SYLLABUS

1. Course title:

Mass and energy balances of processes

2. Code:

3. Cycle of study:

1

4. ECTS credits:

7

5. Type of course:

(•) Mandatory ( ) Elective

6. Prerequisites:

Mathematics, Physics, Chemistry

7. Class restrictions:

no restrictions

8. Duration / semester:

1 5

9. Weekly contact hours:

9.1. Lectures:	3
9.2. Seminars:	3
9.3. Laboratory/Practice classes:	0

10. Faculty:

Faculty of Technology

11. Department/study program:

Chemical Engineering and Technologies

12. Lecturer:

Midhat Suljkanović, Full Professor

13. Lecturer's e-mail:

midhat.suljkanovic@untz.ba

14. Web site:

www.tf.untz.ba

15. Course aims:

The aim of the course is to build the basics for the systematic approach to chemical process analysis od units and process systems by introducing basic principles of chemical processes.

16. Learning outcomes:

After finishing the course, students that have successfully completed their tasks will be able to: accept the process unit and process streams as a elementary module in process balances of any chemical process; create mathematical model of the process based on its description; solve mass and energy balances of reactive and non-reactive processes; define heat, work, enthalpy; solve energy balances of open and closed systems with or without chemical reactions; solve simple problems involving simultaneous mass and energy balances fr reactive and non-reactive processes.

17. Course content:

1. INTRODUCTION to chemical engineering. Definition of the chemical process systems. Process parameters.
2. Basic mass balance equation. Mass balance of process unit with and without reaction; Mass balance of the combustion processes; Mass balance of the processes involving multiple units, with recycle and bypass streams. 3. Mass balance of gas-vapor systems and condensation processes. Vapor-liquid systems, partial vaporisation and condensation. Mass balance of the systems involving liquid-solid equilibrium, evaporation and crystallization processes. Mass balance of the absorption processes.
4. Energy balance. Streams specific enthalpy. Enthalpy change calculation trajectories. Basic energy balance equation and its application on the reactive and non-reactive processes; evaporation, crystallization and distillation processes. Energy balances with chemical reaction. Energy balances of combustion processes and steam production systems.

18. Learning methods:

-Lectures
-Exercises
-Individual work.
Each lecture session is presented in for of oral session and followed by examples in order to apply theoretical backgrounds. Exercises (working sessions) are focused on solving mass and energy balance problems in compliance with the lecture sessions.

19. Assessment methods:

- Two tests during semester
-Final/makeup exam

Tests during semester are organized as simple balance problems. For each test an available time id 60 minutes. Students are informed on time about exact dates for test dues. Final/makeup exam is composed of five mass and energy balance problems for which the available time is 150 minutes. Tests and final/makeup exams are graded based on the difficulty level of the each problem.

20. Assessment components:

Grade is based on the total number of points acquired during semester as well as final/makeup exam and the maximum number of points is 100 as follows:
- Lectures and exercise attendance (10 points), TEST I (20 points), TEST II (20 points).
-Final/makeup exam (50 points). In order to pass the exam student is to acquire minimum of 54 points.

21. Required reading list:

1. Felder, R. & Rousseau, R. 2000. Elementary principles of chemical processes, John Wiley & Sons.
2. Suljkanovic, M. 2007. Procesno bilansiranje, IHI.
3. Himmelblau, D.M. 2004. Basic Principles and Calculations in Chemical Engineering, Prentice-Hall.

22. Web sources:

23. Applicable starting from the academic year:

2015/2016

24. Adopted in the Faculty/Academy session:

(max. 10 char.)