

EE3315: INTERNET TECHNOLOGY

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Internet Technology

Subject Code

EE - Electrical Engineering

Course Number

3315

Academic Unit

Electrical Engineering (EE)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

EE3009 Data Communications and Networking

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

The aim of this course is to provide students with the knowledge of key technologies and protocols in the TCP/IP protocol suite, network control plane. It will look at technologies which transform the Internet from its data-only roots to a true multi-service network that can handle voice, video and multimedia with comparable quality and reliability.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Recognize the design principles and the implementation issues of IP routing protocols and SDN control plane		x	x	
2	Demonstrate the understanding of the principles for TCP and apply them to solve problems analytically		x	x	
3	Recognize the design principles for multimedia networking, e.g. audio and video streaming		x	x	
4	Demonstrate the understanding of the principles for various application protocols		x	x	
5	Demonstrate the understanding of IP routing protocols through hands-on tasks in laboratory exercise		x	x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

TLAs	Brief Description	CILO No.	Hours/week (if applicable)	
1	Lecture	Two-hour lecture per week is used to cover the subject material. Whenever possible, numerical examples and graphical illustrations will be provided to strength the students' learning and understanding.	1, 2, 3, 4	3 hrs/wk

2	Laboratory	Students perform hands-on tasks in laboratory exercise in order to strengthen students' knowledge of IP routing protocols acquired in the lecture.	5	3 hrs/wk(4 wks)
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Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tests (min.: 2)	1, 2, 3, 4	30	
2	#Assignments (min.: 3)	1, 2, 3, 4	10	
3	Lab Exercises/Reports	5	10	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Additional Information for ATs

Remark:

To pass the course, students are required to achieve at least 30% in course work and 30% in the examination. Also, 75% laboratory attendance rate must be obtained.

may include homework, tutorial exercise, project/mini-project, presentation

Assessment Rubrics (AR)**Assessment Task**

Examination

Criterion

Achievements in CILOs

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Coursework

Criterion

Achievements in CILOs

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Transport Layer

- User Datagram Protocol (UDP)
- Transmission Control Protocol (TCP)
 - TCP Addressing: TCP connection, TCP endpoint, TCP port
 - Retransmission Strategy: positive acknowledgements, retransmission timeout, adaptive retransmission algorithm
 - TCP Flow Control: credit allocation scheme, window advertisement
 - Connection Establishment: problems with two-way handshake, three-way handshake
 - Connection Termination: graceful termination, modified three-way handshake
 - Congestion Control: Slow Start, Congestion Avoidance, Fast Retransmit, Fast Recovery
- Stream Control Transmission Protocol (SCTP)

Application Layer

- Internet Services and Protocols: Host Configuration (DHCP), Domain Name System (DNS), Remote Logging (Telnet and SSH), File Transfer (FTP), Electronic Mail (SMTP/POP/IMAP, MIME), WWW (HTTP), Network Management (SNMP), Multimedia.
- Network Programming: Socket API with implementation of DNS, Telnet, FTP, SSH, SMTP/POP/IMAP/MIME or HTTP
- Internet Applications: Client-Server Architecture, P2P, HTML, XML

Internet Routing & Software Defined Networking (SDN) Control Plane

- Routing principles: distance vector, link-state, hierarchical routing
- Internet routing protocols: RIP, EIGRP, OSPF, EGP, BGP
- SDN: SDN-controlled switches, SDN controller, network-control applications, OpenFlow protocol

Multimedia Networking

- Multimedia networking applications, streaming stored video, voice-over-IP
- Protocols for real-time conversational applications, network support for multimedia

Laboratory Experiment:

Laboratory will complement the lecture and reinforce students' understanding of the course material.

Reading List

Compulsory Readings

Title	
1	Kurose and Ross: Computer Networking – A Top Down Approach , 7th Edition, (Pearson Addison Wesley, 2017)

Additional Readings

Title	
1	Nil