Course Code	TKEE163122
Course Name	Communication Systems
Course Instructors	Iswandi
Course Type	Selected Elective
Course Classification	Engineering Topics
Credit / Contact Hour per Week	3 / 150 minutes per Week
Course Description	This course material is more analytical (mathematical) to analyze the performance of the basic techniques and methods that exist today. Some analytical bases are necessary, for example about the area of frequency and probability. Some of the materials studied are quite deeply eg about modulation (analogue and digital), digitization by PCM, and the influence of noise in communication. Compression techniques, encryption, and channel encoding are also introduced.
Prerequisites Courses	
Covered Student Outcome	**Fundamental and Engineering Knowledge (a)** **Development of Engineering Solution (b)**

Learning Outcome	1. Be able to analyze the performance of various modulation techniques. 2. Be able to perform compression, encryption-decryption, and simple case FEC.
Topic	1. Introduction 1: (1) Description of point-to-point communication problems; (2) Objectives, Constraints, Restraints; (3) Digital Goodness; (4) Nyquist and Shannon's Theorem 2. Introduction 2: (5) Efforts to Improve the Performance of Work; (6) Exercise 3. Flash Base Analytical 1: (1) Probability; (2) Correlation; (3) Orthogonality 4. Flash Base Analytical 2: (4) Sign room; (5) Frequency spectrum: DF, TF, and spectral meetings; (6) Normalized power 5. Analog Modulation Analysis 1: AM 6. Analog Modulation Analysis 2: FM 7. Analog-Digital Conversion: (1) Principles of DAC and ADC-PCM, (2) Sampling, (3) Quantization, (4) SNR Analysis, (5) Speech compression techniques; (6) Implementation aspect 8. Digital Modulation 1: (1) Binary Modulation (BPSK, BASK, BFSK): its axis and its immunity; (2) wide-field-saving techniques: modulation type, M-er, pulse shaper; 9. Digital Modulation 2: (3) Modulation of M-er (QPSK, M-PSK, QAM, MSK): its aberration and its immunity; (4) Implementation aspect: PAPR and constellation constellation 10. Noise: (1) The nature of amplitude and frequency; (2) Representation; (3) Modeling: ambient temperature, equivalent width-field, noise figure; (4) Calculation of system noise 11. Effect of Noise on Analog Communication 12. Effect of Noise on Digital Communications 1: (1) Matched Filter; (2) BEP analysis of binary systems; (3) BEP Analysis of M-er system; 13. Effect of Noise on Digital Communications 2: (4) SNR Analysis on PCM; (5) Exercise 14. Introduction to Information Theory: (1) Information and Entropy; (2) Huffman Password; (3) Encryption: symmetric and asymmetric keys, ciphering, RSA; (4) Error detection: parity and CRC; (5) Error correction: block, convolution, and Turbo; (6) Interleaving

Direct Asessment		
	Direct Asessment Plan	**Measured Learning Outcome**
	Assignments	LO1,LO2
	Mid Exam	LO1

	Final Exam	LO2	
Indirect Assesment	Questionnaire (EDOM)		
References	[1] Taub, H., D.L. Schilling, 1986, *Principles of Communication Systems*, McGraw-Hill. [2] Carlson, A.B., P.B Crilly, J.C. Rultledge, 2002, *Communication Systems: an Introduction to Signals and Noise in Electrical Communication*, McGraw-Hill, Singapore. [3] Cough II, L.W., 1993, *Digital and Analog Communication Systems*, 4th Ed., Max-millan Publishing Company, New York. [4] Haykin, S., M. Moher, 2005, *Modern Wireless Communication*, Pearson Education, Inc., New Jersey. [5] Setiyanto, B., 2010, *Dasar-Dasar Telekomunikasi*, Penerbit Sakti, Yogyakarta. [6] Wilson, S.G., 1996, *Digital Modulation and Coding*, Prentice Hall, New Jersey		