SYLLABUS

1. Course title:

WIND POWER PLANTS

2. Code:

3. Cycle of study:

I

4. ECTS credits:

4

5. Type of course:

Mandatory

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:	45,00
9.2. Seminars	1		Individual work:	72,58
9.3. Laboratory / Practice classes	1		In total:	117,58

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 academic competencies necessary for analyzing wind energy potential, selecting a location and preparing documentation for the construction of a wind power plant.

• Acquiring academic competencies necessary for designing wind power plants - blade sizing, calculating power, torque and aerodynamic characteristics, calculating based on similarity theory and forming a wind power plant..

14. Learning outcomes:

• Ability to analyze the potential of wind energy use at different locations, select a location and prepare documentation for the construction of a wind power plant.
• Ability to understand different designs of wind turbine plants and design methods, select the appropriate wind turbine for given operating conditions, use knowledge of mathematics, programming, mechanics and fluid mechanics in the calculation of wind turbines.

15. Course content:

Dynamics of processing of teaching units by weeks:
1. The importance of using wind energy. Development trends. Installed capacities.
2. Fundamentals of wind energy conversion. Available wind power.
4. Wind turbine power and torque. Wind turbine aerodynamics. Rotor design and efficiency.
3. Wind resources and characteristics. Estimation of potential wind resources.
4. Wind measurement and instrumentation. Wind data analysis.
5. Using numerical or fluid dynamics models for flow characterization.
6. Overview of wind turbine development.
7. Wind energy conversion systems - wind generators, wind generator parks
8. Performance of wind energy conversion systems - wind turbine power curve, capacity factor,.
9. Matching the turbine to the wind regime, performance of wind-driven pumping systems.
10. Wind energy and the environment - life cycle analysis of the plant, environmental problems of wind energy.
11. Wind energy economy - overview of production costs of networked wind farms.
12. Availability, lifetime, capital costs of construction, maintenance of wind farms.
13. Wind turbine electrical system-accumulation of electrical energy. Test with tasks.
14. Connection to the public network, losses in the transmission system.
15. Management and supervision of the operation of wind farms within the EES..

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/associate during lecture/exercise periods as well as during certain consultation periods.

17. Assessment methods:

Pre-exam requirements - In the second part of the semester, a test is taken from tasks that were done in the auditory exercises, and if at least 50% of the points are scored on the test, the test is passed. If the tasks are not passed on the test, the test is taken during the final exam and the expected part of the points is transferred and scored during the final exam. As part of the pre-exam requirements, students are required to prepare an individual project assignment that involves designing a wind power plant with the given data. The seminar paper must be sent to the assistant for review, who helps with advice and review, and when the work is completed, the assistant scores it and then the student can present and defend it in front of the professor. In order for the seminar to be considered completed, the student must receive at least 50% of the points expected for the preparation, and at least 50% of the points expected 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 tasks are done (for those who did not pass the test) as well as a theoretical part. The exam is considered passed if a minimum of 50% of points are achieved in the assignments and a minimum of 50% of points in the theory.

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 20 writing +10 defense=30
- Test with assignments 30

Pre-exam requirements - total points: 65
Final exam - total points 35
TOTAL: 100 points

19. Mandatory reading list:

1. Begić F., Hadžiabdić M.: Energija vjetra (osnove konverzije, zaštita okoline, ekonomija), Sarajevo, 2011.
2. Pilić Rabadan LJ. i dr: Hidroenergetska i aeroenergetska postrojenja, Zagreb, 1996.
3. Buljubašić I., Osmić M.: Elektrane i okolina, Soreli d.o.o. Tuzla, 2020

20. Additional reading list:

1. Z.Zavargo: Održive tehnologije, TEMPUS, Novi Sad, 2013.
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: