اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	Wireless Networks
Course Code:	333 CNET-3
Program:	Bachelor in Computer and Network Engineering
Department:	Computer and Network Engineering
College:	College of Computer Science and Information Technology
Institution:	Jazan University

Table of Contents

A. Course Identification

1. Credit hours: 3	

2. Course type

a.   University ☐   College ☐   Department √   Others ☐

b.   Required √   Elective ☐

3. Level/year at which this course is offered: Level 13 / Year 05

4. Pre-requisites for this course (if any)**:** 222CNET-3, Introduction to Communication System

5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	52	100%
2	**Blended**	--	--
3	**E-learning**	--	--
4	**Distance learning**	--	--
5	**Other**	--	--

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	22
2	**Laboratory/Studio**	22
3	**Tutorial**	--
4	**Others** (specify)	8
	Total	52

B. Course Objectives and Learning Outcomes

1. Course Description

This course will cover the fundamental aspects of wireless networks, with emphasis on current and next-generation wireless networks. Various aspects of wireless networking will be covered including: Wireless communication forms, spread spectrum concept and techniques, satellite communications and classifications, and wireless LAN application and standards (802.11). The goal of this course is to introduce the students to state-of-the-art wireless network protocols and architectures. It will be also look at industry trends and discuss some innovative ideas that have recently been developed.

After completing this course student will be able to design and setup wireless network for small corporate office. In addition, they can understand mobile technology, challenges, and real-world application areas in wireless communication.

2. Course Main Objective

This course will develop the students' ability to learn:

- To provide an overview of Wireless Communication networks area and its applications in communication engineering.
- To develop the concept of systems thinking in the context of wireless networks and mobile.
- To understand the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies through experiments and simulations.
- To explain the various key concepts and techniques underlying modern physical layer wireless and mobile communications in real-world application.
- To enable students to analyze various spread spectrum techniques, satellite communication wireless LAN application and standards and -based wireless networks

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	**Describe** the basic concepts related to wireless communication and state the core communication technologies	K2
1.2	**Discuss** various kinds of advanced wireless transmission and technologies.	K3
2	**Skills:**	
2.1	**Design** wireless network using access point and configure its supporting devices.	S2
2.2	**Demonstrate** the various spread spectrum techniques, Mobile IP and cellular communications	S3
2.3	**Analyze** various satellite communications, wireless LAN and 802.11 standards	S5
2.4	**Communicate** effectively presenting their assignments and mini projects	S4
3	**Values:**	
3.1	**Show** team work attribute, working on group assignment related to wireless networking.	V1

C. Course Content

No	List of Topics	Contact Hours
1	**Chapter 1: Introduction to Wireless Networks** ▪ Introduction to Wireless Networks ▪ Wireless Communications and its forms ▪ Broadband wireless technology ▪ WLAN's ▪ Wireless Routers ▪ Access Points and Wireless Clients ▪ History of Wireless Networks ▪ SWOT of the Wireless Networks ▪ Wireless Networks certifications	4T + 4P

	▪ Advantages of Wireless Networks ▪ Wireless Limitations ▪ Standards Organizations (IEEE, IETF and Wi-Fi Alliance) ▪ IEEE Standards (a,b,g,n,ac and ad) ▪ Wireless networks types and future trends ▪ Wireless networks types understanding (Wi-Fi, WiMAX, Bluetooth and ZigBee) ▪ Smart Grid Wireless Technology	
2	**Chapter 2: Transmission Fundamentals** ▪ How Wireless Works (Understanding the medium, (RF) radio frequency medium, the electromagnetic spectrum) ▪ The signal characteristics of the RF (Wavelength, Frequency, Amplitude and Phase) ▪ Time Domain Concepts and Frequency Domain Concepts ▪ Radio Frequency behaviors (Free space, reflection, diffraction, scattering and multipath signals) ▪ Components affect wireless networks ▪ Analog and Digital Transmission ▪ Channel Capacity (related between Data Rate and bandwidth) ▪ Nyquist Bandwidth ▪ Signal-to-Noise Ratio (SNR) ▪ Shannon Capacity Formula ▪ Transmission Media (guided and unguided media) ▪ General Frequency Ranges ▪ Terrestrial Microwave ▪ Satellite Microwave ▪ Broadcast Radio ▪ Multiplexing	4T + 4P
3	**Chapter 3: Spread Spectrum** ▪ Concept of Spread Spectrum ▪ How is the SS signal different from the normal signal ▪ Spread Spectrum Advantages ▪ Techniques of Spread Spectrum ▪ Frequency Hopping Spread Spectrum ▪ Multiple Frequency-Shift Keying (MFSK) ▪ Direct Sequence Spread Spectrum ▪ Multiple access schemes (FDMA-TDMA-CDMA and OFDM)	3T + 3P
4	**Chapter 4: Satellite Communication** ▪ Satellite Based Wireless Communication ▪ Terrestrial based Wireless Communication ▪ Difference between Satellite based and terrestrial based communication ▪ Factors in satellite communication ▪ Earth Stations, Uplink, Downlink ,Transponders ▪ Fixed Service Satellite (FSS) ▪ Broadcast Service Satellite (BSS) ▪ Mobile Service Satellite (MSS) ▪ Classification of Satellite Orbits ▪ Geostationary Earth Orbit ▪ Satellite Link Performance Factors	4T + 4P

	▪ Satellite Footprint ▪ Satellite Broadcast and point-to-point link ▪ Capacity Allocation Strategies	
5	**Chapter 5: Mobile IP and cellular communications** ▪ **Introductions of Mobile IP** ▪ Mobile IP Goals ▪ How Mobile IP is Working ▪ Mobile IP Uses ▪ Operation and Capabilities of Mobile IP ▪ The requirements for physical mobility ▪ **Introduction of Cellular communication** ▪ Adjacent cells use different frequencies ▪ Microcells add more users ▪ The Handoff (soft and hard) ▪ Generations of the cellular communications (1G,2G,3G,4G,5G)	3T + 3P
6	**Chapter 6: Specification the Wireless LAN's** ▪ Overview ▪ Ad Hoc LAN's ▪ Single and Multiple-cell ▪ Wireless LAN Requirements ▪ Spread Spectrum LAN's ▪ IEEE 802 Protocol layered and MAC Layer	4T + 4P
	Final Exam	4T+4P
	Total	52

Online Study Topics:

- History of Wireless Networks
- Wireless Networks certifications
- Advantages of Wireless Networks
- Smart Grid Wireless Technology
- Transmission Media (guided and unguided media)
- LEO Categories
- Frequency Bands for satellite Communications
- Capacity Allocation Strategies
- Mobile IP Goals
- Mobile IP Uses
- The requirements for physical mobility

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	**Describe** the basic concepts related to wireless communication and state the core communication technologies	Visual &Verbal [Lectures / Presentations]	➢ Assignment 1 ➢ Mid-Term Exam ➢ Final Exam
1.2	**Discuss** various kinds of advanced wireless transmission and technologies.	Visual &Verbal [Lectures / Presentations]	➢ Assignment 1 ➢ Mid-Term Exam ➢ Final Exam
2.0	**Skills**		
2.1	**Design** wireless network using access point and configure its supporting devices.	Visual &Verbal [Lectures / Presentations]	➢ Assignment 1 ➢ Mid-Term Exam ➢ Lab Exam ➢ Final Exam
2.2	**Demonstrate** the various spread spectrum techniques, Mobile IP and cellular communications	Visual &Verbal [Lectures / Presentations]	➢ Assignment 2 ➢ Mid-Term Exam ➢ Lab Exam ➢ Final Exam
2.3	**Analyze** various satellite communications, wireless LAN and 802.11 standards	Visual &Verbal [Lectures / Presentations]	➢ Assignment 2 ➢ Lab Exam ➢ Final Exam
2.4	**Communicate** effectively presenting their assignments and mini projects	Visual &Verbal [Lectures / Presentations]	➢ Assignment 2 ➢ Lab Exam
3.0	**Values**		
3.1	**Show** team work attribute, working on group assignment related to wireless networking	Visual &Verbal [Lectures / Presentations]	➢ Assignments ➢ Mini Projects and Case Study

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments / Mini Project	4th Week	20%
2	Midterm Exam	6th Week	20%
3	Lab Exam	11th Week	20%
4	Final Theory Exam	12th Week	40%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

In CNET department Academic Advising committee has been formed to provide the counseling for all students. In addition to that, each faculty member should have at least 3 office hours per week for course related consultation to students

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	"Wireless Communication Networks and Systems. ", Cory Beard and William Stallings, 1st Edition, Pearson Education, Year-2016,ISBN 10: 0-13-359417-3 , ISBN 13:978-0-13-359417-1
Essential References Materials	1. Wireless Communications and Networks 2nd Edition (Prentice Hall) by William Stallings, 2004 ISBN: 0-13-191835-4 2.Wireless Communications and Networking By Vijay K. Garg and Morgan Kaufmann, 2007 ISBN: 978-8131218891
Electronic Materials	https://www.tutorialspoint.com/Wireless-Networks
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	The strength of students should not exceed 25.
Technology Resources (AV, data show, Smart Board, software, etc.)	Cisco Packer Tracer and Hardware (Wireless Router and TP Link)
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Sufficiency of resources and facilities for students	Students	Course evaluation survey form
Effectiveness of teaching / learning process	Students	Course evaluation survey form
Effectiveness of teaching / learning process	CRC / QAU / HoD	Course reports / result analysis
Quality of learning Resources	Track leaders / CRC	Review meetings and star rating with suggestions for

Evaluation Areas/Issues	Evaluators	Evaluation Methods
		further modification and improvements
Verifying standards of student achievement / evaluation	HoD / committee nominated by HoD	Random re-checking of evaluated answer sheets
Achievement of course learning outcomes	Course Teachers / QAU	CLO assessment template that is further verified at course coordinator, Track leader and QAU level.

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	DEPARTMENT COUNCIL
Reference No.	
Date	