01-08-2019

In addition to Part I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No	: **ECE F434**
Course Title	: **Digital Signal Processing**
Instructor-in-charge	: Prabhakar Rao
Team of Instructors	
Tutorial	: SK Sahoo, Prabhakar Rao
Practical	: Venkateswaran Rajagopalan, Ramakant Yadav, Priyanka B G, Naveen Bokka, Pranjali Gajbhiye

1. Course Description:

This course deals with the design of analog filters like Butterworth, Chebyshev, Elliptic., digital filter design for both IIR & FIR filters. Different filter structures for the realization of digital filters will be discussed. Finite word length effects and Multirate DSP will be introduced. DSP Processor architecture and implementation of DSP algorithms will be part of the course, which will be emphasized upon.

2. Scope and Objective:

Digital signal processing is one of the most powerful technologies that have made revolutionary changes in the broad range of fields like audio and speech signal processing, sonar and radar signal processing, spectral estimation, statistical signal processing, digital image processing, signal processing for communication, biomedical signal processing. Each of these areas has developed deep DSP technology, with its own algorithms, mathematics and specialized techniques. Digital signal processors, such as TMS320 family of processors are used in a wide range of applications, such as in communications, controls, speech processing and so on.

The course aims at enumerating the theoretical and practical aspects of modern signal processing in a digital environment.

3. Text Book:
 (1) Digital Signal Processing, Sanjit K Mitra, TMH, Third Ed., 2006.

4. Reference Books:

1. Digital Signal Processing : Principles, Algorithms and Application, John G Proakis & D G Manolakis, PHI, 1998.
2. Digital Signal Processing: A Practical Approach, Second Edition, Emmanuel C. Ifeachor
    and Barrie W. Jervis, Pearson education.
3. Digital Signal Processing: Fundamentals and Applications, Li Tan, Elsevier.
4. Digital Signal Processing, Oppenhiem & Schafer, Pearson Education Asia, 2002.
5. Digital Signal Processors, Architecture, Programming and Applications",
    B. Venkataramani & M Bhaskar, TMH, 2002.

5. Course Plan:

Lecture No.	Learning Objectives	Topics to be covered	Chapter in the Text Book
1	Overview of the course	Introduction	-------
2-5	Z- Transform and its application	Basics of Z- transform and its use for analysis of LTI systems	Chapter 6
6-7	Discrete time Fourier transform	CTFT, DTFT, Phase and group delay	Chapter 3
8	Finite length discrete transform	DFT, FFT	Chapter 5 & Chapter 11 (sec.11.3 only)
9-11	Analog filter design	Butterworth,Chebyshev, Elliptic & Bessel Filters	Chapter 4
12	Analog filter design	Design of HP, BP and BS filters	4.5
13	Sampling	Sampling lowpass & bandpass signals	4.2, 4.3
14-16	Simple digital filters	Different LTI systems as frequency selective device.	7.1-7.4
17-18	Digital Filter design	IIR filter design: IIT, BLT	9
19-21	Digital Filters	Linear phase FIR filters	7.3
22-23	Digital Filter design	FIR Filter Design	10
24	DSP Architectures	General DSP architectural aspects	Class notes
25	DSP Architectures	Numeric representation used in DSP	Class notes
26 - 28	DSP Architectures	Architectural details of a typical DSP processor	R5
29, 30	Digital filter structures	Realization of IIR filters	8.4-8.8
31, 32	Digital filter structures	Realization of FIR filters	8.3, 8.9
33, 34	Finite Word-Length Effects	IIR & FIR Filters	12.1 – 12.4
35, 36	Multi rate DSP	Decimators & Interpolators	13.1, 13.2
37	Multi rate DSP	Poly phase decomposition	13.4
38	Multi rate DSP	Arbitrary rate sampling rate conversion	13.5
39	Adaptive Digital Filters	Introduction and Concepts of Adaptive filtering, Wiener Filters	RB2 10.1 – 10.3
40	Applications of DSP	Various applications	Class note/ Chapter 14
41	Applications of DSP	Various applications	Class note/ Chapter 14

6. Evaluation Scheme:

S. No.	Evaluation Component	Duration Min.	weightage	Date. time, venue	Nature of Component
1	Midsemester Exam	90	25%	30/9 3.30 – 5 pm	Closed book
2	Lab	Regular	10%		Open book
3	Lab test		10%	Will be announced	Closed book
4	Quiz Exams / Assignments	Regular	15%		Closed Book
5	Comprehensive	180	40%	5/12 FN	Closed book – 20% Open book – 20%

7. Chamber Consultation Hours: To be announced in the class.

8. Make-up Policy:

Make Up for any component will be given only in genuine cases. In all cases prior intimation must be given to IC. There will be no makeup for Lab test and Quiz component.

9. Notices: Notices regarding the course will be uploaded on CMS.

10. Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor - in - charge