



**COLLEGE OF ENGINEERING
DEPARTMENT OF TELECOMMUNICATION ENGINEERING**

COURSE SYLLABUS/ SPECIFICATION

Course Code & Title: ECTE 531 Advanced Networking

Weight: (3-0-3)

Prerequisite: None

NQF Level Allocated: 9

NQF Notional Hours / Credits: 120

Description: This course gives an overview of the networking in general and concentrates on the purposes and protocols involved in the upper IP reference model layers. It covers in details the following layers: Network, Transport and Application.

Objective:

1. To provide students with the general concepts of data networking,
2. To explore in detail various techniques related to the lower layers.
3. To discuss the upper layers protocols and their associated techniques in detail.

Semester:

Instructor (s):

Office Telephone: 17298 999

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding		NQF Descriptor/ Level
A1	Concepts and Theories: Demonstrate knowledge and understanding of concepts and theories related to data networking and associated layers.	Knowledge: theoretical understanding [Level 9]
A2	Contemporary Trends, Problems and Research: Demonstrate an informed and critical awareness of internetworking problems, research issues and technological advancements.	Knowledge: theoretical understanding [Level 9]
A3	Professional Responsibility: Demonstrate cognizance of and adhere to the professional and legal standards as a	Knowledge: theoretical understanding [Level 9]

	network user/consumer.	
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B. Subject-specific Skills		NQF Descriptor/ Level
B1	Problem Solving: Identify internetworking problems; plan, design, and implement appropriate solutions related to the following concepts: error detection/ correction, flow control and multiple access, IP distribution and management, transport layer protocols and traffic management.	Knowledge: theoretical understanding [Level 9] Communication, ICT and Numeracy Skills [Level 9] Generic problem solving and analytical skills [Level 9]
B2	Modeling and Design: Model and design internetworking protocol/ component in order to illustrate one or combination of the following concepts: reliable and unreliable communication, connectionless and connection-oriented communication, hop-to-hop, host-to-host, and process-to-process deliveries.	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 implement various techniques relevant to internetworking in order to illustrate one or combination of lower/upper layers protocols.	Knowledge: practical application [Level 9] Communication, ICT and Numeracy Skills [Level 9]

C. Critical-Thinking Skills		NQF Descriptor/ Level
C1	Analytic skills: Evaluate internetworking protocols within lower/upper layers considering identification of the corresponding benefits and challenges for each implementation.	Generic problem solving and analytical skills [Level 9] Communication, ICT and Numeracy Skills [Level 9]
C2	Synthetic: Link internetworking lower/upper layers through appropriate protocols in order to provide end-to-end communication corresponding to the desired application demands and user expectation.	Knowledge: theoretical understanding [Level 9] Generic problem solving and analytical skills [Level 9]
C3	Creative Thinking and innovation:	

D. General and Transferable Skills (other skills relevant to employability and personal development)		NQF Descriptor/ 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 an enterprise network/system.	Competence: Autonomy, Responsibility and Context [Level 9]
D3	Organizational and Developmental Skills:	

D4	Ethics and Social Responsibility:	
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Course Structure (Outline)

Week	Hours	ILOs	Topics	Teaching Method	Assessment Method
1	3	A1,A3	Introduction: General concepts	Lecture	-
2	3	A2,A3,C2,D2	Network Thinking and Social Networks	Lecture, Group Discussion	-
3	3	A1,B3,C1,C2	Physical Layer: Overview	Lecture	-
4	3	A1,B1, B3,C1,D2	Data Link Layer: Error detection and correction	Lecture, Group Discussion	-
5	3	B1, B3,C1,D2	Data Link Layer: DLC and MAC	Lecture, Group Discussion	-
6	3	A1,C1,C2	Data Link Layer: Wired and Wireless LANs	Lecture	-
7	3	A2,A3,C2,D1,D2	Research Project Presentation	Group Discussion	Test1
8	3	A1, B1,C1,C2,D1	Network Layer: Protocols	Lecture	
9	3	A1,B3,C1,D2	Network Layer: Unicast and Multicast Routing	Lecture	-
10	3	A1,B3,C1,D2	Network Layer: Next Generation IP	Lecture, Group Discussion	-
11	3	A1,C1,C2,D2	Transport Layer: Introduction	Lecture, Group Discussion	Research Project (part1)
12	3	A1,B3,C1,D2	Transport Layer: UDP, TCP, SCTP	Lecture, Group Discussion	Research Project (part2)
13	3	A1,A3,D2	Network Management	Lecture, Group Discussion	Research Project (part3)
14	3	A3,B2,,D1,D2	Group Assignment Presentation	Group Discussion	Test 2
15	3	A1,B1,C1,D1	Final Revision	Lecture, Group Discussion	-
16	2	A1,B1,C1,D1	Final Examinations		Written Exam

* Formative assessment

Teaching Materials:

Textbook(s):	1. Nader F. Mir, "Computer and Communication Networks", Pearson Education, Inc., 2015
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Handout(s):	Notes will be provided on Moodle.
Reference(s):	<p>Books:</p> <p>1. B. A. Forouzan, "Data Communications and Networking", 5th edition, McGraw-Hill education, 2013.</p> <p>Articles:</p> <p>1. <u>Liu, J.</u> ; <u>Yang, O.</u>; "Using Fuzzy Logic Control to Provide Intelligent Traffic Management Service for High-Speed Networks", IEEE Transactions on <u>Network and Service Management</u>, Issue 99, pp.1 – 14, May 2013.</p> <p>2. <u>Jianhua Han</u>; <u>Jikui Wen</u> ; <u>Zhao, Xiaojun</u>; "A study on academic performance and interpersonal interactions based on network", <u>14th International Conference on Computer Supported Cooperative Work in Design (CSCWD 2010)</u>, pp. 647 – 652, 14-16 April 2010.</p> <p>3. <u>Zhijun Rong</u>; <u>Peigen Li</u> ; <u>Xinyu Shao</u> ; <u>Kuisheng Chen</u>; "Social aspects of collaborative design", <u>12th International Conference on Computer Supported Cooperative Work in Design (CSCWD 2008)</u>, pp. 241 – 245, 16-18 April 2008.</p>

Assessment

Method of Assessment	Description	Learning Outcomes	Weighting
Test 1	"One hour Test covering topics discussed in the first 7 weeks".	A1,B1,D1	20%
Research Project: Oral Presentation: Report:	"Each student has to select a topic from the specified networking areas, and present a research proposal."	A2,A3,C2,D1	5% 15%
Test 2	"One hour Test covering topics discussed in the weeks 8 to 14".	A1,B1,D1	20%
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 %

Admissions	
Pre-requisites	None
Minimum number of students	4
Maximum number of students	25