SYLLABUS

1. Course title:

Instrumentation

2. Code:

AR104

3. Cycle of study:

1

4. ECTS credits:

6

5. Type of course:

(•) Mandatory ( ) Elective

6. Prerequisites:

[ESKE001] Fundamentals of Electrical Engineering I, [FIZ1] Physics I, [FIZ2] Physics II

7. Class restrictions:

8. Duration / semester:

1 5

9. Weekly contact hours:

9.1. Lectures:	3
9.2. Seminars:	0
9.3. Laboratory/Practice classes:	2

10. Faculty:

Faculty of Electrical Engineering

11. Department/study program:

Electrical Engineering and Computer Science

12. Lecturer:

PhD. Jakub Osmic, associate professor

13. Lecturer's e-mail:

jakub.osmic@untz.ba

14. Web site:

www.untz.ba

15. Course aims:

The aim of the course is to introduce students with modern means, devices, systems and methods for measuring physical quantities and acquisition of measurement signals. Introducing students with sensor connectivity, conditioning, filtering, converting, transferring, processing, presenting, and applying measurement signals. Getting acquainted with the architecture of modern measurement-acquisition systems. Getting acquainted with software packages and equipment for the design and implementation of measurement-acquisition systems and virtual instrumentation.

16. Learning outcomes:

At the end of the semester, successful students, who continued to perform their duties throughout the teaching period, will be trained to:
• Specify measuring equipment for the design of measuring systems for measuring, processing, transmission and presentation of measurement quantities (non-electric measurement quantities)
• design electronic circuits for conditioning and processing of measurement quantities
• design measurement systems for acquisition, processing and presentation of off-line and real-time measurement quantities
• handle software packages and data acquisition devices
• design virtual instrumentation.

17. Course content:

Introduction to Modern Measurement and Acquisition Systems. Static characteristics of sensors. Measurement of non-electric quantities. Sensors, transducers and transmitters: temperature, pressure, flow, level, force, position, speed, acceleration. Standards of measurement signals. Connecting sensors. Amplification and adjustment of measurement signals. Linearization of static characteristics of sensors. Measuring bridges. Transfer and processing of measurement signals. Forest and forestry measures. Characteristics of cable for signal transmission. Operational, differential, instrumentation and isolation amplifiers. Programmable gain amplifiers. Analogue filters of measurement signals. Digital-to-analog converters. Basics of PC architecture. A/D converter. Interrupts. Direct memory access. Connect an acquisition devices to a PC over a common bus, standard serial and parallel interfaces. Architecture AD, DA, DI/DO and timer counter of acquisition boards. Architecture of VXI, PXI and PXI Express Instruments. LabVIEW software.

18. Learning methods:

The following learning methods are planned:
• lectures
• laboratory exercises
• seminar papers / project assignments
• educational visits to companies that use equipment and devices for measuring, processing, transmission and presentation of process quantities in their work.

19. Assessment methods:

At the half of semester, students hold a colloquium that consists of lecture questions (theories) that were held in the first part of the semester as well as tasks related to the design of electronic signal conditioning circuits. The duration of both exams is two school hours. Both exams are in writing from. For each of the two exams, students can achieve a maximum of 100 points each with the weighted factor of ¼. Students on both mentioned parts must have at least 54 points. At the beginning of the second part of the semester, students receive seminar assignments that are required to be completed by the end of the semester. Seminar papers are evaluated with a maximum of 100 points with the weight factor of seminar papers 15/100. The minimum number of points students have to complete on seminar papers is 54 points. In addition to this, after each laboratory exercise, students are required to submit a report on the results of laboratory exercises on the next laboratory exercises. At the final exam, students can achieve a maximum of 100 points and the weight factor of the final exam is 1/4. The minimum number of points that students have to complete on the final exam is 54. On the final exam, students answer the questions asked in a written form at duration of one school hour, then answer the questions verbally. For student activity, students can earn up to 5 points. Also, for the presence of lectures students can achieve a maximum of 5 points.

20. Assessment components:

Students cumulatively on the exam can achieve 100 points
For pre-exam activities, students can achieve a maximum of 75 points.
The First colloquium:
Theoretical part: 54-100 points, weight factor ¼
Tasks: 54 - 100 points, weight factor ¼
Seminar work: 54-100 points, weight factor 15/100
Activity in lectures: 5 points, weight factor 1
Attendance: 5 points, weight factor 1
Final Exam: 54 - 100 points, weight factor ¼.

21. Required reading list:

V. Drndarević, "Personalni računari u sistemima merenja i upravljanja", Akademska misao, Beograd 2003
T. Brodić, "Elektronički elementi i osnovni sklopovi", Školska knjiga, Zagreb, 1995
Tomislav Brodić, "Analogna integrisana elektronika", Svjetlost

22. Web sources:

(max. 687 characters)

23. Applicable starting from the academic year:

2016/2017

24. Adopted in the Faculty/Academy session:

04.04.2016.