



DIGITAL SIGNAL PROCESSING

PROF. C. S. RAMALINGAM

Department of Electrical Engineering
IIT Madras

TYPE OF COURSE : New | Core | UG

COURSE DURATION : 12 weeks (29 Jul'19 - 18 Oct'19)

EXAM DATE : 17 Nov 2019

PRE-REQUISITES : Networks and Systems

INTENDED AUDIENCE : UG students in ECE/EEE

COURSE OUTLINE :

This course will introduce you to the basics of discrete-time sequences, z-transform, frequency response of discrete-time systems, sampling, and the DFT.

ABOUT INSTRUCTOR :

C.S. Ramalingam obtained his BE (ECE) from the University of Madras, an M.Tech degree from IIT Kharagpur, and a Ph.D in Electrical Engineering from the Univ. of Rhode Island, Kingston, USA. He was a Member of Technical Staff at the DSPS R&D Center of Texas Instruments (Dallas, TX) from 1995—2001. Since 2001 he is with the Department of Electrical Engineering at IIT Madras, where he is currently Associate Professor. His areas of interest are Signal Processing with applications to Speech Analysis, Synthesis, and Coding.

COURSE PLAN :

- Week 1:** Introduction to discrete-time sequences, operations on the independent variable, elementary signals: unit step
- Week 2:** Elementary signals: Dirac delta, exponentials, similarities and differences between CT and DT sinusoids
- Week 3:** Introduction to systems and their properties, LTI systems, convolution
- Week 4:** Definition of the z-transform, region of convergence, simple examples, DTFT as a special case of the z-transform
- Week 5:** Properties of the z-transform
- Week 6:** Inverse z-transform
- Week 7:** Sequences having DTFT but no z-transform
- Week 8:** Response to suddenly applied inputs, response to $A \cos(l_0 n+l)$.
- Week 9:** Frequency Response of LTI systems with rational transfer function, magnitude response
- Week 10:** Phase Response
- Week 11:** Sampling
- Week 12:** Discrete Fourier Transform