# Exercise 0

# Introductory laboratory

## Instruction manual

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# 1. Goal

- The goal of the exercise is to get acquainted with the equipment available in the electronic metrology lab (laboratory 301/C3).
- Observation of simple voltage waveforms and measurement of their basic parameters using multimeter and oscilloscope.
- Getting acquainted with the limitations of the equipment available in the laboratory and their influence on the measurements.

# 2. Required theoretical background

- The basic parameters of signals in the range presented at the lecture „Signals and their parameters" (http://galaxy.uci.agh.edu.pl/~lab515/dzienne/metrology/pdf/L_2_signals.pdf).
  - Amplitude, peak-to-peak value, frequency, period, phase for sinusoidal and square wave signals.
  - Sinusoidal signal with a DC offset.
  - Mean value of a periodic signal - a general formula.
  - Root-mean-square value of a periodic signal - a general formula.

# 3. Equipement used

- Function generator Rigol DG1022.
- Multimeter Agilent U3401A.
- Digital oscilloscope Tektronix TBS1154.

# 4. Preparation to the exercise

- Each student is required to prepare its own conspectus with a short (max one A4 page, simple hand-made sketches are enough) preparation according to the requirements presented in paragraph 2 of this instruction.
- Read the operation manual of Rigol DG1022 function generator, especially the sections related to: The Front/Rear Panel (1-4), User Interface (1-6), To Set a Waveform (1-7), To Set the Output (1-10), To Set Sine Waveform (2-2), To Set Square Waveform (2-7). (http://galaxy.uci.agh.edu.pl/~lab515/dzienne/metrology/pdf/DG1022.pdf)
  Example 1: Output a Sine Waveform (3-2), Example 2: Output a Square Waveform (3-3).
- Read the operation manual of Agilent U3401A multimeter related to the location of the connectors and buttons on the control panel.
  (http://galaxy.uci.agh.edu.pl/~lab515/dzienne/metrology/pdf/U3401A.pdf)

It is not required to write all information in the conspectus; however, be able to realize the exercise fast and efficiently, it is essential to know the location of various connectors and control buttons, and to understand symbols displayed on the front panel of multimeter and generator.

The conspectus is necessary for a student to be allowed to take part in the exercise. The preparation to the exercise will be checked by the laboratory instructor.

## 5. Realization of the exercise

This is an introductory laboratory and the instructions will be given by the laboratory instructor during the class. Problems that arise during the exercise will be discussed *ad hoc*.