BE 4100 Biomedical Signal Processing

Course Syllabus for Fall Semester 2018

Abstract

This course introduces fundamental aspects of practical signal processing, modeling, and analysis techniques for biomedical signals, using specific application to demonstrate these principles.

1 Instructor

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2 Course Goals and Objectives

Goal: The goal of this course is for the students to understand the characteristics of biomedical signals and the various algorithms which manipulate or extract information from such signals, choose an appropriate algorithm to achieve a desired result, properly implement the algorithm using modern computing tools such as MATLAB, and correctly interpret the results.

Objectives: Students will be able to

- Explain how biomedical signals are acquired, digitized, and stored (a,k).
- Calculate the limitations of signal acquisition, digitization, and storage in terms of resolution, frequency content, signal to noise ratio, and so on (a,k,l).
- Manipulate biomedical signals in the time domain and the frequency domain to achieve a desired result such as enhancement or denoising (a,b,e,k,l).
- Implement the chosen algorithm or procedure in MATLAB(k).

3 ABET and Engineering Education

Engineering programs in the United States are accredited by the Accreditation Board for Engineering and Technology (ABET). All engineering students in such accredited programs (including all engineering majors at Oakland University) must demonstrate, before graduation, that they have achieved the following program outcomes:

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multi-disciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
l. applying principles of engineering, biology, human physiology, chemistry, calculus-based physics, mathematics (through differential equations), and statistics
m. solving bio/biomedical engineering problems, including those associated with the interaction between living and non-living systems
n. analyzing, modeling, designing and realizing bio/biomedical engineering devices, systems, components, or processes systems
o. making measurements on and interpreting data from living systems

4 Course Prerequisites

BE 3899 Introduction to Bioengineering

5 Course Grading

5.1 Breakdown of Graded Events

Graded material is given the following weights.

	Weight
Homework/Quizzes	20%
Exam 1	25%
Exam 2	25%
Final Exam	30%
Total	100%

Unless arranged for ahead of time by the student with the instructor, it is not possible to make up a missed exam or quiz.

6 Course Materials and Resources

6.1 Textbooks

The primary textbook used for this course, by Rangaraj M. Rangayyan, is listed as [1] in the reference section of this syllabus. This is a very good text for this topic. You will use the book extensively in this course. For some topics, handouts may also be used.

6.2 Web Sites

We will make use of the Moodle course website located at

http://moodle.oakland.edu

A copy of this syllabus, assignments, data files, and other supplemental material will be posted to this web site. Typically, an email will be sent when updates are posted to Moodle, but you are responsible for checking it regularly.

7 Academic Conduct

Students are expected to conduct themselves according to the student handbook in the classroom, outside of the classroom, and in the labs. Any student found responsible for cheating by the Academic Conduct Committee will receive a 0.0 in this course in addition to the penalty designated by the committee. We will talk in class more about the do's and don'ts of working together and individually.