

  
**AMOU UNIVERSITY**  
**“A Vehicle for Peace and Development”**  
**AMOU UNIVERSITY**



**FACULTY OF COMPUTING AND ICT**

**BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY PROGRAMME**

**ACADEMIC YEAR 2015/ 2016**

**COURSE DESCRIPTION**

<b>BIT 325</b>	<b>Wireless and Mobile Communication System</b>
Contact Hours	52
Pre-requisite	<b>BIT 325 Data Communication</b>
Purpose/Aim	<ul style="list-style-type: none"> <li>This course will cover advanced topics in wireless communications for voice, data, and multimedia. We begin with a brief overview of current wireless systems and standards. We then characterize the wireless channel, including path loss for different environments, random log-normal shadowing due to signal attenuation, and the flat and frequency-selective properties of multipath fading. Next we examine the fundamental capacity limits of wireless channels and the characteristics of the capacity-achieving transmission strategies. These strategies are typically not practical. The course concludes with a brief overview of wireless networks, including multiple and random access techniques, WLANs, cellular system design, and ad-hoc network design. Applications for these systems, including the evolution of cell phones and PDAs, smart homes and appliances, sensor networks, and automated highways and skyways, will also be discussed.</li> </ul>
Course Objective (Indicative Learning Outcomes)	<ul style="list-style-type: none"> <li>Become familiar with the regulatory environment in which the wireless industry operates,</li> <li>Understand functions and operational principles of the various components of wireless networks, and how the connections are setup and maintained,</li> <li>Understand the concept of frequency reuse, and be able to apply it in design of simple frequency reuse patterns,</li> <li>Realize the complicated nature of wireless propagation and be able to apply simple models to calculate link budget,</li> <li>understand different modulation schemes and multiple access</li> </ul>



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	<p>Techniques used in wireless communications.</p> <ul style="list-style-type: none"> <li>• Understand how artificial satellite interlink all wireless technology around word and how they are kept in their orbit to give coverage and handover between the devices on the earth</li> <li>• Become familiar with some of the existing and emerging wireless technology.</li> </ul>
<p>Course Content</p>	<ul style="list-style-type: none"> <li>• Introduction Mobile Communication Applications  Vehicles, Emergencies, Business, Replacement of Wired Network Infotainment and more, Location Dependent Services, Mobile and Wireless Devices; A short History of Wireless Communication; A Market for Mobile Communications; Some Open Research Topics; Limitations of Wireless.</li> <li>• Wireless Transmission  Frequencies for Radio Transmission; Regulations; Antennas; Signal Propagation; Path Loss of Radio Signals; Additional Signal Propagation Effects; Multiplexing; Modulation; Amplitude Shift Keying; Frequency Shift Keying; Phase Shift Keying; Spread Spectrum</li> <li>• Global System for Mobile Communication  Mobile Services; System Architecture; Radio Interface; Handover; Security; HSCSD, GPRS; EDGE</li> <li>• Satellite Systems  Satellite Systems Design issues; Satellite Orbits, Frequency Bands; Transmission Impairments; Satellite Network Configurations; GEO, LEO and MEO; Routing, Localization, Handover</li> <li>• Mobile Network Layer  Mobile IP ; Goals, Assumptions and Requirements; IP Packet Delivery, Agent Discovery, Registration; Tunneling and Encapsulation, Optimization; Mobile ad-hoc Networks; Routing, Destination Sequence Distance Vector; Dynamic Source Routing</li> <li>• Wireless LAN  IEEE 802.11 Architecture; Protocol Architecture; MAC Frame Format; Logical Link Control</li> <li>• IEEE 802 Architecture and Services  IEEE 802.11 Architecture; IEEE 802.11 Services; IEEE 802.11 Medium Access Control; IEEE 802.11 Physical Layer</li> <li>• Antennas and Propagation  Antennas; Propagation Modes; Line-of-Sight Transmission; Fading in the Mobile Environment</li> </ul>



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	<ul style="list-style-type: none"> <li>• Communication Regulation Widely Accepted Regulatory Objectives; Sector Reform; Regulatory Organization; The National Regulatory Authority</li> <li>• International Telecommunication Union Telecommunication Standardization (ITU-T); Telecommunication Development Sector (ITU-D)</li> <li>• Cell Coverage for Signal and Traffic The need for a spectrum efficient system; Cell system for frequency; Cell Clusters; Cell Size and coverage; Capacity of the cell; Call Quality; Latency</li> </ul>		
Learning & Teaching Methodologies	Lectures, tutorials and visiting communication companies whenever possible		
Instructional Materials/Equipment	Classroom with audio visual aids Computer videos		
Course Assessment	<b>Type</b>		<b>Weighting (%)</b>
	Final Examination		60
	Mid Term Examination		20
	Assignment		10
	Attendance		10
	Total		100
Recommended Reading	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
	Mobile Communication	Jochen Schiller	Pearson education (1998)
Additional Reading	Wireless Communication	Andreas F. Molisch	Wiley (1999)
	Mobile Satellite Communication Network	Ray E. Sheriff and Y. Fun Hu	Pramod Viswanath (2004)
Other Support Material	To become well familiar in wireless communication world it is good idea to read microwave propagation, satellite communication and Global system for mobile communication books.		