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**	:	Pengkodean Kanal / *Channel Coding*
2	**Kode Mata Kuliah / Course Code**	:	EL234714
3	**Kredit / Credits**	:	2 SKS
4	**Semester / Semester**	:	Pilihan / Elective Course

Deskripsi Mata Kuliah / Course Description

Pengkodean kanal merupakan mata kuliah yang membahas tentang konsep, prinsip dan strategi pengiriman pesan secara digital dengan cara menambahkan sejumlah bit redundansi (paraty check) dan teknik pengkodean tertentu yang mempunyai kemampuan mendeteksi dan mengkoreksi error baik error bit tunggal maupun error burst yang terjadi saat sinyal pesan digital ditransmisikan melewati kanal transmisi.

Channel coding is a course that discusses the concepts, principles, and strategies of transmitting digital messages by adding a certain amount of redundancy bits (paraty check) and specific coding techniques that have the ability to detect and correct errors, both single-bit errors and burst errors that occur when digital message signals are transmitted through a transmission channel.

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

1. (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

2. (CPL-07) Mampu mengidentifikasi, memformulasikan, menganalisis, dan menyelesaikan permasalahan kompleks di bidang teknik telekomunikasi
   (PLO-07) Able to identify, formulate, analyze, and solve the complex problems in the field of Telecommunication Engineering

3. (CPL-08) Mampu mengetahui dan mengaplikasi metode dan keahlian sesuai perkembangan terkini di bidang ilmu pengetahuan dan teknologi untuk

menyelesaikan permasalahan di bidang Teknik Telekomunikasi dengan mengedepankan nilai-nilai universal
(PLO-08) Able to know and apply methods, skills according to the latest developments in the field of science and technology to solve electrical engineering problems by prioritizing universal values

Capaian Pembelajaran Mata Kuliah / Course Learning Outcomes

1. Mampu memahami pentingnya penerapan teknik pengkodean kanal dalam mengatasi permasalahan transmisi pesan dalam sistem komunikasi digital. / *Able to understand the importance of applying channel coding techniques in overcoming message transmission problems in digital communication systems.*
2. Mampu memahami dan mendefinisikan konsep aljabar koding dan aplikasinya pada disain pengkodean kanal. / *Able to understand and define the concept of coding algebra and its application in channel coding design.*
3. Mampu memilih dan menerapkan strategi pengkodean kanal yang termasuk dalam kode blok / *Able to select and apply channel coding strategies that are included in block codes.*
4. Mampu memilih dan menerapkan strategi pengkodean kanal yang termasuk dalam konvolusional. / *Able to select and apply channel coding strategies that are included in convolutional codes.*
5. Mampu menganalisa dan membandingkan kinerja bit-error-rate sistem komunikasi digital sebelum dan sesudah penerapan teknik pengkodean kanal untuk kanal ideal dengan gangguan interferensi derau putih Gaussian. / *Able to analyze and compare the bit-error-rate performance of digital communication systems before and after the application of channel coding techniques for an ideal channel with Gaussian white noise interference.*

Pokok Bahasan / Contents

1. Konsep dan teori dasar pengkodean kanal / *Concept and basic theory of channel coding.*
2. Konsep aljabar koding: Galois field orde prima, polynomial primitive, dan polinomial minimal / *Algebraic coding concepts: Prime order Galois field, polynomial primitive, and minimal polynomial.*
3. Konsep pengkodean kanal : perhitungan syndrome, array standard dan pengkodean kode sederhana: kode repetisi dan kode Hamming / *Channel coding concepts: Syndrome calculation, standard array, and simple coding: repetition code and Hamming code.*
4. Konsep pengkodean kanal : kode blok linier / *Channel coding concept: Linear block codes.*
5. Konsep pengkodean kanal : kode siklik / *Channel coding concept: Cyclic codes.*
6. Konsep pengkodean kanal : modifikasi kode blok / *Channel coding concept: Block code modification.*
7. Konsep pengkodean kanal: kode konvolusional / *Channel coding concept: Convolutional codes.*
8. Konsep dekode kode konvolusional : Diagram trellis dan algorithma Viterbi / *Decoding concept for convolutional codes: Trellis diagram and Viterbi algorithm.*

9. Konsep perhitungan kinerja sistem komunikasi digital sebelum dan setelah penerapan pengkodean kanal / *Concept of performance evaluation of digital communication systems before and after the application of channel coding.*

Prasyarat / Pre-requisite

Sistem Komunikasi / *Communication Systems*

Pustaka / Reference

Utama / Primary :

1. Shu Lin and Daniel J Costello, Jr, “Error Control Coding Fundamental and Application”, Prentice-Hall Inc., 1983.
2. Stephen B Wicker, “Error Control Systems for Digital Communica-tion and Storage, Vol. 1. Englewood Cliffs: Prentice hall, 1995.
3. Hwei Hsu, Ph.D., Schaum's outline of theory and problems of Analog and Digital Communications, 2nd Edition, Mc-Graw Hill, 2003.

Pendukung / Support :

1. Yuan Jiang, “A practical guide to error-control coding using Matlab”. Artech House, 2010.
2. K Sam Shanmugam, Digital and Analog Communication Systems, John Wiley and Sons,1979.
3. Elwyn R Berlekamp, “ Algebraic coding theory”, World Scientific Publishing Co, 2015
4. Robert H Morelos-Zaragoza, “The art of error correcting coding”, John Wiley & Sons, 2006.