CLARENCE FITZROY BRYANT COLLEGE

PROGRAMME: *INFORMATION TECHNOLOGY ASSOCIATE DEGREE*

CURRICULUM:	*Information and Communications Technology*
COURSE TITLE:	*Fundamentals of Telecommunication Systems*
COURSE CODE:	IFTH2008
LEVEL OF STUDENTS:	N/A
CREDITS:	*3*
SEMESTER:	*2 (Two)*
DURATION:	*45 hours*
PREREQUISITE(S):	None

RATIONALE

The climate of rapid technological change which characterises modern society and the desire for increased efficiency and effective decision-making in today's business has resulted in enterprise information systems and inter-organisational systems being brought into sharp focus. Data networks, interoperability and distributed systems philosophies are key components in the delivery of such systems. Therefore, it is vital that a course that teaches the fundamentals of telecommunication systems form an integral part of all contemporary information communication curriculum design, and not simply be treated as an afterthought that in-service training addresses when graduates enter the world of work.

COURSE DESCRIPTION

This course equips beginners with limited understanding and knowledge of telecommunications with knowledge of the technologies and services offered in today's telecommunications networks. It provides opportunities for students to explore fundamental telecommunication concepts and technologies relating to telephony, data communication, and wireless communication.

LEARNING OUTCOMES

Upon successful completion of this course, students will be able to:

1. Explain the origins, growth and roles of telecommunication systems in society.
2. Describe how data is telecommunicated through telephone, cable and satellite systems as well as computer networks.
3. Use different mathematical frameworks to explain various digital processing that occur in telecommunication system environments.
4. Demonstrate how telecommunication systems developments make it possible for voice and video be communicated over Internet protocols.
5. Use voice and video over Internet protocol system in order to analyse its advantages and disadvantages.
6. Explain with the aid of diagrams and models, the principle of digital speech compression.
7. Describe and identify the concepts of subscriber loop, and echo path model.

CONTENT KNOWLEDGE

1. **Introduction to Telecommunications:**

   - Telephone network historical overview.
   - Basic model for the communication process.
   - Subscriber access to the telephone network.
   - Telephone channel- Trunk transmission.
   - Telephone switching historical perspective.
   - Networks and Protocols-public and private.
   - Data Networks-circuit and packet switching.
   - Integrated Services Digital Networks (ISDN).
   - Wireless and cellular communications.
   - Telecommunication standards.

2. **Mathematical Framework and Models for Telecommunications and Signal Processing (TSP) Signal theory and Waveform Properties:**

   - Frequency domain representations of signals and systems
   - Random signals and stochastic processes
   - Properties of communication systems
   - Distortion-less   transmission characteristics

3. **Principles of Voice and Data Communications:**

   - Analog Modulation/Demodulation (MODEMS) Analog/Dialog (A/D) and Digital/ Analog (D/A) converters
   - Sampling, quantization and encoding
   - Line coding and pulse shaping
   - Probability of detection and matched filters • Digital Modulation/Demodulation (MODEMS)

4. **Fundamentals of Digital Processing:**

- Discrete-time signals and systems.

- Discrete Fourier Transform Algorithms.

- Z-transforms and applications.

- Digital filter analysis and design overview

- Infinite Impulse Response (IIR) Filters

- Finite Impulse Response (FIR) Filters

- Digital filter structures and implementations

- Finite   A/D/ Quantization and word length effects

5. **Digital Compression of Speech Signals:**

- Speech generation models

- Speech Coders- waveform and source

- Adaptive Predictive Coding (APC)

- Adaptive Differential PCM (ADPCM)

- Channel and formant Vocoders

- Linear Predictive Coding (LPC)

- Digital Speech Interpolation (DSI)

6. **Telephone Subscriber Loop and Echo Path Models:**

- Echo path models. Echo Suppression (ES)

- Adaptive filters

- Echo cancellers (EC)

- EC Baseband and Passband Models

TEACHING AND LEARNING METHODS

To facilitate fulfilment of the requirements of this course, the teaching and learning sessions will utilise the following approaches:

- Demonstrations
- Guided Practice

- Group Work
- Lab Work
- Independent Work

ASSESSMENT PROCEDURES

1. Coursework 60%
2. Examination 40%

ASSESSMENT SUMMARY

Task / Assignment No. & Name	Due Date	Time	Weight	Type	Learning Outcomes
1. Oral Presentation / Video	13th Feb.	3:30 pm	20%	Class Work	1, 2
2. Practical / Video	10th Mar.	3:30 pm	30%	Project	3, 4
3. Mid Term	07th April.	3:30 pm	20%	Test	5, 6, and 7
4. Final Exam	May		30%	Individual	1 - 7

Nb: Dates and weighting are subjected to be changed.

TEXTBOOKS AND REFERENCES

1. Fitzgerald, J. & Dennis, A. (2004). *Business data communication and networking* (8th ed). John   NY: Wiley & Sons.
2. Housel, T. J. & Skopec, E. (2001). *Global telecommunications revolution: The business Perspective. Boston, MA:* McGraw-Hill, Irwin.
3. Summers, J., & Smith, B. (2004). *Communication skills handbook: How to succeed in written   and oral communication* (revised & updated edition). Milton, Queensland: John Wiley &   Sons.

READING LIST

1. Beyda, W. J. (2000). *Data communications from basics to broadband* (3rd ed.). Upper Saddle River, New Jersey: Prentice Hall.
2. Halsall, F. (1996) *Data communications, computer networks and OSI* (4th ed). NY: Addison-Wesley.
3. Martin, J. (1981). *Design and strategy for distributed data processing.* Englewood Cliffs, New Jersey: Prentice-Hall.
4. Renaud, P. E. (1996). *Introduction to client/server systems: a practical guide for systems professionals* (2nd ed.). New York: Wiley Computer Publishing.
5. Shelly, G. B., Cashman, T.J. & Serwatka, J.A. (2001). *Business data communications.*

6. *introductory concepts and techniques* (3rd ed.). Course Technology: Boston, Massachusetts.
7. Vargo, J., & Hunt, R. (1996). *Telecommunications in business strategy and application.*
8. Chicago, Illinois: Irwin.
9. White, C. M. (2001). *Data communications and computer networks : A business user's Approach*. Cambridge, Massachusetts: Course Technology.