

**SECOND SEMESTER 2019-20**

**Course Handout (Part-I)**

Date: 28/11/2019

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| ***Course No.*** | **: EEE G592** |
| ***Course Title*** | **: Mobile and Personal Communication** |
| ***Instructor-in-Charge*** | **: Dr. Amit Ranjan Azad** |

**Course Description:**

History of mobile radio; the mobile radio signal environment; review of statistical techniques; pathover flat as well as hilly terrain; effects of RF system design on propagation; received signal envelope and phase characteristics; modulation schemes employed; functional design of mobile radio systems, diversity schemes-space; frequency and polarization diversity; mobile radio system functional design; signal error analysis versus performance criteria; multiple access schemes; classification of the concepts of sensitive topics; new concepts data transmission via cellular; spectrum and technology of WLL.

**Scope and Objective of the Course:**

The course aims at the study of mobile personal communications, one of the fastest growing fields in the engineering worldwide. Design methods and general concepts involved in understanding and implementation of wireless systems and techniques are discussed. In this course an effort will be made to impart an understanding of the basics of the rapidly growing field of mobile and personal communication systems, services and standards.

1. **Text Book:**
2. “Wireless Communications - Principles and Practice” by Theodore S. Rappaport, Second Edition, Pearson, 2010
3. **Reference Books:**
4. “Mobile Communications Engineering - Theory and Applications” William C.Y. Lee, Mc-Graw-Hill Education,1998
5. “Fundamentals of Wireless Communication”, David Tse, Pramod Viswanath, Cambridge University Press, 2005
6. Wireless Communications & Networks, William Stallings, Second Edition, Pearson, 2009
7. **Course Plan:**

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| **Lec. No.** | **Learning Objectives** | **Topics to be covered** | **Reference** |
| 1 | Introduction and General Overview | Introduction to Wireless Communication and Overview of Mobile Networks | Ch-1 (T1, R1) |
| 2 | Modern Wireless CommunicationSystems | 2G, 2.5G , 3G and 4G Technologies, Wireless Local Loop (WLL), Local Multipoint Distribution Service (LMDS) | Ch-2 (T1) |
| 3-8 | Cellular Engineering Fundamentals | Frequency Reuse, Channel Assignment and Handoff Strategies,Interference and System Capacity, Improving Coverage and Capacity in Cellular Systems | Ch-3 (T1) |
| 9-14 | Free Space Radio Wave Propagation | Free Space Propagation Model, Basic Methods of Propagation, Link Budget Design, Outdoor Propagation Models, Indoor Propagation Models | Ch-4 (T1) |
| 15-18 | Multipath Propagation and Fading | Small-Scale Multipath Propagation and Measurements, Multipath Channel Parameters, Types of Small-Scale Fading, Statistical Models for Multipath Propagation | Ch-5 (T1) |
| 19-20 | Modulation Techniques | AM, FM, Digital Modulation,Linear Modulation Techniques, Constant Envelope Modulation, Spread Spectrum Modulation Techniques, Modulation Performance in Fading and Multipath Channels | Ch-6 (T1) |
| 21-22 | Equalization, Diversity and Channel Coding | Equalization in Communication Receivers, Types of Equalizers, Diversity Techniques, Channel Coding | Ch-7 (T1) |
| 23-24 | Speech Coding | Speech Signals, Quantization Techniques, Pulse Code Modulation, Vocoders | Ch-8 (T1) |
| 25-26 | Multiple Access Techniques | FDMA, TDMA, CDMA, OFDM, SDMA, Packet Radio | Ch-9 (T1) |
| 27-30 | Wireless Networking | Development of Wireless Networks, Fixed Network Transmission Hierarchy, Circuit Switching, Packet Switching, Wireless Data Services, ISDN, SS7, PCS/PCNs, Protocols for Network Access, UMTS | Ch-10 (T1) |
| 31-34 | Wireless Systems and Standards | GSM, CDMA Digital Cellular Standard (IS-95), WiMAX and IEEE 802.16 Broadband Wireless Access Standards | Ch-11 (T1), Ch-11 (R3) |
| 35-38 | Wireless Network Technology and Standards | Wireless LAN Technology, WiFi and IEEE 802.11 Wireless LAN Standard, Bluetooth and IEEE 802.15 | Ch-13 to 15 (R3) |
| 39-41 | Ad-hoc Wireless Network | Multihop Ad-hoc Wireless Network Scenario, BER Performance, Spectral Efficiency (MIMO, OFDM) | Class Notes |

1. **Evaluation Scheme:**

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| **Component** | **Duration** | **Weight** | **Marks** | **Date & Time** | **Evaluation Type** |
| Mid Semester Exam | 90 min | 20% | 60 | 6/3,9:00 – 10:30 AM | Closed Book |
| Surprise Quizzes | – | 10% | 30 | – | Closed Book |
| Lab Component | – | 20% | 60 | – | Open Book |
| Term Project | – | 20% | 60 | – | Open Book |
| Comprehensive Exam | 3 hours | 30% | 90 | 12/05 FN | Closed Book |
| Total | – | – | 300 | – | – |

1. **Chamber Consultation Hour:** To be announced in the class
2. **Notices:** EEE Notice Board and CMS
3. **Make-Up Examination:**

No make-up will be given for Surprise Quizzes. However, for Lab, Mid Semester and Comprehensive Exam, make-up exam will be conducted only for extremely genuine cases for which prior permission of the instructor-in-charge is required.

**8.Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**Instructor-in-Charge**

**EEE G592 Mobile and Personal Communication**

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