Scheme of Course Work
Submitted by Prof G T RAO for M. Tech II semester

SCHEME OF COURSE WORK

Course Details:

Course Title	**: Advanced Mobile Communications**		
Course Code	**: 13EC2111**	**L P C**	**: 4 0 3**
Program:	**: M. Tech**		
Specialization:	**: Communications and Signal Processing**		
Semester	**: II**		
Prerequisites	**: Digital Communications and Wireless Communications**		
Courses to which it is a prerequisite	**: NOT APPLICABLE**		

Course Outcomes (COs):

1	Comprehend the characterisation of fading channels
2	Design and analyse cellular and mobile communications
3	Analyse the performance of CDMA and OFDM
4	Configure MIMO scheme for channel performance improvement
5	Analyse the error performance of Ultra Wide Band system and applications to 4G wireless standards

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Fundamentals The Wireless Channel, Wireless multi path Channel Fading, Physical Models	CO-1	Explain non-line-of-sight propagation for Rayleigh fading model.	▫ Lecture ▫ Discussion ▫ Covered in PPT slides only	
2	Baseband Equivalent Channel Sampling Multipath Resolution Flat and Frequency-Selective Fading Statistical Models	CO-1		▫ Lecture ▫ Discussion ▫ Covered in PPT slides only	Assignment 1 (Week 2 - 4)
3	Diversity Introduction Baseline: AWGN Channel Rayleigh Flat Fading Channel	CO-1		▫ Lecture ▫ Discussion ▫ Covered in PPT slides only	
4	Frequency Diversity Time Diversity Antenna Diversity Space-time Codes	CO-1		▫ Lecture ▫ Discussion ▫ Covered in PPT slides only	
5	Cellular Communications Frequency reuse Call set up Handoff techniques	CO-2	If a signal to interference ratio of 15dB is required for satisfactory forward channel performance,	▫ Lecture ▫ Discussion ▫ Program solving	

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			what is the frequency reuse factor and cluster size for maximum capacity when the path loss exponent is (a) n=4, (b) n=3? Assume that there are six co- channels cells in the first tier and all of them are at the same distance from the mobile. Use necessary assumptions.		
6	Multiple Access Technologies - FDMA - TDMA - SSMA	CO-2		▫ Lecture ▫ Discussion ▫ Covered in PPT slides only	
7	Teletraffic Theory - Purpose of Teletraffic Theory - Network level: switching principles - Telephone traffic models Data traffic models	CO-2		▫ Lecture ▫ Discussion ▫ Covered in PPT slides only	
8	REVISION			▫ EXAMPLES ▫ PROBLEM SOLVING	
9	**Mid-Test 1**				Mid-Test 1 (Week 9)
10	CDMA Basic Principles	CO-3	Write short notes on (i) jamming and (ii) multipath fading.	▫ NPTEL VIDEO LECTURES ▫ PPT	
11	Generation Of Coding Sequences Walsh Codes Variable-Length Orthogonal Codes	C0-3		▫ NPTEL VIDEO LECTURES ▫ PPT	
12	Rake Receivers Receiver Synchronisation	CO-3		▫ NPTEL VIDEO LECTURES ▫ PPT	Assignment 2 (Week 11 - 14)
13	OFDM Introduction Channel Uncertainty Channel model PAPR	C0-3		▫ NPTEL VIDEO LECTURES ▫ PPT	
14	MIMO Spatial Multiplexing and Capacity and Multiplexing Architectures Diversity-Multiplexing Tradeoff	C0-4	Draw the block diagram for MIMO-OFDM system and differentiate between MIMO and SISO.	▫ Lecture ▫ Discussion ▫ Covered in PPT slides only	
15	Alamouti, OSTBC, MIMO-OFDM	CO-4		▫ Lecture ▫ Discussion ▫ Covered in PPT slides only	Seminar (Week 15)
16	**UWB** Introduction BER Performance	CO-5	Define UWB wireless channels and differentiate between Multiband channels and UWB channels.	▫ Lecture ▫ Discussion ▫ Covered in PPT slides only	
17	New generation Technologies	CO-5		▫ EXAMPLES ▫ PROBLEM SOLVING	
18	**Mid-Test 2**				Mid-Test 2 (Week 15)
19/20	**END EXAM**				**END EXAM**

Program Outcomes (POs):

1) Able to apply the knowledge of Electronics and Communication Engineering fundamentals to solve complex problems in communications and signal processing.

2) Able to identify, formulate and analyze problems related to communications and signal processing area and substantiate the conclusions using the first principles of sciences and engineering.

3) Able to Design solutions for communications and signal processing problems and design system components and processes that meet the specified needs with appropriate consideration for public health and safety.
4) Able to perform analysis and interpretation of data by using research methods such as design of experiments to synthesize the information and to provide valid conclusions.
5) Able to select and apply appropriate techniques from the available resources and modern tools, and will be able to predict and model complex engineering activities with an understanding of the practical limitations.
6) Able to collaborate with engineers of other disciplines and work on projects which require multi-disciplinary skills.
7) Able to demonstrate knowledge and understanding of the engineering and management principles and apply the same while managing projects in multidisciplinary environments.
8) Able to communicate fluently on complex engineering activities with the engineering community and society, and will be able to prepare reports and make presentations effectively.
9) Engage them in independent and life-long learning in the broadest context of technological change while continuing professional practice in the Communication technologies.
10) Transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.
11) Able to carry out tasks by working independently and also in a group of members.

Course Outcome versus **Program Outcomes:**

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO-1	S		M			M		S			S
CO-2	S		M	S		M		S			S
CO-3	S		M	S		M		S			S
CO-4	S		M	S		M	S	S			S
CO-5	S		M	S		M	S	S			S