NED UNIVERSITY OF ENGINEERING & TECHNOLOGY
E-Mail:dracad@neduet.edu.pk/Website:http://www.neduet.edu.pk
Phone: (92-21) 99261261-8 Ext-2221/Fax: (92-21) 99261255

No.Acad/27(174)/7104 **Dated: 30-09-2021**

NOTIFICATION

In pursuance to powers delegated to the Academic Council by Syndicate vide its Resolution No.Syn-186.4(b) dated 26-10-2018, it is hereby notified that the Academic Council vide its Resolution No. AC-153.4(i) dated 13-09-2021 has approved the proposal regarding Scheme of Studies in BE Civil (Specialization in Urban) at Department of Urban & Infrastructure Engineering, along with changes in programme title to be mentioned in Degree and Transcript, applicable from Batches 2017, 2018, 2019, 2020 and 2021, as under:

Scheme of Studies of BE Civil (Specialization in Urban) for the Batch 2017

FIRST YEAR							
Fall semester				**Spring semester**			
Course No.	**Course Title**	**Credit Hours**		**Course No.**	**Course Title**	**Credit Hours**	
		Theory	**Practical**			**Theory**	**Practical**
UE-118	Engineering Surveying-I	3	1	UE-117	Engineering Drawing & Drafting-I	1	2
EE-123	Basic Electrical Engineering	2	0	UE-102	Statics and Dynamics	3	1
ME-110	Basic Mechanical Engineering	2	0	UE-104	Engineering Materials	3	1
MT-114	Calculus	3	0	HS-205/ HS-209	Islamic Studies OR Ethical Behavior (for Non-Muslims)	2	0
CY-110	Applied Chemistry for Engineers	2	1	MT-221	Linear Algebra & Ordinary Differential Equations	3	0
HS-106 / HS-107	Pakistan Studies/ Pakistan Studies (for Foreigners)	1	0	HS-111	Functional English	2	0
	Total Credits	13	2		Total Credits	14	4
SECOND YEAR							
Fall Semester				**Spring Semester**			
Course No.	**Course Title**	**Credit Hours**		**Course No.**	**Course Title**	**Credit Hours**	
		Theory	**Practical**			**Theory**	**Practical**
UE-205	Engineering Drawing & Drafting-II	2	2	UE-361	Planning and Design of Transportation Systems	3	1
UE-212	Mechanics of Solids	3	1	UE-214	Fluid Mechanics	3	1
UE-215	Engineering Surveying - II	2	1	MT-229	Probability & Statistics	2	0
HS-304	Business Communication & Ethics	3	0	UE-218	Law and Regulatory Control Studies	2	0
AR-204	Urban Sociology	2	0	UE-209	Analysis of Structures	3	0
UE-114	Computing Tools and Applications	1	2	UE-216	Geology for Engineers	2	1
	Total Credits	13	6		Total Credits	15	3

THIRD YEAR							
Fall semester				**Spring Semester**			
Course No.	**Course Title**	**Credit Hours**					
		Theory	**Practical**			**Theory**	**Practical**
UE-321	Civil Works Quantity & Cost Estimations	1	2	UE-305	Soil Mechanics-I	3	1
UE-316	Traffic Engineering and Management	3	1	UE-306	Structural Analysis and Design	3	0
UE-322	Principles of Engineering Construction	3	0	UE-323	Urban Hydrology and Municipal Engineering	2	1
AR-308	Urban Infrastructure Planning & Management	2	0	CF-313	Applied Economics for Engineers	2	0
MT-443	Numerical Analysis	3	0	EN-301	Environmental Engineering-I	2	1
UE-304	Reinforced Concrete Design	3	1	UE-217	Introduction to Geo-Informatics	1	1
	Total Credits	15	4		Total Credits	13	4
FOURTH YEAR							
Fall semester				**Spring Semester**			
Course No.	**Course Title**	**Credit Hours**		**Course No.**	**Course Title**	**Credit Hours**	
		Theory	**Practical**			**Theory**	**Practical**
UE-403	Soil Mechanics-II	3	1	UE-413	Mechanics and Design of Steel Structures	3	0
UE-405	Construction Planning & Management	3	0	UE-402	Urban Mass Transportation	2	0
UE-418	Hydraulic Engineering and Water Resources Management	2	1	CF-410	Financial Resource Management	2	0
UE-407	Advanced Technologies and Disaster Management	2	0	EN-402	Environmental Impact Assessment	2	0
EN-401	Environmental Engineering-II	2	1	UE-415	Urban Engineering Project	0	3
UE-415	Urban Engineering Project	0	3	XX-XXX	Inter-Disciplinary Electives	2	1
	Total Credits	12	6		Total Credits	11	4
TOTAL 139 CREDIT HOURS							

	XX-XXX- Inter-Disciplinary Electives		
UE-421	Modern Aspects of Construction Project Management	*2*	*1*
UE-422	Traffic Impact Assessment	*2*	*1*
UE-423	Highway and Airfield Pavement Design	*2*	*1*
UE-424	Building Information Modeling	*2*	*1*
UE-425	Applications in City and Regional Planning	*2*	*1*
UE-426	Geosynthetics and their applications	*3*	*0*

Additional Three Courses for the Batch 2017 (Summer Semester)

Course Code	Course Title	Theory	Practical
UE-357/CE-322	Mechanics of Solid-II	3	0
UE-453/CE-424	Reinforced Concrete Design-II	3	0
UE-358/CE-314	Structural Analysis-II	3	0
		9	0
TOTAL CREDIT HOURS AFTER ADDITION OF 3 COURSES =139+9 = ***148***			

Scheme of Studies of BE Civil (Specialization in Urban) for the Batch 2018 Only

FIRST YEAR									
Fall Semester					**Spring Semester**				
Course Code	Course Title	Credit Hours			Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total			Th.	Pr.	Total
UE-118	Engineering Surveying-I	3	1	4	UE-117	Engineering Drawing & Drafting-I	1	2	3
EE-123	Basic Electrical Engineering	2	0	2	UE-102	Statics and Dynamics	3	1	4
ME-110	Basic Mechanical Engineering	2	0	2	UE-104	Engineering Materials	3	1	4
MT-114	Calculus	3	0	3	HS-205/ HS-209	Islamic Studies OR Ethical Behaviour (for Non-Muslims)	2	0	2
CY-110	Applied Chemistry for Engineers	2	1	3	HS-111	Functional English	2	0	2
HS-106 / HS-127	Pakistan Studies/ Pakistan Studies (for Foreigners)	1	0	1	MT-221	Linear Algebra & Ordinary Diff. Equation	3	0	3
	Total Credits	13	2	15		Total Credits	14	4	18
SECOND YEAR									
Fall Semester					**Spring Semester**				
Course Code	Course Title	Credit Hours			Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total			Th.	Pr.	Total
UE-205	Engineering Drawing & Drafting-II	2	2	4	UE-361	Planning and Design of Transportation Systems	3	1	4
UE-212	Mechanics of Solids -I	3	1	4	UE-214	Fluid Mechanics	3	1	4
UE-215	Engineering Surveying - II	2	1	3	MT-229	Probability and Statistics	2	0	2
HS-304	Business Communication & Ethics	3	0	3	UE-218	Law and Regulatory Control Studies	2	0	2
AR-204	Urban Sociology	2	0	2	UE-209	Analysis of Structures	3	0	3
UE-114	Computing Tools and Applications	3	1	4	UE-216	Geology for Engineers	2	1	3
	Total Credits	15	5	20		Total Credits	15	3	18

THIRD YEAR									
Fall Semester					**Spring Semester**				
Course Code	Course Title	Credit Hours			Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total			Th.	Pr.	Total
UE-351/CE-320	Reinforced Concrete Design-I	3	0	3	*UE-323*	*Urban Hydrology and Municipal Engineering*	*2*	*1*	*3*
UE-352/CE-321	Construction Engineering	3	0	3	UE-305/CE-305	Soil Mechanics-I	3	1	4
UE-353/CE-323	Quantity & Cost Estimations	3	0	3	CF-303	Applied Economics for Engineers	3	0	3
UE-316	*Traffic Engineering and Management*	*3*	*1*	*4*	UE-355/CE-424	Essential in Construction Project Management	3	0	3
MT-443	Numerical Analysis	*3*	*0*	*3*	UE-453/CE-420	Reinforced Concrete Design- II	3	0	3
AR-308	Urban Infrastructure Planning and Management	2	0	2					
	Total Credits	17	1	18		Total Credits	14	2	16
FINAL YEAR									
Fall Semester					**Spring Semester**				
Course Code	Course Title	Credit Hours			Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total			Th.	Pr.	Total
UE-403/CE-403	Soil Mechanics-II	3	1	4	***UE-360***	***Mechanics of Solid-II***	***2***	***0***	***2***
UE-452	*Urban Mass Transportation*	*2*	*0*	*2*	*UE-435*	*Financial Resource Management*	*2*	*0*	*2*
UE-451/CE-418	Hydraulic Engineering and Water Resources Engineering-I	3	1	4	UE-454/CE-421	Design of Steel Structures	3	0	3
UE-359	***Structural Analysis-II***	***2***	***0***	***2***	EN-401	Environmental Engineering-II	2	1	3
EN-301	Environmental Engineering-I	2	1	3	***UE-460***	***Geoinformatics***	***1***	***1***	***2***
UE-415	Urban Engineering Project	0	3	3	UE-415	Urban Engineering Project	0	3	3
	Total Credits	12	6	18		Total Credits	10	5	15
	Total Fall semesters			71		Total Spring semesters			67
Grand Total- 138									

Bold fonts, Italics and thick border are courses, that have been introduced in the scheme as per desire of PEC (EAB-100)

Scheme of Studies of BE Civil (Specialization in Urban) for the Batch 2019 ONLY

FIRST YEAR									
Fall Semester					**Spring Semester**				
Course Code	Course Title	Credit Hours			Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total			Th.	Pr.	Total
UE-118	Engineering Surveying-I	3	1	4	UE-117	Engineering Drawing & Drafting-I	1	2	3
EE-123	Basic Electrical Engineering	2	0	2	UE-102	Statics and Dynamics	3	1	4
ME-110	Basic Mechanical Engineering	2	0	2	UE-104	Engineering Materials	3	1	4
MT-114	Calculus	3	0	3	HS-205/ HS-209	Islamic Studies OR Ethical Behaviour (for Non-Muslims)	2	0	2
CY-110	Applied Chemistry for Engineers	2	1	3	HS-111	Functional English	2	0	2
HS-106 / HS-127	Pakistan Studies/ Pakistan Studies (for Foreigners)	1	0	1	MT-221	Linear Algebra & Ordinary Diff. Equation	3	0	3
					HSK-1	Chinese Language	NC		
	Total Credits	13	2	15		Total Credits	14	4	18

SECOND YEAR									
Fall Semester					**Spring Semester**				
Course Code	Course Title	Credit Hours			Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total			Th.	Pr.	Total
UE-201/CE-201	Engineering Surveying - II	3	1	4	UE-253/CE-222	Engineering Drawing -II	1	2	3
UE-251/CE-205	Mechanics of Solids -I	3	1	4	UE-254/CE-219	Fluid Mechanics-I	3	1	4
UE-252/CE-220	Geology for Engineers	2	1	3	UE-255/CE-221	Structural Analysis -I	3	0	3
HS-218	Business Communication	2	1	3	HS-219	Professional Ethics	2	0	2
UE-155/CE-111	Intro to Computing for Civil Engineering	1	2	3	MT-331	Probability & Statistics	3	0	3
HSK-2	Chinese Language	NC			CF-303	Applied Economics for Engineers	3	0	3
	Total Credits	11	6	17		Total Credits	15	3	18

THIRD YEAR									
Fall Semester					**Spring Semester**				
Course Code	Course Title	Credit Hours			Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total			Th.	Pr.	Total
UE-351/CE-320	Reinforced Concrete Design-I	3	0	3	AR-309	Architecture and Town Planning	3	0	3
UE-352/CE-321	Construction Engineering	3	0	3	UE-305/CE-305	Soil Mechanics-I	3	1	4
UE-353/CE-323	Quantity & Cost Estimations	3	0	3	*UE-356*	*Traffic Engineering and Management*	*3*	*0*	*3*
UE-455	***Municipal Engineering and Urban Management***	***2***	***0***	***2***	*UE-218*	*Law and Regulatory Control Studies*	*2*	*0*	*2*
MT-443	Numerical Analysis	3	0	3	UE-355/CE-424	Essential in Construction Project Management	3	0	3
UE-361	***Planning & Design of Transportation System***	***3***	***1***	***4***	UE-453/CE-420	Reinforced Concrete Design- II	3	0	3
	Total Credits	17	1	18		Total Credits	17	1	18

FINAL YEAR									
Fall Semester					**Spring Semester**				
Course Code	Course Title	Credit Hours			Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total			Th.	Pr.	Total
UE-403/CE-403	Soil Mechanics-I	3	1	4	***UE-360***	***Mechanics of Solid-II***	***2***	***0***	***2***
UE-452	*Urban Mass Transportation*	*2*	*0*	*2*	*UE-435*	*Financial Resource Management*	*2*	*0*	*2*
UE-451/CE-418	Hydraulic Engineering and Water Resources Engineering-I	3	1	4	***UE-460***	***Geoinformatics***	***1***	***1***	***2***
UE-359	***Structural Analysis-II***	***2***	***0***	***2***	UE-454/CE-421	Design of Steel Structures	3	0	3
EN-301	Environmental Engineering-I	2	1	3	EN-401	Environmental Engineering-II	2	1	3
UE-415	Urban Engineering Project	0	3	3	UE-415	Urban Engineering Project	0	3	3
	Total Credits	12	6	18		Total Credits	10	5	15
	Total Fall semesters			68		Total Spring semesters			69
Grand Total- 137									

Bold fonts, Italics and thick border are courses, that have been introduced in the scheme as per desire of PEC (EAB-100)

Scheme of Studies of BE Civil (Specialization in Urban) for the Batch 2020 & 2021

FIRST YEAR

Fall Semester

Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total
UE-151/CE-107	Engineering Drawing-I	1	2	3
UE-102/CE-102	Statics and Dynamics	3	1	4
EE-123	Basic Electrical Engg	2	0	2
UE-152/CE-108	Engineering Materials	2	1	3
MT-114	Calculus	3	0	3
HS-106 / HS-127	Pakistan Studies/ Pakistan Studies (for Foreigners)	1	0	1
	Total Credits	12	4	16

Spring Semester

Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total
UE-153/CE-109	Engineering Surveying-I	2	1	3
UE-154/CE-110	Chemistry for Civil Engineers	1	1	2
UE-155/CE-111	Intro to Computing for Civil Engg	1	2	3
ME-110	Basic Mechanical Engineering	2	0	2
HS-111	Functional English	2	0	2
MT-221	Linear Algebra & Ordinary Differential Equations	3	0	3
HSK-1	Chinese Language	NC		
	Total Credits	11	4	15

SECOND YEAR

Fall Semester

Course Code	course Title	Credit Hours		
		Th.	Pr.	Total
UE-201/CE-201	Engineering Surveying - II	3	1	4
UE-251/CE-205	Mechanics of Solids -I	3	1	4
UE-252/CE-220	Geology for Engineers	2	1	3
HS-218	Business Communication	2	1	3
HS-205/ HS-209	Islamic Studies OR Ethical Behaviour (for Non-Muslims)	2	0	2
HSK-2	Chinese Language			
	Total Credits	12	4	16

Spring Semester

Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total
UE-253/CE-222	Engineering Drawing -II	1	2	3
UE-254/CE-219	Fluid Mechanics-I	3	1	4
UE-255/CE-221	Structure Analysis -I	3	0	3
HS-219	Professional Ethics	2	0	2
MT-331	Probability & Statistics	3	0	3
CF-303	Applied Economics for Engineers	3	0	3
	Total Credits	15	3	18

THIRD YEAR

Fall Semester

Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total
UE-351/CE-320	Reinforced Concrete Design-I	3	0	3
UE-352/CE-321	Construction Engineering	3	0	3
UE-353/CE-323	Quantity & Cost Estimations	3	0	3
UE-455	***Municipal Engineering and Urban Management***	***2***	***0***	***2***
MT-443	Numerical Analysis	3	0	3
UE-361	***Planning & Design of Transportation System***	***3***	***1***	***4***
	Total Credits	17	1	18

Spring Semester

Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total
AR-309	Architecture and Town Planning	3	0	3
UE-305/CE-305	Soil Mechanics-I	3	1	4
UE-356	*Traffic Engineering and Management*	*3*	*0*	*3*
UE-218	*Law and Regulatory Control Studies*	*2*	*0*	*2*
UE-355/CE-424	Essential in Construction Project Management	3	0	3
UE-453/CE-453	Reinforced Concrete Design- II	3	0	3
	Total Credits	17	1	18

FINAL YEAR

Fall Semester

Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total
UE-403/CE-403	Soil Mechanics-II	3	1	4
UE-452	*Urban Mass Transportation*	*2*	*0*	*2*
UE-451/CE-418	Hydraulic Engineering and Water Resources Engg-I	3	1	4
UE-359	***Structural Analysis-II***	***2***	***0***	***2***
EN-301	Environmental Engineering-I	2	1	3
UE-415	Urban Engineering Project	0	3	3
	Total Credits	12	6	18
	Total Fall semesters			68

Spring Semester

Course Code	Course Title	Credit Hours		
		Th.	Pr.	Total
XX-###	Engineering Electives (3+0 OR 2+1 OR 1+2)	3	0	3
UE-435	*Financial Resource Management*	*2*	*0*	*2*
UE-460	***Geoinformatics***	***1***	***1***	***2***
UE-454/CE-421	Design of Steel Structures	3	0	3
EN-401	Environmental Engineering-II	2	1	3
UE-360	***Mechanics of Solid-II***	***2***	***0***	***2***
UE-415	Urban Engineering Project	*0*	*3*	*3*
	Total Credits	13	5	18
	Total Spring semesters			69

Grand Total- 137

Bold fonts, Italics and thick border are courses, that have been introduced in the scheme as per desire of PEC (EAB-100)

List of Engineering Electives (3+0 OR 2+1 OR 1+2)

COURSE CODE	COURSE TITLE
CE-419	Applied Hydraulics
CE-423	Masonry Structures
CE-426	Building Information Modeling
CE-429	Geo-synthetics and their applications
CE-438	Hydraulics and Water Resources Engineering-II
CN-424	Environmental Issues in construction
CN-430	Disaster and Reconstruction Management
UE-422	Traffic Impact Assessment
UE-423	Highway and Airfield Pavement Design
EN-403	***Environmental Impact Assessment***
UE-421	***Modern Aspects of Construction Project Management***
UE-436	***Urban Sociology***

LIST OF URBAN ENGINEERING COURSES

CODE	*COURSE NAME*	*Theory*	*Practical*	*Total CH*
UE-455	***Municipal Engineering and Urban Management***	***2***	***0***	***2***
UE-361	***Planning & Design of Transportation System***	***3***	***1***	***4***
UE-217	***Introduction to Geo-Informatics***	***1***	***1***	***2***
UE-452	*Urban Mass Transportation*	*2*	*0*	*2*
UE-356	*Traffic Engineering and Management*	*3*	*0*	*3*
UE-460	*Law and Regulatory Control Studies*	*2*	*0*	*2*
UE-XXXX	*URBAN ENGINEERING ELECTIVES*	*3*	*0*	*3*
UE-415	Urban Engineering Project	*0*	*6*	*6*
	Total credit hours	***16***	***8***	***24***

UE-360 MECHANICS OF SOLID-II

	Cr. Hrs.	Contact Hrs.	Exam Marks
Th.	2	2	100
Pr	-	-	-

Enhanced Topics Related to Beam Bending and Shear:
Unsymmetrical bending Shear flow, shear center Analysis of curved beams Beams on elastic foundations.

Theory of Elasticity:
Analysis of stresses and strains due to combined effect of axial, bending and twisting forces/moments Elementary theory of elasticity Equilibrium and compatibility equations Stress and deformation relationships Stress transformation Theories of failure

Torsion of Thin Tubes and Open Sections:
Torsion of non-circular shafts Membrane analogy Torsion in thin tubes and open sections.

Stability:
Struts and columns, Euler, Rankine and other formulas for buckling load of columns, Stability analysis of columns under eccentric loading.

Theory of Plasticity
Elementary theory of plasticity, Plastic hinges, Shape factor, Collapse mechanism.

Recommended book(s) for the approved course
(Author's name, "*Title*", edition, publisher, publication year).

Text Book:

1. James M. Gere & Barry. J. Goodno, Mechanics of Materials, 8th Edition, CL Engineering, 2008

Reference Books:

1. Arthur P. Boresi. & Richard J. Schmidt, Advanced Mechanics of Materials, ; 6th Edition, John Wiley, 2002
2. Pytel, A. & Ferdinand L. Singer, Strength of Material, ; 4th Sub Edition, Harper and Row Harper Collins College Div (1987)
3. R.C. Hibbeler, Mechanics of Materials, 8th Edition, Prentice Hall; 2010
4. James M. Gere & Stephen P. Timoshenko, Mechanics of Materials, 4th Edition, , PWS Pub Co. 1997
5. Zahid Ahmed Siddiqi, Mechanics of Materials, 1st Edition, Help Civil Engineering, 2015

UE-455: MUNICIPAL ENGINEERING AND URBAN MANAGEMENT

	Cr. Hrs.	Contact Hrs.	Exam Marks
Th.	2	2	100
Pr	-	-	-

General

Organization of local government; Role of planners; Municipal Engineer co-ordination with different civic agencies.

Sustainable Infrastructure Development

Green building Concepts, Sustainable Infrastructure Development such as LEED Systems, Renewable Energy technologies (e.g. wind/solar/Thermal), and construction technologies such as (Trenchless technology)

Disaster Management

Predictions and preparedness strategies for natural disasters such as Earthquakes, Tsunami and Floods. Emergency management; Follow-on Disasters; Recovery plans; Strategies for protection; Loss estimation; Risk and Vulnerability Analysis; Disaster Mitigation

Infrastructure Analysis and Management

Infrastructure study design; cohort studies; cross-sectional studies etc. Infrastructure inventory surveys.

Recommended book(s) for the approved course

(Author's name, "*Title*", edition, publisher, publication year).

Text book(s)

1. Barth Detlef, The Disaster Risk Management Handbook- A learning experience of DRM Model Mansehra, PDMA KP, 2013
2. Ivor H. Seeley, Municipal Engineering Practice, Palgrave, 2014
3. Nitesh Kumar, Textbook of Disaster Management, 1st edition, Satish Serial Publishing House, 2013

UE-359: STRUCTURAL ANALYSIS-II

	Cr. Hrs.	Contact Hrs.	Exam Marks
Th.	2	2	100
Pr	-	-	-

Analysis of Indeterminate Structures Using Force Approach:

Compatibility methods for beams and frames with and without support settlement

Analysis of Indeterminate Structures Using Stiffness Approach:

Moment distribution for beams and frames for prismatic and non-prismatic members with and without side-sway and support settlement, Slope deflection method for beams and frames with and without support settlement.

Matrix Methods:

Introduction to flexibility method, Determination of flexibility matrix for beams, Introduction to stiffness method, development of member and structure stiffness matrices, Bending moment and shear force diagrams, Application of computer programs.

Recommended book(s) for the approved course

(Author's name, "*Title*", edition, publisher, publication year).

Text book:

1. Hibbeler, R. C., Structural Analysis, 8th Edition, Prentice Hall, 2011
2. Wang, C. K., Intermediate Structural Analysis, McGraw-Hill Education - Europe. 1984
3. West, H. H., Analysis of Structures: An Integration of Classical and Modern Methods 2nd Edition, John Wiley and Sons Ltd;.1989

UE-361: PLANNING & DESIGN OF TRANSPORTATION SYSTEM			
	Cr. Hrs.	Contact Hrs.	Exam Marks
Th.	3	3	100
Pr	1	3	50

Transportation Systems and Planning: Role of Transportation: Classification of Transportation Systems development of various modes in Pakistan; Role of highways within a transport system; Highway classification. Planning needs Goals and Objectives, Types of Plan.

Geometric and Pavement design of Highway: Geometric design including cross section element Horizontal alignment Curves; Super elevation and gradient Flexible and rigid pavement design; Highway drainage.

Air Transportation: Component of air transportation: Airport activity; Aircraft characteristics affecting airport airside; Airport site Selection; Airside configuration; Navigation aids; Airport lighting and marking; Distribution concepts of terminal buildings; Geometric design of airside; Structural design of airfield pavements.

Waterway Transportation: Role of water transportation as a supplementary transportation system. Classification of harbours; Ports and harbours of Pakistan; Design principles and requirement of harbours; Effect of wind, waves and tides on design; wharves and jetties; Breakwater and groins Channel regulation and demarcations; Classification of docks and their construction; Transit sheds and warehouses. Emerging trends in Ports/ container termina.

Recommended book(s) for the approved course
(Author's name, "*Title*", edition, publisher, publication year).

Text book:

1. Fred L. Mannering, Principles of Highway Engineering and Traffic, Seventh Edition), Scott S. Washburn and Publisher Wiley,2020
2. Jason C. Yu, Transportation Engineering Introduction to Planning, Design and Operations, Elsevier Science Ltd. (June 1982).
3. Horonjeff, R. Planning and Design of Airports, McGraw-Hill Professional; 5th Edition,2010.
4. Gregory P. Tsinker, Port Engineering Planning Construction Maintenance and Security, John Wiley, 2004.

UE-460: GEOINFORMATICS			
	Cr. Hrs.	Contact Hrs.	Exam Marks
Th.	1	1	100
Pr	1	3	50

Introduction to Geo informatics Resources of information: Photogrammetric surveying, Satellite System, Aerial and Satellite photogrammetry.

Geographic Information System (GIS): Fundamentals of GIS, Spatial Data types and acquiring consideration. Data models and structures. Coordinate System, Datum and map projection and their transformation. Attribute-based operation, Introduction to Spatial Analysis.

Remote Sensing (RS): Basic Concepts. Physicals basis of Remote Sensing, Earth Resources Satellites/ Platforms, Sensors, Types of Resolutions, Georeferencing, Image Processing Techniques. Classification.

Global Positioning System (GPS): Navigational Satellites, Positioning Systems (GLONASS, GPS & Galileo), Fundamentals and Elements of GPS, System Operation & Characteristics, Errors and Atmospheric effects. Differential GPS (DGPS).

Field and Laboratory Work: Training on GPS instruments-based surveys, Integration GPS data in GIS. Exercises on Image processing software and recent GIS software. Demonstration on RS/GIS applications in engineering disciplines

Recommended book(s) for the approved course
(Author's name, "*Title*", edition, publisher, publication year).

Text book:

1. Michael Kennedy, The Global Positioning System and Arc GIS System, 3rd Edition, Taylor & Frances, New York, , 2017
2. Thomas, M. Lillesand & Ralph W. Kiefer, Remote Sensing and Image Interpretation, 7th edition, John Wiley & Sons, Inc. 2015,
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It was further resolved that the deficient courses for the batch 2017 will be offered during a semester which will be arranged in parallel with Fall Semester 2021.

REGISTRAR

To,

Chairperson, Dept. of Urban & Infrastructure Engg.

Copy to:-

1- Dean (CPL)
2- Controller of Examinations
3- Director, I.T. Department
4- Mr. Muhammad Riaz, Sr. D.E.O (Academic)

Copy for information to:-

1- PS to the Vice Chancellor
2- PA to Pro-Vice Chancellor
3- Director QEC/MR ISO 9000