

SYLLABUS

1. Course title:

WASTE WATER TREATMENT

2. Code:**3. Cycle of study:**

1

4. ECTS credits:

8

5. Type of course: Mandatory Elective**6. Prerequisites:****7. Class restrictions:****8. Duration / semester:**

1

8

9. Weekly contact hours:

9.1. Lectures:

3

9.2. Seminars:

2

9.3. Laboratory/Practice classes:

2

10. Faculty:

Faculty of Technology

11. Department/study program:

Chemical Engineering and Technologies / Ecological Engineering

12. Lecturer:

Vahida Selimbašić, full professor

13. Lecturer's e-mail:

vahida.selimbasic@untz.ba

14. Web site:

www.tf.untz.ba

15. Course aims:

Students will become familiar with the types of waste water, their quality indicators, purification methods, and methods of disposal of sludge remaining after wastewater treatment.

16. Learning outcomes:

- the impact of pollution on water ecosystem
- the necessity of waste water purification and its link with sustainable development
- sources and characteristics of waste water, indicators of pollution
- the calculation of wastewater loads by harmful substances and the number of equivalent residents
- selection of wastewater treatment method
- mechanical methods of wastewater treatment
- physico-chemical treatment of waste water
- biological treatment of waste water
- calculation of the basic parameters of running the process of returning the biomass of the active sludge
- biological sludge treatment processes

17. Course content:

The importance of natural waters. Pollution of natural waters. Indicators of pollution: physical, chemical, biological, radiological. Specific and non-specific indicators of quality. Self-purification process and acceptance capacity. Oxygen status in water. Quantities and quality of wastewaters. Urban wastewaters. Industrial wastewaters. Cooling wastewaters. Precipitation wastewater. Leachate wastewaters. Wastewater load by harmful substances and the number of equivalent residents. Wastewater treatment. Mechanical methods of wastewater treatment. Physico-chemical processes and methods of waste water treatment. Biological processes for wastewater treatment. Treatment of sludge generated in the waste water treatment. Pre-treatment facilities and equipment of I, II and III degree of wastewater treatment. Wastewater management strategy (national and local regulations, regulations and recommendations for waste water treatment and output quality).

18. Learning methods:

lectures (through interactive lectures to introduce students with types and indicators of waste water quality, purification methods and sludge treatment methods)
auditorial exercises (group solving of given problems)
laboratory exercises (group solving of given problems, visits to waste water treatment plants)
seminar (group solving of given problems)
consultations- through consultations, students can deepen the knowledge acquired at lectures.

19. Assessment methods:

Throughout the course, students are required to regularly attend lectures and exercises. Students' attendance records will be regularly kept. On a special form, the subject teacher will continuously monitor the presence of each student. During the semester, the student can be absent with a maximum of three lectures and three exercises, being obliged to bring proof of justification of absence (medical certificate, etc.). In the case of more unexcused absences, the student loses the right to the signature of the teacher.

- TESTS - Two tests throughout the semester, for the oral part of the exam, and two tests for the written part of the exam, ie a total of 4 tests. Each test for the oral part of the exam consists of 20 short theoretical questions related to the previously processed lectures and carries 15 points (for a passing grade, one should achieve a minimum of 8 points). Each test for the written part of the exam consists of two assignments related to the previously processed lectures and carries 10 points (for a passing grade, one should achieve a minimum of 6 points). Tests are usually conducted after every six weeks of lectures, whereby the subject teacher will announce them to the students at least two weeks before each test.
- LABORATORY EXERCISES: the student is obliged to do all laboratory exercises, and based on activity in exercises can achieve a maximum of 10 points (for a passing grade should achieve a minimum of 6 points).
- FINAL PART OF THE EXAM - Students who have collected the required number of points by all criteria (54 points), have the option of additional (verbally or in writing exam) for a higher final grade. The maximum number of points that can be obtained on the final exam is 30. The minimum number of points, which must be reached on the final exam is 18.

All the students who did not meet the conditions in one of the tests or who are not satisfied with the grade, but who have completed all other obligations of the course (have the signature of the subject teacher in the index) take the final exam. The student can not get a final grade if he has not passed all the tests.

- SEMINAR WORK OF STUDENTS: student has the opportunity to do one seminar work. Successfully prepared and verbally performed seminar work is evaluated with a maximum of 5 points (minimum 3 points), which are added to the total number of points achieved on other bases, in the formation of the final grade.

20. Assessment components:

The final grade is based on the total number of points obtained through prerequisites and the final exam, according to the quality of the acquired knowledge and skills. It has a maximum of 100 points, according to the following scale:

Regularity of teaching attendance (lectures + exercises): 5 points

Activity in laboratory exercises: 10 points

Tests (theory): 30 points

Tests (assignments): 20 points

Seminar paper: 5 points

Final exam: 30 points

21. Required reading list:

Selimbašić V, Stuhli V (2012). Procesi obrade otpadnih voda sa zakonskom regulativom. OFF-SET, Tuzla.

Tušar B (2009). Pročišćavanje otpadnih voda. KIGEN, GFV, Zagreb.

Selimbašić V, Cipurković A, Crnkić A (2014). Hemija i zaštita okoline. OFF-SET, Tuzla

22. Web sources:**23. Applicable starting from the academic year:**

2015/2016

24. Adopted in the Faculty/Academy session: