

## Module Name: Introduction to Telecommunications Networks

### Module Acronym: ITN

### Module Manager: Professor Izzat Darwazeh

### Course Summary:

This is an introductory module that provides a wide perspective of available communication networks and their properties. Many of the topics covered are fundamental to communication engineers regardless of whether they are working in a circuit switched or packet switched environment.

### Intended Learning Outcomes

On completion of this course, students should be able to:

- Know and understand the engineering principles and methodologies of digital transmission and detection and use this to analyse and design systems. Learn how to assess and optimise error rates and inter symbol interference (ISI).
- Have a comprehensive knowledge of the underlying technologies of digital communication networks and data transport technologies for use in access and core networks.
- Have a comprehensive knowledge of the underlying technologies of packet-based networks and use this to analyse the different components and layer functionality of such networks.
- Know and understand the fundamentals of circuit switching and the multi-stage switching arrangements and use such knowledge to design and analyse optimum switches with varying degrees of availability and complexity.
- Analyse the functional differences between circuit switched and packet switched networks and between connection oriented and connectionless architectures.
- Know and understand the traffic engineering principles and the basic measures of traffic and use these to estimate traffic statistical parameters and analyse networks capacity.
- Identify and classify the key metrics required to assess the quality of service (QoS) in IP-based networks and then to optimise network operation on the basis of specific metrics.
- Use fundamental knowledge to assess communication system performance and identify the necessary compromises between bandwidth, signal quality and coding requirements.
- Calculate the design requirements for coding in systems for speech and video transmission.
- Investigate and define various types of networks appropriate for pre specified applications and operation scenarios.
- Understand the contexts in which communication engineering knowledge can be applied.
- Identify user demands and appropriate network designs for specific demands.

### Course Content

- Introduction to communication networks and services, network hardware, Voice and data network structures and protocols
- The rapidly changing world of telecommunications
- Telecommunication networks and the Internet
- Sources and signal characteristics
- PCM systems
- PDH and SDH: plesiochronous digital hierarchy (PDH), synchronous digital hierarchy (SDH), synchronous transport networks

- Multimedia systems
- Teletraffic engineering and performance evaluation
- Control and Management planes: network control and signalling, management of networks
- Packet Network Technologies
- Services management
- Internet Technologies
- Introduction to access network technologies including xDSL, PONS, Fibre Coax; evolution and potential of ATM, ADSL and PONs, outline and development
- Multi-services networks

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### **.Assessment:**

A two and half hour unseen written examination will be held under UCL MSc examination regulations at UCL.

### **Tutorials/Workshops:**

*A two hour tutorial will take place in the week following the course.*