SYLLABUS

1. Course title:

REACTION ENGINEERING I

2. Code:

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course:

(●) Mandatory ( ) Elective

6. Prerequisites:

Numerical methods in engineering; Material and energy balances of processes

7. Class restrictions:

8. Duration / semester:

1 6

9. Weekly contact hours:

9.1. Lectures:	4
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:

Dr. Ivan Petric, PhD, Associate Professor

13. Lecturer's e-mail:

ivan.petric@untz.ba

14. Web site:

www.tf.untz.ba

15. Course aims:

- students to be familiar with the basics of chemical-engineering kinetics and its application in the design and analysis of chemical reactors,
- students to be familiar with the numerical software package POLYMATH in solving problems in the field of chemical engineering kinetics,
- students learn how to solve problems using interactive computer modules and simulation software.

16. Learning outcomes:

After the successful completion of the learning process, the student is expected to know, understand and be able to:
- review, evaluate and differentiate different principles demonstrated through teaching,
- solve different weight-weighted problems with or without application of the numerical software package Polymath,
- analyzes the available literature for solving various problems of this course,
- compares the results of the calculation obtained in different simulation cases.

17. Course content:

1. INTRODUCTION (Basic concepts. Significance and role of reactor in the process.). 2. KINETICS AND MECHANISMS OF HOMOGENEOUS REACTION (Definitions of reaction rate. Kinetic models. Reaction mechanism.). 3. STOICHIOMETRY FOR BATCH AND FLOW REACTOR SYSTEMS (Constant-volume reaction systems. Variable-volume reaction systems. Reaction systems with phase change). 4. COLLECTION AND ANALYSIS OF EXPERIMENTAL DATA FROM REACTORS (Integral and differential data analysis method for constant and variable volume of batch reactor. Partial method of data analysis from batch reactor. Criteria for evaluation and selection of laboratory reactors). 5. IDEAL REACTORS (Batch reactor. Plug-Flow Reactor, Continuous Stirred Tank Reactor, Semi-Batch Reactor. Design equations and graphs. Algorithm for design of isothermal reactors. Advantages and disadvantages of different types of reactor. 6. REACTOR DESIGN FOR SINGLE REACTIONS (Multi-staged reactor systems, Serial and parallel connection).

18. Learning methods:

- lectures with active participation and discussion of students,
- experimental exercises (Numerical Software Package Polymath, Reactor Lab Simulation Software, Interactive Computer Modules),
- consultations.

19. Assessment methods:

After approximately every five weeks in the semester, students take one Quiz, Test-Theory and Test-calculation problem, which cover up to date the topic from lectures and exercises. During the semester, three Quizes, three Tests-theory and three Tests-calculation problem will be organized. The professor will promptly notify students of the terms of each test of knowledge. For each Quiz, Test-theory, and Test-calculation problem, a student must achieve at least 50% of the total points predicted for specific test of knowledge. Quizzes 1 and 3 are taken through interactive computer modules (Kinetic Challenge 1, Kinetic Challenge 2), and Quiz 2 is taken through ten short questions with four offered answers (with more than one correct answer). The Tests-theory and the Tests-calculation problem are taken in writing. Each Test-theory is consisted of 20 short theoretical questions related to the material being studied. Each Test-calculation problem consists of one problem with several items to be solved. The final exam can be organized in writing and orally, depending on the number of points awarded.

20. Assessment components:

The exam score is based on the total number of points that a student has accomplished by completing the preexamination commitments and taking the exam, and it contains a maximum of 100 points, and is determined as follows: attendance and activity (4 points), Quizzes (each 6 points) , Tests-Theory (each 10 points), Tests-calculation problems (10 each), Final Exam (18 points). In order to pass the course, a student has to accomplish at least 54 points.

21. Required reading list:

1. Levenspiel, O. (1998): Chemical Reaction Engineering (3rd edition), John Wiley & Sons, Inc., New York
2. Smith, J. M. (1981): Chemical Engineering Kinetics (3rd edition), McGraw-Hill, New York

22. Web sources:

23. Applicable starting from the academic year:

2015/2016

24. Adopted in the Faculty/Academy session: