BS Information Technology

Semester 1

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	COSC-1105	Introduction to ICT	2	
2	COSC-1205	Introduction to ICT-Lab	1	
3	COSC-1101	Programming Fundamentals	3	
4	COSC-1201	Programming Fundamentals-Lab	1	
5	MATH-1100	Calculus	3	
6	ENGL-1118	Functional English	3	
7	PHYS-1122	Applied Physics	3	
8	ISLS-1112	Islamic Studies/Ethics	2	
Total Credit Hours			**18**	

Semester 2

S.	Course	Course Title	Credit Hours	Pre-Requisite
1	COSC-1102	Object Oriented Programming	3	
2	COSC-1202	Object Oriented Programming-Lab	1	
3	COSC-1103	Discrete Structures	3	
4	INFT-1101	IT Infrastructure	3	
5	COSC-1104	Software Engineering	3	
6	PAKS-1113	Pakistan Studies	2	
7	ENGL-1119	Communication Skills	3	
Total Credit Hours			**18**	

Semester 3

S.	Course	Course Title	Credit Hours	Pre-Requisite
1	COSC-2101	Data Structures & Algorithms	3	
2	COSC-2201	Data Structures & Algorithms-Lab	1	
3	COSC-3101	Computer Networks	3	
4	COSC-3201	Computer Networks-Lab	1	
5	MATH-2102	Linear Algebra	3	
6	ENGL-4117	Technical and Business Writing	3	
7	MSCI-2116	Principles of Accounting	3	
Total Credit Hours			**17**	

Semester 4

S.	Course	Course Title	Credit Hours	Pre-Requisite
1	COSC-2102	Operating Systems	3	
2	COSC-2202	Operating Systems-Lab	1	
3	COSC-2103	Database Systems	3	
4	COSC-2203	Database Systems-Lab	1	
5	STAT-2131	Probability & Statistics	3	
6	COSC-2120	Software Requirements Engineering	3	
7	HLTH-1113	Basic Health Awareness	2	
Total Credit Hours			**16**	

Semester 5

S.	Course	Course Title	Credit Hours	Pre-Requisite
1	INFT-3101	System and Network Administration	3	COSC-2102 and COSC-2202
2	INFT-3201	System and Network Administration- Lab	1	
3	INFT-3102	IT Project Management	3	
4	COSC-3120	Formal Methods in Software Engineering	3	
5	COSC-3121	Operations Research	3	
6	MSCI-3104	Financial Management	3	
Total Credit Hours			**16**	

Semester 6

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	COSC-3102	Information Security	3	
2	INFT-3103	Web Technologies	3	
3	INFT-3104	Database Administration and Management	3	
4	INFT-3204	Database Administration and Management-Lab	1	
5	COSC-3109	Data Science	3	
6	COSC-3116	Mobile Application Development	3	
Total Credit Hours			**16**	

Semester 7

S.	Course	Course Title	Credit Hours	Pre-Requisite
1	COSC-4301	Final Year Project-I	3	COSC-1104 and COSC-2103
2	INFT-4101	Virtual Systems and Services	3	
3	INFT-4201	Virtual Systems and Services-Lab	1	
4	SSCI-3120	Constitution & Legal System of Pakistan	2	
5	COSC-3112	Artificial Intelligence	3	
6	COSC-41111	Visual Programming	3	
7	INFT-4107	Routing & Switching	2	
Total Credit Hours			**17**	

Semester 8

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	CSOC-4302	Final Year Project-II	3	COSC-4301
2	INFT-4102	Cyber Security	3	
3	COSC-4120	Web Programming	3	
4	MSCI-3111	Entrepreneurship	3	
5	SSCI-2111	Professional Ethics	2	
Total Credit Hours			**14**	

Program Total Credit Hours	**132**

List of Elective Courses

S.	Course	Course Title	Credit Hours	Pre-Requisite	Semester#	S.	Course	Course Title	Credit Hours	Pre-Requisite	Semester#
1	INFT-2102	Telecommunication Systems	3	COSC-3101	6	15	COSC-3109	Data Science	3	-	
2	INFT-3105	Wireless Networks	3	COSC-3101	6	16	COSC-3110	Data Warehousing	3	COSC-2103	6
3	INFT-4103	Mobile Networks	3	COSC-3101	6	17	COSC-3111	Distributed Database Systems	3	COSC-2103	6
4	INFT-4104	Internet of Things	3	COSC-3101	8	18	COSC-3112	Artificial Intelligence	3	COSC-1103	6
5	INFT-4105	Network Security	3	COSC-3101	8	19	COSC-3113	Data Mining	3	-	6
6	INFT-4106	Optical Networks	3	COSC-3101	8	20	COSC-4101	Parallel and Distributed	3	COSC-2102	6
7	INFT-4107	Routing & Switching	3	COSC-3101	7	21	COSC-4107	Theory of Progr Languages	3	-	7
8	INFT-4108	Software Defined Networks	3	COSC-3101	8	22	SENG-3111	Mobile Application Develpment	3	-	7
9	COSC-2105	Theory of Automata	3	COSC-1103	6	23	SENG-3112	Natural Language Processing	3	-	7
10	COSC-3104	Compiler Construction	3	COSC-2105	7	24	SENG-3113	Real Time Systems	3	-	6
11	COSC-3105	Advanced Real World Programming	3	-	6	25	SENG-4104	Computer Graphics	3	-	6
12	COSC-3106	Advanced Object Oriented Prog	3	COSC-1102	6	26	SENG-4106	E-Commerce Application Dev	3	-	7
13	COSC-3107	Machine Learning	3	-	6	27	SENG-4112	Semantic Web	3	-	7
14	COSC-3108	Image Processing	3	-	6	28	SENG-4115	Visual Programming	3	-	8

BS Bioinformatics

Semester 1

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	ENGL-1118	Functional English	3	
2	COSC-1101	Programming Fundamentals	3	
3	COSC-1201	Programming Fundamentals Lab	1	
4	MATH- OR BIOL-1151 BIOL-1251	Math-I OR Basic Biology Basic Biology-Lab	3 OR 2 1	
5	CHEM-1153	Chemistry	2	
6	CHEM-1253	Chemistry-Lab	1	
7	COSC-1105	Introduction to ICT	2	
8	COSC-1205	Introduction to ICT-Lab	1	
9	BIOI-1101	Bioinformatics Colloquium	1	
Total Credit Hours			**17**	

Semester 2

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	BIOL-1153	Basic Cell Biology	3	
2	BIOL-1253	Basic Cell Biology-Lab	1	
3	COSC-1102	Object Oriented Programming	3	
4	COSC-1202	Object Oriented Program-ming-Lab	1	
5	MATH-1100	Calculus	3	
6	ENGL-1119	Communication Skills	3	
7	CHEM-1151	Biochemistry-I	3	
8	CHEM-1251	Biochemistry-I-Lab	1	
Total Credit Hours			**18**	

Semester 3

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	ENGL-1111	Technical & Business Writing	3	
2	MATH-2103	Linear Algebra	3	
3	BIOL-2152	Essentials of Genetics	3	
4	BIOL-2252	Essentials of Genetics-Lab	1	
5	COSC-2101	Data Structures & Algorithms	3	
6	COSC-2201	Data Structures & Algorithms-Lab	1	
7	SSCI-3120	Constitution & Legal System of Pakistan	2	
8	ISLS-1112	Islamic Studies/Ethics	2	
Total Credit Hours			**18**	

Semester 4

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	BIOI-2101	Introduction to Bioinformatics	2	
2	BIOI-2201	Introduction to Bioinformatics-Lab	1	
3	STAT-2104	Probability & Statistics	3	
4	PAKS-1113	Pakistan Studies	2	
5	CHEM-2152	Biochemistry-II	3	CHEM-1151
6	BIOL-2154	Molecular Biology	3	BIOL-1153
7	BIOL-2254	Molecular Biology-Lab	1	
8	COSC-1103	Discrete Structures	3	
Total Credit Hours			**18**	

Semester 5

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	BIOI-3101	Recombinant DNA Technology	2	
2	BIOI-3201	Recombinant DNA Technology-Lab	1	
3	COSC-2103	Database Systems	3	
4	COSC-2203	Database Systems-Lab	1	
5	BIOI-3102	Bioinformatics Analysis	3	
6	BIOI-3202	Bioinformatics Analysis-Lab	1	
7	BIOI-3103	Genomics	3	BIOL-2154
8	COSC-3108	Image Processing	3	
Total Credit Hours			**17**	

Semester 6

S.	Course	Course Title	Credit Hours	Pre-Requisite
1		Bioinformatics Computing-I	3	COSC-1101
2	BIOI-3204	Bioinformatics Computing-I-Lab	1	
3	SENG-3107	Modeling and Simulation	3	
4	BIOI-3105	Proteomics	3	BIOL-2154
5	BIOI-3106	Graphics and Visualization	3	COSC-1101
6	BIOI-3206	Graphics and Visualization-Lab	1	
7	BIOI-3107	Systems Biology	3	BIOI-3103
Total Credit Hours			**17**	

Semester 7

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	COSC-3112	Artificial Intelligence	3	COSC-1103
2	BIOI-4101	Bioinformatics Software Engineering	2	
3	BIOI-4201	Bioinformatics Software Engineering-Lab	1	
4	SSCI-1112	Social Service	1	
5	COSC-3109	Data Science	3	
6	BIOI-4102	Functional and Structural Bioinformatics	3	
7	BIOI-4103	Ethical and Legal Issues in Bioin-formatics	2	BIOI-3102
8		Final Year Project-I	3	ENGL-1111 and COSC-2103
Total Credit Hours			**18**	

Semester 8

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	BIOI-4104	Bioinformatics Computing-II	3	
2	BIOI-4105	Network Biology	3	
3	HLTH-1113	Basic Health Awareness	2	
4	BIOI-4302	Final Year Project-II	3	
Total Credit Hours			**11**	

Program Total Credit Hours	**134**

"The past resembles the future more than one drop of water resembles another"

- Ibn Khaldun

List of Elective Courses

S. No.	Course Code	Course Title	Credit Hours
1	BIOI-4106	Immuno-Informatics	3
2	BIOI-4105	Network Biology	3
3	COSC-3101	Computer Networks	3
4	COSC-3107	Machine Learning	3
5	COSC-3108	Image Processing	3
6	COSC-3109	Data Science	3
7	MSCI-3111	Entrepreneurship	3
8	COSC-3113	Data Mining	3
9	SENG-4115	Visual Programming	3
10	SENG-4112	Semantic Web	3
11	MATH-2122	Differential Equations	3
12	SSCI-1112	Social Service (Elective Mandatory)	3
13	BIOI-4107	Special Topics in Biochemistry	3
14	BIOI-1101	Bioinformatics Colloquium (Elective Mandatory)	3

"Innovation distinguishes between a leader and a follower"

-Steve Jobs

MS Information Security

Semester 1

S. No.	Course Code	Course Title	Credit Hours	Remarks
1	COSC-5101	Advanced Algorithms Design and Analysis	3	Core
2	COSC-5107	Cryptography and Network Security	3	Core
3		Specialization-I	3	Specialized
4		Elective-I	3	Elective
Total Credit Hours			**12**	

Semester 2

S. No.	Course Code	Course Title	Credit Hours	Remarks
1	INFS-5101	Information Security and Privacy	3	Core
2		Specialization-II	3	Specialized
3		Elective-II	3	Elective
4		Elective-II	3	Elective
Total Credit Hours			**12**	

Semester 3 & 4

S. No.	Course Code	Course Title	Credit Hours	Remarks
1	INFS-6601	Thesis	12	Core
Total Credit Hours			**12**	

Program Total Credit Hours	**36**

Specialization: Information Security Management

S. No.	Course Code	Course Title	Remarks
1	INFS-5102	Legal Issues in Information Security	Elective
2	INFS-5103	IT Security Evaluation and Auditing	Elective
3	INFS-6111	Intrusion Detection Systems	Elective
4	INFS-6112	Cyber Risk Management	Elective

Specialization: Digital Forensics

S. No.	Course Code	Course Title	Remarks
1	INFS-6113	Computer Forensics	Elective
2	INFS-6114	Network Forensics	Elective
3	INFS-6115	Operating System Forensics	Elective
4	INFS-6116	IT Forensics and Investigation	Elective

General Elective Courses

S. No.	Course Code	Course Title	Remarks
1	MSCI-6134	Cases in Small Business & Entrepreneurship	Elective
2	INFS-5104	ICT Innovation-Product Design and Development	Elective
3	INFS-6101	Software Security	Elective
4	INFS-6102	Advanced Software Engineering	Elective
5	INFS-6103	Modeling and Analysis of Security Protocols	Elective
6	INFS-6104	Usable Security and Privacy	Elective
7	INFS-6105	Security of Smart Devices	Elective
8	INFS-6106	Biometric Authentication	Elective

S. No.	Course Code	Course Title	Remarks
9	INFS-6107	Principles of Data Protection	Elective
10	INFS-6108	Cloud Computing Security	Elective
11	INFS-6109	Security of Data Communication Networks	Elective
12	INFS-6110	Advanced Topics in Network Security	Elective

S. No.	Course Code	Course Title	Remarks
13	COSC-5112	Machine Learning	Elective
14	COSC-6101	Formal Methods	Elective
15	COSC-6102	Model Checking	Elective
16	COSC-6120	Internet of Things	Elective
17	MSCI-6102	Research Methodology	Elective

Deficiency Courses

S. No.	Course Code	Course Title	Remarks
1	COSC-1101	Programming Fundamentals	None
2	COSC-1102	Object Oriented Programming	COSC-1101
3	COSC-1103	Discrete Structures	None
4	COSC-2101	Data Structures & Algorithms	COSC-1101
5	COSC-3101	Computer Networks	None

S. No.	Course Code	Course Title	Remarks
6	Operating Systems	Operating Systems	None
7	Database Systems	Database Systems	None
8	Software Engine	Software Engineering	None
9	Information Security	Information Security	None

MS Information Technology

Semester 1

S. No.	Course Code	Course Title	Credit Hours	Remarks
1	INFT-5101	Advanced Database Management Systems	3	Core
2		Elective-I	3	Elective
3		Elective-II	3	Elective
4		Elective-III	3	Elective
Total Credit Hours			**12**	

Semester 2

S. No.	Course Code	Course Title	Credit Hours	Remarks
1	INFT-5101	Information Security and Assurance	3	Core
2		Elective-IV	3	Elective
3		Elective-V	3	Elective
4		Elective-VI	3	Elective
Total Credit Hours			**12**	

Semester 3 & 4

S. No.	Course Code	Course Title	Credit Hours	Remarks
1	INFT-6601	Thesis	12	Mandatory
Total Credit Hours			**12**	

List of Elective Courses

S. No.	Course Code	Course Title	Category
1	INFT-5101	Information Technology Infrastructure	Elective
2	INFT-5102	Telecom Management	Elective
3	INFT-5103	Data Warehousing Trends & Issues	Elective
4	INFT-5104	Data Mining Trends & Issues	Elective
5	INFT-5105	Advanced Business Intelligence and Analytics	Elective
6	INFT-5106	Multimedia Databases	Elective
7	INFT-5107	Mobile & Pervasive Computing	Elective
8	INFT-5108	Enterprise Data Center Design and Methodology	Elective
9	INFT-5109	Data Center Network Design, Implementation, and Security	Elective
10	INFT-5110	Virtualized Data Center	Elective
11	INFT-5111	Advanced Computer Networks	Elective
12	INFT-5112	Network Performance Modelling and Evaluation	Elective
13	INFT-5113	Integrated Services over Packet Networks	Elective
14	INFT-5114	Stochastic Systems	Elective

S. No.	Course Code	Course Title	Category
15	INFT-5115	Stochastic Processes	Elective
16	INFT-5116	Knowledge-Based Systems	Elective
17	INFT-5117	Distributed Databases	Elective
18	INFT-5118	Advanced Telecommunication Networks	Elective
19	INFT-5119	Telecommunication Systems	Elective
20	INFT-5120	Advanced Network Security	Elective
21	INFT-5121	Principles of Multimedia Systems	Elective
22	INFT-5122	Advanced Multimedia Systems	Elective
23	INFT-5123	Distributed System	Elective
24	INFT-5124	Computer Graphics	Elective
25	INFT-5125	Advanced Topics in Information Technology	Elective
26	INFS-6108	Cloud Computing Security	Elective
27	COSC-5107	Cryptography and Network Security	Elective
28	COSC-5111	Information Retrieval Techniques	Elective

S. No.	Course Code	Course Title	Category
29	COSC-5112	Machine Learning	Elective
30	COSC-5118	Advanced Digital Image Processing	Elective
31	COSC-6105	Computer Vision	Elective
32	COSC-6120	Internet of Things	Elective
33	COSC-6124	Big Data Analytics	Elective
34	MSCI-6102	Advanced Research Methodology	Elective
35	COSC-5120	Tools and Techniques in Data Science	Elective

BS Telecommunication Systems

Semester 1

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	COSC-1105	Introduction to Computing	2	
2	COSC-1205	Introduction to Computing-Lab	1	
3	PHYS-1121	Applied Physics	3	
4	PHYS-1221	Applied Physics -Lab	1	
5	TLC-1101	Electric Circuits I	3	
6	TLC-1102	Electric Circuits I-Lab	1	
7	MATH-1101	Calculus I	3	
8	ENGL-1114	Eng-I, English Composition and Comprehension	2	
Total Credit Hours			**16**	

Semester 2

S.	Course	Course Title	Credit Hours	Pre-Requisite
1	COSC-1102	Object Oriented Programming	3	
2	COSC-1202	Object Oriented Programming-Lab	1	
3	ELEN-1120	Electronic Devices & Circuits	3	
4	ELEN-1220	Electronic Devices & Circuits-Lab	1	
5	MATH-1102	Calculus II	3	
6	ENGL-1119	Eng-II, Communication Skills	3	
7	PAKS-1113	Pakistan Studies	2	
8	ISLS-1112	Islamic Studies/Ethics	2	
Total Credit Hours			**18**	

Semester 3

S.	Course	Course Title	Credit Hours	Pre-Requisite
1	ELEN-2100	Digital Logic Design	3	
2	ELEN-2200	Digital Logic Design	1	
3	COSC-3103	Data Communications and Networking	3	
4	COSC-3203	Data Communications and Networking -Lab	1	
5	MATH-2103	Linear Algebra	3	
6	SSCI-2111	Professional Ethics	3	
7	TLC-2101	Electric Circuits II	3	
Total Credit Hours			**17**	

Semester 4

S.	Course	Course Title	Credit Hours	Pre-Requisite
1	INFT-3103	Telecommunication Systems	3	
2	TLC-2102	Complex Variables and Transforms	3	
3	CEEN-2122	Signals and Systems	3	
4	CEEN-2122 L	Signals and Systems-Lab	1	
5	MSCI-3110	Organizational Behaviour	3	
6	ENGL-2111	Eng-III, Technical Report Writing	2	
Total Credit Hours			**15**	

Semester 5

S.	Course	Course Title	Credit Hours	Pre-Requisite
1	TLC-3101	Analog & Digital Communications Systems	3	
2	TLC-3102	Information and Network Security	3	
3	ELEN-3131	Electromagnetic Theory	3	
4	TLC-3103	Introduction to Business and Marketing	3	
5	TLC-3104	Economics	3	
6	STAT-2131	Probability & Statistics	3	
Total Credit Hours			**18**	

Semester 6

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	TLC-3105	Antenna and Wave Propagation	3	
2	TLC-3106	Transmission and Switching Systems	3	
3	TLC-3107	Telecommunication Policies and Regulations	3	
4	TLC-3108	Microcontrollers & Embedded Systems	3	
5	TLC-3208	Microcontrollers & Embedded Systems-Lab	1	
6	TLC-3109	e-Business Management	3	
Total Credit Hours			**16**	

Semester 7

S.	Course	Course Title	Credit Hours	Pre-Requisite
1	TLC-4301	Final Year Project-I	3	
2	ELEN-4131	Wireless and Mobile Communications	3	
3	TLC-4101	Telecommunication Network Management	3	
4	TLC-4106	Cyber Policies and Regulations	3	
5	TLC-4110	Parallel and Distributed Computing	3	
Total Credit Hours			**15**	

Semester 8

S. No.	Course Code	Course Title	Credit Hours	Pre-Requisite
1	TLC-4302	Final Year Project -II	3	
2	TLC-4102	Optical Fiber Communication	3	
3	MSCI-6106	Project Management	3	
4	TLC-4105	Broadband Networks	3	
5	INFT-3118	Real Time Systems	3	
Total Credit Hours			**15**	

Program Total Credit Hours	**130**

List of Elective Courses

S. No.	Course Code	Course Title	Cr. Hrs
29	TLC-4103	Ubiquitous Computing	3
30	TLC-4104	Information Theory and Coding	3
31	TLC-4105	Broadband Networks	3
32	TLC-4106	Cyber Policies and Regulations	3
33	TLC-4107	Software Define Radios	3
34	INFT-4114	Optical Networks	3
35	INFT-4107	Routing & Switching	3
36	TLC-4108	Software Defined Networks	3
37	COSC-2105	Theory of Automata	3
38	COSC-3104	Compiler Construction	3
39	COSC-2160	Advanced Real World Programming	3
40	COSC4110	Advanced Object Oriented Programming	3
41	COSC-5112	Machine Learning	3
42	COSC-3112	Advanced Image Processing	3

S. No.	Course Code	Course Title	Cr. Hrs
43	INFT-4106	Data Science	3
44	TLC-4109	Data Warehousing	3
45	INFT-4106	Distributed Database Systems	3
46	COSC-3112	Artificial Intelligence	3
47	COSC-4108	Data Mining	3
48	TLC-4110	Parallel and Distributed Computing	3
49	TLC-4111	Theory of Programming Languages	3
50	COSC-3116	Mobile Application Development	3
51	COSC-4109	Natural Language Processing	3
52	INFT-3118	Real Time Systems	3
53	COSC-3114	Computer Graphics	3
54	TLC-4112	E-Commerce Application Development	3
55	COSC-3116	Semantic Web	3
56	COSC-4111	Visual Programming	3

MS Telecommunication Systems

Semester 1

S. No.	Course Code	Course Title	Credit Hours	Remarks
1	TLC-5101	Advanced Digital Communication	3	Core
2	TLC-5102	Telecommunication Network Operations	3	Core
3		Specialized Core Course-I	3	Specialized Core Course
4		Elective-I	3	Elective
Total Credit Hours			**12**	

Semester 2

S. No.	Course Code	Course Title	Credit Hours	Remarks
1	TLC-5103	Digital Signal Processing	3	Core
2		Specialized Core Course- II	3	Specialized Core Course
3		Specialized Core Course-III	3	Specialized Core Course
4		Elective-II	3	Elective
Total Credit Hours			**12**	

Semester 3 & 4

S. No.	Course Code	Course Title	Credit Hours	Remarks
1	TLC-6601	Thesis	12	Mandatory
Total Credit Hours			**12**	

List of Elective Courses

S. No.	Course Code	Course Title	Category
1	TLC-5125	Advanced Telecommunication Management	Elective
2	TLC-5126	Advanced e-business Management	Elective
3	TLC-5127	Business Process Management	Elective
4	TLC-5128	Multinational Project Management	Elective
5	TLC-5129	Management Information Systems	Elective
6	TLC-5130	Review of International Telecommunication Laws	Elective
7	TLC-5131	Macro Economics	Elective
8	TLC-5132	Investment Management	Elective

Specialization Core Courses

S. No.	Course Code	Course Title	Category
1	TLC-5104	Probability and Random Processes	Specialized Core Course
2	TLC-5105	Advanced Communication Systems	Specialized Core Course
3	TLC-5106	Information Theory and Coding	Specialized Core Course
4	TLC-5107	Microwave Systems	Specialized Core Course
5	TLC-5108	Advance Mobile Communication	Specialized Core Course
6	TLC-5109	Advanced concepts in Radar Systems	Specialized Core Course
7	TLC-5110	Cyber Security	Specialized Core Course
8	TLC-5111	Cryptography and Security Systems	Specialized Core Course
9	TLC-5112	Wireless Local Positioning Systems	Specialized Core Course
10	TLC-5113	Global Positioning and Navigation Systems	Specialized Core Course
11	TLC-5114	Signal Detection and Estimation	Specialized Core Course
12	TLC-5115	Advanced Optical Communication Systems	Specialized Core Course
13	TLC-5116	Advanced Satellite Communication Systems	Specialized Core Course
14	TLC-5117	Advanced electromagnetic and Antenna systems	Specialized Core Course
15	TLC-5118	Advanced Broadband Communication Systems	Specialized Core Course
16	TLC-5119	Multimedia Communication Systems	Specialized Core Course
17	TLC-5120	Modelling and Simulation of Telecommunication systems	Specialized Core Course
18	TLC-5121	Electromagnetic Compatibility Regulations	Specialized Core Course
19	TLC-5122	Quality of Service in Telecommunication systems	Specialized Core Course
20	TLC-5123	Advances in transmission & switching system	Specialized Core Course
21	TLC-5124	Selected Topics in Telecom systems	Specialized Core Course

"The happiness of the drop is to die in the river."

- Al-Ghazali

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