



Course Specification

(Postgraduate Programs)

Course Title: **Mobile Networks**

Course Code: **CE6202**

Program: **Master of Science in Computer Engineering**

Department: **Computer and Network Engineering**

College: **College of Computing**

Institution: **Umm Al-Qura University**

Version: **2.0**

Last Revision Date: **12/4/2025**



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A. General information about the course:

1. Course Identification:

1. Credit hours: (3)

2. Course type

A.	<input type="checkbox"/> University	<input type="checkbox"/> College	<input type="checkbox"/> Department	<input checked="" type="checkbox"/> Track
B.	<input checked="" type="checkbox"/> Required Required in the Wireless Communication and Networks Track		<input checked="" type="checkbox"/> Elective in all other tracks	

3. Level/year at which this course is offered: (Level 4)

4. Course General Description:

This course provides students with an in-depth understanding of the fundamental principles of cellular networks, including their architecture, protocols, and operation. The course will cover topics such as radio propagation, multiple access techniques, cellular network planning, optimization, and performance analysis. Students will also learn about emerging cellular technologies, such as 5G and beyond.

5. Pre-requirements for this course (if any):

Non

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

Non

7. Course Main Objective(s):

This course is to equip students with the knowledge and skills necessary to design, analyze, and optimize cellular networks. Students will be able to identify and analyze the key issues and challenges in cellular network design, as well as evaluate the performance of different cellular technologies.

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		



No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	39
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify) - Seminar	6
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Identify challenges in the design of cellular networks concepts, protocols and technologies	K1	Lectures, and reading assignments	Written exams, assignments, projects and oral presentations
1.2	Explain fundamentals of cellular networks design concepts, terminologies protocols and technologies	K2		
2.0	Skills			
2.1	Design and implement modern cellular networks using engineering and mathematics concepts	S1	Lectures, project, discussions, tutorials	Written exams, assignments, projects and oral presentations
2.2	Apply principles of cellular networks to solve complex problems	S2		
2.3	Communicate effectively through a written report embodying the design, implementation, evaluation of cellular networks	S3		
2.4	Evaluate the performance of cellular networks	S4		



Code	Course Learning Outcomes	Code of PLOs	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
3.1	Demonstrate commitment to ethical and professional responsibilities in cellular networks	V1	Lectures, project, discussions, assignments and projects	Group assignments and projects
3.2	Work in a team to implement a project in cellular networks	V2	Group assignments and projects	Group assignments and projects

C. Course Content:

No	List of Topics	Contact Hours
1	Introduction to Wireless Communication: Focus on fundamental concepts and definitions.	3
2	Review Technical Background: a. Transmission Fundamentals b. Communication Networks c. Protocols and TCP/IP	3
3	Introduction to cellular systems: a. Architecture of the cellular systems b. Review of dB and basic probability theory	6
4	Coverage planning: a. Mobile communication channel basics b. Macroscopic propagation modeling c. Propagation model optimization d. Small scale propagation effects e. Link budget and nominal cell planning	9
5	Capacity planning: a. Multiple access schemes (FDMA/TDMA) b. Multiple access schemes (CDMA) c. Elements of queuing theory d. Traffic planning for circuit switched services	6
6	Planning for QoS: a. Interference and frequency planning b. Interference reduction techniques c. Automatic Frequency Planning (AFP) d. Automatic Cell planning (ACP)	3
7	Fourth Generation Systems and LTE	3
8	5G Networks Architecture and Protocols	3
9	New Trends and Applications: Explore topics like 6G technologies and IoT in wireless systems.	6
10	Design future wireless communication systems	3
Total		45





D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1	Written tests/quizzes	3, 6, 9, 12	40
2	Assignments	7, 13	20
3	Projects	14	30
4	Presentation/report on scientific article(s)	12-15	10

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	Wireless Communications: Principles and Practice" by Theodore S. Rappaport, Cambridge University Press, 2024, ISBN-10: 1009489836, ISBN-13: 978-1009489836
Supportive References	Wireless Communication Networks and Systems 1st Edition by Cory Beard and William Stallings, Pearson, 2015, ISBN-10: 9780133594171, ISBN-13: 978-0133594171 Principles of Mobile Communication by Gordon L. Stüber, 4th Edition, 2017, Springer, ISBN-10: 3319556142, ISBN-13: 978-3319556147
Electronic Materials	The instructor may provide as per requirements.
Other Learning Materials	The instructor may provide as per requirements.

2. Educational and Research Facilities and Equipment Required:

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	The instructor may provide as per requirements.



F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Program Leaders	Indirect
Effectiveness of students' assessment	Program Leaders	Direct
Quality of learning resources	Students, Faculty	Indirect
The extent to which CLOs have been achieved	Students, Faculty, Program Leaders	Direct and Indirect
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	Computer and Network Engineering Department Council
REFERENCE NO.	The 18 th Session Of The Academic Year 1446
DATE	15/4/2025

