



INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)
FAKULTAS TEKNOLOGI ELEKTRO DAN INFORMATIKA CERDAS
DEPARTEMEN TEKNIK ELEKTRO
Program Studi Sarjana (S1) Teknik Telekomunikasi

1	Nama Mata Kuliah / Course Name : Pengolahan Sinyal Digital / Digital Signal Processing
2	Kode Mata Kuliah / Course Code : EL234404
3	Kredit / Credits : 3 SKS
4	Semester / Semester : 4

Deskripsi Mata Kuliah / Course Description

Mata kuliah Pengolahan Sinyal Digital membahas tentang sinyal diskrit dan konsep sistem LTI waktu diskrit, bagaimana rangkaian realisasi sistem waktu diskrit berdasarkan persamaan beda, analisa frekuensi sinyal dan sistem waktu diskrit, konsep mengubah sinyal waktu kontinu menjadi sinyal waktu diskrit dengan teknik sampling, teori Nyquist dan aliasing, analisa sinyal dan sistem waktu diskrit menggunakan transformasi Z, algoritma DFT-IDFT, dan FFT-IFFT untuk analisa frekuensi sinyal dan sistem secara komputasi, disain filter Finite Impulse Response (FIR) dan Infinite Impulse Response (IIR).

Digital Signal Processing discusses discrete signals and the concept of discrete-time LTI systems, the realization of discrete-time systems based on difference equations, frequency analysis of discrete signals and systems, the concept of converting continuous-time signals into discrete-time signals using sampling techniques, Nyquist theory and aliasing, analysis of discrete-time signals and systems using Z-transform, DFT-IDFT algorithms, and FFT-IFFT for computational frequency analysis of signals and systems, as well as the design of Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) filters.

Capaian Pembelajaran Lulusan (CPL) Yang Dibebankan Mata Kuliah / Program Learning Outcomes Charged to The Course

1. (CPL-04) Mampu menerapkan ilmu pengetahuan alam dan matematika serta teknologi dan rekayasa informasi untuk memperoleh pemahaman komprehensif pada bidang teknik telekomunikasi
(PLO-04) Able to apply knowledge of sciences, mathematics, and information technology to acquire comprehensive understanding of engineering principles in Telecommunication Engineering
2. (CPL-05) Mampu merancang komponen, sistem, dan proses yang logis dan realistis sesuai dengan spesifikasi yang ditentukan dengan mempertimbangkan aspek keselamatan, sosial, budaya, lingkungan, dan ekonomi.

(PLO-05) Able to design components, systems, and/or processes to meet desired needs within realistic constraints in such aspects as law, economic, environment, social, politics, health and safety, sustainability as well as to recognize and/or utilize the potential of local and national resources with global perspective

Capaian Pembelajaran Mata Kuliah / Course Learning Outcomes

1. Mampu menjelaskan Konsep sinyal dan sistem LTI waktu diskrit / *Be able to explain the concept of discrete-time LTI signals and systems*
2. Mampu menjelaskan mekanisme analisis sinyal dan sistem LTI waktu diskrit di domain frekuensi / *Be able to explain the mechanism of signal analysis and discrete time LTI systems in the frequency domain*
3. Mampu menerapkan teori sampling dan rekonstruksi sinyal. / *Able to apply sampling theory and signal reconstruction*
4. Mampu menerapkan transformasi-Z dalam analisis sinyal dan sistem LTI waktu diskrit. / *Be able to apply Z-transforms in signal analysis and discrete-time LTI systems.*
5. Mampu merancang dan mengimplementasikan filter digital / *Able to design and implement digital filters.*

Pokok Bahasan / Contents

1. Konsep sinyal dan sistem waktu diskrit / The concept of discrete-time signals and systems.
2. Sistem LTI waktu diskrit / Discrete time LTI system.
3. Analisa frekuensi sinyal dan sistem LTI waktu diskrit / Discrete-time LTI system and signal frequency analysis
4. Sampling dan rekonstruksi / Sampling and reconstruction.
5. Transformasi-Z / Z-transform
6. Disain Filter Digital FIR / FIR Digital Filter Design
7. Disain Filter Digital IIR / Digital IIR Filter Design
8. DFT-IDFT dan FFT-IFFT / DFT-IDFT and FFT-IFFT.

Prasyarat / Pre-requisite

Kalkulus1, Kalkulus 2, Sinyal dan Sistem / Calculus 1, Calculus 2, Signals and Systems

Pustaka

Utama :

1. Suwadi dan Titiek Suryani : Pengolahan Sinyal Digital, Refika Aditama, 2020.
2. John G Proakis and Dimitris G, Manokalis, Digital Signal Processing: Principles, algoritms and applications, 4th Edition, Pearson International Edition, Pearson Prentice-Hall, NewJersey, 2014.
3. Lonnie C Ludeman, Fundamentals of Digital Signal Processing, Wiley,1986.

Pendukung :

1. Alan V. Oppenheim, R. W. Schafer : Discrete Time Signal Processing, Prentice Hall, second edition, 1999.
2. Monson H Hayes, Digital Signal Processing, Schaum's Outline Series, McGraw-Hill Companies, Inc., USA, 1999.

3. Vinay K. Ingle, John G. Proakis Digital Signal Processing Using MATLAB, BookWare Companion Series™ , Second Edition, 2007.