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

1	**Nama Mata Kuliah**	:	Software Defined Radio
2	**Kode Mata Kuliah**	:	EL234716
3	**Kredit**	:	2 SKS
4	**Semester**	:	Pilihan

Deskripsi Mata Kuliah

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.

Capaian Pembelajaran Lulusan (CPL) Yang Dibebankan Mata Kuliah

1. (CPL-04) Mampu menerapkan ilmu pengetahuan alam dan matematika serta teknologi dan rekayasa informasi untuk memperoleh pemahaman komprehensif pada bidang Teknik Telekomunikasi.
2. (CPL-07) Mampu mengidentifikasi, memformulasikan, menganalisis, dan menyelesaikan permasalahan kompleks di bidang teknik telekomnikasi
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

Capaian Pembelajaran Mata Kuliah

1. Mahasiswa mampu menjelaskan konsep dan prinsip software-defined radio dan perkembangannya
2. Mahasiswa mampu menjelaskan prinsip desain sistem RF dan teknik-teknik sistem komunikasi nirkabel
3. Mahasiswa mampu menjelaskan prinsip dan teknik-teknik pada arsitektur penerima dan pemancar
4. Mahasiswa mampu menjelaskan konsep dan prinsip sistem radio digital, software-defined radio, dan software radio
5. Mahasiswa mampu melakukan perancangan sederhana sistem radio berbasis SDR

Pokok Bahasan

1. Pengantar tentang software defined radio.
2. Dasar-dasar desain RF dan sistem komunikasi nirkabel
3. Arsitektur penerima
4. Arsitektur pemancar
5. Sistem radio digital
6. Software-defined radio
7. Studi kasus

Prasyarat

Sistem Tertanam dalam Telekomunikasi, Elektronika Telekomunikasi, Jaringan Komunikasi Nirkabel

Pustaka

1. Behzad Razavi, “RF Microelectronics,” 2nd ed., Prentice Hall, 2012.
2. Tony J. Rouphael, “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.

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FACULTY OF INTELLIGENT ELECTRICAL AND INFORMATICS TECHNOLOGY
DEPARTMENT OF ELECTRICAL ENGINEERING
Undergraduate Study Program (S1) Telecommunication Engineering

1	**Course Name**	:	Software Defined Radio
2	**Course Code**	:	EL234716
3	**Credit**	:	2 CREDITS
4	**Semester**	:	Options

Course Description

This course discusses the principles and techniques of digital radio systems, software-defined radio (SDR), radio software and cognitive radio. To support the understanding of SDR problems and design, the basic RF system design and receiver and transmitter architecture will be studied, followed by a discussion of various platforms for building SDR and radio software along with sampling rate design. Furthermore, various concepts and approaches to cognitive radio systems and architectures that have been proposed will be studied, followed by cognitive radio networks and dynamic spectrum access.
Students will also simulate and implement the studied system on software and SDR platforms available in the laboratory, namely WARP and Ettus.

Graduate Learning Outcomes (SLOs) Charged Courses

1. (CPL-04) Able to apply natural science and mathematics as well as technology and information engineering to gain a comprehensive understanding of the field of Telecommunication Engineering.
2. (CPL-07) Able to identify, formulate, analyze, and solve complex problems in the field of telecommunication engineering
3. (CPL-08) Able to know and apply methods and expertise according to the latest developments in the field of science and technology to solve problems in the field of Telecommunication Engineering by prioritizing universal values.

Course Learning Outcomes

1. Students are able to explain the concepts and principles of software-defined radio and its development
2. Students are able to explain the design principles of RF systems and techniques of wireless communication systems
3. Students are able to explain the principles and techniques in receiver and transmitter architecture
4. Students are able to explain the concepts and principles of digital radio systems, software-defined radio, and radio software.
5. Students are able to do simple design of SDR-based radio system

Subject matter

1. Introduction to software defined radio.
2. Fundamentals of RF design and wireless communication systems
3. Receiver architecture
4. Transmitter architecture
5. Digital radio system
6. Software-defined radio
7. Case study

Prerequisites

Embedded Systems in Telecommunications, Telecommunications Electronics, Wireless Communication Networks

Library

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