Course Code	TKEE165222
Course Name	Channel Coding
Course Instructors	Bondhan Winduratna, Dr. Ir., M.Eng, Wayan Mustika, S.T., M.Eng., Ph.D.
Course Type	Elective
Course Classification	Engineering Topics
Credit / Contact Hour per Week	3 / 150 minutes per Week
Course Description	This course introduces the problem of communication in noisy communication channel and the corresponding channel coding methods to solve this problem. The emphasis is given in the classical channel coding methods which powers our everyday communication needs. The course covers both the theoretical underpinings of classical channel codes, and the practical algorithm for classical codes.
Prerequisites Courses	Discrete Mathematics and Logics, Communication System, Fundamentals of Telecommunication Engineering
Covered Student Outcome	**Fundamental and Engineering Knowledge (a)** **Development of Engineering Solution (b)**

Learning Outcome	1. Students are able to understand the mathematical basis of channel coding (e.g, Finite Field Algebra, Information Theory etc.) 2. Students are able to understand the performance metrics of channel and channel codes (e.g, Channel Capacity, Codeword Distances etc.) 3. Students are able to explain the theoretical framework for channel codes decoding process (e.g, ML decoding, MAP decoding) 4. Students are able to understands the algorithm and implementation of binary block codes. 5. Students are able to understand the algorithm and implementation of convolutional codes. 6. Students are able to design transmission scheme for noisy channel by utilizing channel codes.
Topic	1. Channel Coding Problem : Noisy Channel Models 2. Information Theory Metrics : Entropy, Mutual Information, and Channel Capacity 3. Digital Communication Model (AWGN) 4. Finite Field : Binary Field, Galois Field 5. Linear Block Codes : Hamming, Reed-Mueller, Golay 6. ML and MAP Decoding 7. Non-Binary Codes : Reed Solomon, BCH 8. Convolutional Coding 9. Viterbi Decoding & SOVA 10. Student Presentation
Direct Asessment	
Indirect Assesment	Questionnaire (EDOM)
References	[1] Shu Lin, Daniel J. Costello, Error Control Coding 2nd., Pearson, 2004 [2] William Ryan, Shu Lin, Channel Codes: Classical and Modern, Cambridge University Press, 2009

Direct Asessment Plan	**Measured Learning Outcome**
Mid Exam	LO1, LO2,LO4,LO5
Presentation	LO3,LO4,LO5,LO6
Final Exam	LO3,LO4,LO5,LO6