



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 : Software Defined Radio / <i>Software-Defined Radio</i>
2	Kode Mata Kuliah / Course Code : EL234716
3	Kredit / Credits : 2 SKS
4	Semester / Semester : Pilihan / Elective Course

Deskripsi Mata Kuliah / Course Description

Mata kuliah ini membahas prinsip dan teknik-teknik sistem radio digital, software-defined radio (SDR), software radio dan radio kognitif. Untuk menunjang pemahaman permasalahan dan desain SDR akan dipelajari dasar desain sistem RF dan arsitektur penerima dan pemancar, dilanjutkan dengan pembahasan berbagai platform untuk membangun SDR dan software radio beserta desain laju sampling. Selanjutnya akan dipelajari berbagai konsep dan pendekatan sistem radio kognitif dan arsitektur yang telah diusulkan, yang dilanjutkan dengan jaringan radio kognitif dan dynamic spectrum access. Mahasiswa juga akan mensimulasikan dan mengimplementasikan sistem yang dipelajari pada perangkat lunak dan platform SDR yang tersedia di laboratorium, yaitu WARP dan Ettus.

This course covers the principles and techniques of digital radio systems, software-defined radio (SDR), software radio, and cognitive radio. To support the understanding of SDR issues and design, the basics of RF system design and receiver and transmitter architecture will be studied, followed by discussions on various platforms for building SDR and software radio, including sampling rate design. Furthermore, various concepts and approaches to cognitive radio systems and proposed architectures will be explored, followed by cognitive radio networks and dynamic spectrum access. Students will also simulate and implement the studied systems on available SDR software and platforms in the laboratory, namely WARP and Ettus.

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-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. Mahasiswa mampu menjelaskan konsep dan prinsip software-defined radio dan perkembangannya / *Students are able to explain the concepts and principles of software-defined radio and its development.*
2. Mahasiswa mampu menjelaskan prinsip desain sistem RF dan teknik-teknik sistem komunikasi nirkabel / *Students are able to explain the principles of RF system design and wireless communication techniques.*
3. Mahasiswa mampu menjelaskan prinsip dan teknik-teknik pada arsitektur penerima dan pemancar / *Students are able to explain the principles and techniques of receiver and transmitter architecture.*
4. Mahasiswa mampu menjelaskan konsep dan prinsip sistem radio digital, software-defined radio, dan software radio / *Students are able to explain the concepts and principles of digital radio systems, software-defined radio, and software radio.*
5. Mahasiswa mampu melakukan perancangan sederhana sistem radio berbasis SDR / *Students are able to perform a simple design of a radio system based on SDR.*

Pokok Bahasan / Contents

1. Pengantar tentang software defined radio. / *Introduction to software-defined radio.*
2. Dasar-dasar desain RF dan sistem komunikasi nirkabel / *Basics of RF design and wireless communication systems.*
3. Arsitektur penerima / *Receiver architecture.*
4. Arsitektur pemancar / *Transmitter architecture.*
5. Sistem radio digital / *Digital radio system.*
6. Software-defined radio / *Software-defined radio.*
7. Studi kasus / *Case study.*

Prasyarat / Pre-requisite

Elektronika Telekomunikasi, Jaringan Komunikasi Nirkabel
Telecommunication Electronics, Wireless Communication Networks

Pustaka / Reference

1. Behzad Razavi, "RF Microelectronics," 2nd ed., Prentice Hall, 2012.

2. Tony J. Roupael, "RF and Digital Signal Processing for Software-Defined Radio: A MultiStandard Multi-Mode Approach," Elsevier, 2009.
3. Charles W. Bostian, Nicholas J. Kaminski & Almohanad S. Fayed, "Cognitive Radio Engineering," Scitech, 2016.
4. Ezio Biglieri et al., "Principles of Cognitive Radio," Cambridge University Press, 2013.