

Academic Course Description

BHARATH UNIVERSITY Faculty of Engineering and Technology Department of Electronics and Communication Engineering BEC705 CELLULAR MOBILE COMMUNICATION Seventh Semester, 2017-18 (Odd Semester)
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Course (catalog) description

This Course is to expose the students to the most recent technological developments in Mobile communication systems.. The Course considers the basic concepts of cellular system. Following this, various propagation effects and propagation models used in mobile communication are included in the course. This course deals with various methodologies to improve the received signal quality in mobile communication. The Course provides various multiple access techniques and Standards in Cellular mobile Communication.

Compulsory/Elective course : Elective course for ECE students

Credit & Contact hours : 3 & 45

Course Coordinator : Mr.T.Silambarasan, Asst.Professor.

Instructor(s) :

Name of the instructor	Class Handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Mr.T.Silambarasan	III ECE	SA block			9.00 - 9.50 AM
Ms.G.Angelo Virgin	III ECE	SA block			12.45 - 1.15 PM

Relationship to other courses:

Pre –requisites : Computer Communication and Networks

Assumed knowledge : The students will have a basic knowledge in wireless and Mobile communication system

Following courses : -

Syllabus Contents

UNIT I INTRODUCTION TO WIRELESS MOBILE COMMUNICATION 9 HOURS

History and evolution of mobile radio systems, Types of mobile wireless services/systems – Cellular, WLL, Paging, Satellite systems, Standard, Future trends in personal wireless systems.

UNIT II CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS 9 HOURS

Cellular concept and frequency reuse, Multiple Access Schemes, Channel assignment and handoff, Interface and system capacity, Trunking and Erlang capacity calculations.

UNIT III MOBILE RADIO PROPAGATION**9 HOURS**

Radio wave propagation issues in personal wireless systems, Propagation models, Multipath fading and based and impulse models, Parameters of mobile multipath channels, Antenna systems in mobile radio.

UNIT IV MODULATION AND SIGNAL PROCESSING**9 HOURS**

Analog and digital modulation techniques, Performance of various modulation techniques – Spectral efficiency, Error rate, Power Amplification, Equalization/Rake receiver concepts, Diversity and Space-time processing, Speech coding and channel coding.

UNIT V SYSTEM EXAMPLES AND DESIGN ISSUES**9 HOURS**

Multiple Access Techniques – FDMA, TDMA and CDMA systems, Operational systems, Wireless networking, design issues in personal wireless systems.

TOTAL 45 HOURS**Text Books:**

T1. K. Feher, Wireless Digital Communication, Prentice Hall of India, New Delhi, 1995.

References:

R1. T.S. Rappaport, Wireless Communication; Principles and Practice, Prentice Hall, NJ, 1996.

R2. W.C.Y. Lee, Mobile Communication Engineering; Theory and Application, Second Edition, McGraw-Hill International, 1998.

R3. https://en.wikipedia.org/wiki/Cellular_network

Computer usage: Nil

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area : Communication | Electronics | Signal processing | Embedded | VLSI

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	August 2 nd week	Session 1 to 14	2 Periods
2	Cycle Test-2	September 2 nd week	Session 15 to 28	2 Periods
3	Model Test	October 2 nd week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

To develop problem solving skills and understanding of circuit theory through the application of techniques and principles of electrical circuit analysis to common circuit problems. This course emphasizes:	Correlates to program outcome		
	H	M	L
1.Discuss cellular radio concepts	a,h,j	f,i	
2.Identify various propagation effects	g	a,c	b,i
3.To have knowledge of the mobile system specifications.	b,k	a,c,f	g
4.Classify multiple access techniques in mobile communication.	b,e	a,d,g,h,j	
5.Outline cellular mobile communication standards.		F	b,i
6.Analyze various methodologies to improve the cellular capacity	e,f	d,i	

H: high correlation, M: medium correlation, L: low correlation

DRAFT LECTURE SCHEDULE

Session	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I INTRODUCTION TO WIRELESS MOBILE COMMUNICATION			
1.	History and evolution of mobile radio systems.	No	[T1] Chapter -1, [R1]Chapter-1
2.	Types of mobile wireless services/systems	No	
3.	Cordless Telephone System	No	
4.	Paging	No	
5.	Cellular	No	
6.	Wireless Local Loop	No	
7.	Satellite systems	No	
8.	Standards in Mobile Communication system	Yes	
9.	Future trends in personal wireless system	No	
UNIT II CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS			
10.	Cellular concept and frequency reuse	Yes	[T1] Chapter -1 [R1]Chapter-3
11.	Multiple Access Schemes,	No	
12.	Co-channel and Adjacent channel Cells	No	
13.	Channel assignment Strategies	No	
14.	Handoff Strategies	No	
15.	Co-channel Interference and System capacity	Yes	
16.	Adjacent Channel Interference	Yes	
17.	Trunking Theory	Yes	
18.	Grade of Service	Yes	

UNIT III MOBILE RADIO PROPAGATION			
19.	Mobile Radio Propagation-Free Space Propagation model.	No	[T1] Chapter -3 [R1]Chapter-4,5
20.	Radio wave propagation issues in personal wireless systems-Reflection	Yes	
21.	Diffraction and Scattering	Yes	
22.	Propagation models-Outdoor	Yes	
23.	Propagation models-Indoor	Yes	
24.	Multipath fading-small scale fading	Yes	
25.	Impulse models	No	
26.	Parameters of mobile multipath channels	No	
27.	Antenna Systems in Mobile Radio	No	
UNIT IV MODULATION AND SIGNAL PROCESSING			
28.	Analog and digital modulation techniques.	No	[T1] Chapter -2,4,7 [R1]Chapter-6,7,8
29.	Performance of various modulation techniques- Spectral efficiency, Error rate, Power Amplification	No	
30.	Equalization-Linear	No	
31.	Equalization- Non Linear	No	
32.	Diversity Techniques-Types	No	
33.	Polarization Diversity	No	
34.	Rake receiver Concepts	No.	
35.	Speech coding	Yes	
36.	channel coding.	Yes	
UNIT V SYSTEM EXAMPLES AND DESIGN ISSUES			
37.	Multiple Access Techniques – FDMA	No	[T1] Chapter -6,9 [R1]Chapter-9,10,11
38.	TDMA	No	
39.	CDMA	No	
40.	Operational systems.	No	
41.	Wireless networking	No	
42.	First generation Cellular system and standard	Yes	
43.	Second generation Cellular system and standard	Yes	
44.	Third generation Cellular system and standard	Yes	
45.	Design issues in personal wireless systems.	No	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	10%
Assignment /Seminar/online test/quiz	-	5%
Attendance	-	5%
Final exam	-	70%

Prepared by: Mr.T.Silambarasan, Asst.Professor

Dated :

Addendum**ABET Outcomes expected of graduates of B.Tech / ECE / program by the time that they graduate:**

- a. An ability to apply knowledge of mathematics, science, and engineering
- b. An ability to design and conduct experiments, as well as to analyze and interpret data
- c. An ability to design a hardware and software system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. An ability to function on multidisciplinary teams
- e. An ability to identify, formulate, and solve engineering problems
- f. An understanding of professional and ethical responsibility
- g. An ability to communicate effectively
- h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- i. A recognition of the need for, and an ability to engage in life-long learning
- j. A knowledge of contemporary issues
- k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives**PEO1: PREPARATION**

Electronics Engineering graduates are provided with a strong foundation to passionately apply the fundamental principles of mathematics, science, and engineering knowledge to solve technical problems and also to combine fundamental knowledge of engineering principles with modern techniques to solve realistic, unstructured problems that arise in the field of Engineering and non-engineering efficiently and cost effectively.

PEO2: CORE COMPETENCE

Electronics engineering graduates have proficiency to enhance the skills and experience to apply their engineering knowledge, critical thinking and problem solving abilities in professional engineering practice for a wide variety of technical applications, including the design and usage of modern tools for improvement in the field of Electronics and Communication Engineering.

PEO3: PROFESSIONALISM

Electronics Engineering Graduates will be expected to pursue life-long learning by successfully participating in post graduate or any other professional program for continuous improvement which is a requisite for a successful engineer to become a leader in the work force or educational sector.

PEO4: SKILL

Electronics Engineering Graduates will become skilled in soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, interpersonal relationship, group discussion and leadership ability to become a better professional.

PEO5: ETHICS

Electronics Engineering Graduates are morally boosted to make decisions that are ethical, safe and environmentally-responsible and also to innovate continuously for societal improvement.

Course Teacher	Signature
Mr.T.Silambarasan	
Ms.G.Angelo Virgin	

Course Coordinator

HOD/ECE