy system.
4. Diagnostics of lines for energy sources, air, technical gases, steam, oil, electricity.
5. Measurements at the plant. Overview of basic measurements for determining the operational availability of the plant.
6. Diagnostic algorithms. Defining the structure of the plant and basic modules.
7. Selection of diagnostic methods and techniques. Specification of diagnostic parameters.
8. Selection of diagnostic equipment. Sequence of testing.
9. Testing regime. Preliminary tests.
10. Locating the problem focus. Signing the repair program.
11. Realization of service requests. Verification.
12. Checking the geometry of elements. IBR diagnostics.
13. Vibrodiagnostics. Presentation and defense of a seminar paper.
14. Qualitative and quantitative analysis of fluids and materials. Presentation and defense of a seminar paper.
15. Intelligent and expert systems in energy. Presentation and defense of a seminar paper.

16. Learning methods:

Lectures using multimedia tools, active learning techniques with active participation and discussions of students. Preparation of assignments and preparations for other assigned activities as part of the exercises. In addition to the above, students have access to consultations with the subject teacher during lecture times as well as during certain consultation times.

17. Assessment methods:

Pre-exam requirements - Students are required to prepare an individual project assignment/seminar paper that involves the selection and application of technical diagnostics methods for a specific energy facility. During the preparation, the seminar paper must be sent to the teacher for review, who assists with advice and review, and when the work is completed, the teacher scores the work and then the student can present and defend the seminar in front of the teacher. In order for the seminar to be considered completed, the student must receive at least 50% of the points allocated for the preparation, and at least 50% of the points allocated for the defense. The student can also earn some points based on attendance at classes and exercises.
Final exam - The exam consists of a part in which the theoretical part of the course is taken. The exam is considered passed if a minimum of 50% of the points on theory are achieved.

Scoring scale:

Rating	Described	Verbally	Points
5 (five)	Does not meet the minimum criteria	F, FX	< 54
6 (six)	Meets the minimum criteria of	E	54-64
7 (seven)	Generally good, but with significant flaws	D	65-74
8 (eight)	Average, with noticeable errors	C	75-84
9 (nine)	Above average, with some errors	B	85-94
10 (ten)	Exceptional success without mistakes or with minor mistakes	A	95-100

18. Assessment components:

Pre-exam requirements (points):
- Lecture attendance - 2.5
- Exercise attendance 2.5
- Project assignment/seminar paper 30 writing +20 defense=50
Pre-exam requirements - total points: 55
Final exam - total points 45
TOTAL: 100 points

19. Mandatory reading list:

1. Milovančević M.: Tehnička dijagnostika, Mašinski fakultet u Nišu, 2011.
2. Šćepanović S.: Tehnička dijagnostika (monografija), VTŠ, Beograd, 2009.
3. Z.Zavargo: Održive tehnologije, TEMPUS, Novi Sad, 2013.

20. Additional reading list:

1. Hillier F. S., Lieberman G. J.: Introduction to operations research, McGraw-Hill, New York, 2000.
2. P. Breeze: Power Generation Technologies, Elsevier, 2019.
3. G.Boyle: Renewable Energy- power for a sustainable future, Oxford, (2004) 2012.
4. M.Ebrahimi: Power Generation Technologies- Foundations, Design and Advances, Elsevier, 2023.
5. Y.Zang et.al: Advances in ultra low emission control technologies for coal-fired power plants, Elsevier, 2019.

21. Web sources:

https://www.iea.org/
https://commission.europa.eu/topics/energy_hr
https://www.energy-community.org/

22. Applicable from the academic year:

2025/26.

23. Adopted in the Faculty/Academy session: