Institute of Biomedical Engineering
SYLLABUS
Mathematics for Biomedical Engineering Course
Fall Semester

Course Code	Course Name	Course Type	Weekly Hours T	A	L	Credits	ECTS	Campus / Weekly Time & Classroom Schedule
BM 504	Systems Theory for Biomedical Science	Elective	3	1	0	3	9	To be arranged.
Web Page:	http://neurosignal.boun.edu.tr/courses/							
Prerequisite		**Prerequisite to**						

Course Lecturers	Ahmet Ademoğlu	**Office Hours Schedule**	Friday 10:00 - 13:00	
E-mail	ademoglu@bogazici.edu.tr			
Phone	0216 516 3447	**Office / Room No**	A1-05	
Teaching Assistant	Hüden Neşe	**Phone**		
E-mail	hudennese@gmail.com	**Office / Room No**		

Course Objectives	Linearity and time invariance. Convolution. Fourier Analysis, Laplace Transform, z-transform, Filters, Filtering, Time-frequency Analysis.

Textbooks/ References	
1.	*Text 1: Signals and Systems, 2nd Edition,* Alan Oppenheim, Alan Willisky & H. Nawab, Prentice Hall.
2	*Text 2: Applied Digital Signal Processing,* Dimitris G. Manolakis & Vinay K. Ingle, Cambridge .
3	*Text 3: Statistical Digital Signal Processing and Modeling,* Monson Hayes, Wiley.
4	*Reference: Digital Signal Processing: A computer Based Approach, Sanjit Mitra, Mc Graw Hill.*

Learning Outcomes	
1	Basic concepts as linearity, time invariance, discrete or continuous time representation, periodicity, stabiliy and causality
2	Representation of systems through their input output relationships
3	Mathematical analysis of signals and systems using Fourier, Laplace and z transforms
4	Time and frequency domain characteristics of signals and systems
5	Sampling, Modulation and filtering of signals
6	State Space Systems and Linearization

Teaching Methods	Lecturing, assignments and tutorials.

WEEK	Work required for that week	Reading Assignment
Week 1,2	Introduction to Linear Systems	Text 1 (Related Chapter)
Week 3	Laplace Transform	Text 1 (Related Chapter)
Week 4	Continuous Time Fourier Series	Text 1 (Related Chapter)
Week 5,6	Continuous Time Fourier Transform	Text 1 (Related Chapter)
Week 6,7	Applications of Laplace and Fourier Transforms	Text 1 (Related Chapter)
Week 8	z-Transform	Text 1 (Related Chapter)
Week 9	Discrete Time Fourier Series	Text 1 (Related Chapter)
Week 9	Discrete Time Fourier Transform	Text 1 (Related Chapter)
Week 10	Sampling and Interpolation	Text 2 (Related Chapter)
Week 10	IIR Filter Design	Text 2 (Related Chapter)
Week 11	FIR Filter Design	Text 2 (Related Chapter)
Week 12	Signal Modeling	Text 3 (Related Chapter)
Week 13	Time-Frequency Analysis and Wavelets	Papers from SP Magazine
Week 13	Multirate Signal Processing	Text 2 (Related Chapter)
Week 14	Final Exams	

Assessment Methods and Criteria	Evaluation Tool	Quantity	Date	Weight in %	
	Final Exam	1		**30**	
	Semester Evaluation			**70**	
	Attendance, active tutorials, Quizzes	5		10	
	In-term exams	2		30	
	Homework Assignments	10		30	

*** ECTS Credit Calculation ***				Language of Instruction:		English

Evaluation Tool	Hour	Quantity	Student Workload Hours	Evaluation Tool	Hour	Quantity	Student Workload Hours
Theoretical hours	3	14,0	42	In Term Exam	10	2	20,0
Pre-class self study	4	14,0	56	Final Exam	20	1	20,0
Post-class self study	4	14,0	56	Assignments	5	10	50,0
GENERAL TOTAL HOURS:							240,0
Recommended ECTS Credit (Total Hours / 25) :							9