KING SAUD UNIVERSITY
COLLEGE OF ENGINEERING
CIVIL ENGINEERING DEPARTMENT

BACHELOR OF SCIENCE IN

CIVIL ENGINEERING

Academic Plan

1439 H

2018 G

KING SAUD UNIVERSITY
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CIVIL ENGINEERING DEPARTMENT

B.SC. PROGRAM IN CIVIL ENGINEERING

1. Introduction

The Civil Engineering Department is one of the earliest departments established in the Kingdom's universities. The department was established in 1382H.

The department currently has 54 faculty members: 24 Full Professors, 12 Associate Professors, and 18 Assistant Professors, in addition to 37 lecturers and teaching assistants. The department has very well equipped laboratories including all branches of civil engineering: structures, materials, water resources, environmental engineering, soil, and surveying. Besides the students' laboratories, the department contains faculty laboratories in which they conduct their own research. Also, the department has advanced computation facilities either through direct contact with university and college computers or the departmental personal computers facilities. The departmental computation laboratories are equipped with a number of analysis, design, and simulation packages.

Since its establishment, the civil engineering department has effectively contributed to the rapid development and advancement of the Kingdom through establishing the infrastructure projects necessary to the welfare of human beings. The graduates hold key positions in all governmental and private sectors. They are heavily involved in construction, transportation, water, environment protection, project management and soil treatment engineering projects. The diverse areas of the specialty associated with civil engineering provide the graduates with very good job opportunities both in the governmental and in the private sectors all over the Kingdom.

The Department of Civil Engineering offers two undergraduate programs, the civil engineering program and the surveying engineering program.

2. Bachelor of Science Program in Civil Engineering

The program of the B.Sc. in Civil Engineering offers a comprehensive and integrated program that allows the student to develop solid basis in different civil engineering disciplines that includes; Structural and & Geotechnical engineering, Water Resources and Environmental Engineering, and Transportation Engineering and Construction Engineering & Management. The B.Sc. program is a five-year program (10 semesters).

***Approved by*:** Chairman: …… Dean: ……

2.1 Course Requirements (165 credit hours)

To complete the graduation requirements for a B. S. in Civil Engineering, the students are required to successfully pass a total of 165 credit hours (32 credit hours of the Common First Year, CFY + 132 credit hours and 1 (no-grade) credit hour of practical training) as shown in Table 1), with minimum GPA 2.75 out of 5.0. The program is divided into:

- **32** credit hours of Common First Year Requirements. The breakdown is shown in Table 2.
- **8** credit hours of University requirements (Table 3) of which:
  - 2 credit hours are compulsory (Table 3A)
  - 6 credit hours are elective to be taken from IC courses (Table 3B).
- **51** credit hours of College requirements (Table 4) of which:
  - 40 credit hours are compulsory courses for all departments (Table 4A)
  - 9 credit hours of additional courses from a list of optional courses offered by the College of Engineering (Table 4B)
  - 2 credit hours of free courses to be taken by the student from any college but not from his department (Table 4C)
- **74** credit hours of departmental requirements (Table 5) of which
  - 44 credit hours are core courses (Table 5A),
  - 4 credit hours of graduation project (Table 5B),
  - 7 credit hours of courses from other programs (Table 5-C)
  - 18 credit hours of elective courses (Table 5-D). The elective courses are to be selected from the list of elective courses in Table 5-E.
  - 1 credit hour (NP, no-grade pass or fail) of practical training (Table 5F).
  - The department provides its students with a chance to register a zero credit hour, no-grade course in research project (Table 5G); this course is NOT required for graduation.

2.2 Graduation Project Requirements (4 credit hours)

The design project is divided into two parts (2 credit hours each). The student is eligible to register for Graduation Project-1 if he completes successfully at least 129 credit hours including f the CFY (or 97 credit hours excluding the CFY) and successfully passing ALL courses at level 7 and below (levels 1-7). The Senior Graduation Projects (1 and 2) can only be taken during the first and second semesters (not during summer semester).

2.3 Practical Training Requirements (1 no-grade credit hour)

Students in the department are required to complete a 10 weeks practical training requirement in an area related to Civil Engineering. Prior to undertaking the practical training program, the student must obtain the approval of the department and he must have completed, successfully, at least 110 credit hours including the CFY (or 78 credit hours excluding the

CFY). Students enrolling in the practical training program are not allowed to take simultaneously any course or the graduation project.

A typical plan of study for a B.Sc. in Civil Engineering is presented in Table 6.

Table 1 SUMMARY OF B.SC. DEGREE REQUIREMENTS IN CIVIL ENGINEERING

Requirements	Cr. Hr.	Description
Common First Year	**32**	General Chemistry (4) Differential Calculus (3) Introduction to Statistics (3) English (12) Writing Skills (2) University Skills (3) IT Skills (3) Entrepreneurship (1) Health and Fitness (1)
University	**8**	**Islamic Studies**: Compulsory (2) Electives (6)
College	**51**	Compulsory (40) Additional (9) Free course (2)
Department	**74**	Core (44), Projects (4), Compulsory courses from other programs (7), Electives (18) , Practical training (1, NP) and Research Project (0, NP)
Total	**165**	

NP= No grade (Pass or Fail)

Table 2: Common First Year (32 credit hours)

Level 1			
Course Code	**Course Title**	**Cr. Hr. (X,Y,L)**	**Pre-requisite**
ENGS 100	English language	6(6,9,0)	
MATH 101	Differential Calculus	3(3,1,0)	
ENT 101	Entrepreneurship	1(1,0,0)	
CHEM 101	General Chemistry	4(3,0,2)	
ARAB 100	Writing Skills	2(2,0,0)	
Total		**16**	

Level 2			
Course Code	**Course Title**	**Cr. Hr. (X,Y,L)**	**Pre-requisite**
ENGS 110	English	6(6,9,0)	
CUR 101	University Skills	3(3,0,0)	
CT 101	IT skills	3(0,0,6)	
STAT 101	Introduction to Statistics	3(2,2,0)	
EPH 101	Health Education & Fitness	1(1,1,0)	
Total		**16**	

(X,Y,L) X = Lectures; Y = Tutorials; L = Lab.

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Table 3: UNIVERSITY REQUIREMENTS (TOTAL 8 CREDIT HOURS)

TABLE 3-A: COMPULSORY UNIVERSITY REQUIREMENTS (2 CREDIT HOURS)

Course Code	Course Title	Cr. Hr.	Nature
IC 107	Ethics of the Profession	2(2,0,0)	Compulsory
	Total	**2**	

TABLE 3-B: OPTIONAL COURSES (The student must choose 3 courses (6 hours) from the list below)

Course Code	Course Title	Cr. Hr.	Nature
IC 100	Studies in Prophet Biography	2(2, 0, 0)	Elective
IC 101	Origins of Islamic Culture	2(2, 0, 0)	Elective
IC 102	Family in Islam	2(2, 0, 0)	Elective
IC 103	The Economic System in Islam	2(2, 0, 0)	Elective
IC 104	The Political System in Islam	2(2, 0, 0)	Elective
IC 105	Human Rights	2(2, 0, 0)	Elective
IC 106	Medical Jurisprudence	2(2, 0, 0)	Elective
IC 108	Contemporary Issues	2(2, 0, 0)	Elective
IC 109	Role of Women in Development	2(2, 0, 0)	Elective
	Total	**6**	

Table 4: COLLEGE REQUIREMENTS (51 CREDIT HOURS)

Table 4-A COLLEGE COMPULSORY COURSES (40 CREDIT HOURS)

Course Code	Course Title	Cr. Hr. (X,Y,L)	Prerequisites
MATH 106	Integral Calculus	3(3,2,0)	MATH 101
MATH 107	Vectors and Matrices	3(3,2,0)	MATH 101
MATH 203	Differential and Integral Calculus	3(3,2,0)	MATH 106 MATH 107
MATH 204	Differential Equations	3(3,2,0)	MATH 203
PHYS 103	General Physics (1)	4(3,0,2)	
PHYS 104	General Physics (2)	4(3,0,2)	PHYS 103
ENGL 109	Language & Communication	2 (2,1,0)	
ENGL 110	Technical Writing	2 (2,1,0)	ENGL 109
GE 201	Statics	3(3,1,0)	MATH 106, MATH 107
GE 104	Basics of Engineering Drawing	3(2,0,2)	
GE 106	Introduction to Engineering Design	3 (2,1,2)	GE 104
GE 203	Engineering and Environment	2 (2,0,0)	CHEM 101; MATH 101
GE 402	Engineering Projects Management	3 (3,1,0)	
GE 403	Engineering Economy	2 (2,1,0)	
Total		**40**	

(X,Y,L) X = Lectures; Y = Tutorials; L = Lab

***Approved by*:** Chairman: …… Dean: ……

Table 4-B: COLLEGE ADDITIONAL COURSES FOR CE PROGRAM (9 CREDIT HOURS)

Course Code	Course Title	Cr. Hr. (X,Y,L)	Prerequisites
GE 209	Computer Programming	3(2,0,2)	
MATH 254	Numerical Methods	3(3,2,0)	MATH 107
GE 202	Dynamics	3(3,1,0)	GE 201 , PHYS 103
	Total	**9**	

Table 4-C: COLLEGE FREE COURSE FOR CE PROGRAM (2 CREDIT HOURS)

Course Code	Course Title	Cr. Hr. (X,Y,L)	Pre-requisites
xxxxxx	Free elective	2	
	Total	**2**	

Table 5: CIVIL ENGINEERING REQUIREMENTS (74 CREDIT HOURS)

Table 5-A: CORE COURSES (44 CREDIT HOURS)

Course Code	Course Title	Cr. Hr. (X,Y,L)	Requisites	
			Pre-	Co-
CE 302	Mechanics of Materials	3(3,1,0)	GE 201	
CE 305	Mechanics of Materials Lab.	1(0,0,2)		CE 302
CE 306	Properties and Testing of Structural Materials	3(2,0,2)	CE 302 CE 305	
CE 320	Fluid Mechanics	2(2,1,0)		GE 202
CE 324	Hydraulics	2(2,1,0)	CE 320 GE202	
CE 325	Hydraulics Lab.	1(0,0,2)	CE 320	CE 324
CE 360	Structural Analysis-1	4(4,1,0)	CE 302	
CE 370	Reinforced Concrete Design-1	4(4,1,0)	CE 306 CE 360	
CE 380	Soil Mechanics Lab.	1(0,0,2)		CE 382
CE 382	Geotechnical Engineering-1	2(2,1,0)	CE 302 GEO 281	
CE 419	Construction Management	4(4,1,0)	CE 370 CE 382	
CE 424	Hydrology	2(2,1,0)	CE 324	
CE 430	Transportation Systems	2(2,1,0)	STAT 101	
CE 431	Highway Engineering	3(3,1,0)	SE 212 CE 382 CE 430	
CE 432	Highway Lab.	1(0,0,2)	CE 380	CE 431
CE 447	Water Supply and Drainage Systems	2(2, 1,0)		CE 424
CE 448	Water and Wastewater Treatment	2(2,1,0)	GE 203 CE 324	
CE 443	Water and Wastewater Lab.	1(0,0,2)		CE 448
CE 481	Geotechnical Engineering-2	2(2,1,0)	CE 382	
CE 483	Foundation Engineering	2(2,1,0)	CE 481 CE 370	
	Total	**44**		

NP= No grade (Pass or Fail)

***Approved by*:** Chairman: …… Dean: ……

Table 5-B: SENIOR GRADUATION PROJECTS (4 CREDIT HOURS)

Course Code	Course Title	Cr. Hr. (X,Y,L)	Prerequisites
CE 496	Graduation Project -1	2(2,0,0)	Complete successfully 129 credits hours and passing all courses in levels 1-7.
CE 497	Graduation Project -2	2(2,0,0)	CE 496
	Total	**4**	

(X,Y,L) X = Lectures; Y = Tutorials; L = Lab.

TABLE 5-C: COMPULSORY COURSES FROM OTHER PROGRAMS (7 CREDIT HOURS)

Course Code	Course Title	Cr. Hr. (X,Y,L)	Requisites	
			Pre-	Co-
SE 212	Spatial Measurements	3(2,1,2)	MATH 107	
ARCH 239	Building Construction for Civil Eng. Students	2(1,0,2)	CE 370	
GEO 281	Geology for Engineers	2(2,1,0)		
	Total	**7**		

(X,Y,L) X = Lectures; Y = Tutorials; L = Lab.

TABLE 5-D: ELECTIVE COURSES REQUIREMENTS (18 CREDIT HOURS)

(Each student is required to take 18 cr. hr. from the list of CE elective courses in Table 5-E)

Course Code	Course Title	Cr. Hr. (X,Y,L)	Requisites	
			Pre-	Co-
CE 4**	Elective (1)	3	CE 4**	CE 4**
CE 4**	Elective (2)	3	CE 4**	CE 4**
CE 4**	Elective (3)	3	CE 4**	CE 4**
CE 4**	Elective (4)	3	CE 4**	CE 4**
CE 4**	Elective (5)	3	CE 4**	CE 4**
CE 4**	Elective (6)	3	CE 4**	CE 4**
	Total	**18**		

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Table 5-E: LIST OF ELECTIVE COURSES

Course Code	Course Title	Cr. Hr. (X,Y,L)	Requisites	
			Pre-	Co-
STRUCTURAL ENGINEERING COURSES				
CE 460	Structural Analysis-2	3 (3,1,0)	CE 360	
CE 470	Reinforced Concrete Design-2	3 (3,1,0)	CE 370	
CE 462	Analysis and Design of Buildings	3(1,0,4)	CE 470	
CE 464	Structural Analysis Using Finite Elements	3(3,1,0)	CE 460	
CE 466	Bridge Engineering	3(3,1,0)	CE 470	
CE 468	Wind and Earthquake Resistant Design	3(3,1,0)	CE 470	
CE 473	Steel Structures	3(3,1,0)	CE 360	
CE 475	Pre-stressed Concrete Design	3(3,1,0)	CE 470	
CE 477	Concrete Technology	3(3,1,0)	CE 306	
CE478	Selected Topics in Structural Analysis and Design	3(3,1,0)	CE 470	
CE 479	Rehabilitation of Reinforced Concrete Structures	3(3,1,0)	CE 470	
GEOTECHNICAL ENGINEERING COURSES				
CE 484	Deep Foundations	3(3,1,0)	CE 470	CE 483
CE 487	Geotechnical Engineering in Arid Regions	3(3,1,0)	CE 481	
CE 485	Introduction to Rock Mechanics	3(3,1,0)	CE 481	
CE 486	Improvement of Geotechnical Materials	3(3,1,0)		CE 483
CE 488	Selected Topics in Geotechnical Engineering	3(3,1,0)	CE 481	
CE 489	Introduction to Tunnels Design	3(3,1,0)	CE 481	
WATER RESOURCES ENGINEERING COURSES				
CE 423	Hydraulic Structures	3(3,1,0)	CE 324	
CE 425	Surface and Groundwater Hydrology	3(3,1,0)	CE 424	
CE 426	Water Resources Planning	3(3,1,0)	CE 424	
CE 427	Hydraulics of Pressurized Flow	3(3,1,0)	CE 324	
CE 428	Hydraulics of Open Channel Flow	3(3,1,0)	CE 324	
CE 429	Computer Applications in Water Engineering	3(3,1,0)	CE 424	
ENVIRONMENTAL ENGINEERING COURSES				
CE 444	Environmental Engineering	3(3,1,0)	CE 448	
CE 445	Wastewater Reclamation and Reuse	3(3,1,0)	CE 448	
CE 446	Environmental Assessment and Management Systems	3(3,1,0)	CE 447 CE 448	
CE449	Introduction to Solid Waste Management	3(3,1,0)	CE447, CE448	
CE450	Air Pollution Control Engineering	3(3,1,0)	CE448	
CE451	Advanced Water and Wastewater Treatment	3(3,1,0)	CE448	
TRANSPORTATION ENGINEERING COURSES				
CE 435	Railway Engineering	3(3,1,0)	CE 431	
CE 436	Traffic Engineering	3(3,1,0)	CE 430	
CE 437	Analysis and Design of Pavement Systems	3(3,1,0)	CE 431	
CE 438	Urban Public Transportation	3(3,1,0)	CE430	
CE 439	Pavement Maintenance	3(3,1,0)	CE 431	
CONSTRUCTION ENGINEERING AND MANAGEMENT COURSES				
CE 411	Introduction to Construction Contracts	3(3,1,0)		
CE 412	Estimating Construction Cost	3(3,1,0)	Successful Completion of 110 credit hours	
CE 413	Construction Scheduling	3(3,1,0)		CE 419
CE 415	Selected Topics in Engineering and Construction Management	3(3,1,0)	Successful Completion of 110 credit hours	

(X,Y,L) X = Lectures; Y = Tutorials; L = Lab; NP=No grade (Pass or Fail)

Table 5F PRACTICAL TRAINING REQUIREMENT (COMPULSORY; 1 NP)

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Course Code	Course Title	Cr. Hr. (X,Y,L)	Pre-requisites
CE 999	Practical Training	1 (NP)	Successful Completion of 110 credit hours
	Total	**1**	

NP= No grade (Pass or Fail)

Table 5G ELECTIVE COURSE WITHOUT CREDIT HOURS (0 NP)

(This is an optional elective course with no credit hours; no required for the B.S. degree in CHE)

Course Code	Course Title	Cr. Hr. (X,Y,L)	Pre-requisites
CE 998	Research Project	0 (NP)	Successful completion of 129 cr. hr.

Table 6 RECOMMENDED SEMESTER SCHEDULE - CIVIL ENGINEERING PROGRAM

Level 1			
Course Code	**Course Title**	**Cr. Hr. (X,Y,L)**	**Pre-requisite**
ENGS 100	English language	6(6,9,0)	
MATH 101	Differential Calculus	3(3,1,0)	
ENT 101	Entrepreneurship	1(1,0,0)	
CHEM 101	General Chemistry	4(3,0,2)	
ARAB 100	Writing Skills	2(2,0,0)	
Total		**16**	

Level 2			
Course Code	**Course Title**	**Cr. Hr. (X,Y,L)**	**Pre-requisite**
ENGS 110	English	6(6,9,0)	
CUR 101	University Skills	3(3,0,0)	
CT 101	IT skills	3(0,0,6)	
STAT 101	Introduction to Statistics	3(2,2,0)	
EPH 101	Health Education & Fitness	1(1,1,0)	
Total		**16**	

Level 3			
Course Code	**Course Title**	**Cr. Hr. (X,Y,L)**	**Pre-requisite**
IC 1xx	Optional IC course	2(2,0,0)	
PHYS 103	General Physics (1)	4(3,0,2)	
MATH 106	Integral Calculus	3(3,2,0)	MATH 101
MATH 107	Vectors & Matrices	3(3,2,0)	MATH 101
ENGL 109	Language & Communication	2(2,1,0)	
GE 104	Basics of Engineering Drawing	3(2,0,2)	
Total		**17**	

Level 4			
Course Code	**Course Title**	**Cr. Hr. (X,Y,L)**	**Pre-requisite**
PHYS 104	General Physics (2)	4(3,0,2)	PHYS 103
ENGL 110	Technical Writing	2(2,1,0)	ENGL 109
MATH 203	Differential and Integral Calculus	3(3,2,0)	MATH 106 MATH 107
GE 106	Introduction to Engineering Design	3(2,1,2)	GE 104
GE 201	Statics	3(3,1,0)	MATH 106 MATH 107
GE 203	Engineering and Environment	2(2,0,0)	CHEM 101 MATH 101
Total		**17**	

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Level 5			
Course Code	**Course Title**	**Cr. Hr. (X,Y,L)**	**Pre-requisite**
IC 1xx	Optional IC course	2(2,0,0)	
GE 202	Dynamics	3(3,1,0)	GE 201 PHYS 103
CE 320	Fluids Mechanics	2(2,1,0)	GE 202*
CE 302	Mechanics of Materials	3(3,1,0)	GE 201
CE 305	Mechanics of Materials Lab.	1(0,0,2)	CE302*
MATH 204	Differential Equations	3(3,2,0)	MATH 203
GEO 281	Geology for Engineers	2(2,1,0)	
Total		**16**	

Level 6			
Course Code	**Course Title**	**Cr. Hr. (X,Y,L)**	**Pre-requisite**
CE 324	Hydraulics	2(2,1,0)	CE 320 GE202
CE 325	Hydraulics Lab.	1(0,0,2)	CE 324*
CE 360	Structural Analysis-1	4(4,1,0)	CE 302
CE 306	Properties and Testing of Structural Materials	3(2,0,2)	CE 302 CE 305
CE 382	Geotechnical Eng.-1	2(2,1,0)	CE 302 GEO 281
CE 380	Soil Mechanics Lab.	1(0,0,2)	CE 382*
SE 212	Spatial Measurements	3(2,1,2)	MATH 107
Total		**16**	

Level 7			
Course Code	**Course Title**	**Cr. Hr. (X,Y,L)**	**Pre-requisite**
IC 107	Ethics of the Profession	2(2,0,0)	
CE 370	Reinforced Concrete Design-1	4(4,1,0)	CE 360 CE 306
CE 481	Geotechnical Engineering-2	2(2,1,0)	CE 382
CE 430	Transportation Systems	2(2,1,0)	STAT 101
GE 209	Computer Programming	3(2,0,2)	
CE 447	Water Supply and Drainage Systems	2(2,1,0)	CE 424*
CE 424	Hydrology	2(2,1,0)	CE 324
Total		**17**	

Level 8			
Course Code	**Course Title**	**Cr. Hr. (X,Y,L)**	**Pre-requisite**
CE 448	Water and Wastewater Treatment	2(2,1,0)	GE 203 CE 324
CE 443	Water and Wastewater Lab.	1(0,0,2)	CE 448*
CE 431	Highway Engineering	3(3,1,0)	CE 382 SE 212 CE 430
CE 432	Highway Lab.	1(0,0,2)	CE 380 CE 431*
MATH 254	Numerical Methods	3(3,2,0)	MATH 107
CE 4xx	Department Elective (1)	3(3,1,0)	
CE 4xx	Department Elective (2)	3(3,1,0)	
Total		**16**	

Level 9			
Course Code	**Course Title**	**Cr. Hr. (X,Y,L)**	**Pre-requisite**
IC 1xx	Optional IC course	2(2,0,0)	
ARCH 239	Building Construction for Civil Eng. Students	2(1,0,2)	CE 370
CE 4xx	Department Elective (3)	3(3,1,0)	
CE 4xx	Department Elective (4)	3(3,1,0)	
CE 419	Construction Management	4(4,1,0)	CE 370 CE 382
CE 483	Foundation Engineering	2(2,1,0)	CE 370 CE 481
CE 496	Graduation Project -1	2(2,0,0)	Complete successfully 129 credits hours and passing all courses in levels 1-7.
Total		**18**	

Level 10			
Course Code	**Course Title**	**Cr. Hr. (X,Y,L)**	**Pre-requisite**
xxxxxx	Free Course	2	
CE 497	Graduation Project -2	2(2,0,0)	CE 496
CE 4xx	Department Elective (5)	3(3,1,0)	
CE 4xx	Department Elective (6)	3(3,1,0)	
GE 403	Engineering Economy	2(2,1,0)	
GE 402	Engineering Projects Management	3 (3,1,0)	
CE 999	Practical Training	1 (NP)	Successful completion of 110 credit hrs. and passing all courses in levels 1-7.
CE 998	Research Project	0 (NP)	Complete successfully 129 credits hours
Total		**16**	

* CO-REQUISITE

NP: No grade (Pass or Fail) ; (X,Y,L) X = Lectures; Y = Tutorials; L = Lab.

***Approved by*:** Chairman: …… Dean: ……

3. COURSE DESCRIPTION

3.1 Common First Year

ENGS 100: English language ***6(6,9,0)***

This initial stage of the course is designed to give the students a strong foundation in the language, improving their command of English as well as improving their vocabulary, reading, writing and communication skills. In the process of improving these skills, students will also develop their confidence in the language and also their presentation skills. These all contribute to the life skills of the student and help to prepare them for their future studies and careers beyond KSU. As the course progresses and students reach a higher level of English, the focus will switch to the academic side of the language. This will involve preparing students for the style of language they will need for their future studies.
Pre-requisites: None.

MATH 101: Differential Calculus ***3(3,1,0)***

Limits and Continuity: The Concept of Limit, Computation of Limits, Continuity and its Consequences, Limits Involving Infinity, Formal Definition of the Limit. Differentiation: The Concept of Derivative, Computation of Derivatives (The Power Rule, Higher Order Derivatives, and Acceleration), the Product and Quotient Rules, The Chain Rule, Derivatives of Exponential and Logarithmic Functions, Implicit Differentiation and Inverse Trigonometric Functions, the Mean Value Theorem. Applications of Differentiation: Indeterminate Forms and L'Hopital's rule, Maximum and Minimum Values, Increasing and Decreasing Functions, Concavity and the Second Derivative Test, Optimization, Related Rates.

Textbook: Robert T. Smith, and Roland R. Minton, "Calculus, early Transcendental functions", Third Edition, 2007.
Pre-requisite: None

ENT 101 Entrepreneurship ***1(1,0,0)***

Pre-requisites: None.

CHEM 101: General Chemistry ***4(3,0,2)***

Stoichiometry: SI Units, chemical formulas, the mole, methods of expressing concentration, Calculations based on chemical equations. Gases: laws, kinetic theory, deviation and van der Waals equation. Thermochemistry: Types of enthalpy changes, Hess Law and its applications,, first law of thermodynamics. Solutions: Type of solutions and laws related , colligative properties. Chemical kinetics: Law of reaction rate, reaction order, factors affecting the rates. Chemical Equilibrium : Relation between Kc & Kp, Le Chatelier's principle and factor affecting equilibrium. Ionic equilibrium: Acid and base concepts, pH calculations of acid, base and buffer solutions. Atomic Structure: emission spectrum, Bohr's theory de Broglre's hypothesis, quantum numbers, electronic configuration of elements, consequences of the periodic table.
Pre-requisites: None.

ARAB 100: Writing Skills ***2(2,0,0)***

ENGS 110: English ***6(6,9,0)***

The final assessment for the course is the highly regarded International English Language Testing System (IELTS), which is used as a qualifying test for students wishing to attend university in many countries including the UK and Australia. Specialist material will be used to prepare students for this test with the aim of reaching an IELTS score of 5.0 by the end of the year.

Pre-requisites: None.

CUR 101: University skills ***3(3,0,0)***

Learning skills**:** Self management for learning, Learning tools, Reading strategies, Second language learning skills, Test administration.

Thinking skills: Theory Of Inventive Problem Solving (TRIZ), Rounding Thinking, Expanding perception, Creative thinking. Research skills: Problem determining, Search for information strategies, Sites of sources, access this information, Using thin formation, Information construction, Information evaluation.

Pre-requisites: None.

CT 101: IT skills ***3(0,0,6)***

Basic Concepts of Information Technology, Using a computer and Managing Files, Word Processing, Spreadsheets, Databases, Presentation.

Pre-requisites: None.

STAT 101 Introduction to Statistics ***3(2,2,0)***

Descriptive statistics; Probability; Random variables and probability distribution functions; Statistical inference; Correlation and simple linear regression.

Pre-requisites: None.

EPH 101 : Health Education and Fitness ***1(1-1-0)***

Subjects about general health and body and brain fitness.

Pre-requisites: None.

3.2 University Requirements

Student selects 4 course from the following IC courses, but only IC 107 should be among the selected courses.

IC 100- Studies in Prophet Biography 2(2,0,0)

IC 101- Origins of Islamic Culture *2(2-0-0)*

This subject aims to introduce the student to the Islamic culture; manifestation of the Muslims attitude towards other cultures; explaining the characteristics of Islam, such as: Universality, Comprehensibility, integrity, consistency with human nature (instinct), reason, and science. This subject also explains the Islamic tenet and its fundamentals, such as: To believe in Allah, the Hereafter, the Angles, the Holy Books, the Messengers, and Divine Destiny.

Pre-requisite: ---

IC 102 Family in Islam *2(2-0-0)*

This course studies the following: The concept of the Muslim society; its basics, its method and characteristics, means of consolidating its social ties; the most important social problems,

the Islamic philosophy of family affairs, marriage: its introductory formalities, aims and effects. It also deals with ways of strengthening the family bonds.
Pre-requisite: ---

IC 103 The Economic System in Islam *2(2-0-0)*
This course depicts the Islamic concept of life, the nature of man, the basic constituents of the Islamic economics and its objectives; it studies as well the legal evidences of these topics. It also explains the opinion of Islam toward finance, ownership, production, maintenance, conception, distribution of wealth, and the exchange in the Islamic Economic system.
Pre-requisite: ---

IC 104 The Political System in Islam *2(2-0-0)*
This subject contains the following: Introduction to the Political System and its fundamentals; the Islamic Political System is the best system for human societies to follow and apply; the rise up of Islamic State during the Prophet's lifetime, Caliphate, and the fundamentals of State.

IC 105 Human Rights 2(2,0,0)

IC 106 Medical Jurisprudence 2(2,0,0)

IC 107 Ethics of the Profession 2(2,0,0)

IC 108 Contemporary Issues 2(2,0,0)

IC 109 Role of Women in Development 2(2,0,0)

3.3 College Requirements

A- College Compulsory Courses

MATH 106 - Integral Calculus *3 (3, 2, 0)*
The definite integral, fundamental theorem of calculus, the indefinite integral, change of variable, numerical integration. Area, volume of revolution, work, arc length. Differentiation and integration of inverse trigonometric functions. The logarithmic, exponential, hyperbolic and inverse hyperbolic functions. Techniques of integration: substitution, by parts, trigonometric substitutions, partial fractions, miscellaneous substitutions. Indeterminate forms, improper integrals. Polar coordinates.

Textbook:
1. Robert T. Smith, and Roland R. Minton, "Calculus, early Transcendental functions", 3rd Edition.
2. Earl W. Swokowski, Michael Olinick, Dennis Pence, and Jeffery A. Cole "Calculus", 6th Edition.

Prerequisite: MATH 101.

MATH 107 – Vectors and Matrices *3 (3, 2, 0)*

Vectors in two and three dimensions, scalar and vector products, equations of lines and planes in space, surfaces, cylindrical and spherical coordinates. Vector valued functions, their limits, continuity, derivatives and integrals. Motion of a particle in space, tangential and normal components of acceleration. Functions in two or three variables, their limits, continuity, partial derivatives, differentials, chain rule, directional derivatives, tangent planes and normal lines to surfaces. Extrema of functions of several variables, Lagrange multipliers. Systems of linear equations, matrices, determinants, inverse of a matrix, Cramer's rule.

Textbook: Edward and Penny, "Calculus", international edition.

Prerequisite: MATH 101.

MATH 203 – Differential & Integral Calculus *3 (3, 2, 0)*

Infinite series, convergence and divergence of infinite series, integral test, ratio test, root test and comparison test. Conditional convergence and absolute convergence, alternating series test. Power series, Taylor and Maclaurin series. Double integral and its applications to area, volume, moments and centre of mass. Double integrals in polar coordinates. Triple integral in rectangular, cylindrical and spherical coordinates and applications to volume moment and centre of mass. Vector fields, line integrals, surface integrals, Green's theorem, the divergence theorem, Stoke' theorem.

Textbook:

1- Robert T. Smith, and Roland R. Minton, "Calculus, early Transcendental functions", 3rd Edition.
2- Earl W. Swokowski, Michael Olinick, Dennis Pence, and Jeffery A. Cole "Calculus", 6th Edition.

Prerequisite: MATH 106 and MATH 107.

MATH 204 - Differential Equations *3 (3, 2, 0)*

Various types of first order equations and their applications. Linear equations of higher order. Systems of linear equations with constant coefficients, reduction of order. Power series methods for solving second order equations with polynomial coefficients. Fourier series, Fourier series for even and odd functions. Complex Fourier series. The Fourier integral.

Textbook: Dennis G. Zill and Michael R Cullen, "Differential equations with boundary value problems", 6th edition

Prerequisite: MATH 203.

PHYS 103 - General Physics (1) *4 (3, 0, 2)*

Introduction (Vectors), Motion in one dimension with constant acceleration, Motion in two dimension with application to projectile motion and circular motion, Newton's Laws of Motion, Work and Energy, Potential Energy and conservation of Energy, Linear Momentum and Collisions, Rotation of rigid object about a fix axis.

Prerequisite: None.

***Approved by*:** Chairman: …… Dean: ……

PHYS 104 - General Physics (2) *4 (3, 0, 2)*

Electricity and Magnetism: Coulomb's law, electric fields, Gauss' Law, electric potential, potential energy, capacitance and dielectric, currents and resistance, electrical energy and power, direct current circuits, Kirchhoffs rules, magnetic fields, motion of charged particle in a magnetic field, sources of the magnetic field, Ampere's law, Faraday's law of induction, self inductance, energy in a magnetic field, mutual inductance, alternating current circuits, the RLC series circuit, power in an A.C. circuit, resonance in RLC services circuit.

Prerequisite: PHYS 103

GE 104 – Basics of Engineering Drawing *3 (2, 0, 2)*

The course includes the drawing of Orthographic and isometric projections. Other topics include scaling, sectioning, dimensioning and blue print reading. The course is taught using free hand, AutoCAD and AutoDesk Invetor

Textbook: Fundamentals of Graphics Communication, Bertoline, G.R., And Weibe, E.N., Mc Grew-Hill Inc., New York, 5th edition, 2007

References: A Manual of Engineering Drawing Practice, C.H. Simons and D.E. Maguire, Hodder & Stoughton.
Engineering Drawing and Graphic Technology, French T. E., Charles J. V. and Foster R.J., 14th Edition, McGraw-Hill,1993.

Pre-requisites: None.

GE 106 - Introduction to Engineering Design *3 (2, 1, 2)*

Engineering profession, jobs, and disciplines; Elements of engineering analysis; Introduction to engineering design and team formation; Engineering problem definition; Engineering system Architecture and physical function decomposition; human factor, environment, and safety issues in design; Generation of alternative concepts; Evaluation of alternatives and selection of a concept, Design defense, performance evaluation, and reporting; Engineering ethics.

Textbook: Philip Kosky, Robert T. Balmer, William D. Keat, George Wise, Exploring Engineering: An Introduction to Engineering and design, 4th ed.

Prerequisite: *GE 104*.

ENGL 109 Language and Communication *2(2,1,0)*

ENGL 109 includes *English for Specific Purpose* (ESP) units that cover terminology and expressions, in various engineering disciplines. The course is designed to improve the communication and reading skills of engineering students. It equips the student with essential linguistic expertise for his engineering study and prospective professional career.
Textbook: Eric H. Glendinning & Norman Glendinning, "Oxford English for Electrical and mechanical Engineering", Oxford University Press (2000).
Pre-requisites: None.

ENGL 110 – Technical Writing ***2(2,1,0)***

English 110 is intended to enhance technical writing skills. It equips students with writing basics and techniques required for constructing clear and persuasive presentation of their ideas, on various forms including reports, presentations, worksheets, CVs' and memos. The course highlights effective writing features including: focus, organization, support & elaboration, style, and conventions. It emphasizes on observing ethical norms in writing.
Textbook: Daphne Mackey, "Send me a Message: *A step-by-step approach to business and professional writing*", McGraw Hill (2006)
Pre-requisites: ENGL 109.

GE 201 - Statics *3(3,1,0)*

Force systems; vector analysis, moments and couples in 2D and 3D. Equilibrium of force systems. Analysis of structures; plane trusses and frames. Distributed force system; centroid of simple and composite bodies. Area moments of inertia. Analysis of beams. Friction.

Textbook: Meriam, J. L. and Kraige, L. G. "Engineering Mechanics, Volume 1, Statics", SI units Version

Pre-requisite: MATH 106 and MATH 107.

GE 203: Engineering and Environment *2(2, 0, 0)*

This course introduces the impact of engineering and industrial activities on the environment. The lectures cover basics of ecosystems, environmental balance, types of pollution, and types, sources, and limits of pollutants; in addition to fundamentals of Environmental Impact Assessment (EIA). Pollution control technologies and examples of pollution from various engineering and industrial sectors are also covered.

Textbook: G. Tyler Miller, Scott Spoolman. Living in the Environment, 17th edition. Cengage Learning (2014)
Jerry A. Nathanson, Richard A. Schneider. Basic Environmental Technology: Water Supply, Waste Management, and Pollution Control, 6th edition. Pearson Education, Limited (2014)

Pre-requisite: CHEM 101, MATH 101

GE 402 – Engineering Projects Management *3(3, 1, 0)*

This course introduces techniques that provide rational solutions to a range of project management decisions encountered in engineering projects. Students are expected to gain a detailed understanding of some of the techniques, tools and processes available and their application in starting, planning, managing and finishing engineering projects; The course covers project management fundamentals including projects life cycle, project planning and scheduling techniques, cash flow forecasting, performance evaluations, estimating and cost control; project organizations; Introduction to risk management.

Textbook: Meredith, J. R., Mantel Jr, S. J., & Shafer, S. M. (2013). Project management in practice. Wiley Global Education

Prerequisite: None

***Approved by*:** Chairman: …… Dean: ……

GE 403 - Engineering Economy *2(2,1,0)*

This course is being offered to the students who enroll in the College of Engineering to give them fundamental knowledge and understandings on Cost concepts, Time value of money operations, Measuring the worth of investments, Comparison of alternatives, Depreciation, and Economic analysis of public projects

Textbook: John A. White, Kenneth E. Case and David B. Pratt, "Principles of engineering economic analyses", 5th edition.

Pre-requisites: None

B- College Additional Courses

GE 202 – Dynamics *3(3,1,0)*

Kinematics of a particle: curvilinear motion and relative motion; Kinematics of a rigid body in plane motion: relative velocity relative acceleration, and rotating axes; Kinetics of particles: Newton's 2nd law, work and energy, impulse and momentum, and impact; Kinetics of a rigid body in plane motion: translation, fixed axis rotation, general motion, work and energy, and impulse and momentum.

Textbook: J. L. Meriam and L. G. Kraige, "Engineering Mechanics, Volume 2, Statics, SI units Version", Latest edition.

Pre-requisites*: GE 201, PHYS 103*

GE 209: Computer Programming *3(2,0,2)*

Introduces computer programming for solving engineering problems in MATLAB environment. Data types, constants & variables. Operators & functions assignment statement. Simple input/output. Program composition & format. Types of errors. Formatted output. Algorithm. If construct. Do loop. Data files. One- & two-dimensional arrays. Programming with function.

Textbook: MATLAB for Engineers by Holly Moore, Pearson; 5th edition (2017).

Pre-requisites: None.

MATH 254: Numerical Methods *3(3,2,0)*

Various numerical methods for solving nonlinear equations. Direct and iterative methods for solving systems of linear equations along with error estimate. Polynomial interpolation with error formula. Numerical differentiation and integration with error terms. An introduction to numerical solution of ordinary differential equations.

Textbook: Rizwan Butt and Yacine Benhadid, "An Introduction to Numerical Analysis"

Pre-requisite: *MATH 107*

CE 998: Research Project *0 (NP)*

The course is designed to serve the research needs of the students. The course is not required for graduation; so students may opt to register it or otherwise. The consent of the faculty member with whom the student might work is essential.

***Approved by*:** Chairman: …… Dean: ……

Prerequisite: Successful completion of 129 credit hours.

CE 999: Practical Training *1 (NP)*

Students in the department are required to complete a 10 weeks summer training requirement in an area related to Civil Engineering. Prior to undertaking the summer training program, the student must obtain the approval of the department and he must have completed, successfully, at least 110 credit hours including the CFY (or 78 credit hours excluding the CFY). Students enrolling in the summer training program are not allowed to take simultaneously any course or projects.

Prerequisite: Successful completion of 110 credit hours

3.4 CE Program Core Courses

1. Structural Engineering:

CE 302 Mechanics of Materials *3 (3, 1, 0)*

Introduction and fundamentals of mechanics of deformable materials. Concept of stress and strain and Hooke's law. Concept of failure, yield and allowable stresses. Factor of safety and allowable stress design. Normal stress under axial loading and bending. Shear stress under shear force and torsion. Shear force and bending moment diagrams. Transformation of stress and strain and Mohr's circle. Buckling of columns.

Textbook: Ferdinand P. Beer& E. R. Johnson, "Mechanics of Materials" SI Ed., McGraw Hill, USA.
Prerequisite: GE 201

CE 305 Mechanics of Materials Lab *1 (0, 0, 2)*

Introduction to numerical tools for solving Mechanics of materials problems. Experimental demonstrations of uniaxial deformations and Poisson's effect. Experimental calculation of beam deflections and angle of twist and shearing strain in a twisted circular shaft. Calculation of Column buckling loads using Euler's formula for different boundary conditions. Determination of flexural Modulus of elasticity for different metallic materials subjected to lateral loads.

Textbook:

1. Mechanics of Materials by Beer, Johnston, Dewolf, and Mazurek, Latest Edition in SI Units, McGraw Hill.
2. Laboratory Manual, latest edition

Prerequisites: None
Co-requisite: CE 302

CE 306 Properties and Testing of Structural Materials *3 (2, 0, 2)*

General properties, testing and specifications of engineering materials. Stress-strain behavior of concrete and reinforcing bars. Properties and testing of concrete making materials (cement,

aggregates, mixing water and admixtures). Requirements and design of concrete mixes. Mixing, placing and curing of concrete. Quality control and statistical evaluation.

Textbook:

1. Steven H. Kosmatka and Michelle L. Wilson, "Design and Control of Concrete Mixtures," Portland Cement Association, PCA, latest edition.
2. William A. Cordon, "Properties Evaluation, and Control of Engineering Materials", Latest Ed., McGraw-Hill, USA.

Prerequisite: CE 302 and CE305

CE 360 Structural Analysis -1 *4(4, 1, 0)*

Classification of structures; loads and structural design. Geometric stability and determinacy. Analysis of statically determinate frames: Computations of reactions, axial force, shear force and bending moment diagrams. Deformation of beams, frames and trusses using virtual work method. Influence lines for beams. Analysis of statically indeterminate beams frames and trusses using Force Method. Moment Distribution Method for beams and nonsway frames. Introduction to computer applications.

Textbook: Hibbeler, R.C., "Structural Analysis" SI Ed., Pearson Education

Prerequisite: CE 302

CE 370 Reinforced Concrete Design -1 *4 (4, 1, 0)*

Introduction to reinforced concrete members and structures, building codes, overview of SBC and ACI codes, the design process, limit states and the design of reinforced concrete, load factors and load combinations in SBC, loadings and actions. Material properties of concrete and reinforcing steel. Flexural behavior of reinforced concrete beams. Analysis and design of beams for flexure and shear in accordance with strength design method of SBC-304. Bond, development length of reinforcement and splices. Analysis and design of continuous beams and one-way floor systems (one way solid and joist slabs). Analysis and design of short columns. Analysis and design of spread footings.

Textbook:

1. J. K. Wight and J. G. MacGregor, "Reinforced Concrete: Mechanics and Design" Latest Edition, Pearson.
2. ACI Committee 318, "Building Code Requirements for Structural Concrete (ACI 318M-14) and Commentary (ACI 318RM-14)", American Concrete Institute, Farmington Hills, MI.
3. Saudi Building Code 304, "Saudi Building Code Requirements for Structural Concrete (SBC 304-07)".

Prerequisite: CE 306, CE 360

***Approved by*:** Chairman: …… Dean: ……

CE 460 Structural Analysis - 2 *3 (3, 1, 0)*

Analysis of statically indeterminate structures by the stiffness method: trusses, beams and frames under the effect of loads, pre-strain and temperature. Approximate methods for analyzing building frames. Introduction to structural dynamics, and applications on single and multi-degree of freedoms under different types of dynamic loads.

Textbook: Hibbeler, R.C., "Structural Analysis", SI Ed., Pearson Education

Prerequisite: CE 360

CE 462 Analysis and Design of Buildings *3 (1, 0, 4)*

Structural design process of RC buildings, preliminary design and selection of appropriate structural system. Integration and implementation of analysis and design process through a term-long design project of real structures utilizing modern computer software and including: idealization and modeling of structures, estimation of gravity and wind loads, results validation and verification, preparation of structural drawings and details.

Textbook:

1. American Concrete Institute, "ACI Detail Manual".
2. ACI Committee 318, “Building Code Requirements for Structural Concrete (ACI 318M-14) and Commentary (ACI 318RM-14)”, American Concrete Institute, Farmington Hills, MI.
3. Saudi Building Code 304, “Saudi Building Code Requirements for Structural Concrete (SBC 304-07)”.

Prerequisite: CE 470

CE 464 Structural Analysis Using Finite Elements *3 (3, 1, 0)*

Introduction to finite element method: element types, meshing, and modeling concepts. Application of finite element computer programs to frames, slabs, walls and footings. Graphical presentation and interpretation of results. Validation and verification of computer solutions by comparison to known solutions and code methods.

Textbook: Finite element book and ETABS user’s manual

Prerequisite: CE 460

CE 466 Bridge Engineering *3 (3, 1, 0)*

Type of bridges. Design codes and bridge loadings. Analysis of bridge superstructures. Design of slab-on-girder decks: R.C. girders, pre-stressed girders, steel girders and composite girders. Analysis and design of bridge substructures.

Textbook:

1. Demetrios. E. Tonias and Jim J. Zhao. “Bridge Engineering”, Latest Edition, McGraw Hill.

***Approved by*:** Chairman: …… Dean: ……

2. AASHTO LRFD Bridge Design Specifications. American Association of State Highway and Transportation Officials, Washington, D.C., latest edition.
3. ACI Committee 318, "Building Code Requirements for Structural Concrete (ACI 318M-14) and Commentary (ACI 318RM-14)", American Concrete Institute, Farmington Hills, MI.

Prerequisite: CE 470

CE 468 Wind and Earthquake Resistant Design *3 (3, 1, 0)*

Introduction on: nature, concept, and characteristics of wind and earthquakes, their effects on buildings. Building Code Provisions for basic requirements and criteria of wind and earthquake resistant design. Calculation of wind and earthquake loads. Concepts of: moment resisting frames, building configuration, structural systems, loads combinations, and analysis procedures. Code Provisions for design and detailing requirements of RC frames. Requirements for non-structural components. Computer applications for RC frames.

Textbook:

1. S. K. Ghosh , David A. Fanella. "Seismic and Wind Design of Concrete Buildings." Latest edition. Kaplan Publishing, Wokingham RG41 2QZ, UK.
2. ACI Committee 318, "Building Code Requirements for Structural Concrete (ACI 318M-14) and Commentary (ACI 318RM-14)", American Concrete Institute, Farmington Hills, MI.
3. Saudi Building Code 301, "Saudi Building Code Requirements for Loading and Forces (SBC 301)".
4. International Code Council (ICC), 2012, IBC Structural/Seismic Design Manual Volume 3: Examples for Concrete Buildings. Molly Millars Ln, Wokingham RG41 2QZ, UK

Prerequisite: CE 470

CE 470 Reinforced Concrete Design - 2 *3 (3, 1, 0)*

Analysis and Design of short columns under combined axial load and bending, P-M interaction diagrams. Design of biaxially loaded columns, slenderness effect and behavior of slender columns, Design of slender columns in Nonsway and Sway frames. Two-way slab systems, Design of two-way slabs using direct design and coefficient methods. Design of spread, continuous and combined footings. Introduction to torsion, deeps beams, corbels and staircases. Design Project.

Textbook:

1. J. K. Wight and J. G. MacGregor, "Reinforced Concrete: Mechanics and Design" Latest Edition, Pearson.

2. ACI Committee 318, "Building Code Requirements for Structural Concrete (ACI 318M-14) and Commentary (ACI 318RM-14)", American Concrete Institute, Farmington Hills, MI.
3. Saudi Building Code 304, "Saudi Building Code Requirements for Structural Concrete (SBC 304-07)".

Prerequisite: CE 370

CE 473 Steel Structures *3 (3, 1, 0)*

Introduction to types of structural steel and steel structures. Concept of LRFD method. Strength and design of tension members with bolted and welded connections. Strength and design of columns, beams and beam-columns. Design of bolted and welded connections, splices, and column base plates. Analysis and design of roof trusses and frame structures

Textbook:

1. Jack, C. McCormac & James Nelson, "Structural Steel Design", LRFD Method, SI ED., Pearson Education.
2. Jack, C. McCormac & James Nelson, "Manual of Steel Construction", LRFD Vol.1, Pearson Education.

Prerequisite: CE 360

CE 475 Pre-stressed Concrete Design *3 (3, 1, 0)*

Fundamentals of pre-stressing, pre-stressing materials and pre-stress losses. Allowable stress and ultimate strength design methods. Analysis and design of beams for flexure, shear and deflection. Slab system.

Textbook:

1. Naaman, A. E. Prestressed concrete analysis and design: fundamentals, McGraw-Hill New York, Latest Edition.
2. AASHTO LRFD Bridge Design Specifications. American Association of State Highway and Transportation Officials, Washington, D.C., latest edition.
3. ACI Committee 318, "Building Code Requirements for Structural Concrete (ACI 318M-14) and Commentary (ACI 318RM-14)", American Concrete Institute, Farmington Hills, MI.

Prerequisite: CE 470

CE 477 Concrete Technology *3 (3, 1, 0)*

Chemical composition of Portland cement. Structure of hydrated cement paste. Chemical and mineral admixtures. Properties of fresh concrete. Hot weather concreting and influence of curing. Durability of concrete. Quality of concrete and compliance with specifications. Field visits and group project.

Textbook: Mindess, J.F. Yound and Darwing, "Concrete", SI Ed.

***Approved by*:** Chairman: …… Dean: ……

Prerequisite: CE 306

CE 478 Selected Topics in Structural Analysis and Design *3 (3, 1, 0)*

Different selected structural engineering topics that are not covered in other courses such as; fundamentals of structural dynamics. Introduction to seismic design. Design of different systems of slabs , shear walls, tanks, and silos.

Textbook:

1. Chopra, A. K., "Dynamics of Structures", Latest Edition, Pearson.
2. J. K. Wight and J. G. MacGregor, "Reinforced Concrete: Mechanics and Design" 6th
3. ACI Committee 318, Building Code Requirements for Structural Concrete (ACI 318-11) and Commentary, American Concrete Institute, Farmington Hills, MI, 2011, 480 pp.
4. Saudi Building Code 304, Saudi Building Code Requirements for Structural Concrete (SBC 304).

Prerequisite: CE470

CE 479 Rehabilitation of Reinforced Concrete Structures *3 (3, 1, 0)*

Rehabilitation issues/life extension for structures. Requirements/performance criteria for rehabilitation. Condition assessment and evaluation of existing structures. Rehabilitation for strength, ductility, durability and serviceability. Conventional and non-conventional procedures of rehabilitation.

Textbook:

1. Repair and Rehabilitation Manuals and Proceedings.
2. ACI 440.2R-08: Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures. Farmington Hills, Michigan.

Prerequisite: CE 470

2. Geotechnical Engineering

CE 380 Soil Mechanics Laboratory *1 (0, 0, 2)*

Moisture content. Liquid, plastic and shrinkage limits. Specific gravity. Sieve analysis. Hydrometer test. Compaction test. Field Density. Permeability test. Total sulfate and chloride content of soil. pH value and organic content. Direct shear test. Unconfined compression test. Consolidation test. Conventional triaxial test.

Textbook: Engineering properties of Soil and their Measurements byJ.E.,Bowells, McGraw-Hill , Latest Edition.

Prerequisites:None

Co-requisite: CE 382

CE 382 Geotechnical Engineering-I *2 (2, 1, 0)*

Types and classification of rocks. Formation of soils. Weight-volume relationships. Consistency limits. Classification of soils. Soil compaction. Permeability and seepage. Total and effective stress principle. Soil stresses using elastic theory.

Textbook: Braja M. Das, "Principles of Geotechnical Engineering", Brooks-Cole-Thomson Learning.

Prerequisites: CE 302, GEO 281

CE481 Geotechnical Engineering-II *2 (2, 1, 0)*

Compressibility of soils. Shear strength of soils. Slopes Stability .Lateral earth pressures. Retaining walls.

Textbook: Braja M. Das, "Principles of Geotechnical Engineering", Brooks-Cole-Thomson Learning.

Prerequisites: CE 382

CE 483 Foundation Engineering *2 (2, 1, 0)*

Site investigations. Bearing capacity of shallow foundations. Settlement of shallow foundations. Spread footings. Combined footings. Mat foundations. General overview of Saudi Building Code for soils and foundations.

Textbook: Braja, M. Das, "Principle of Foundation Engineering", Brooks-Cole-Thomson Learning.

Prerequisites: CE 481, CE 370

CE 484 Deep Foundations *3 (3, 1, 0)*

General concepts. Types of deep foundation. Bearing capacity of single piles. Bearing capacity of group piles. Settlement of piles. Laterally loaded piles. Excavation and bracing. Sheet piling. Drilled piers. Caisson foundations.

Textbook: Braja, M. Das, "Principle of Foundation Engineering", Brooks-Cole-Thomson Learning.

Prerequisites: CE 470

Co-requisite: CE 483

CE 485 Introduction to Rock Mechanics *3 (3, 1, 0)*

Rock and rock mass classifications for engineering purposes. Index properties and their measurements in field and laboratory. Stresses and their measurements. Deformability. Strength and failure criteria. Stability of rock masses.

Textbook:

1. Goodman, Richard E., "Introduction to Rock Mechanics" 2nd Ed., John Wiley and Sons, N.Y., 1989.

2. Jaeger, J.C. and Cook, N.G.W. "Fundamentals of Rock Mechanics" 3rd Ed. Chapman and Hall, N.Y.

Prerequisites: CE 481

CE 486 Improvement of Geotechnical Materials *3 (3, 1, 0)*

Improving performance of soils for engineering applications. Analysis of methods of stabilizing soils and rocks including topics on: Mechanical and chemical stabilization and earth reinforcement.

Textbook:

1. Moseley, M.P. "Ground Improvement", Blackie Academic & Professional.
2. Hausmann, M.R. "Engineering Principles of Ground Modification". McGraw-Hill.

Prerequisites:

Co-requisite: CE 483

CE 487 Geotechnical Engineering in Arid Regions *3 (3, 1, 0)*

Geology of arid regions. Introduction to unsaturated soil mechanics. Construction and design of foundations on: expansive soils, collapsing soils, shrinking soils, loessial soils, salt bearing soils, highly weathered limestone, large cavities in rock, coralline limestone, and sand dunes.

Prerequisites: CE 481

CE 488 Selected Topics in Geotechnical Engineering *3 (3, 1, 0)*

Soil behavior. Computer applications in geotechnical engineering. Seepage and consolidation. Soil dynamics. Principles of unsaturated soil mechanics. Geo-environmental engineering.

Prerequisites: CE 481

CE 489 Introduction to Tunnels Design

History of Tunneling and tunnels projects. Type of tunneling constructions methods. Design of tunnels supporting system. Ground monitoring system. Risk assessments in tunnels projects.

Textbook: D.Chapman, N. Metje, A. Stärk. Introduction to Tunnel Construction, CRC Press, 2010.

Prerequisites: CE 481

3. Water Resources Engineering:

CE 320 Fluid Mechanics *2 (2, 1, 0)*

Units and Dimensions, fluid properties, fluid pressure at a point, pressure variation with depth, hydrostatic forces on plane and curved surfaces, buoyancy and stability of floating and submerged bodies, flow types (steady, unsteady, uniform, non-uniform), continuity equation, energy equation, momentum equation.

***Approved by*:** Chairman: …… Dean: ……

Textbook: Fundamentals of Fluid Mechanics Latest Edition (SI Version). Authors: Munson,Okiishi, Huebsch, Rothmayer

Prerequisite: None

Co-requisite: GE 202

CE 324 Hydraulics *2 (2, 1, 0)*

Energy equation, friction losses, minor losses, types of pipe flow & Reynolds number, series piping, parallel piping, pump's power, unsteady pipe flow, classification of free-surface flow, Froude number, uniform flow, critical flow, basics of channel design, specific energy, non-uniform rapidly varied flow (hydraulic jump), introduction to non-uniform gradually varied flow.

Textbook: Hydrology & Hydraulic Systems by Ram S. Gupta, Published by Prentice-Hall, New Jersy, U.S.A.

Prerequisite: CE 320, GE 202

CE 325 Hydraulics Laboratory *1 (0, 0, 2)*

Verification of Bernoulli's equation. Flow through small orifices, venture-meters. Impact of water jets on plates. Flow over weirs (rectangular & v-notch). Water hammer phenomenon. Losses in pipes and pipe fittings. Velocity measurements in open channels. Uniform open channel flow. Applications of specific energy and specific force principles in hydraulic jumps.

Textbook: Mechanics of Fluids by Merle C. Potter and David C. Wiggert, Published by Prentice Hall, New Jersy, U.S.A., 1997

Prerequisite: None

Co-requisite: CE 324

CE 423 Hydraulic Structures *3 (3, 1, 0)*

Design of inlet structures of irrigation canals, cross structures, culverts, siphons and aqueducts, energy dissipation below hydraulic structures, spillways, and design of dams.

Textbook: Novak, P., Moffat, A. Nalluri, C. and Narayanan, R., Hydraulic Structures, 3ed Ed., 2001

Prerequisite: CE 324

CE 424 Hydrology *2 (2, 1, 0)*

Hydrologic cycle and budget, meteorological data, hydrologic processes: precipitation; evaporation; transpiration; runoff and stream flow; infiltration; and groundwater aquifers and wells.

Textbook:

1. Hydrology & Hydraulic Systems by Ram S. Gupta, Published by Prentice-Hall, New Jersy, U.S.A.

***Approved by*:** Chairman: …… Dean: ……

2. Theory and Design of Irrigation Structures by Varshney, R., Gupta, S. and Gupta, R., Roorkee, India : Nem Chand & Bros. 1982
3. Water Resources Engineering by Ray, K., et al, New York : McGraw Hill. 1992
4. Design of Small Dams by U.S. Bureau of Reclamation. 1987

Co-requisite: CE 324

CE 425 Surface and Groundwater Hydrology *3 (3, 1, 0)*

Review of hydrologic cycle elements, computation of average precipitation, stream flow and stage relationship, hydrograph analysis, infiltration indices, hydrograph of basin outflow, storage routing for natural channels and reservoirs, probability concepts in design recurrence intervals, flood frequency analysis and flow direction curves, hydraulics of wells, boundary effects, wells construction and maintenance.

Textbooks:

1. Engineering Hydrology, by Wilsan, Wiley. Latest edition
2. Groundwater Hydrology by Todd, Wiley. Latest edition

Prerequisite: CE 424

CE 426 Water Resources Planning *3 (3, 1, 0)*

Introduces the main concepts and principles of water resources planning; Determining water supply and water demand from possible resources and for different purposes. Realizing the different considerations in planning : economic , social, legislative , and environmental and presenting the water resources planning for Saudi Arabia as a case study .

Text Book: "Water Resources Planning" by Dzurik , Andrew and Threiaque , David. 1990, Roman and Littlefield

Prerequisite: CE 424

CE 427 Hydraulics of Pressurized Flow *3 (3, 1, 0)*

Dimensional analysis (Buckingham's Pi-Theorem) and similarity, review of the hydrodynamics conservation laws (mass, energy and momentum), types of pumps and turbines, hydraulic system curves, pump characteristic curves (head, power, efficiency), pumps connected in parallel and in series, applications of pumps and turbines in common pipe flow setups (e.g. pump stations in pipe networks and pipelines, turbines in hydropower generation).

Textbook: Hydrology & Hydraulic Systems by Ram S. Gupta, Published by Prentice-Hall, New Jersy, U.S.A.

Prerequisite: CE 324

CE 428 Hydraulics of Open Channel Flow *3 (3, 1, 0)*

Application of mass, energy and momentum conservation principles to open channel flows; types of open channel flows (steady versus unsteady flows with examples); flow hydraulic

controls (critical flow locations), specific discharge and flows over hump, sump and in variable-width channels; non-uniform flows (rapidly varied and gradually varied); design of open channel sections (rigid and loose boundary channels).

Textbook:

1. Hydrology & Hydraulic Systems by Ram S. Gupta, Published by Prentice-Hall, New Jersy, U.S.A.
2. Essential reference: Open Channel Hydraulics by Ven Te Chow, Published by McGraw-Hill, Inc., U.S.A., 1959

Prerequisite: CE 324

CE 429 Computer Applications in Water Engineering *3 (3, 1, 0)*

The course is designed to introduce students to water engineering software in the fields of hydraulics and hydrology. Students learn about modeling open channel and closed conduit flows, as well as surface and groundwater hydrology problems. Students are introduced to setting boundary conditions and calibrating models. Example computer application programs that they may use include: HEC-RAS, WaterCad, HEC-HMS, HYDROMED and MODFLOW.

Textbook:

1. Fluid Mechanics by V. L. Streeter & E. B. Wylie
2. Open Channel Hydraulics by Ven Te Chow
3. Applied Hydrology by Ven Te Chow, David R. Maidment, Larry W. Mays
4. Groundwater Hydrology and Hydraulics by McWhorter & Sunada
5. Manuals of the adopted application programs

Prerequisite: CE 424

4. Transportation Engineering:

CE 430 Transportation Systems *2 (2, 1, 0)*

This course provides students an introduction to analysis and design of the fundamental elements of transportation system, such as highways and traffic systems, transit system, elementary geometric design, capacity analysis and flow relations, urban transportation planning and traffic forecasting.

Textbook: C. S. Papacostas & P. D. Prevedouros, "Transportation Engineering and Planning", Prentice Hall.

Prerequisites: STAT 101

CE 431 Highway Engineering *3 (3, 1, 0)*

Introduction, Highway Travel Characteristics, Economic Analysis of Highways, Highway and the Environment, Highway Surveys and Plans, Geometric Design of Highway,

Intersections and Interchanges, Pavement Structural Design, Pavement Evaluation and Maintenance.

Textbook: P. H. Wright & Karen K. Dixon, "Highway Engineering", John Wiley and Sons.

Prerequisites: CE 430, CE 382, SE212

CE 432 Highway Laboratory *1 (0, 0, 2)*

Highway materials, Purpose of highway materials testing, Sampling methods, Soil and aggregate properties and testing methods, Bituminous material properties and testing methods. Bituminous mix design. Distresses of asphalt pavements

Textbooks: Highway Engineering, 7th Edition, (2004), by Paul H. Wright & Karen Dixon

Prerequisites: CE 380,

Co-requisites: CE 431

CE 435 Railway Engineering *3 (3, 1, 0)*

Introduction to railway transport systems, railway terminologies, Railways in Saudi Arabia, dynamic aspects of train motion (train speed, power, and acceleration requirements), track components, vertical and horizontal alignments, railway yards, stations and platforms, and railway traffic control and signaling.

Textbooks :Railway Engineering by S.C. Saxena and S.P.Arora (2013)

Prerequisites: CE 431

CE 436 Traffic Engineering *3 (3, 1, 0)*

This course give students in-depth explanations on the Traffic Stream Characteristics, Volume Studies and Characteristics, Speed, Travel Time and Delay Studies, Parking Studies, Accident Studies, Traffic Control Devices, and Intersection Signalization.

Textbook: Roger P. Roess, Elena S. Prassas & William R. McShane, "Traffic Engineering", Prentice Hall.

Prerequisites: CE 430

CE 437 Analysis and Design of Pavement Systems *3 (3, 1, 0)*

This course provides students the concept of pavement Serviceability, design factors, pavement types, basic differences between pavement types, basic differences between airport and highway pavements, stresses in flexible pavement, traffic considerations, materials and material characterization for different pavement layers, variability in pavement materials, methods of pavement design. Computer application in pavement analysis and design.

Textbook: E. J. Yoder & M. W. Witczak, "Principles of Pavement Design", John Wiley.

Prerequisites: CE 431

CE 438 Urban Public Transportation *3 (3, 1, 0)*

This course introduces students to the Conceptual Framework for Estimating Transit Demand, Technological Characteristics and Their Impacts on Capacity, Service Quality, and

Cost. In additions, it covers Data Collection and Analysis, Performance Monitoring, Route Design, Frequency Determination, and Vehicle and Crew Scheduling.

Textbook: V. R. Vuchic. Urban Transit: Operations, Planning, and Economics. John Wiley & Sons, Inc., 2005.

Prerequisites: CE 430

CE 439 Pavement Maintenance *3 (3, 1, 0)*

Concept of Pavement Serviceability and Maintenance, Pavement Evaluation, Types of Pavement Maintenance and Rehabilitations, Identification of Flexible Pavement Distresses, Treatment of Pavement Distresses, Maintenance Activities, Maintenance Decisions, Structural and Functional Overlay, Economic Evaluation of Pavement Maintenance Alternatives.

Textbook:

1. Asphalt in Pavement Preservation & Maintenance, MS-16, The Asphalt Institute
2. Alternatives in Pavement Maintenance, Rehab & Reconstruction, IS-178, The Asphalt institute.
3. Modern Pavement Management, R. Hass, W.R. Hudson, and J. Zawienski, Krieger Publishing Company, 1994

Prerequisites: CE 431

5. Environmental Engineering:

CE 443 Water and Wastewater Laboratory *1 (0, 0, 2)*

Laboratory experiments related to water and wastewater quality testing. Recognizing the technical aspects of water and wastewater testing, with the identification of the necessary test for water and wastewater monitoring. Practical sample testing for the most common water and wastewater quality parameters.

Textbook: Metcalf & Eddy, Inc. "Wastewater Engineering: Treatment and Resource Recovery", 5th edition, McGraw-Hill Inc. (2014).

Prerequisite: None

Co-requisite: CE 448

CE 444 Environmental Engineering *3 (3, 1, 0)*

Natural Water Systems: self purification mechanisms, BOD exertion, DO modeling. Air Pollution: lapse rate, stability, dispersion of pollutants, control technology. Solid Waste Management: types, properties, integrated management, collection, reuse & reccycle, sanitary landfills. Noise Pollution: sources, effects, measurements, standards, control. Environmental Impact Assessment: definition, importance, main features.

***Approved by*:** Chairman: …… Dean: ……

Textbook: Mackenzie Davis and Susan Masten, "Principles of Environmental Engineering and Science", McGraw-Hill Inc.

Prerequisite: CE 448

CE 445 Wastewater Reclamation and Reuse *3 (3, 1, 0)*

Potential reuse applications. Sources of water for reuse. Treatment technologies suitable for water reuse applications. Criteria for each application. Feasibility and planning of water reuse systems. Management of biosolids resulting from wastewater treatment.

Textbook: Metcalf & Eddy, "Water Reuse: Issues, Technology and Applications", McGraw-Hill Inc. (Last Edition)

Prerequisite: CE 448

CE 446 Environmental Assessment and Management Systems *3 (3, 1, 0)*

Knowledge for principle of environmental impact assessment includes the definition, historical background, laws and tools related to environmental impact assessment. The principles of environmental impact assessment focus on physical, biological and human use to achieve quality of life with case studies and examples.

Textbook: Canter, Larry W., "Environmental Impact Assessment" ", McGraw Hill

Prerequisite: CE 447, CE 448

CE 447 Water Supply and Drainage Systems *2 (2, 1, 0)*

Quantity of Water, Population Estimation & Forecasting, Water Consumption, Fire Demand, Storage, Design and analysis of Water Distribution systems. Quantity of Wastewater, Amount of Storm Runoff, Design and analysis of Sanitary and Storm Sewers, Stresses & Loads on Pipes, Corrosion Phenomenon, Pumps and Pumping Stations.

Textbook: Terence J. Mcghee, "Water Supply and Sewerage", McGraw-Hill Inc.

Prerequisite: None

Co-requisite: CE 424

CE 448 Water and Wastewater Treatment *2 (2, 1, 0)*

Fundamental principles and current practices in water processing, municipal wastewater treatment, and sludge processing. Characteristics of surface and ground waters, and municipal wastewater. Concepts and design of different unit operations and processes for the treatment of water/wastewater. Drinking water standards. Wastewater reuse and disposal criteria. Properties of sludge generated from treatment processes, treatment, and utilization. Field trips to water/wastewater treatment plants.

Textbook: James R. Mihelcic, Julie B. Zimmerman (2010) Environmental Engineering: Fundamentals, Sustainability, Design, USA: Wiley.

Prerequisite: GE 203, CE 324

***Approved by*:** Chairman: …… Dean: ……

CE 449 Introduction to Solid Waste Management *3(3, 1, 0)*

Municipal solidwaste generation, characteristics and generation rates - Reuse and recycling of municipal solidwaste -Solidwaste Management – Collection and transport – Material recovery facilities – Transfer stations – Methods of municipal solidwaste disposal including sanitary landfilling – Hazardous solidwastes and disposal processes.

Textbook: Integrated Solid Waste Management: A Life Cycle Inventory, 2nd Edition, Forbes R. McDougall, Peter R. White, Marina Franke, Peter Hindle

Prerequisites: CE 447, CE448

CE 450 Air Pollution Control Engineering *3(3, 1, 0)*

Air pollution and sources; classification of air pollutants; units of measurements; effects of air pollutants on health, human welfare and environment; physical and chemical behavior of pollutants in the atmosphere; regulatory control of air pollution (air quality criteria and standards; indoor air quality, emission standards); preventing and controlling air pollution; air pollutants and global climate

Textbook: Air Pollution Control: A Design Approach, 4th Edition, Waveland Pr Inc;

4th edition

Prerequisites: CE448

CE 451 Advanced Water and Wastewater Treatment *3(3, 1, 0)*

The course will teach the role of water and wastewater treatment technologies in providing adequate water supply and effective sanitation that are essential for a human. This course will detail urban water services, focusing on basic drinking water technologies. Unit processes involved in the treatment chain will be described and designed as well as the physical and chemical processes involved. There will be an emphasis on water quality and the functionality of each unit process within the treatment chain. Also, unit processes involved in the wastewater treatment will be described and designed as well as the physical, chemical and biological processes involved.

Textbook:

1-Metcalf & Eddy, Inc. "Wastewater Engineering: Treatment and Resource Recovery Water Reuse: Issues, Technology and Applications", 5th edition, McGraw-Hill Inc. (2014).

2-James R. Mihelcic, Julie B. Zimmerman (2010) Environmental Engineering: Fundamentals, Sustainability, Design, USA: Wiley.

Prerequisites: CE448

6. Construction Engineering and Management:

CE 411 Introduction to Construction Contracts *3 (3, 1, 0)*

Basics of construction law are covered, including types and selection of construction contracts. Topics include ingredients of engineering contracts, responsibilities and rights for

the Contract Parties. International and Saudi standard contracts are presented to familiarize the students of the way Engineering Projects are administered time, cost and quality wise.

Textbook: Keith Collier, "Construction Contracts", Prentice Hall.

Prerequisite: Successful Completion of 110 credit hours

Co-requisite: None.

CE 412 Estimating Construction Cost *3 (3, 1, 0)*

The estimating process. Conceptual estimation. Range estimation. Detailed estimate. Earthwork. Concrete. Masonry. Carpentry and steel. Mechanical and Electrical estimating. Heavy construction. Profit and bonds. Labor productivity. Computers in estimating. Bidding strategy, Group Project.

Textbook: Stephen and Roger W. Liska, "Building Construction Estimation", McGraw-Hill.

Prerequisite: Successful Completion of 110 credit hours.

Co-requisite: None.

CE 413 Construction Scheduling *3 (3, 1, 0)*

Construction Planning. Construction Scheduling using different CPM techniques

Probabilistic scheduling. Constrained and unconstrained resource allocation. Network compression. Techniques for scheduling repetitive works. Updating construction schedules.

Textbook: Jimmie W. Hinze, Construction Planning and Scheduling, 4th Edition, Prentice Hall PTR, 2011

Co-requisite: CE 419

CE 415 Selected Topics in Engineering and Construction Management *3 (3, 1, 0)*

This course will cover the contemporary and present theories and tools that will be beneficial for the students. This course covers unique topics of current interests in construction management. The course may feature a detailed look at a single topic or a series of focused topical presentations.

Prerequisite: Successful Completion of 110 credit hours

CE 419 Construction Management *4 (4, 1, 0)*

Introduction to construction industry, Introduction to cost estimation, Types and productivity of earthmoving equipment, Design of Concrete Formworks, cost of equipment operation and maintenance, Construction Economics, Construction Safety and Ethics, and improving productivity.

Textbook: S. W. Nunnaly, "Construction Methods and Manamagement", Prentice Hall.
Prerequisite: CE 370, CE 382

3.5 Graduation Projects:

***Approved by*:** Chairman: …… Dean: ……

CE 496 Graduation Project-1 *2 (2, 0, 0)*

This is the first phase of the capstone design project that is a continual project over two semesters, and involves number of students working as one team tackling different aspects of the civil engineering works. This phase introduces knowledge of ethical responsibilities, public policies, administration, leadership, and contemporary issues related to Civil Engineering practice. It also includes project selection, data collection, identification of real-life constraints (e.g. economy, environmental, global, and contemporary issues), generation of possible design alternatives considering client needs, and preparation of a work plan for implementing and completing the project. All work conducted during the semester must be complied in a final report.

Prerequisite: Successful completion of 129 credit hrs. and passing all courses in levels 1-7.

CE 497 Graduation Project-2 *2 (2, 0, 0)*

This is the implementation phase of the capstone design project. It includes analysis of design criteria, parameters and constraints for the design alternatives to select the preferred option, and design calculation and/or use of experimental tools (if required) to refine design. The final report to be submitted by the team includes project title, description, objectives and constraints; data and assumption; design alternatives and analysis; details of preferred design analysis and calculations along with pertinent drawings; and summary and conclusions.

Prerequisite: CE 496

3.6 C*ourses from other Programs*

SE 212 Spatial Measurements *3 (2, 1, 2)*

Introduction & definitions; surveying types & importance, measurements units; basics of Linear Measurements (tape, optical & electronic); theodolites & angular measurements; levels & leveling operations; applications of leveling (contouring); planimetric (cross-sectional area & volume determination); introduction to total station; setting out; introduction to underground surveying; introduction to photogrammetry & remote sensing.

Textbook: Paul, R. Wolf & Charles D. Ghilani, "Elementary Surveying: An Introduction to Geomatics" 11th Ed. 2005. Pearson.

Prerequisite: Math 107

ARCH 239 Building Construction for Civil Eng. Students *2(1,0,2)*

Definition of building construction and main building elements. Engineering drawings required at design and construction levels. Reading architectural drawings. Studies and research problems for engineering projects, such as: feasibility and soil studies. Studying some building elements such as stairs and materials.

Prerequisite: CE 370

GEO 281 Geology for Engineers *2(2,1,0)*

***Approved by*:** Chairman: …… Dean: ……

Introduction. Structure of Earth. Minerals and Rocks. Igneous Rocks and Volcano. Weathering, erosion and soil formation. Sedimentary Rocks. Metamorphic Rocks. Geology and Water Supply; Geology of Saudi Arabia

Textbook:

McLean, A.C. and Gribble, C.D., 1985, ***Geology for Civil Engineering***, 2nd Edition, George Allen & UNWIN.

Tarbuck, E.J. and Lutgens, F.K., 2002, ***The Earth***, Ninth Edition, Prentice Hall, New Jersey, 670 p. with accompanying GEODe III CD-ROM bound into book inside back cover**.**

3.7 Courses Offered to other Programs

CE 323 Water Engineering for Surveying Students *3(3,1,0)*

Introduction to fluid properties, hydrostatics, motion of fluids, closed conduit flow and open channel flow. Introduction to hydrology and ground water.

Prerequisites: GE 202

CE 334 Highway Engineering for Surveying Engineering Students *3(2,1,2)*

Introduction to Transportation Systems, Economic Analysis of Highways, Highway Surveys and Plans, Geometric Design of Highway, Intersections and Interchanges, Introduction to Pavement types and layers.

Textbook: P. H. Wright & Karen K. Dixon, "Highway Engineering", 7th ed. 2009, John Wiley and Sons.

Prerequisites: STAT 101 and SE 312

CE 363 Basics of Concrete Structures for Surveying Students *3(3,1,0)*

Introduction to concrete technology; composition and properties of concrete; tests of fresh and hardened concrete, analysis of simple and continuous beams, design of bending and shear. Design of short columns, bond strength and development length.

Prerequisites: CE 302