SYLLABUS

1. Course title:

Pattern Recognition

2. Code:

BMI204

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course:

○ Mandatory ◉ Elective

6. Prerequisites:

[RI101] Introduction to Programming

7. Class restrictions:

Students of Faculty of Electrical Engineering, study program Electrical Engineering and Computer Science with fulfill

8. Duration / semester:

1 8

9. Weekly contact hours:

9.1. Lectures: 3

9.2. Seminars: 0

9.3. Laboratory/Practice classes: 1

10. Faculty:

Faculty of Electrical Engineering

11. Department/study program:

Electrical Engineering and Computer Science

12. Lecturer:

Ph.D. Damir Demirović, associate prof.

13. Lecturer's e-mail:

damir.demirovic@untz.ba

14. Web site:

www.fe.untz.ba

15. Course aims:

The goal is to introduce students to the fundamentals of pattern recognition with examples from several application areas with strong emphasis on applications in biomedical sciences. Students will learn about the techniques for analyzing multidimensional data of various types and scales along with algorithms for projection, dimensionality reduction, clustering and classification of data. The course will present various approaches to the data analysis and classifier design so students can make judicious choices when confronted with real pattern recognition problems.

16. Learning outcomes:

After completed course students will be competent to identify the basic problems of data dimensionality. Students will gain the knowledge of main concepts in pattern recognition, particularly classification, and learn how to differentiate the classification methods and gain the knowledge how to pick the right method for the particular problem. Also students will learn how to evaluate different methods. In practical examples students will implement the generic methods for solving real world problems.

17. Course content:

Introduction to pattern recognition. Statistical decision theory. Parameter estimation. Curse of dimensionality. Component analysis and discriminants. Non-parametric techniques. Linear discriminant functions. Neural networks. Feature selection. Unsupervised learning, clustering and multidimensional scaling. Semi-supervised learning, Syntactic pattern recognition, Applications in Biomedical engineering and Medical Image Processing and Analysis: Bayesian Networks in Medicine, Image segmentation by clustering, feature extraction from images, EEG signal pattern analysis.

18. Learning methods:

In order to achieve an efficient teaching and accomplishment of the course objectives and student competencies, during the course will be used the following methods:
- lectures,
- home work

19. Assessment methods:

1. Midterm
2. Homework
3. Final exam

During the semester, students will have two tests with tasks related to specific areas. Tests will be conducted after completion of planned lectures and theoretical exercises. Each test can bring a maximum of 20 points. Through completion of both tests student can gain maximum of 40 points. To successfully pass the written exam and thus gain the right to the final exam, student has to obtain, from all three tests, minimum 20 (twenty) points.

Homework
Students will solve several assignments at home, and present it to lecturer. For doing and presenting homework can gain maximum of 15 points.

Final exam
During final exam student solve theoretical and practical problems which brings maximal 40 points. To successfully pass the final exam student has to obtain minimal 20 points. Each assesment is passed if gains minimal 50% of points. To successfully pass the course student must gain minimal of 54 cummulative points, in which are minimal 20 points obtained from final exam.

20. Assessment components:

The grading system, participation of particular components in percentage and the method for forming a final grade is presented as follows:

Criterion	max. number of points
- attendance and activities at the lectures and exercises	5
- homework/tests	15
- midterm:	40
- final exam:	40
Total points:	100

Students can gain 5 points for attending lectures and exercises and for activity during the semester. Students can gain maximum of 15 points (15%) for doing and presenting homeworks successfully. The rest of students can gain at midterm and final exam.

21. Required reading list:

- R.O. Duda, P.E. Hart, D.G. Stork: “Pattern Classification“, J. Wiley, New York, 2001
- K. Fukunaga: “Introduction to Statistical Pattern Recognition“, Academic Press, 1990
- Bishop: “Pattern Recognition and Machine Learning“, Springer, 2006

22. Web sources:

23. Applicable starting from the academic year:

2016/2017

24. Adopted in the Faculty/Academy session:

4.4.2016.