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

INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)
FACULTY OF INTELLIGENT ELECTRICAL & INFORMATICS TECHNOLOGY
DEPARTMENT OF ELECTRICAL ENGINEERING
Bachelor Degree Program in Electrical Engineering

1	**Nama Mata Kuliah / *Course Name***	:	Lab. Telekomunikasi / *Telecommunication Laboratory*
2	**Kode Mata Kuliah / *Course Code***	:	EE234771
3	**Kredit / *Credits***	:	3 SKS
4	**Semester / *Semester***	:	7

Deskripsi Mata Kuliah / *Course Description*

Mata kuliah Lab Telekomunikasi ini memberikan kemampuan kepada mahasiswa untuk mengukur, melakukan tes dan menganalisis karakteristik peralatan yang ada di bidang telekomunikasi dan melakukan pengolahan sinyal secara digital serta jaringan dan rekayasa protokol internet secara praktis menggunakan simulator hardware maupun software. Materi yang dipelajari meliputi pengukuran dan analisis karakteristik antena sederhana dipole λ/2, melakukan tes Polarisasi Antena, pengukuran pengaruh jarak Antena dengan detektor dalam kekuatan radiasi, pengukuran resiprositas Antena, dan melakukan 'matching impedance', membangkitkan dan menganalisis karakteristik sinyal digital baseband, deteksi optimum, modulasi dan demodulasi passband dan teknik pengkodean kanal siklik, serta jaringan LAN/WAN, VPN, infrastruktur layanan, kinerja jaringan dan layanan. / *The Telecommunications Lab course equips students with the ability to measure, test, and analyze the characteristics of telecommunications equipment, perform digital signal processing, and practical network and internet protocol engineering using hardware and software simulators. Topics covered include measurements and analysis of the characteristics of simple dipole λ/2 antennas, antenna polarization tests, distance impact measurements with a radiation power detector, antenna reciprocity measurements, impedance matching, generation and analysis of baseband digital signal characteristics, optimal detection, passband modulation and demodulation, and cyclic channel coding techniques, as well as LAN/WAN networks, VPN, service infrastructure, network performance, and services.*

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

CPL 4 Mampu merancang dan melaksanakan eksperimen laboratorium dan/atau lapangan, menganalisa dan menginterpretasi data, serta menggunakan penilaian yang obyektif untuk menarik kesimpulan */ Able to designing and conducting laboratory and/or field experiments, analyzing and interpreting data, and using objective assessments to draw conclusions.*

CPL 7 Mampu mengetahui dan mengaplikasi metode, keahlian sesuai perkembangan terkini di bidang ilmu pengetahuan dan teknologi untuk menyelesaikan permasalahan teknik elektro dengan mengedepankan nilai-nilai universal / *Able to understanding and applying the latest methods and skills in the field of science and technology to solve electrical engineering problems while emphasizing universal values.*

Capaian Pembelajaran Mata Kuliah / *Course Learning Outcomes*

1. Mampu melakukan pengukuran, maupun testing menggunakan peralatan ukur sesuai standar/metode pengukuran, mampu melakukan analisis dan interpretasi data hasil pengukuran dan mampu mengambil kesimpulan yang logis dan obyektif berdasarkan teori/knowledge di bidang / *Able to performing measurements and testing using measurement equipment in accordance with standards/methods, able to analyze and interpret measurement data, and capable of drawing logical and objective conclusions based on theoretical knowledge in the field.*
2. Mampu memahami konsep sinyal digital dan pengolahan sinyal komunikasi digital dan mampu melakukan simulasi software pengolahan sinyal Komunikasi serta mampu memodelkan dan menganalisis karakteristik sinyal komunikasi untuk transmisi digital. / *Able to understand the concept of digital signals and digital communication signal processing, proficient in using communication signal processing software for simulation, and capable of modeling and analyzing communication signal characteristics for digital transmission.*
3. Mampu merancang dan melakukan pengukuran antena serta mampu menganalisis parameter-parameter antenna dan karakteristik propagasi gelombang serta dampaknya terhadap sistem telekomunikasi. / *Able to design and conduct antenna measurements, analyze antenna parameters, wave propagation characteristics, and their impact on telecommunication systems.*
4. Mampu merancang maupun melakukan setting jaringan LAN/WAN, VPN, melakukan rekayasa protokol internet secara praktis menggunakan simulator hardware maupun software, serta mampu mengukur dan melakukan analisis jaringan infrastruktur, kinerja jaringan dan layanan. / *Able to design and configure LAN/WAN networks, VPNs, practically engineer internet protocols using hardware or software simulators, and capable of measuring and analyzing network infrastructure, network performance, and services.*

Pokok Bahasan / *Contents*

1. Standar prosedur pengukuran, tes dan analisis sinyal menggunakan spectrum analyzer dan oscilloscope / *Standard Procedure for Measurement, Testing, and Signal Analysis Using Spectrum Analyzer and Oscilloscope*
2. Karakteristik Antena Simple Dipole λ/2 / *Characteristics of Simple Dipole Antenna λ/2*

3. Prosedur Tes Polarisasi Antena / *Antenna Polarization Test Procedure*
4. Karakteristik Jarak Antena Dengan Detektor Dalam Kekuatan Radiasi / *Antenna Distance Characteristics Using Radiated Power Detector*
5. Disain Penyesuai impedansi antena menggunakan teknik Matching Stub / *Antenna Impedance Matching Design Using Matching Stub Technique*
6. Link budget
7. Jenis dan Karakteristik sinyal baseband / *Types and Characteristics of Baseband Signals*
8. Karakteristik Matched filter dan Korelator untuk deteksi optimal Maksimum Likelihood sinyal digital / *Characteristics of Matched Filters and Correlators for Optimal Maximum Likelihood Digital Signal Detection*
9. Karakteristik sinyal modulasi passband biner / *Characteristics of Binary Passband Modulation Signals*
10. Karakteristik sinyal modulasi passband M-ary / *Characteristics of M-ary Passband Modulation Signals*
11. Pengkodean kanal kode siklik / *Channel Coding: Cyclic Code*

Prasyarat / *Pre-requisite*

TGE dan Antena / *Electromagnetic Wave Transmission and Antennas*

Sistem Komunikasi 2 / *Communication Systems 2*

Jaringan dan Rekayasa Trafik / *Networks and Traffic Engineering*

Pustaka / *Reference*

1. John G. Proakis, Masoud Salehi and Gerhard Bauch, Contemporary Communication Systems using MATLAB, 3rd edition, Cengage Learning, 2013.
2. Constantine A. Balanis, Antenna Theory: Analysis and Design, 4th Edition, Wiley, 2016
3. William Stallings, Data and Computer Communications, 10th Edition, Pearson, 2013
4. Mathuranathan Viswanathan , Simulation of Digital Communication systems using MATLAB, 2nd Edition, 2013.
5. “Antenna Trainer”, BYTRONIC Education Technology
6. Cisco Secure Router 520 Series Software Configuration Guide, Cisco Systems, Inc, 2008
7. Kwonhue Choi and Huaping Liu, “Problem-Based-Learning-in-Communication-Systems-Using-MATLAB-and-Simulink”, John Wiley & Sons, Inc., Hoboken, New Jersey, 2016.
8. Christoph Rauscher, Fundamental of Spectrum Analysis, Digital Edition, Rochde & Schwarz, 2001