COURSE PROFILE

Course Number : EE 482	**Course Title : Introduction to Biomedical Engineering**
Required / Elective : Departmental Elective	**Pre-requisite :** Consent of instructor (EE350 and EE331)
Catalog Description: Bioelectric phenomena. Origin and nature of bioelectrical signals. Bioelectrical signals and their characteristics in time and frequency domain. Biomedical sensor, transducers and electrodes. Biopotential amplifiers and their applications. Electrical safety. Electrocardiogram (ECG), electroencephalogram (EEG), electromyogram (EMG). Application of the basic digital signal processing techniques to bioelectrical signals.	**Textbook / Required Material :** • Introduction to Biomedical Engineeering, Second Edition, J. Enderle, S. Blanchard, J. Bronzino, Elsevier, ISBN: 978-0-12-238662-6. • Biomedical Signal Analysis: A Case-Study Approach, Rangaraj M. Rangayyan, ISBN:978-0-471-20811-2.
Course Structure / Schedule : (3+0+0) 3 / 6 ECTS	
Extended Description : -	
Design content : • Design of Biopotential Amplifier. • Design of specific digital/analog filters to remove the artifacts in bioelectrical signals. • Design and implementation ORS detection, segmentation, and compression algorithms in Matlab.	**Computer usage:** Pspice and Matlab

Course Outcomes: [relevant program outcomes in brackets]:

At the completion of the course, students will be able to:

- understand how electrical signals arise in the body [2,6].
- understand the basic principles and operation of biopotential electrodes and biomedical sensors [2,6].
- measure and record bioelectric signals using biopotential electrodes [2,6].
- describe the basic requirements and features of biopotential amplifiers [2,6].
- design biopotential amplifiers that meet specific criteria and given specifications.[6,7,11]
- design appropriate analog and digital filters for bioelectrical signals [6,7,11].
- learn application-oriented signal processing techniques for biomedical signals [6,7].
- apply biosignal processing techniques for real biomedical signals [6,7,11].
- gain experience in with the application of biomedical signal processing using Matlab [6,7,11].
- assess the impact of the biomedical engineering solutions to global, economics, environmental, ethical, health and safety context [3,10].

Level of contribution of course to program outcomes:
Strong: [2], [6], [7], [11]
Average: [10]
Some:[3]

Recommended reading:

- Bioelectrical Signal Processing in Cardiac and Neurological Applications, Leif Sörnmo, Pablo Laguna, ISBN: 9780124375529.
- Introduction to Biomedical Equipment Technology, Fourth Edition, Joseph J. Carr, John M. Brown, ISBN: 0-13-010492-2.

Teaching Methods:

Pre-readings, lecture, individual exercises and group work.

Assessment Methods: [Related to course objectives]

Homework , Project , Midterm, Final .

Student Workload:

e.g. Preparatory reading	40 hrs
Lectures, discussions	21 hrs
Homeworks	45 hrs
Projects	20 hrs
Laboratory work	21 hrs
Final Exam	3 hrs
TOTAL …… 150 hrs … to match 25 x 6 ECTS	

Prepared by : Assist. Prof. Hakan Gürkan	Revision Date : 02.02.2010