



Course Specification

Course Name: Selected Topics in Information Technology - 1(High-Speed Broadband Networks)

Course Code: IT495

I. Basic Course Information

Major or minor element of program: Major

Department offering the course: Information Technology Department

Academic level: 300 Level

Semester in which course is offered: Second (spring) summer

Course pre-requisite(s): None

Credit Hours: 3

Contact Hours Through:

Lecture	Tutorial *	Practical *	Total
2.5	0.0	1.5	4.0

* 1.5 hours for **either** Tutorial or Practical

Approval date of course specification: January 2015

II. Overall Aims of Course

This course introduces students to the fundamental concepts of broadband high-speed communication networks. The course covers the core concepts of Internet and broadband technologies, protocols, and applications

III. Program ILOs covered by course

Program Intended Learning Outcomes (By Code)			
Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
K6,K14,K17,K23	I2,I15	P12,P17	G1,G5,G9



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IV. Intended Learning Outcomes of Course (ILOs)

a. Knowledge and Understanding

On completing the course, students should be able to:

- K.1 Explain the current underlying technologies of broadband high-speed networks.
- K.2 Describe the evolution of high-speed networks and their key technologies.
- K.3 Illustrate essential concepts, principles, theories, current and future development for switching and routing techniques.
- K.4 Define the design issues of high-speed switches/routers.
- K.5 Interpret data related to switching and hardware complexity qualitatively and quantitatively.

b. Intellectual/Cognitive Skills

On completing the course, students should be able to:

- I.1 Develop their own perspective on what high-speed networks are.
- I.2 Distinguish between the concepts, principles, and theories of various switching technologies.
- I.3 Assess the reason about the tradeoffs involved in the design of high-speed switches/routers.
- I.4 Analyze data related to network performance qualitatively and quantitatively.

c. Practical/Professional Skills

On completing the course, students should be able to:

- P.1 Use of advanced network simulators adopted in telecom industry.
- P.2 Apply research skills, through the use of online resources, search engines, technical repositories and library-based material to search and understand topics related to high-speed networks and security issues.

d. General and Transferable Skills

On completing the course, students should be able to:

- G.1 Show the ability to identify, understand, and present the quantitative dimensions related to high-speed networks and design/routers design problems.
- G.2 Develop to ability to professionally criticize arguments on a specific basis.
- G.3 Search and acquire knowledge from external resource.

V. Course Matrix Contents

	Main Topics / Chapters	Duration (Weeks)	Course ILOs Covered by Topic (By ILO Code)			
			K & U	I.S.	P.S.	G.S.
1-	Introduction and Definition of High-Speed Networks	1	K1	I1	P2	G2,G3
2-	Network Architecture and Protocol Stack	2	K1			G2
3-	High-Speed Switching and Multiplexing Techniques	2	K1	I2		
4-	Evolution of High-Speed Networks	0.5	K2	I3	P2	G2,G3
5-	The X.25, Frame Relay, and the ATM Architecture	0.5	K2			G1



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6-	Hybrid Network Architectures (e.g., IP-over-ATM)	1	K2		P2	G2
7-	Design Issues in High-Speed Routers	1	K4	I2	P1,P2	G2,G3
8-	High-Speed Switch/Router Types and Architectures: forwarding switches, L2/L3 switches, IP routers	2	K3	I2,I3	P1,P2	G3
9-	Design and Analysis of High-Speed Switching Fabrics: Crossbar switches, LogN (Banyan) Networks, Benes Networks, and Clos Networks	3	K3,K5	I2,I3,I4	P2	G1,G2
Net Teaching Weeks		13				

VI. Course Weekly Detailed Topics / hours / ILOs

Week No.	Sub-Topics	Total Hours	Contact Hours	
			Theoretical Hours	Practical Hours *
1	Introduction and Definition of High-Speed Networks	2.5	2.5	
2	Network Architecture and Protocol Stack	4	2.5	1.5
3	Network Architecture and Protocol Stack	4	2.5	1.5
4	High-Speed Switching and Multiplexing Techniques	4	2.5	1.5
5	High-Speed Switching and Multiplexing Techniques	4	2.5	1.5
6	Evolution of High-Speed Networks The X.25, Frame Relay, and the ATM Architecture	4	2.5	1.5
7	Midterm Exam			
8	High-Speed Switch/Router Types and Architectures: forwarding switches, L2/L3 switches, IP routers	4	2.5	1.5
9	Design Issues in High-Speed Routers	4	2.5	1.5
10	High-Speed Switch/Router Types and Architectures: forwarding switches, L2/L3 switches, IP routers	4	2.5	1.5
11	High-Speed Switch/Router Types and Architectures: forwarding switches, L2/L3 switches, IP routers	4	2.5	1.5
12	Design and Analysis of High-Speed Switching Fabrics: Crossbar switches, LogN (Banyan) Networks, Benes Networks, and Clos Networks	4	2.5	1.5



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13	Design and Analysis of High-Speed Switching Fabrics: Crossbar switches, LogN (Banyan) Networks, Benes Networks, and Clos Networks	4	2.5	1.5
14	Design and Analysis of High-Speed Switching Fabrics: Crossbar switches, LogN (Banyan) Networks, Benes Networks, and Clos Networks	4	2.5	1.5
15	Final Exam			
Total Teaching Hours		51	33	18

* No Practical/Tutorial during the first week of the semester

VII. Teaching and Learning Methods

Teaching/Learning Method	Selected Method	Course ILOs Covered by Method (By ILO Code)			
		K & U	Intellectual Skills	Professional Skills	General Skills
Lectures & Seminars	X	All	All	P2	All
Tutorials					
Computer lab Sessions	X	All	I4	P1	G1,G2
Practical lab Work					
Reading Materials	X	All	I1	P2	All
Web-site Searches	X	All	All	P2	G3
Research & Reporting					
Problem Solving / Problem-based Learning					
Projects					
Independent Work					
Group Work					
Case Studies					
Presentations					
Simulation Analysis					
Others (Specify):					

VIII. Assessment Methods, Schedule and Grade Distribution

Assessment Method	Selected Method	Course ILOs Covered by Method (By ILO Code)				Assessment Weight / Percentage	Week No.
		K & U	I.S.	P.S.	G.S.		
Midterm Exam	X	K1,K2	All	P2	All	15%	7
Final Exam	X	All	All	P2	All	60%	15
Quizzes	X	All	All	P2	All	5%	5
Course Work							
Report Writing							
Case Study							



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Analysis							
Oral Presentations							
Practical	X	All	All	All	G1,G2	10%	10
Group Project							
Individual Project	X	All	All	All	All	10%	12
Others (Specify):							

IX. List of References

Essential Text Books	<ul style="list-style-type: none"> William Stallings. High-Speed Networks and Internets: Performance and Quality of Service, 2/e, Prentice Hall, 2002.
Course notes	<ul style="list-style-type: none"> Lecture notes on PowerPoint provided by instructor
Recommended books	<ul style="list-style-type: none"> William Stallings. Data and Computer Communications. Prentice-Hall, Inc., 5th Ed., 1997 Andrew S. Tanenbaum. Computer Networks. Prentice-Hall, Inc., 3rd Ed., 1997 Larry L. Peterson and Bruce S. Davie. Computer Networks: A Systems Approach. Morgan Kaufmann Publishers, 2nd Ed. 2000
Periodicals, Web sites, etc ...	<ul style="list-style-type: none"> IEEE ACM http://www.ietf.org/ http://www.cisco.com/en/US/products/hw/routers/index.html

X. Facilities required for teaching and learning

<p>List the facilities required</p> <ul style="list-style-type: none"> Data Show White Board Simulation Software Computer Lab

Course coordinator: Ass. Prof. Haitham S. Hamza

Head of Department: Prof. Hesham El Mahdy

Date: January 2015