



Graduation Requirements/ weekly hours and credit units

Requirements	Hrs./ week			Credit Units
	Theo.	Tut.	Lab.	
University Requirements	8	4	4	10
	16			
College Requirements	23	9	14	30
	46			
Department Requirements	92	40	44	114
	176			
Total	123	53	62	154
	238			

1- University Requirements: 10 Credit Units

Course No.	Course Title	Hrs./ week			Cr./ Units
		Theo.	Tut.	Lab.	
R.E 110	Fundamentals of Computer Science	1	1	2	2
R.E 135	Workshops	-	-	2	1
R.E 140	Arabic Language	1	-	-	1
R.E 145	Sport and fitness	-	2	-	0
R.E 136	Freedom and Human rights	1	1	-	1
R.E 141	English Language (1)	1	-	-	1
R.E 236	English Language (2)	1	-	-	1
R.E 345	English Language (3)	1	-	-	1
R.E 440	English Language (4)	1	-	-	1
R.E 446	Engineering Ethics	1	-	-	1
Total		8	4	4	10
		16			

2 - College Requirements: 30 Credit Units

Course No.	Course Title	Hrs./ week			Cr./ Units
		Theo.	Tut.	Lab.	
R.E 100	Mathematics (1)	3	1	-	3
R.E 101	Mathematics (2)	3	1	-	3
R.E 115	Engineering Drawing (1)	-	1	4	2
R.E 116	Engineering Drawing (2)	-	1	4	2
R.E 130	Engineering Statistics (1)	2	-	-	2
R.E 131	Engineering Statistics (2)	2	-	-	2
R.E 111	Computer programming (1)	1	1	2	2
R.E 210	Computer Programming (2)	1	1	2	2
R.E 211	Computer Programming (3)	1	1	2	2
R.E 200	Mathematics (3)	3	1	-	3
R.E 201	Mathematics (4)	3	1	-	3



R.E 330	Engineering Management	2	-	-	2
R.E 331	Engineering Economy	2	-	-	2
Total		23	9	14	30
		46			

3- Department Requirements: 116 Credit Units

Course No.	Course Title	Hrs./ week			Cr ./ Units
		Theo.	Tut.	Lab.	
R.E 105	Engineering Mechanics (1)	3	1	-	3
R.E 106	Engineering Mechanics (2)	3	1	-	3
R.E 125	Engineering Materials Properties	1	1	2	2
R.E 126	Construction Materials	1	1	2	2
R.E 121	Engineering Geology	2	1	-	2
R.E 120	Principles of Roads Engineering	2	-	-	2
R.E 205	Strength of Materials (1)	3	1	-	3
R.E 206	Strength of Materials (2)	3	1	-	3
R.E 215	Engineering Surveying (1)	2	1	2	3
R.E 216	Engineering Surveying (2)	2	1	2	3
R.E 220	Fluid Mechanics (1)	1	1	2	2
R.E 221	Fluid Mechanics (2)	1	1	2	2
R.E 225	Concrete Technology (1)	2	-	2	3
R.E 226	Concrete Technology (2)	2	-	2	3
R.E 230	Asphalt Technology (1)	2	-	2	3
R.E 231	Asphalt Technology (2)	2	-	2	3
R.E 235	Construction of Roads and Bridges	1	1	-	1
R.E 300	Engineering Analysis	2	2	-	2
R.E 301	Numerical Analysis	2	2	-	2
R.E 305	Soil Mechanics (1)	2	2	2	3
R.E 306	Soil Mechanics (2)	2	1	2	3
R.E 310	Theory of Structures	3	1	-	3
R.E 311	Design of Concrete Structures (1)	3	1	-	3
R.E 315	Traffic Engineering (1)	2	1	-	2
R.E 316	Traffic Engineering (2)	2	1	-	2
R.E 320	Airports Engineering	2	1	-	2
R.E. 321	Railways Engineering	2	-	-	2
R.E 325	Pavement Design (1)	2	1	-	2
R.E 326	Pavement Design (2)	2	1	-	2
R.E 335	Computer Applications (1)	-	-	2	1
R.E 336	Computer Applications (2)	-	-	2	1
R.E 340	Geomatics (1)	1	1	2	2
R.E 341	Geomatics (2)	1	1	2	2
R.E 400	Foundation Engineering (1)	3	1	-	3
R.E 401	Foundation Engineering (2)	3	1	-	3
R.E 405	Design of Concrete Structures (2)	3	1	-	3
R.E 406	Design of Concrete Bridges	3	1	-	3



R.E 410	Design of Steel Bridges (1)	2	1	-	2
R.E 411	Design of Steel Bridges (2)	2	1	-	2
R.E 415	Highways Design 1	2	1	-	2
R.E 416	Highways Design 2	2	1	-	2
R.E 420	Hydrology	2	1	-	2
R.E 425	Transports Planning	2	1	-	2
R.E 426	Quantity surveying and Specifications	2	1	-	2
R.E 430	Soil Improvements	2	-	-	2
R.E 431	Roads Maintenance and Safety	2	1	-	2
R.E 435	Computer Applications (3)	-	-	2	2
R.E 436	Computer Applications (4)	1	-	2	1
R.E 445	Graduation Project of 1st Semester	-	-	4	2
R.E 445	Graduation Project of 2nd Semester	-	-	4	2
Total		92	40	44	114
		176			

Subjects Summary:

First Year/First Semester

Subject		Hrs./week			Units
		Theo.	Tut.	Lab.	
R.E 100	Mathematics (1)	3	1	-	3
R.E 105	Engineering Mechanic (1)	3	1	-	3
R.E 110	Fundamentals of Computer Science	1	1	2	2
R.E 115	Engineering Drawing (1)	-	1	4	2
R.E 120	Principles of Roads Engineering	2	-	-	2
R.E 125	Engineering Materials Properties	1	1	2	2
R.E 130	Engineering Statistics (1)	2	-	-	2
R.E 135	Workshops	-	-	2	1
R.E 140	Arabic Language	1	-	-	1
R.E. 150	English language 1	1	1	0	1
R.E 145	Sport and fitness	-	2	-	0
Total		14	8	10	19
		32			

First Year/ Second Semester

Subject		Hrs./week			Units
		Theo.	Tut.	Lab.	
R.E 101	Mathematics (2)	3	1	-	3
R.E 106	Engineering Mechanic (2)	3	1	-	3
R.E 111	Computer programming (1)	1	1	2	2
R.E 116	Engineering Drawing (2)	-	1	4	2
R.E 121	Engineering Geology	2	1	-	2
R.E 126	Construction Materials	1	1	2	2
R.E 131	Engineering Statistics (2)	2	-	-	2



R.E 136	Freedom and Human rights	1	1	-	1
R.E 141	English Language (2)	1	1	-	1
Total		14	8	8	18
		30			

Second Year/ First Semester

Subject		Hrs./week			Units
		Theo.	Tut.	Lab.	
R.E 200	Mathematics (3)	3	1	-	3
R.E 205	Strength of Materials (1)	3	1	-	3
R.E 210	Computer Programming (2)	1	1	2	2
R.E 215	Engineering Surveying (1)	2	1	2	3
R.E 220	Fluid Mechanics (1)	1	1	2	2
R.E 225	Concrete Technology (1)	2	-	2	3
R.E 230	Asphalt Technology (1)	2	-	2	3
R.E 235	Construction of Roads and Bridges	1	1	-	1
R.E. 240	English language 3	1	1	-	1
Total		16	7	10	21
		33			

Second Year/ Second Semester

Subject		Hrs./week			Units
		Theo.	Tut.	Lab.	
R.E 201	Mathematics (4)	3	1	-	3
R.E 206	Strength of Materials (2)	3	1	-	3
R.E 211	Computer Programming (3)	1	1	2	2
R.E 216	Engineering Surveying (2)	2	1	2	3
R.E 221	Fluid Mechanics (2)	1	1	2	2
R.E 226	Concrete Technology (2)	2	-	2	3
R.E 231	Asphalt Technology (2)	2	-	2	3
R.E 236	English Language (4)	1	1	-	1
Total		15	6	10	20
		31			

Third Year/ First Semester

Subject		Hrs./week			Units
		Theo.	Tut.	Lab.	
R.E 300	Engineering Analysis	2	2	-	2
R.E 305	Soil Mechanics (1)	2	2	2	3
R.E 310	Theory of Structures	3	1	-	3
R.E 315	Traffic Engineering (1)	2	1	-	2
R.E 320	Airports Engineering	2	1	-	2
R.E 325	Pavement Design (1)	2	1	-	2
R.E 330	Engineering Management	2	-	-	2



R.E 335	Computer Applications (1)	-	-	2	1
R.E 340	Geomatics (1)	1	1	2	2
R.E. 345	English language (5)	1	1	-	1
Total		17	10	6	20
		33			

Third Year/ Second Semester

Subject		Hrs./week			Units
		Theo.	Tut.	Lab.	
R.E 301	Numerical Analysis	2	2	-	2
R.E 306	Soil Mechanics (2)	2	1	2	3
R.E 311	Design of Concrete Structures (1)	3	1	-	3
R.E 316	Traffic Engineering (2)	2	1	-	2
R.E 321	Railways Engineering	2	-	-	2
R.E 326	Pavement Design (2)	2	1	-	2
R.E 331	Engineering Economy	2	-	-	2
R.E 336	Computer applications (2)	-	-	2	1
R.E 341	Geomatics (2)	1	1	2	2
R.E 346	English Language (6)	1	1	-	1
Total		17	7	6	20
		31			

Fourth Year/ First Semester

Subject		Hrs./week			Units
		Theo.	Tut.	Lab.	
R.E 400	Foundation Engineering (1)	3	1	-	3
R.E 405	Design of Concrete Structures (2)	3	1	-	3
R.E 410	Design of Steel Bridges (1)	2	1	-	2
R.E 415	Highways Design 1	2	1	-	2
R.E 420	Hydrology	2	1	-	2
R.E 425	Transports Planning	2	1	-	2
R.E 430	Soil Improvements	2	-	-	2
R.E 435	Computer applications (3)	-	-	2	1
R.E 440	English Language (7)	1	-	-	1
R.E 445	Graduation Project of 1 st Semester	-	-	4	2
Total		17	6	6	20
		29			

Fourth Year/ Second Semester

Subject		Hrs./week			Units
		Theo.	Tut.	Lab.	
R.E 401	Foundation Engineering (2)	3	1	-	3
R.E 406	Design of Concrete Bridges	3	1	-	3
R.E 411	Design of Steel Bridges (2)	2	1	-	2



R.E 416	Highways Design 2	2	1	-	2
R.E 426	Quantity Surveying and Specifications	2	1	-	2
R.E 431	Roads Maintenance and Safety	2	1	-	2
R.E 436	Computer Applications (4)	1	-	2	2
R.E 445	Graduation Project of 2 nd Semester	-	-	4	2
R.E 446	Engineering Ethics	1	-	-	1
R.E 451	English Language (8)	1	-	-	1
Total		17	6	6	20
		29			

Total Units 155

Syllabus Details

R.E 100 Mathematics (1)		
No.	Theory: 3hrs./ Week Tutorial: 1hr./ Week	Number of weeks
1	Functions and their graphs	2
2	Limits and continuity	2
3	The derivatives	2
4	Application of derivatives	2
5	Trigonometric functions and inverse Trigonometric functions	3
6	Transcendental functions	2

R.E 105 Engineering Mechanics (1)		
No.	Theory: 3hrs./ Week Tutorial: 1hr./ Week	Number of weeks
1	Basic concepts, analysis of forces	3
2	Concepts of moments and couples	3
3	Resultant of force systems	4
4	Equilibrium and free body diagram	5

R.E 110 Fundamentals of Computer Science		
No.	Theory: 1hr./ Week Tutorial: 1hr./ Week Lab. 2hr./ Week	Number of weeks
1	Computer definition: (Computer generation, computer components, numerical systems, algorithms and charts)	1
2	File, definition, types and names, operating system (MS-DOS): Explain internal and external commands	1
3	Introduction to WINDOWS, Desktop, using the mouse, My Computer, closing any open window, temporary closing	1
4	Microsoft office (Word, Excel and Power point)	6



5	Computer oriented procedures	2
6	Flow charts	2
7	Introduction to programming language	2

R.E 115 Engineering Drawing (1)		
No.	Theory: 0hr./ Week Tutorial: 1hr./ Week Lab: 4hr./ Week	Number of weeks
1	Graphic instruments and their use	1
2	Arabic and Latin lettering	1
3	Drawing of all types of lines	1
4	Geometrical operation	3
5	Drawing scales (horizontal and vertical)	2
6	Drawing of Projections	7

R.E 120 Principles of Roads Engineering		
No.	Theory: 2hr./ Week Tutorial: 0hr./ Week Lab. hr./ Week	Number of weeks
1	General introduction to roads and transports Engineering	1
2	Definition of a trip, history of transport, transport modes	2
3	Classification of highways and roads elements	2
4	Introduction to traffic Engineering	4
5	Introduction to public transport systems	2
6	Introduction to airports Engineering	2
7	Introduction to ports and railways Engineering	2

R.E 125 Engineering Material properties		
No.	Theory: 1hr./ Week Tutorial: 1hr./ Week Lab. 2hr./ Week	Number of weeks
1	Mechanical properties of materials	3
2	Rocks composition of materials	4
3	Chemical properties of materials	2
4	Heat and sound properties of materials	3
5	Electrical properties of materials	2

R.E 130 Engineering Statistics (1)		
No.	Theory: 2hr./ Week Tutorial: 0hr./ Week Lab. 0hr./ Week	Number of weeks
1	Introduction and definitions	2



2	Data collection and summarizing	2
3	Graphical presentations	2
4	Location and desperation measurement, applications and examples	4
5	Theory of probabilities, applications and examples	5

R.E 135 Workshops		
No.	Theory: 0hr./ Week Tutorial: 0hr./ Week Lab. 2hr./ Week	Number of weeks
1	<p>The workshop training program is designed to satisfy the following objectives:</p> <ul style="list-style-type: none"> • Teaching safety rules and regulations on-site in an industrial environment. • Proper use of working tools, instruments, and machines. • Introducing basic workshop practices, production, labor, and time-requirements of workshop operations. <p>The students are introduced to training programs in many workshops including electrical, welding, turning and milling, carpentry, plumbing, auto-mechanics.</p>	15

R.E 101 Mathematics (2)		
No.	Theory: 3hrs./ Week Tutorial: 1hr./ Week	Number of weeks
1	Hyperbolic functions and inverse Hyperbolic functions	2
2	Principle of integration	2
3	Methods of integration	6
4	Application of definite integrals	3
5	Complex numbers	2

R.E 106 Engineering Mechanics (2)		
No.	Theory: 3hrs./ Week Tutorial: 1hr./ Week	Number of weeks
1	Analysis of Trusses in plane	2
2	Friction force	2
3	Centroid, center of gravity and center of pressure, moment of inertial and products of inertia of areas	5
4	Kinematics-absolute motion	4



R.E 111 Computer Programming (1)		Number of weeks
No.	Theory: 1hr./ Week Tutorial: 1hr./ Week Lab. 2hr./ Week	
1	Fortran programming preliminaries, Fortran contents and variables	3
2	Arithmetic expression	2
3	Input-output statements, control statements and statement subscripted variables	3
4	Elementary format specifications logical expression, and decision table	2
5	Functions and subroutines	2
6	Processing files in variables, character manipulation in Fortran	3

R.E 116 Engineering Drawing (2)		Number of weeks
No.	Theory: 0hr./ Week Tutorial: 1hr./ Week Lab. 4hr./ Week	
1	Drawing of projections	4
2	Collection of isomeric shapes	4
3	Drawing of sections	4
4	Structural drawing	3

R.E 121 Engineering Geology		Number of weeks
No.	Theory: 2hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	
1	Introduction: Relationship between geology and civil engineering, earth structure (crust, mantle, core), geological cycle	1
2	Minerals and rocks	2
3	Soil: Weathering, soil formation, classification, transported and residual soils, mineral composition, soils of Iraq	2
4	Structural geology: Types of earth movements, basic definitions, folds, faults, joints, and their types	2
5	Topographic and geological maps	3
6	Physical and engineering properties of rocks	2
7	Surface and ground water	3

R.E 126 Construction Materials		Number of weeks
No.	Theory: 2hr./ Week Tutorial: 0hr./ Week Lab. 2hr./ Week	
1	Bricks: Classification, manufacture, properties of brick, durability, standard tests and specifications	2
2	Bonding materials: Classification, manufacture, Standard tests and	4



	specifications	
3	Timber: Classification, seasoning, types of defects, standard tests	2
4	Thermal and acoustic insulation materials	2
5	Plastics: Methods of manufacturing, moldings, plastic binders, fields of application of plastics	2
6	Metal: Classification, composition, uses, standard tests and specifications.	2

R.E 131 Engineering Statistics (2)		
No.	Theory: 2hr./ Week Tutorial: 0hr./ Week Lab. 0hr./ Week	Number of weeks
1	Estimation using probabilities, distribution, applications and examples	5
2	Logarithmic regression by least squares method	3
3	Testing linear and logarithmic regression	2
4	Non parametric hypotheses tests	5

R.E 136 Freedom and Human Rights		
No.	Theory: 1hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Origins of civil rights and freedom, including: legislation for civil rights, understanding civil rights, philosophy of civil rights, economical conception of civil rights, etc	1
2	Legal basis for the rule of law	1
3	General Freedoms guarantee	2
4	Basic Freedoms and basic civil rights	2
5	Freedom of movement of people	1
6	Freedom of thought, opinion & belief	1
7	Freedom of labor, etc.	1
8	Freedom of owning property, capitalistic & socialist understanding of ownership	2
9	Freedom of trade and industry including constitutional requirements, commercial freedom, etc.	1
10	Other Freedoms including, forming political parties, third world application of civil rights, advances in scientific & technical aspects of civil rights	1

R.E 141 English Language (1)		
No.	Theory: 1hr./ Week Tutorial: 0hr./ Week Lab. 0hr./ Week	Number of weeks
1	Basic introduction	1
2	Reading skills	6
3	Listening skills	4



4	Making notes during lectures	4
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R.E 200 Mathematics (3)		Number of weeks
No.	Theory: 3hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	
1	Matrices and Determinates	4
2	Vectors and the Geometry of Space	3
3	Polar Coordinates	4
4	Infinite Sequences and Series	4

R.E 205 Strength of Materials (1)		Number of weeks
No.	Theory: 3hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	
1	Simple stress and strain	3
2	Thermal stresses	2
3	Torsion	4
4	Bending (flexural) stresses in beams	3
5	Shearing stresses in beams	3

R.E 210 Computer Programming (2)		Number of weeks
No.	Theory: 1hr./ Week Tutorial: 1hr./ Week Lab. 2hr./ Week	
1	Introduction to visual basic	1
2	Forms: Control tools, name selection of the control tools, explorer project, properties, events, project, save project, applications.	2
3	Menus, building and writing the code. dialogue box, message box, file dialogue box, line dialogue box, color dialogue box, printer dialogue box.	3
5	Programming statements	4
6	Drawing	2
7	Engineering applications	3

R.E 215 Engineering Surveying (1)		Number of weeks
No.	Theory: 2hr./ Week Tutorial: 1hr./ Week Lab. 2hr./ Week	
1	General concepts and principles of surveying	2
2	Errors and mistakes	1
3	Linear measurements: Taping methods; systematic error in taping, measuring obstructed distances, other uses of tape.	2



4	Leveling: - Direct leveling; level, basic parts and principles. - Direct differential leveling; systematic errors, field procedure, types of differential leveling. - Adjustment of differential leveling by the least squares method. - Direct profile leveling; field procedure, adjustment of profile leveling, computation of cut and fill.	7
5	Angles and directions: - Angles; types of angles, types of horizontal angles. - Directions; direction of a line, meridian, azimuth, bearing.	3

No.	R.E 220 Fluid Mechanics (1) Theory: 1hr./ Week Tutorial: 1hr./ Week Lab. 2hr./ Week	Number of weeks
1	Fluid properties	2
2	Fluid static, pressure at point	4
3	Pressure measurements	3
4	Submerged plane surfaces	3
5	Forces on curved plane surfaces	3

No.	R.E 225 Concrete Technology (1) Theory: 2hr./ Week Tutorial: 0hr./ Week Lab. 2hr./ Week	Number of weeks
1	Introduction	1
2	Concrete ingredients	1
3	Types of concrete	2
4	Portland cement ,manufacture of Portland cement, chemical composition Portland cement	2
5	The main compounds of cement, minor compounds of Portland cement	2
6	The action of gypsum	1
7	Fineness of cement ,hydration of cement, heat of hydration	2
8	Setting and false setting	2
9	Types of Portland cement, aggregate	2

No.	R.E 230 Asphalt Technology (1) Theory: 2hr./ Week Tutorial: 0hr./ Week Lab. 2hr./ Week	Number of weeks
1	Sources of bituminous materials	2
2	Asphalt definition and types	2
3	Petroleum asphalt flow chart for asphalt cement	2



4	Chemical composition of asphalt	2
5	Fractional components of asphalt	2
6	Rheological behavior of asphalt	2
7	Viscoelastic materials modeling	3

No.	R.E 235 Construction of Roads and Bridges	
	Theory: 2hr./ Week Tutorial: 0hr./ Week Lab. 0hr./ Week	Number of weeks
1	Introduction to construction of highways	1
2	Flexible pavement layers	1
3	Rigid pavement layer	1
4	Stages of highway construction	1
5	Construction equipment	2
6	Laboratory tests in highway construction	2
7	History evolution of bridges, types of bridges	1
8	Methods of bridges construction	2
9	Details of main components of bridges (superstructure and substructure)	2

No.	R.E 201 Mathematics (4)	
	Theory: 3hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Partial derivatives	3
2	Multiple integrals	4
3	Applications of Multiple Integrals	3
4	Differential equations	5

No.	R.E 206 Strength of Materials (2)	
	Theory: 3hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Composite beam	4
2	Deflection in beam (double-Integration method)	2
3	Deflection in beam (moment-area method)	2
4	Compound stresses	4
5	Transformation in stress and strain	3



R.E 211 Computer Programming (3)		
No.	Theory: 1hr./ Week Tutorial: 1hr./ Week Lab. 2hr./ Week	Number of weeks
1	Introduction to Matlab	2
2	Programming statements	3
3	Inputs and outputs	2
4	Functions and differential equations	2
5	Drawing and Engineering applications	6

R.E 216 Engineering Surveying (2)		
No.	Theory: 2hr./ Week Tutorial: 1hr./ Week Lab. 2hr./ Week	Number of weeks
1	Angles measuring instruments: - Basic parts and principles, optical-reading theodolites, digital theodolite, total station. - Measuring horizontal angles; repetition method, direct method. - Measuring vertical angles, double centering,	3
2	Traversing: - Introduction; methods of control survey, accuracy standards and specifications, basic concept of traversing, types of traverses. - Computation of horizontal coordinates of the traverse stations. - Adjustment of horizontal coordinates of the traverse stations.	3
3	Areas: Methods of measuring area	2
4	Angles measuring instruments: - Basic parts and principles, optical-reading theodolites, total station. - Measuring horizontal angles; repetition method, direct method. - Measuring vertical angles, double centering, First term exam.	5
5	Introduction to Global positioning System (GPS)	2

R.E 221 Fluid Mechanics (2)		
No.	Theory: 1hr./ Week Tutorial: 1hr./ Week Lab. 2hr./ Week	Number of weeks
1	Buoyancy and flotation force	2
2	Fluid in motion	4
3	Continuity equation, energy equation, and momentum equation	3
4	Dimensional analysis	3
5	Flow in closed pipes, flow in parallel pipes, flow in junction pipes, pipe network analysis, flow through circular pipes, and flow in open channels	3



R.E 226 Concrete Technology (2)		
No.	Theory: 2hr./ Week Tutorial: 0hr./ Week Lab. 2hr./ Week	Number of weeks
1	Properties of aggregate	3
2	fresh concrete	4
3	Properties of hardened concrete	4
4	Concrete mix design and admixtures another types of concrete	4

R.E 231 Asphalt Technology (2)		
No.	Theory: 2hr./ Week Tutorial: 0hr./ Week Lab. 2hr./ Week	Number of weeks
1	Mass-volume relationship for asphalt mixes	3
2	Gradation of aggregates for asphalt concrete mixture	3
3	Mix design using marshal method	3
4	Types of asphalt concrete mix plant	3
5	Introduction to superpave system	3

R.E 236 English Language (2)		
No.	Theory: 1hr./ Week Tutorial: 0hr./ Week Lab. 0hr./ Week	Number of weeks
1	Grammars	4
2	Principles of academic writing	4
3	Speaking skills	2
4	Preparing for Professional English tests	5

R.E 300 Engineering Analysis		
No.	Theory: 2hr./ Week Tutorial: 2hr./ Week Lab. 0hr./ Week	Number of weeks
1	Ordinary differential equations- applications:	3
2	Simultaneous linear differential equations Cramer's rule and applications	2
3	Second & higher order linear differential equations with no constant coefficients. -Euler method or ($Z=\ln x$) method. -Power series (Frobenous method).	2
4	Fourier series: -Periodic functions & Fourier coefficients.	2



	-Even & odd functions. -Half range expansion.	
5	Partial differential equations: -Separation of variables method. -Applications:.	3
6	Matrices: Solution of linear ordinary differential equations. -Row transformation method (matrix inversion). -Gauss elimination. -Gauss-Jordan method. -Gauss-Siedel method. -Cholesky's method or L-U method. -Eigen values & Eigen vectors.	3

R.E 305 Soil Mechanics (1)		
No.	Theory: 3hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Geotechnical Properties: Formation of natural sedimentation, Grain size distribution, Clay minerals, Soil Classification, Weight-volume relationship, Soil compaction.	5
2	Hydraulic Properties: Permeability field and lab.	1
3	Steady state Flow: One and two-dimensional flow, flow net, piping or boiling.	5
4	Principle of effective stress: Total stress, effective stress, pore water pressure.	4

R.E 310 Theory of Structure		
No.	Theory: 3hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Stability and Determinacy of Structures	2
2	Frames and Trusses	3
3	Influence Lines: Definition & use, Beams, Trusses (Statically Determinate)	3
4	Moving load: Max. moments and Shears, Max. forces in truss members	3
5	Use of virtual work (Unit load) method for deflection of statically determinate structures	4



No.	R.E 315 Traffic Engineering (1)		Number of weeks
	Theory: 2hr./ Week	Tutorial: 1hr./ Week	
	Lab. 0hr./ Week		
1	Principles of traffic		2
2	Volume-speed-density relationships		2
3	Traffic Studies: Spot speed studies		2
4	Traffic Studies: Volume studies		2
5	Methods of traffic data collection		1
6	Traffic Studies: Delay studies		2
7	Traffic Studies: Parking studies		2
8	Concept of level of service		1
9	Types of intersections, Traffic signal warrants		1

No.	R.E 320 Airports Engineering		Number of weeks
	Theory: 2hr./ Week	Tutorial: 1hr./ Week	
	Lab. 0hr./ Week		
1	Introduction to airport engineering		2
2	Characteristics of airplanes related to airport design		2
3	Airports planning		2
4	Capacity of a runway		2
5	Geometric design of airports		4
6	Water drainage in airports		1
7	Signals and lightings		2

No.	R.E 325 Pavement Design (1)		Number of weeks
	Theory: 2hr./ Week	Tutorial: 1hr./ Week	
	Lab. 0hr./ Week		
1	Highway layers illustration		2
2	Flexible pavement, distribution of stresses, equivalent load		4
3	Rigid pavement, distribution of stresses, equivalent load		3
4	Design of flexible pavement for highways.		3
5	Design of rigid pavement for highways.		3

No.	R.E 330 Engineering Management		Number of weeks
	Theory: 2hr./ Week	Tutorial: 0hr./ Week	
	Lab. 0hr./ Week		
1	Project management objectives		1



2	Introduction, planning techniques and management for all civil engineering projects with special highlight for techniques feasible to highway and transportation projects	3
3	Bar-chart, AOA, AON, and line of balance, linear programming, assignment, and transportation problem	5
4	Payments on works	2
5	Time and cost relationship	2
6	Software applications by MS project	2

R.E 335 Computer applications (1)		Number of weeks
No.	Theory: 0hr./ Week Tutorial: 0hr./ Week Lab. 2hr./ Week	
Learning the required skills for AutoCAD		
1	AutoCAD environment	2
2	AutoCAD commands	7
3	Applications	6

R.E 340 Geomatics (1)		Number of weeks
No.	Theory: 1hr./ Week Tutorial: 1hr./ Week Lab. 2hr./ Week	
1	The general concept of a total station, characteristics of a total station	1
2	Total Station field technique: point location, missing line measurement, resection, azimuth determination, remote object elevation, offset measurements, layout or setting out positions, area computations	2
3	Global Positioning System (GPS)	1
4	The idea of an engineering standpoint	1
5	Measure the distance between the receiver and the floating body in space and determine the time it takes the wave	2
6	Sources errors in GPS and Errors in GPS device	1
7	Map projection and observing by GPS device	2
8	Constant observing, Mobile observing and differential observing	2
9	Introduction to Remote Sensing: introduction, fundamentals of remote sensing (physics of light, reflectance), introduction to digital data	1
10	Applications of aerial photography: introduction, stereo viewing activity, types of aerial photography (analog, digital, pan, true color, false color)	2



R.E 301 Numerical Analysis		
No.	Theory: 2hr./ Week Tutorial: 2hr./ Week Lab. 0hr./ Week	Number of weeks
1	Introduction to numerical methods: - Difference table. - Differences & divided differences.	2
2	Linear interpolation: -Newton-Gregory interpolation polynomial. -Newton-Divided difference formula. -Lagrange interpolating polynomial.	2
3	Numerical integration: - Trapezoidal and Simpson's rules. -Gaussian quadrature.	2
4	Solution of non-linear equations: -Newton-Raphson method. - Indeterminate coefficients. -Indeterminate weights.	2
5	Numerical solution of ordinary differential equations (initial value problems): -Taylor series. -Euler method. -Modified Euler method. -Runge-Kutta method-4th order.	3
6	Finite differences- boundary value problems.	3

R.E 306 Soil Mechanics (2)		
No.	Theory: 3hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Stresses within a Soil Mass, geostatic stresses, stresses due to external loads.	2
2	Consolidation theory and settlement: Terzagi theory and assumptions, consolidation test, consolidation analysis.	6
3	Shear strength of soils: Mohr-Coulomb theory, laboratory tests, direct shear test, triaxial test, coefficient of pore water pressure.	5
4	Lateral earth pressure.	2



No.	R.E 311 Design of Concrete Structures (1)	
	Theory: 3hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Introduction to reinforced concrete.	2
2	Beam analysis by working stress method.	2
3	Strength method for analysis and design.	4
4	Design of beam and one way slab.	4
5	Shear design.	3

No.	R.E 316 Traffic Engineering (2)	
	Theory: 2hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Design and analyses of signalized and unsignalized intersections	4
2	Level of service (LOS) for multilane highways	2
3	LOS for Two-lane highways	2
4	LOS for freeways (basic, ramp and weaving sections)	4
5	Statistical distribution of traffic stream	2
6	Traffic signs	1

No.	R.E 321 Railways Engineering	
	Theory: 2hr./ Week Tutorial: 0hr./ Week Lab. 0hr./ Week	Number of weeks
1	Introduction to railways engineering, history of railways	1
2	Railway track components and alignment	1
3	Gauge of railway	1
4	Track and track stresses	1
5	Rails and sleeper	1
6	Ballast layer	1
7	Subgrade and formation	1
8	Geometric design of track	1
9	Curves and superelevation	1
10	Points of crossing and junctions	1
11	Track maintenance	1
12	Railway stations and signaling	1
13	Urban railway system	1
14	Railway tunneling	1
15	High speed trains requirements	1



R.E 326 Pavement Design (2)		Number of weeks
No.	Theory: 2hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	
1	Design of flexible pavement for airports	3
2	Design of rigid pavement for airports	3
3	Design of joints for highways and airports	3
4	Design of block pavement	2
5	Evaluation of pavement load carrying capacity	1
6	Evaluation of pavement surface	1
7	Highways drainage system	2

R.E 331 Engineering Economy		Number of weeks
No.	Theory: 2hr./ Week Tutorial: 0hr./ Week Lab. 0hr./ Week	
1	Engineering economic principles and objectives.	3
2	Interest and time & cost relationship	3
3	Methods of depreciation basic methods	3
4	Economic alternating comparison	4
5	Economic feasibility study	2

R.E 336 Computer applications (2)		Number of weeks
No.	Theory: 0hr./ Week Tutorial: 0hr./ Week Lab. 2hr./ Week	
1	Traffic Data analyses from video recordings	2
2	Traffic applications	7
3	Pavement design applications	6

R.E 341 Geomatics (2)		Number of weeks
No.	Theory: 1hr./ Week Tutorial: 1hr./ Week Lab. 2hr./ Week	
1	Principles of Remote sensing	2
2	Introduction to satellite remote sensing, satellite characteristics around the earth	3
3	Interpretation satellite Image.	2
4	The applications of Remote Sensing Techniques (low, medium, high and very high) discrimination	2
5	Using Remote Sensing Techniques in Roads Eng. (evaluation for highway)	1



	Alignment)	
6	Digital Image Processing	2
7	Geometric correction for Image	2
8	Radiometric correction for Image	1

R.E 346 English Language (3)		
No.	Theory: 1hr./ Week Tutorial: 0hr./ Week Lab. 0hr./ Week	Number of weeks
1	Writing an essay, general structure of an essay	6
2	Examples for good and poor essays	2
3	Research skills	7

R.E 400 Foundation Engineering (1)		
No.	Theory: 3hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Soil investigation: Determination of spacing, No. of bore holes, depth of bore holes, type and methods of drilling, sampling and samples, in situ tests, geophysical exploration, report writing	3
2	Bearing capacity of Shallow foundation: Types of shear failure, Determination of ultimate bearing capacity of soil, eccentrically loaded foundations, bearing capacity of footing on layered soils, bearing capacity of footing on slopes, determination of bearing capacity from field tests.	6
3	Settlements of shallow foundations: Immediate or elastic settlements, consolidation settlements, secondary settlements, prediction of settlement for cohesionless soils, elastic settlements of eccentrically loaded foundations, allowable settlements.	4
4	Foundations on difficult soils: Collapsing soils, expansive soils	2

R.E 405 Design of Concrete Structures (2)		
No.	Theory: 3hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Deflections in beams.	3
2	Splices and anchorage of reinforcement.	2
3	Columns design	4
4	Introduction of two-way slabs	2
5	Methods for prestressing, loss of prestressing.	4

R.E 410 Design of Steel Bridges (1)		
No.	Theory: 2hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Historical background: Types of steel bridges, components of bridges, bridge loadings, analysis and design of bridges, Design criteria	3
2	Tension members: Types of tension members	2
3	Beams: Flexural stresses, shear stresses, buckling, deflection, detailing	4
4	Plate girders: flexural stresses, shear stresses, buckling, deflection	3
5	Compression members: Effective length, buckling, allowable stresses, column base	3

R.E 415 Highways Design 1		
No.	Theory: 2hr./ Week Tutorial: 1hr./ Week Lab. 0 hr./ Week	Number of weeks
1	Introduction	1
2	Selection of route location of highways	2
3	Cut and fill works, costs and economics (Mass haul diagram)	2
4	Cross section elements of highways	2
5	Design of horizontal alignments	4
6	Super elevation transitions in horizontal alignments	4

R.E 420 Hydrology		
No.	Theory: 2hr./ Week Tutorial: 1hr./ Week	Number of weeks
1	Definition, purposes of hydrologic cycle	1
2	Precipitation measurement Precipitation	1
3	Missing data-double mass analysis	1
4	Average annual precipitation over an area	1
5	Rainfall information, infiltration and evaporation	3
6	Measurements of flow and rating curve	1
7	Runoff ,hydrograph and flood routing	1
8	Flood forecasting	1
9	Culverts and siphons	4

R.E 425 Transports Planning Engineering		
No.	Theory: 2hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Introduction to transport planning	2



2	Selection of route location of highways.	2
3	Principles of transport analysis and forecasting	2
4	Transport planning strategies	2
5	Developing the parking plan	2
6	Planning for pedestrians, cyclists and disabled people	2
7	Planning for public transport	2
8	Freight transport planning- an introduction	1

R.E 435 Computer applications (2)		
No.	Theory: 0hr./ Week Tutorial: 0hr./ Week Lab. 2hr./ Week	Number of weeks
1	Introduction to Civil3D software	2
2	Creating points and surface	1
3	Creating alignment	1
4	Creating existing and design profiles	2
5	Creating a corridor	2
6	Creating cross sections	1
7	Intersection design	2
8	Application examples	4

R.E 440 English Language (4)		
No.	Theory: 1hr./ Week Tutorial: 0hr./ Week Lab. 0hr./ Week	Number of weeks
1	Academic writing skills	5
2	Skills of writing a report, advanced skills with Microsoft word	5
3	Plagiarism, referencing and citations	3
4	Strengthen your report skills	2

R.E 401 Foundation Engineering (2)		
No.	Theory: 3hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Structural design and determination of dimensions of footings: Separated footings, combined foundations, rectangular foundations, trapezoidal foundations, strap foundations and raft foundations.	4
2	Pile foundations: Pile classification, pile capacity in cohesive soils, pile capacity in cohesionless soils, pile capacity for c- ϕ soils, pile capacity of tension piles, determination of pile capacity from in situ tests, negative skin friction of piles. -Pile groups:	7



	Group action, efficiency of group piles, ultimate bearing capacity of group piles, pile groups subjected to moments, settlement of pile groups. - pile dynamic formulae - pile load tests	
3	Earth pressures and retaining walls: Types of lateral earth pressures, Rankine theory of earth pressures, Coulomb's theory of earth pressures. - Stability of retaining walls - Sheet pile walls: Cantilever sheet pile walls and anchored sheet pile walls	4

R.E 406 Design of Concrete Bridges		
No.	Theory: 3hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Introduction to types of bridges	1
2	Bridges loads (AASHTO, BS and Iraqi specifications)	2
3	Design of slab bridges	1
4	Deck girder design (concrete bridges)	2
5	Prestressed concrete bridges	3
6	Sub-structures of bridges: Sub-structures, piers, design of piers, bridge shoulders, design of bridge shoulders	2
7	Topics relevant to bridges design	2
8	Bridge details	2

R.E 411 Design of Steel Bridges (2)		
No.	Theory: 2hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Compression members of steel structures equilibrium: Theory of structures, buckling of elastic members, effective length, compression members in steel structures	3
2	Combined flexural and axial stresses	2
3	Welding: Welding process, types of welds, welding requirements	2
4	Fatigue: factors affecting fatigue, fatigue tests	2
5	Local buckling: Axial compression of plates, design requirements	2
6	Bolted and riveted connections	2
7	Welded connections	2



R.E 416 Highways Design 2		
No.	Theory: 2hr./ Week Tutorial: 1hr./ Week Lab. 0 hr./ Week	Number of weeks
1	Widening of horizontal curves	2
2	Design of vertical alignments	5
3	Design of composite crest and sag curves	3
4	Interchanges and channelization	3
5	Roundabout and U-turn	2

R.E 426 Quantity Surveying and Specifications		
No.	Theory: 2hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Introduction, review of areas and volumes estimation	3
3	Estimation of materials used in highways and walkways layers	5
4	Specifications of asphalt and asphalt mixes	2
5	Specifications of concrete used for highways	1
6	Specifications of soil, sub-base and granular materials for highways	1
7	Specifications of highways furniture materials	1
8	Specifications of subsurface drainage works	1
9	Specification of roads marking	1

R.E 431 Roads Maintenance and Safety		
No.	Theory: 2hr./ Week Tutorial: 1hr./ Week Lab. 0hr./ Week	Number of weeks
1	Failure types in flexible pavement	3
2	Maintenance methods of flexible pavement	3
3	Failure types in rigid pavement	2
4	Maintenance methods of rigid pavement	2
5	Rehabilitation methods of highway pavements	3
6	Safety requirements for highways	2

R.E 436 Computer Applications (3)		
No.	Theory: 1hr./ Week Tutorial: 0hr./ Week Lab. 2hr./ Week	Number of weeks
SAAP Software		
1	Introduction to SAAP software	1
2	Geometry of structures	2



3	Member properties	2
4	Material properties	2
5	Boundary conditions	2
6	Application of loads	2
7	Methods of analysis	2
8	Design of bridges	2