SYLLABUS

1. Course title:

HYBRID 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 **VII**

9. Weekly contact hours and student workload:

Semester (1)	**VII**	**Semester (2)**	**-**	**(for two-semester courses)**	**Workload: (hours)**
9.1. Lectures	**2**		**-**	**Classes:**	**33,75**
9.2. Seminars	**1**		**-**	**Individual work:**	**56**
9.3. Laboratory / Practice classes	**0**		**-**	**In total:**	**89,75**

10. Faculty:

Faculty of Mechanical Engineering

11. Department/study program:

Energetics and thermo-fluid engineering

12. Lecturer:

Midhat Osmić, Associate Professor

13. Course aims:

Acquisition of theoretical knowledge in the field of hybrid energy systems, basic knowledge of the concept of hybrid systems, the use of renewable energy sources in combination with other sources and the storage of the obtained electrical energy, the impact on the environment, the advantages and disadvantages of such systems.

14. Learning outcomes:

At the end of the semester/course, successful students, who have continuously performed their duties during the entire teaching period, will be able to: define the term of hybrid energy system, learn the basic postulates of the functioning of independent systems, define and analyze different combinations of hybrid systems, participate in analyzing and evaluating the work existing and designing new hybrid systems.

15. Course content:

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

1,2.Introduction, classic energy systems, advantages and disadvantages, impact on the environment,
3. The importance of hybrid energy systems in current and future energy supply.
4.5.Importance and ways of assessing energy potential with reference to availability in the general case.
6,7. General hybrid energy systems, energy transformation and the width of use.
8.Test
9.Sustainability of such systems and environmental protection, impact on the atmosphere.
10. Strategies and international conventions in the field of energy, market perspective.
11,12.Energy storage in hybrid energy systems, transport and change of energy potential.
13.Energy needs, potentials and system sizing. Techno-economic analysis of hybrid systems.
14.Application perspectives and examples of derived systems.
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. Students pass the material in the form of a written knowledge test. The evaluation is performed by one test with theoretical questions, where the student must score at least 50% of the points. In addition to the test, during the semester, students prepare an individual or group seminar paper, the submission of which can earn the student 25 points. A student can also earn part of the points based on attendance at lectures and exercises, up to 5 points. A student must have a minimum of 3 points to get the teacher's signature. 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 are on 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:

I.Buljubašić, M.Osmić, Elektrane i okolina, Tuzla, 2020.
Yatish T Shah, Hybrid Energy Systems, CRC Press, 2021.
Djamila Rekioua , Hybrid Renewable Energy Systems, Springer, 2020.

20. Additional reading list:

Anton Lindh, Optimisation of Hybrid Renewable Energy systems, KTH, Sverige, 2024
Đonlagić M.: Energija i okolina, Tuzla, 2005.

21. Web sources:

https://kth.diva-portal.org/smash/get/diva2:1886556/FULLTEXT01.pdf
research-hub.nrel.gov/en/publications/
https://www.researchgate.net/publication/321303215_Hybrid_Renewable_Energy_Systems

22. Applicable from the academic year:

2025/2026

23. Adopted in the Faculty/Academy session: