



**ATTACHMENT 5.**

## **T6. COURSE SPECIFICATIONS (CS)**



هيئة تقويم التعليم  
Education Evaluation Commission

## Course Specifications

Institution: Al Yamamah University	Date: 15/11/2018
College/Department : Engineering and Architecture/ Computer Engineering	

### A. Course Identification and General Information

1. Course title and code: NES 212 Data Communications and Computer Networks																				
2. Credit hours: 3																				
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) Bachelor of Engineering in Network Engineering and Security Bachelor of Engineering in Software Engineering																				
4. Name of faculty member responsible for the course Dr Issam Jabri																				
5. Level/year at which this course is offered: 1 <sup>st</sup> Year																				
6. Pre-requisites for this course (if any): No																				
7. Co-requisites for this course (if any): No																				
8. Location if not on main campus: Engineering Campus																				
9. Mode of Instruction (mark all that apply): <table><tr><td>a. traditional classroom</td><td><input checked="" type="checkbox"/></td><td>What percentage?</td><td><input type="text" value="100"/></td></tr><tr><td>b. blended (traditional and online)</td><td><input type="checkbox"/></td><td>What percentage?</td><td><input type="text"/></td></tr><tr><td>c. e-learning</td><td><input type="checkbox"/></td><td>What percentage?</td><td><input type="text"/></td></tr><tr><td>d. correspondence</td><td><input type="checkbox"/></td><td>What percentage?</td><td><input type="text"/></td></tr><tr><td>f. other</td><td><input type="checkbox"/></td><td>What percentage?</td><td><input type="text"/></td></tr></table>	a. traditional classroom	<input checked="" type="checkbox"/>	What percentage?	<input type="text" value="100"/>	b. blended (traditional and online)	<input type="checkbox"/>	What percentage?	<input type="text"/>	c. e-learning	<input type="checkbox"/>	What percentage?	<input type="text"/>	d. correspondence	<input type="checkbox"/>	What percentage?	<input type="text"/>	f. other	<input type="checkbox"/>	What percentage?	<input type="text"/>
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f. other	<input type="checkbox"/>	What percentage?	<input type="text"/>																	
Comments:																				

## B. Objectives

1. What is the main purpose for this course?

This course provides an overall view and concepts of data communications which are used in different types of computer networks and mobile networks including 4G and mobile WiMAX.

2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

- Use of LMS (Learning Management System) that increases the use of IT for students
- Refer students to related website

## C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:

This course is an introductory course in networking technology. Students are taught data communications concepts in both Computer Networks and Mobile Communication Systems/Networks. First the layered architecture of a network is discussed, and then fundamental concepts related to Signal are taught. These concepts are then related with bandwidth, data rate, encoding and modulation of the signals. Different error detection and correction schemes along with flow control are discussed. Finally, different communication protocols are discussed in detail.

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Introduction, Communication Model, Communication Tasks (Transmission system utilization, Interfacing, Signal generation, Synchronization, Exchange management, Error detection and correction, Flow control, Addressing, Routing, Recovery, Message formatting, Security, Network management), Circuit Switching, Packet Switching, Frame Relay, ATM, LAN, MAN, WAN, Internet	1	3
Protocol, Protocol Architecture, Trivial File Transfer Protocol (TFTP), Standardized Protocol Architectures, The TCP/IP Protocol Architecture, Introduction to Physical Layer, Network Access Layer, Internet Layer, Transport Layer, Application Layer, TCP/IP Concepts Operation of TCP/IP, PDU, NPDU, TPDU, UDP, The OSI Model/ Layers	1	3

Information, Bandwidth of the signal, Transmission impairment, Signal domain (frequency, time), Signal (Digital, Analog, periodic, aperiodic), frequency domain concepts, spectrum and bandwidth, effective bandwidth, Data rate and bandwidth, Decibel, Numerical problem related to signal propagation,	1	3
Analog/digital data/signal transmission, Attenuation, Noise and its Four categories, Channel Capacity and its four correlated concepts, Noiseless Channel (Nyquist bandwidth), Claude Shannon Capacity Formula, BER and Eb/N0 Comparison, Spectral efficiency and numerical problem.	1	3
Guided Transmission Media, Wireless Transmission	1	3
Encoding, Modulation Rate, Criteria of Comparison of different modulation schemes, Digital data to Digital signal (Nonreturn to Zero-Level (NRZ-L) , Nonreturn to Zero Inverted (NRZI), Bipolar –AMI, Pseudoternary, Manchester, Differential Manchester, B8ZS, HDB3)	1	3
Encoding Digital Data to Analog signal (Amplitude shift keying (ASK), Frequency shift keying (FSK), Phase shift keying (PSK)), Encoding Analog Data to Digital signal (Pulse Code Modulation), Encoding Analog Data to Analog signal (Amplitude, frequency and phase modulation)	1	3
Synchronous and Asynchronous transmission, Error detection (Redundancy, Parity Check, Cyclic Redundancy Check (CRC), Checksum), Error Correction (Block coding and Convolutional coding)	1	3
Coding gain, Hamming Code, Line configuration, interfacing (DCE, DTE), Interface standard (V.24/EIA-232-F), Specifications (Mechanical, Electrical, Procedural), Loop back testing, Dial up operation, Null Modem, ISDN	1	3
Flow Control (Stop-and-Wait Flow Control, Sliding Window Flow Control), Error Control (Stop-and-Wait ARQ, Go-Back-N ARQ, Selective-Reject ARQ)	1	3
High Level Data Link Control and standards	1	3
Routing in Packet Switched Networks (for example APRANET), Least Cost Algorithms	1	3
Local Area Networks: Topologies and Transmission Media, LAN Protocol Architecture, Bridges, Layer 2	1	3

Emergence of High Speed LAN, Ethernet, Fiber Channel, Coding gain, Hamming Code, Line configuration, Interfacing (DCE, DTE), Interface standard (V.24/EIA-232-F)	1	3
Specifications (Mechanical, Electrical, Procedural), Loop back testing, Dial up operation, Null Modem, ISDN, Introduction to (IPV4, IPV6), Transport Protocols: Connection Oriented Transport Protocol Mechanisms, TCP, TCP Congestion Control, UDP	1	3
<b>Total</b>	<b>15</b>	<b>45</b>

2. Course components (total contact hours and credits per semester):

		Lecture	Tutorial	Laboratory/ Studio	Practical	Other:	Total
Contact Hours	Planned	45	-	-	-	-	45
	Actual	45	-	-	-	-	45
Credit	Planned	3	-	-	-	-	3
	Actual	3	-	-	-	-	3

3. Additional private study/learning hours expected for students per week.

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4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

**On the table below are the five NQF Learning Domains, numbered in the left column.**

**First**, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
<b>1.0</b>	<b>Knowledge</b> After successful completion of the course students will be able to:		
1.1	Recognize all components of Data communication systems and their functions	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> <li>Mini/ Group projects</li> </ul>	<ul style="list-style-type: none"> <li>Written exams (quizzes, mid-term, and final exams)</li> </ul>
1.2	Describe all possible communication methodologies in computer networks and mobile communication systems.	<ul style="list-style-type: none"> <li>Assignments/ Homework</li> </ul>	<ul style="list-style-type: none"> <li>Oral presentations</li> </ul>

			<ul style="list-style-type: none"> <li>• Group discussion</li> <li>• Assignments/ Homework</li> </ul>
<b>2.0</b>	<b>Cognitive Skills</b> After successful completion of the course students will be able to:		
2.1	Write down the data communication requirements of any computer network and mobile communication system.	<ul style="list-style-type: none"> <li>• Case Studies</li> <li>• Projects</li> <li>• Assignments/ Homework</li> <li>• Group discussion</li> </ul>	<ul style="list-style-type: none"> <li>• Oral Presentations</li> <li>• Written exams</li> </ul>
2.2	Explain and apply the knowledge of data communication to any computer network and mobile communication system.		
<b>3.0</b>	<b>Interpersonal Skills &amp; Responsibility</b> After successful completion of the course students will be able to:		
3.1	Demonstrate their effective working in groups and exercise leadership when required	<ul style="list-style-type: none"> <li>• Group Projects</li> <li>• Group discussion Activity</li> </ul>	<ul style="list-style-type: none"> <li>• Oral Presentations</li> <li>• Continuous monitoring and observing</li> </ul>
<b>4.0</b>	<b>Communication, Information Technology, Numerical</b> After successful completion of the course students will be able to:		
4.1	Demonstrate the effective use of Information Technology in design and presentation of Data Communication systems and computer Networks.		<ul style="list-style-type: none"> <li>• Written exams (quizzes, mid-term, and final exams)</li> </ul>
4.2	Show numerical analysis of all design related to Data Communications and computer networks.	<ul style="list-style-type: none"> <li>• Group discussion</li> <li>• Group Projects</li> <li>• Assignments</li> <li>• Use of IT and mathematical tools</li> </ul>	<ul style="list-style-type: none"> <li>• Oral presentations</li> <li>• Mini/Group projects</li> <li>• Doing Assignments/ Homework using IT tools</li> <li>• Lab assignments</li> </ul>
<b>5.0</b>	<b>Psychomotor</b>		
5.1			
5.2			

5. Schedule of Assessment Tasks for Students During the Semester			
	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Assignments/ Projects	4, 9, 12	10%
2	Presentations/ Effective Participation	4, 7, 11, 13	10%
3	Quizzes	3, 6, 10, 13	20%



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4	Midterm Exam	8	20%
5	Comprehensive Final Exam	17	40%

#### **D. Student Academic Counseling and Support**

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

In addition to class lectures time, teacher is supposed to display his/ her advisory hours (10 hours per week) for the students outside his/ her office in order to have individual student consultations and academic advice.

#### **E Learning Resources**

1. List Required Textbooks

Behrouz Forouzan, 'Data Communications and Networking ', 5th edition, 2012, ISBN-10: 0073376221, ISBN-13: 978-0073376226.

2. List Essential References Materials (Journals, Reports, etc.)

William Stallings, 'Data and Computer Communications', 10th Edition), 2013, Prentice Hall, ISBN-10: 0133506487, ISBN-13: 978-0133506488

3. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

[www.ietf.org](http://www.ietf.org)

<http://www.rfc-editor.org/>

<http://ieee802.org/>

4. Other learning material such as computer-based programs/CD, professional standards or regulations and software.



## F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) ✓ Classrooms,
2. Technology resources (AV, data show, Smart Board, software, etc.)  ✓ data show
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

## G Course Evaluation and Improvement Processes

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching During the course, students receive a feedback forms that covers all aspects relating to their learning experience. These forms will then be collected and analyzed by the Academic Advising and Counseling Department. Next, the Academic Advising and Counseling Department will conduct a meeting with the concerned faculty to discuss the students' feedback outcomes.
2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department Peer review visits are normally conducted among faculties wherever possible during academic year. During the lecture time Chair (Head)/ Dean of the department visits the classroom. At the end of each visit, faculties are usually set together to discuss related issues.
3. Processes for Improvement of Teaching ✓ Feedbacks from students using different types of survey including Student Experience Survey (SES), Program Evaluation Survey (PES), and Alumni Survey (AS) are shown and discussed with faculty members to improve the teaching. ✓ Specialized workshops and seminars are conducted throughout academic year to address specific teaching strategies and improvements.
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)  Peer review and discussion with course coordinator. There should be a strong liaison with teacher from some external university/institute in order to exchange ideas related to marking/ evaluating quizzes and assignments.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

At the end of each semester, Curriculum committee conducts a meeting with all faculty members in which surveys filled by the students and other feedbacks from faculty members are discussed. Effectiveness of the courses, mistakes done and weaknesses are discussed. These points are made basis for the planning for improvements for next semester/ year.

Name of Course Instructor: \_\_\_\_Dr Issam Jabri\_\_\_\_\_

Signature: \_\_\_\_\_ Date Specification Completed: \_15-11-2018\_\_\_\_\_

Program Coordinator: \_\_\_\_\_Dr Ibrahim Aloqili\_\_\_\_\_

Signature: \_\_\_\_\_ Date Received: \_\_\_\_\_