SYLLABUS

1. Course title:

Treatment of industrial waste waters

2. Code:

3. Cycle of study:

1

4. ECTS credits:

3

5. Type of course:

◯ Mandatory   ⦿ Elective

6. Prerequisites:

No prerequisites

7. Class restrictions:

8. Duration / semester:

| 1 | | 5 |

9. Weekly contact hours:

9.1. Lectures:	2
9.2. Seminars:	0
9.3. Laboratory/Practice classes:	1

10. Faculty:

Faculty of Technology

11. Department/study program:

Chemical Engineering and Technologies / Chemical Engineering and Technology

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:

To introduce students to sources of wastewater generation, their characteristics and present pollutants in terms of possible impacts and processing problems, then with different processing processes, conventional and advanced, with wastewater management strategies and selection of processes in key industries.

16. Learning outcomes:

1. apply requirements for the appropriate water quality and analyze the characteristics of industrial wastewaters
2. Define processes and process equipment, and input and output values in the wastewater treatment process for specific industry
3. outline the flow diagram of the wastewater treatment process
4. apply an integrated wastewater management strategy
5. ability of either stand alone or team work in the lab and presentation of the work in written and oral form.

17. Course content:

Definition of municipal and industrial waste waters. Waste waters features. Sources and impacts of pollutants on wastewater treatment plants. Industrial waste waters, characterization and reduction of pollutants.
Overview of physico-chemical waste water treatment processes and process units. Coagulation / flocculation. Precipitation. filtration. Chemical processing. Neutralization. Reduction. Oxidation. Membrane separation processes. Advanced oxidation processes. An overview of biological wastewater treatment processes, as well as ecological and toxic effects. Processing processes with active sludge. Nitrogen removal (nitrification, denitrification). Biological removal of phosphorus. Aerobic biofilters. Rotating biodiscs. Anaerobic processes. Processing and disposal of active sludge. Optimization of biological processing processes. 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 sources of wastewater generation, different processes of treatment, wastewater management strategies and selection of procedures in key industries).
laboratory exercises (group solving of given problems, visits to plants for treatment of industrial waste waters)
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. Each test for the oral part of the exam, consists of 20 short theoretical questions related to the previously processed material and carries 15 points (for a passing grade, one should achieve a minimum of 8 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 25 points (for a passing grade should achieve a minimum of 15 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 verbaly performed seminar work is evaluated with a maximum of 10 points (minimum 6 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: 25 points
Tests (theory): 30 points
Seminar paper: 10 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.

22. Web sources:

23. Applicable starting from the academic year:

2015/2016

24. Adopted in the Faculty/Academy session: