SYLLABUS[1]

1. Information about the program

1.1 Higher education institution	University Politehnica of Timisoara
1.2 Faculty[2] / Department[3]	Electronics and Telecommunications/ Measurements and Optical Electronics
1.3 Chair	–
1.4 Field of study (name/code[4])	
1.5 Study cycle	Bachelor
1.6 Study program (name/code)/Qualification	

2. Information about the discipline

2.1 Name of discipline			Biomedical Electronics				
2.2 Coordinator (holder) of course activities			□.l.dr.ing. Iftode Cora				
2.3 Coordinator (holder) of applied activities [5]			□.l.dr.ing. Iftode Cora				
2.4 Year of study[6]	4	**2.5** Semester	8	**2.6** Type of evaluation	E	**2.7** Type of discipline	mandatory

3. Total estimated time (hours / semester of didactic activities)

3.1 No. of hrs. / week	3 , of which:	**3.2** course	1,5	**3.3** seminar/laboratory/ project/training	1,5
3.4 Total no. of hrs. in the education curricula	42 , of which:	**3.5** course	21	**3.6** applied activities	21
3.7 Distribution of time for individual activities related to the discipline					hrs.
Study using a manual, course materials, bibliography and lecture notes					3.5
Additional documentation in the library, on specialized electronic platforms and on the field					3.5
Preparation for seminars / laboratories, homeworks, assignments, portfolios, and essays					3.5
Tutoring					7
Examinations					4
Other activities					
Total hrs. of individual activities					21.5

3.8 Total hrs. / semester[7]	63.5
3.9 No. of credits	3

4. Prerequisites (where applicable)

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1 The form corresponds to the Syllabus promoted by OMECTS 5703/18.12.2011 (Annex3).

2 The name of the faculty which manages the educational curriculum to which the discipline belongs.

3 The name of the department entrusted with the discipline, and to which the course coordinator / holder belongs.

4 Fill in the code provided in GD no. 493/17.07.2013.

5 The applied activities refer to: seminar (S) / laboratory (L) / project (P) / practice/training (Pr).

6 The year of study to which the discipline is provided in the curriculum.

7 It is obtained by summing up the number of hrs. from 3.4 and 3.7.

4.1 Curriculum	•
4.2 Competencies	•

5. Conditions (where applicable)

5.1 of the course	•
5.2 to conduct practical activities	•

6. Specific competencies acquired

Professional competencies[8]	• Basic knowledge of physiological system and bioelectric phenomena • Knowledge about medical biosensors and medical devices • Knowledge of some algorithms used in the processing of biomedical imaging
Transversal competencies	•

7. Objectives of the discipline (based on the grid of specific competencies acquired)

7.1 General objective of the discipline	• The breadth of activity of biomedical engineers is significant. The field of biomedical electronics include a wide-range of activities : application of engineering system analysis, detection, measuremen, and monitoring of physiologic signals, diagnostic interpretation via signal-processing techniques of bioelectric data, therapeutic and rehabilitation procedures and devices, devices for replacement or augmentation of bodily functions, computer analysis of patient-related data and clinical decision making, medical imaging and the creation of new biologic products
7.2 Specific objectives	•

8. Content

8.1 Course	No. of hours	Teaching methods
Physiologic systems: An outline of cardiovascular structure and function; Endocrine system; Nervous system; Vision system; Auditory system; Gastrointestinal system; Respiratory system;	3	ppt
Bioelectric phenomena: Basic Electrophysiology; Volume Conductor Theory; The electrical properties of tissues; Membrane models; Numerical methods for bioelectric	6	

8 The professional competencies and the transversal competencies will be treated according to the Methodology of OMECTS 5703/18.12.2011. The competencies listed in the National Register of Qualifications in Higher Education [Registrul Naţional al Calificărilor din Învăţământul Superior RNCIS] (http://www.rncis.ro/portal/page?_pageid=117,70218&_dad=portal&_schema=PORTAL) will be used for the field of study from 1.4 and the program of study from 1.6 of this form, involving the discipline.

field problems; Principles of Electrocardiography; Principles of Electromyography; Principles of Electroencephalography; Biomagnetism; Electric stimulation of excitable tissue;		
Biomedical sensors: Physical measurements;Biopotential electrodes; Electrochemical sensors; Optical sensors; Bioanalytic sensors;	3	
Biomedical signal analysis: Biomedical signals:origin and dynamic characteristics, frequency-domain analysis;Digital biomedical signal acquisition and processing; Compression of digital biomedical signals; Time-frequency signal representations for biomedical signals; Higher order spectra in biomedical signal processing; Neural Networks in biomedical signal processing; Complexity, scaling and fractals in biomedical signals; Biomedical signal processing and networked multimedia communications;	3	
Medical instruments and devices: Biopotential amplifiers; Noninvasive assessment of arterial blood pressure and mechanics; Cardiac output measurement; Bioelectric impedance measurements; Implantable cardiac pacemakers; Implantable stimulators for neuromuscular control; External defibrillators; Implantable defibrillators; Electrosurgical Devices; Mechanical ventilation; Biomedical lasers, noninvasive optical monitoring.	6	

Bibliography[9]

1. Tărâţă, Mihai, *Medical Electronics*, Sitech Publishing House, Craiova, 1999.
2. Rangayyan, Rangaraj, *Biomedical Signal Analysis,*Wiley, New York, 2002.
3. Aldroubi, Akram and Unser, Michael, *Wavelets in Medicine and Biology,* CRC Press, 1996.

8.2 Applied activities[10]	No. of hours	Teaching methods
Introduction to Matlab. Signal processing	3	Computer applications
Introduction to Matlab. Signal processing	3	

[9] At least one title must belong to the department staff teaching the discipline, and at least 3 titles must refer to national and international works relevant for the discipline, and which can be found in the Politehnica University Library.

[10] The types of applied activities are those specified in footnote 5. If the discipline contains several types of applied activities, then these will be written consecutively in the lines of the table below. The type of activity will be written in a distinct line, as „Seminar:", „Laboratory:", „Project:" and/or „Practice/Training:".

Signal processing in Labview	3	
Simulation of Dynamic Responses of the First and Second Order Linear Systems	3	
Data Acquisition Using NI-DAQmx	3	
Signal Generation Using NI-DAQmx	3	
Digital Filtering Using Matlab	3	
Wavelets in Matlab		

Bibliography [11]

1. Rangayyan, Rangaraj, *Biomedical Signal Analysis,* Wiley, New York, 2002.
2. Aldroubi, Akram and Unser, Michael, *Wavelets in Medicine and Biology,* CRC Press, 1996.

9. Corroboration of the content of the discipline with the expectations of the main representatives of the epistemic community, professional associations and employers in the field afferent to the program

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10. Evaluation

Type of activity	**10.1** Evaluation criteria	**10.2** Evaluation methods	**10.3** Share of the final grade
10.4 Course		Written exam	0.5
10.5 Applied activities	**S:**		
	L:	Written test	0.5
	P:		
	Pr:		
10.6 Minimum performance standard (minimum amount of knowledge necessary to pass the discipline and the way in which this knowledge is verified)			
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Date of completion

16.12.2016

Course coordinator

(signature)

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Coordinator of applied activities

(signature)

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[11] At least one title must belong to the staff teaching the discipline.

Head of Department	Date of approval in the Faculty Council[12]	Dean
(signature)		(signature)
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[12] Avizarea este precedată de discutarea punctului de vedere al board-ului de care aparţine programul de studiu cu privire la fişa disciplinei.