COLLEGE OF ENGINEERING
DEPARTMENT OF TELECOMMUNICATION ENGINEERING
COURSE SYLLABUS/ SPECIFICATION

Course Code & Title: ECTE 535: Broadband & Wireless Networks
Weight: (3 – 0 – 3)
Prerequisite: None
NQF Level Allocated: 9 **NQF Notional Hours / Credits:** 120/12

Description: This course first discusses various concepts involved in multimedia networks including multimedia components presentation, switching techniques, delay analysis, queuing theory, traffic congestion, and QoS. The second part of the course gives an overview of broadband networks including: Telephony Networks, Enterprise Networks, and Mobile ad-hoc networks.

Objective:
1. To explain broadband and wireless networks concepts, techniques and systems.
2. To teach students how to apply the fundamentals of broadband and wireless network with a focus on the design and performance evaluation of cellular wireless networks, Enterprise Networks, and Mobile ad-hoc networks.
3. To explain and demonstrate the effective use of advanced networks concepts such as delay analysis, queuing theory, traffic congestion, and QoS.

Semester: Second 2019 – 2020
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Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	**NQF Level**
A1. Concepts and Theories: *Demonstrate extensive knowledge and critical understanding of key concepts and theories related to Switching, Delay analysis, Queuing Theory, Traffic Congestion, and QoS.*	Knowledge: theoretical understanding [Level 9]
A2. Contemporary Trends, Problems and Research: *Demonstrate an informed and critical awareness of the current trends and advancements of broadband networking problems, research issues and technological advancements.*	Knowledge: theoretical understanding [Level 9]
A3. Professional Responsibility: N/A	

B. Subject-Specific Skills	**NQF Level**
B1. Problem Solving: *Identify appropriate coding approach, switching technology, queuing scheme, type and amount of resources to be allocated, and desired QoS level for the discussed cases.*	Knowledge: theoretical understanding [Level 9] Generic problem solving and analytical skills [Level 9] Communication, ICT and Numeracy Skills [Level 9]
B2. Modeling and Design: *Model and design communication network/ component that is appropriate to be used for transferring multimedia applications in order to illustrate one or combination of the following concepts: coding approach, switching technology, and queuing scheme.*	Knowledge: theoretical understanding [Level 9] Knowledge: practical Application [Level 9]

B3. Application of Methods and Tools: *Use effectively one of the available simulation software (MATLAB, OPNET, or Cisco Packet Tracer) to illustrate various methods and tools related to: multimedia coding/compression, switching techniques, queuing theory, traffic congestion, and QoS.*	Knowledge: theoretical understanding [Level 9] Knowledge: practical Application [Level 9]

C. Critical Thinking Skills	**NQF Level**
C1. Analytic: *Evaluate discussed communication network/component and express benefits and challenges of the involved coding/compression approach, switching technology, and queuing scheme.*	Generic problem solving and analytical skills [Level 9] Communication, ICT and Numeracy Skills [Level 9]

D. General and Transferable Skills	**NQF Level**
D1. Communication: *Express and communicate ideas cogently, persuasively and effectively, in written and oral form, to a diverse range of audiences and stakeholders through written test, final examination, group assignment, and research project.*	Communication, ICT and Numeracy Skills [Level 9]
D2. Teamwork and Leadership: *Work effectively as a member/leader of a team of technical people who may plan, design, implement, manage, monitor and evaluate a communication network/component.*	Competence: Autonomy, Responsibility and Context [Level 9]

Course Structure (Outline)

Week	Hours		ILOs	Topics	Teaching Method	Assessment Method
	Lec.	Lab				
1	3	0	A1	**Introduction:** General concepts	Lecture	-
2	3	0	A1, B1, C1	**Multimedia:** Representation & Compression	Lecture	-
3	3	0	A2, B1, B3, C1	**Multimedia:** Representation & Compression	Lecture	-
4	3	0	A1, B1, B3, C1	**Switching:** Circuit & Packet Switching	Lecture	-
5	3	0	A1, B1, B3, C1	**Advanced Concepts:** Delay Analysis and Queuing Theory	Lecture	-
6	3	0	A1, A2, B1, C1	**Advanced Concepts:** Traffic Congestion and QoS	Lecture	-
7	3	0	B1, B2, B3, D2	**Tutorial Session:** Solving and Discussing Problems related to the topics covered in the first 6 weeks	Tutorial, Group Discussion	-
8	3	0	B2, B3, C1, D1, D2	**Group Project Presentation**	Group Discussion	**Group Project Evaluation** (B2, B3, C1, D1, D2)
9	3	0	A1, B1, B3, C1, D1	**Telephony Networks:** PSTN and Cellular	Lecture	**Test** (A1, B1, D1)
10	3	0	A2, B3, C1, D2	**Telephony Networks:** PSTN and Cellular **Enterprise Networks**	Lecture, Group Discussion	-
11	3	0	A2, B3, C1, D2	**Enterprise Networks**	Lecture, Group Discussion	-
12	3	0	A1, A2, C1, D2	**ATM and Optical Networks**	Lecture, Group Discussion	-

13	3	0	A1, A2, C1, D2	**Mobile Ad-Hoc and Wireless Sensor Networks**	Lecture, Group Discussion	-
14	3	0	B1, B3, C1, D2	**Tutorial Session:** Solving and Discussing Problems related to the topics covered in the last 4 weeks	Tutorial, Group Discussion	-
15	3	0	A2, C1, D1, D2	**Research Assignment Presentation**	Group Discussion	**Research Assignment Evaluation** (A2, C1, D1)
16	2	-				**Final Exam** (A1, B1, C1, D1)

Teaching Materials:

Textbook(s):	1. C. Beard and W. Stallings, "Wireless Communication Networks and Systems", 1st Edition, Pearson, 2016. 2. Nader F. Mir, "Computer and Communication Networks", Pearson Education, Inc., 2015. 3. W. Stallings, "Data and Computer Communications", 9th edition, Pearson, 2011. 4. B. A. Forouzan, "Data Communications and Networking", 5th edition, McGraw-Hill educations, 2013. 5. Chang Wen Chen, Zhu Li, and Shiguo Lian, "Intelligent Multimedia Communication: Techniques and Applications", Springer, 2010.
Handout(s):	• Lecture Notes, Handouts: available on Moodle.
Reference(s):	1. M. Sundarambal, M. Dhivya, and P. Anbalagan; "Performance evaluation of bandwidth allocation in ATM networks", International Journal of Business Information Systems, Volume 6, Number 3, pp. 398-417, 2010. 2. Alex Kesselman, Kirill Kogan, and Michael Segal; "Packet mode and QoS algorithms for buffered crossbar switches with FIFO queuing", Distributed Computing, Volume 23, Issue 3, pp 163-175, November 2010.

Assessment

Type of Assessment[1]	Description[2]	ILOs[3]	Weighting
Test	"One-hour Test covering topics discussed in the first 6 weeks".	A1, B1, D1	20%
Research Assignment: Oral Presentation: Report:	"Each student has to do a literature review about one of the specified communication networks and summarize, present, and discuss his/her research in the class."	A2, C1, D1, D2	 5% 10%
Group Project: Oral Presentation: Team Work: Report:	"The class will be divided into groups, each group has to select a technique related to: compression, switching, or queuing; and present the following: Concept, Implementation, Advantages, and Disadvantages."	B2, B3, C1, D1, D2	 5% 5% 15%
Final Exam:	"Two-hour Final Exam consisting of essay questions. The exam will cover all the topics in the course syllabus".	A1, B1, C1, D1	40%
		Overall:	**100%**

\[1] For approved types of assessment (e.g. quiz, exam, project, etc.) see the ILO-Assessment Matrix in page 9 of Assessment Manual Version 2.0

[2] As *a minimum provide the description should provide details of type of tasks to be completed and duration (if appropriate)*

[3] *The learning outcomes should be taken from the weekly schedule. Ensure that the assessment type and the learning outcomes are aligned as per the ILO-Assessment Matrix in page 9 of Assessment Manual Version 2.0*

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