

Syrian Arab Republic	 الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

Digital Transport Techniques Course Definition File

1- Basic Information:

Course Name	Digital Transport Techniques
Course ID	CRF402
Contact Hours (Registered Sessions)	30
Contact Hours (Synchronized Sessions)	18
Mid Term Exam	No
Exam	1.5
Registered Sessions Work Load	30
Synchronized Session Work Load	18
Credit Hours	5

2- Pre-Requisites:

Course	ID
Introduction in Networking	INT101
Digital Communication	CEE308

3- Course General Objectives:

The target of this course is to introduce students to transport and access networks with special focus on practical aspects .

It starts by giving overview about major Transport protocols, including Plesio-Chronous digital hierarchy PDH, Synchronous Digital Hierarchy SDH, Asynchronous Transfer Mode ATM, IP & MPLS. It highlights usage areas along with advantages and disadvantages of each protocol. Then it moves to technologies used in transport networks such as Microwave links, free space optics links, Satellite communications, and optical Fiber communications including WDM.

Also, the course gives an overview about major access networks with some focus on Digital subscriber Line “DSL” and Optical Access Networks.

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4- Intended Learning Outcomes (ILO):

Code	Intended Learning Outcomes
ILO1	Understand the basic structure of PDH protocol along with its Pros & Cons.
ILO2	Understand the basic structure of SDH protocol along with it Pros & Cons.
ILO3	Recognize the basic structure of ATM protocol along with its Pros & Cons.
ILO4	Recognize the basic structure of Ethernet & IP protocols with its part related to Transport (VLAN, MPLS), and using simulation programs in this domain.
ILO5	Recognize microwave links, practice basic design concepts and compute link budget using simple program for link budget calculation.
ILO6	Recognize satellite communication.
ILO7	Understand optic fiber communication (General introduction, DWDM, OTN).
ILO8	Recognize the basics of Access networks (Digital subscriber Line “DSL”, Optical Access Network)

5- Course Syllabus (18 hours of total synchronized sessions)

- **RS:** Recorded Sessions; **SS:** Synchronized Sessions;

ILO	Course Syllabus	RS	SS	Type	Additional Notes
ILO1	Plesio-Chronous digital hierarchy (PDH) <ul style="list-style-type: none"> • Concept of Plesio-Chronous digital hierarchy (PDH) • Pros & Cons. 	1.5	1.5	<input type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO2	Synchronous Digital Hierarchy (SDH) <ul style="list-style-type: none"> ○ The detailed structure of SDH. ○ Pros & Cons. 	5	3	<input type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO3	Asynchronous Transfer Mode ATM <ul style="list-style-type: none"> ○ The basic structure. ○ Pros & Cons. 	2	1.5	<input type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO4	The basic structure of Ethernet & IP	6	3	<input checked="" type="checkbox"/> Exercises	

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	protocols with its part related to Transport. <ul style="list-style-type: none"> ○ Virtual Networks. ○ Ethernet Protocol. ○ Internet Protocol IP. ○ MPLS. 			<input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO5	Microwave links: <ul style="list-style-type: none"> ○ Microwave links definition, Structure, work mechanism. ○ Microwave link planning. ○ Microwave link budget. ○ Microwave link Protection. ○ Free Space Optic communication introduction. 	7	3	<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO6	Satellite Communication: <ul style="list-style-type: none"> ○ Satellite types, classifications. ○ Satellite Link Budget. ○ Pros & Cons. 	3	1.5	<input type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO7	Fiber Optics Communication : <ul style="list-style-type: none"> ○ Basic components. ○ Pros & Cons. ○ Fiber Optic types. ○ Wave-length Division Multiplexing (WDM). 	4	3	<input type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO8	Access Networks: <ul style="list-style-type: none"> ○ Access Network quick brief. ○ Digital subscriber Line "DSL". ○ Optical Access Network. 	1.5	1.5	<input type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	

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6- Assessment Criteria (Related to ILOs)

ISC	Interactive Synchronized Collaboration	Ex	Exams	Rpt	Reports
PF2F	Presentations and Face-to-Face Assessments	PW	Practice Work		

ILO Code	ILO	Intended Results	Assessment Type				
			ISC	PW	Ex	PF2F	Rpt
ILO1	Understand the basic structure of PDH protocol along with its Pros & Cons.		X		X		
ILO2	Understand the basic structure of SDH protocol along with it Pros & Cons.		X		X		
ILO3	Recognize the basic structure of ATM protocol along with its Pros & Cons.		X		X		
ILO4	Recognize the basic structure of Ethernet & IP protocols with its part related to Transport (VLAN, MPLS), and using simulation programs in this domain.		X	X	X		
ILO5	Recognize microwave links, practice basic design concepts and compute link budget using simple program for link budget calculation.		X	X	X		
ILO6	Recognize satellite communication.		X		X		
ILO7	Understand optic fiber communication (General introduction, DWDM, OTN).		X		X		
ILO8	Recognize the basics of Access networks (Digital subscriber Line “DSL”, Optical Access Network)		X		X		

7- Practice Tools:

Tool Name	Description
GNS3	Network emulation program.
MLPERF	Simulation program for microwave link budget calculation.

8- Main References

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1- Data Communications and Networking - Behrouz A.Forouzan
2- E and E Micro Microwave Planning and Engineering – Ericsson
3- Principles of Synchronous Digital Hierarchy - Rajesh Kumar Jain
4- Optical Fiber Communications – Gerd Keiser
5- Synchronous Digital Hierarchy – Siemens
6- Ossidian : Satellite/Broadcast - Fundamentals of DVB-S
7- Ossidian : Satellite/Broadcast - ATM over Satellite

9- Additional References

1- Understanding Telecommunications Networks
2- Cellular Communication system basics & concepts - Dr. Hicham Aroudaki
3- Introduction to Transmission – MHD Hamsho
4- DWDM Concepts – Huawei
5- OTN tutorial – ITU
6- Optical fiber - Stanford University – ZafarYasin
7- FIBER OPTIC COMMUNICATIONS – University of Texas at Dallas - Murat Torlak
8- Mobile Network Transmission – Nokia
9- SERVICE PROVIDER NETWORK EVOLUTION – Juniper