TEACHER'S GUIDE SHEET

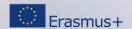|	
MODULE	MODULE BIOMECHANICS: FOUNDATIONS OF BIOMECHANICS APPLIED TO THE LOCOMOTOR SYSTEM
DIDACTIC UNIT	E: TECHNIQUES FOR THE INSTRUMENTAL ANALYSIS OF PHYSIOLOGICAL SIGNS AND ANTHROPOMETRIC AND MORPHOMETRIC PARAMETERS E.2. What are the applications of the analysis of physiological signs?
TITLE OF ACTIVITY/CLASS	Demonstration on example of Heart Rate signal extracted from raw recorded ECG data of the application field of psychological signs usage in medical diagnosis support.
OBJECTIVES	• Clarify the crucial process for medical stuff of important quantity and/or quality parameters extraction from raw recorded data by means of its analysis using mathematical methods, belonging to biomedical signal processing algorithms – on example of Heart Rate signal extraction. • Show and explain the idea of chosen application field of psychological data analysis in the spectrum of medical diagnosis support.
LENGTH	10 MINUTES OF CLASS IN TOTAL.
PREVIOUS KNOWLEDGE REQUIRED	It is advisable for the student to have at least basic knowledge about physics and human anatomy as well as read the theoretical document associated to this module.
TECHNICAL NEEDS	PC with software for the reproduction of videos with audio and power point presentation. Projector and screen to show contents appropriately to all the students during class

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RESOURCES NEEDED	Set of cards with example ECG raw data recordings and tables to estimate the Heart Rate values. Teacher can access to free worldwide psychological signals data base: Physiobank (https://physionet.org/about/database/ , https://physionet.org/ and tutorials: https://physionet.org/about/tutorial/) to gather more examples of real recordings of ECG signals.

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DESCRIPTION OF THE CLASS/ACTIVITY

A power point presentation will be used by the profesor in order to guide the class:

BASIC CONCEPTS

First, based on presentation the basic concepts about ECG signal and Heart Rate (HR) obtained from ECG will be explained.

TASK:

After explaining the basic concepts, students will start to practically estimate the heart rate based on the ECG recording, according to mathematical formula, which from two following RR peaks interval given in [s] (from ECG waves based on unit div. grid) computes the temporal Heart Rate given in [bmp].

SOLUTIONS AND EXPLAINING:

Only after having collected them, the teacher continues with the presentation, by showing the proper formula and way to estimated HR values correctly.

CONCLUSIONS OF THE CLASS

Last, the teacher will explain the conclusions (e.g. that HR in modern biomedical equipment is extracted automatically as a medical diagnosis support) of the class with a possible short discussion

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TASKS TO BE DEVELOPED BY THE STUDENT IN CLASS

TASK: From ECG recording examples printed in ECG cards students will estimated temporal Heart Rate values [bpm] and will write it to the tables.

- The students will work in groups of 5 to 10 people (depending on the total amount of pupils; it is advisable to work in small groups). They will use the cards with several ECG recordings of different type both physiological and pathological heart rhythm patterns (e.g. tachycardia, arrhythmia).

They have to measure the following RR intervals [s] from chosen ECG card by means of grid units or use a more precise ruler and recalculate them to corresponding Heart Rate value given in [bpm – bit per minutes].

They will have 5 minutes to do this task.

Once completed the first, the students will give the teacher the ECG cards with HR tables fulfilled, indicating the student's full name on each.
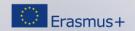
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EVALUATION METHODOLOGY

The teacher will collect the ECG cards with tables fulfilled from every student.

Each of them should be properly identified by the student, who must have written down their full names in the specific space destined to do so.

The teacher will evaluate generally the way of: 1. estimating the RR intervals in [s] and 2. computing Heart Rate values [bpm] from ECG RR intervals.

A general positive/negative overall score is awarded.