

The Academic Plan of Civil  
Engineering Department  
(2010)

**College of Engineering  
Najran University**

## The Academic Plan

The plan of study for Civil Engineering Program is shown in Table 1. Student will be admitted to Civil Engineering Program after completing the two semesters (level 1 and level 2) in the Preparatory year Program that consists of 27 credit hours including 6 credit hours Math courses, in addition to other educational courses. The courses of curriculum of Civil Engineering Program are shown in Figure 1. The curriculum consists of 132 credit hours. The curriculum includes seven courses of general education of 18 credits. Six courses of Arabic language and Islamic studies of 12 credits are required by the university. Two courses of 5 credit hours of communication skills (English courses). The study plan includes nine courses of 29 credit hours of mathematics and basic sciences. These courses cover four basic sciences such as math, math based physics, chemistry and computer programming. This is completely fit the requirement of civil engineering program by ABET. The curriculum also includes 24 courses of 68 credit hours of core civil engineering courses. In addition one course of co-operative field training of zero credit hour.

A flowchart that illustrates the prerequisite structure of the civil engineering program's required courses is shown in Figure 4.

قسم الهندسة المدنية



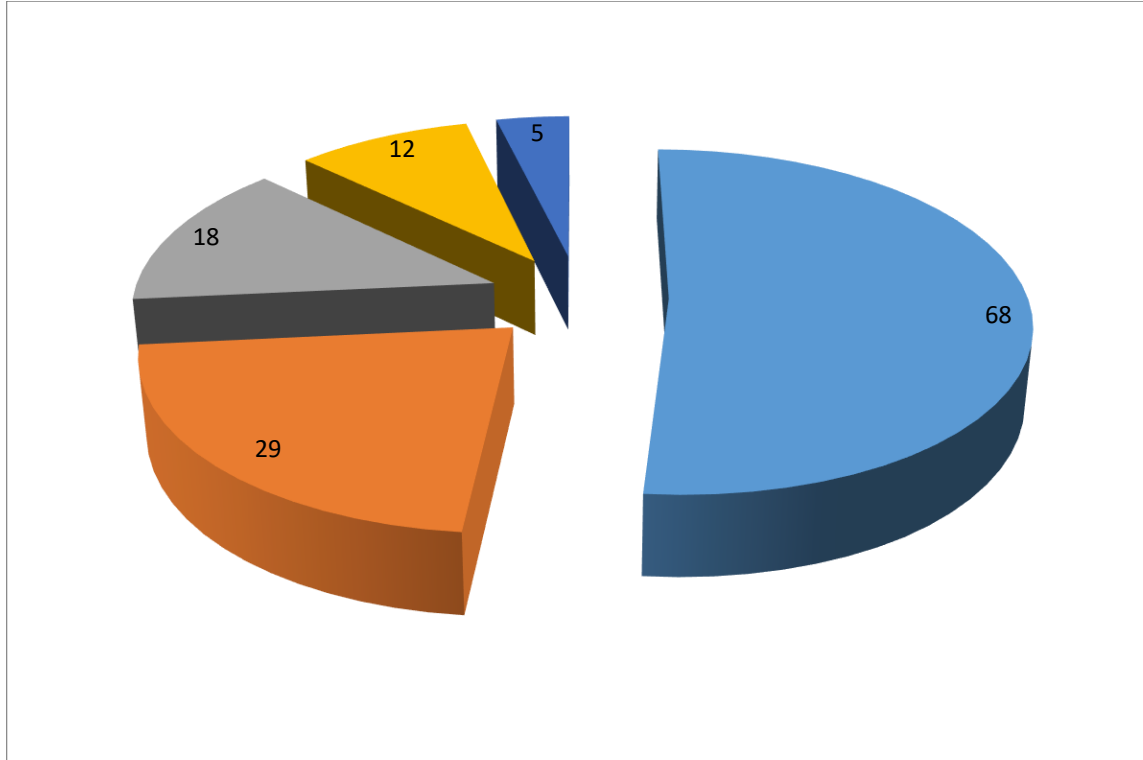
Figure 4: Prerequisites Flowchart for Civil Engineering Program

رؤية الجامعة: الريادة في التعليم والتعلم والبحث العلمي لبناء مجتمع معرفي مبتكر ومناخ دولي.  
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### Curriculum of Civil Engineering Program

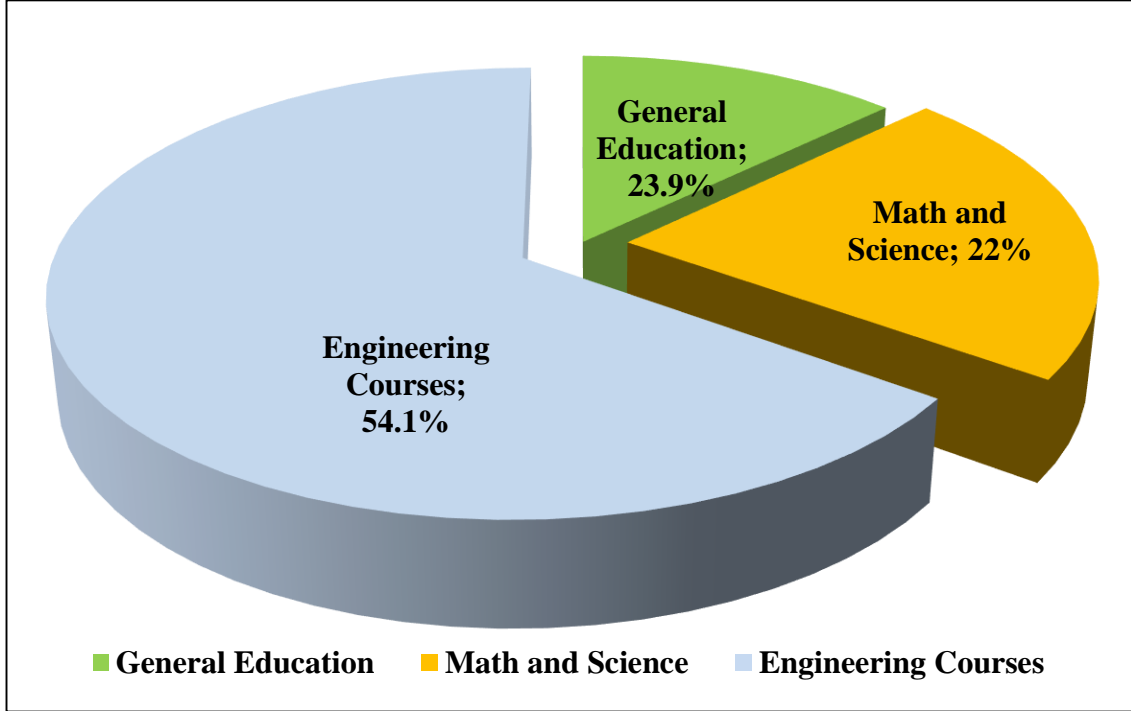
No.	Curriculum Component	No. of Courses	No. of Credit Hours	
1.	University Requirement Courses	6	12	
2.	Faculty Requirements	Communication Skills	2	5
		Math and Science	9	29
		General Engineering	7	18
3.	Department Requirements	24	68	
4.	Cooperative Field Training	1	0	
Total		49	132	



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Figure 5: Credit Hours Distribution of Civil Curriculum Component



Curriculum Distribution according to ABET general criteria by percentage

### Civil Engineering Curriculum Components

No.	Course Code	Prep. Year	
		Course Title	Credit Hours CR (Theory, Lab, Tut.)
1.	140TEC-3	Computer Skills	3 ( 3 , 0 , 0 )
2.	140MATH-2	Introduction of Mathematics	2 ( 2 , 0 , 0 )
3.	140SKL-2	Learning, Thinking and Research Skills	2 ( 2 , 0 , 0 )
4.	140ENGG-2	English Language :Reading Skills	2 ( 2 , 0 , 0 )
5.	141ENGG-2	English Language :Writing Skills	2 ( 2 , 0 , 0 )
6.	142ENGG-2	English Language :Listening and Speaking Skills	2 ( 2 , 0 , 0 )
7.	143ENGG-2	English Language :Grammars	2 ( 2 , 0 , 0 )

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8.	150MAN-1	Occupational Ethics	1 ( 1 , 0 , 0 )
9.	150MATH-4	Algebraic Sciences	4 ( 4 , 0 , 0 )
10.	150SKL-2	Communication Skills	2 ( 2 , 0 , 0 )
11.	150ENGG-3	English Language: Speaking	3 ( 3 , 0 , 0 )
12.	151ENGG-2	Report Writing	2 ( 2 , 0 , 0 )
Total			27( 27 , 0 , 0 )

University Requirements

No.	Course Code	Course Title	Credit Hours CR(Theory,Lab,Tut.)
1.	111ISL-2	Introduction to Islamic Culture 1	2 ( 2 , 0 , 0 )
2.	112ISL-2	Introduction to Islamic Culture 2	2 ( 2 , 0 , 0 )
3.	201ARAB-2	Arabic Language Skills	2 ( 2 , 0 , 0 )
4.	113ISL-2	Islamic Culture (3)	2 ( 2 , 0 , 0 )
5.	202ARAB-2	Arabic Writing	2 ( 2 , 0 , 0 )
6.	114ISL-2	Islamic Culture (4)	2 ( 2 , 0 , 0 )
Total			12( 12 , 0 , 0 )

Faculty Requirements

Faculty Requirements

No.	Course Code	Course Title	Credit Hours CR(Theory,Lab,Tut.)
1.	107ENG-3	Technical Writing	3 ( 3 , 0 , 1 )
2.	108ENG-2	Communication Skills for Engineers	2 ( 2 , 0 , 1 )
Sub Total			5 ( 5 , 0 , 2 )

Math and Science

No.	Course Code	Course Title	Credit Hours CR(Theory,Lab,Tut.)
1.	101CHM-3	General Chemistry	3 ( 3 , 0 , 1 )
2.	104PHIS-4	Principles of Physics	4 ( 3 , 2 , 1 )
3.	106MATH-3	Introduction to Integration	3 ( 3 , 0 , 1 )
4.	107MATH-3	Algebra & Analytical Geometry	3 ( 3 , 0 , 1 )
5.	203MATH-3	Advanced Calculus	3 ( 3 , 0 , 1 )
6.	105PHIS-4	Advanced Physics	4 ( 3 , 2 , 1 )
7.	204MATH-3	Differential Equations	3 ( 3 , 0 , 1 )
8.	324STAT-3	Probabilities and Engineering Statistics	3 ( 3 , 0 , 1 )
9.	254MATH-3	Numerical Methods	3 ( 3 , 0 , 1 )
Sub Total			29 ( 27 , 4 , 9 )

General Engineering

No.	Course Code	Course Title	Credit Hours CR(Theory,Lab,Tut.)
1.	101GE-3	Statics	3 ( 3 , 0 , 1 )

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2.	102GE-2	Introduction to Engineering Design	2 ( 2 , 0 , 1 )
3.	203GE-3	Engineering Drawing	3 ( 1 , 4 , 1 )
4.	205GE-3	Dynamics	3 ( 3 , 0 , 1 )
5.	306GE-2	Engineering Economy	2 ( 2 , 0 , 1 )
6.	407GE-2	Management of Engineering Projects	2 ( 2 , 0 , 1 )
7.	204GE-3	Computer Programming for Engineers	3 ( 2 , 2 , 1 )
	Sub Total		18 ( 15 , 6 , 7 )
	Grand Total		52 ( 47 , 10 , 18 )
<b>Department Requirements (Core Course)</b>			
No.	Course Code	Course Title	Credit Hours CR(Theory,Lab,Tut.)
1.	241CE-3	Strength of Materials	3 ( 3 , 0 , 1 )
2.	261CE-3	Surveying (1)	3 ( 2 , 2 , 1 )
3.	221CE-3	Soil Mechanics (1)	3 ( 2 , 2 , 1 )
4.	211CE-3	Fluid Mechanics	3 ( 2 , 2 , 1 )
5.	251CE-3	Structural Analysis (1)	3 ( 3 , 0 , 1 )
6.	312CE-3	Hydraulics	3 ( 2 , 2 , 1 )
7.	352CE-3	Reinforced Concrete (1)	3 ( 3 , 0 , 1 )
8.	342CE-3	Properties and Testing of Materials	3 ( 2 , 2 , 1 )
9.	353CE-3	Structural Analysis (2)	3 ( 3 , 0 , 1 )
10.	313CE-3	Hydrology	3 ( 2 , 2 , 1 )
11.	371CE-3	Sanitary Engineering	3 ( 2 , 2 , 1 )
12.	354CE-3	Reinforced Concrete (2)	3 ( 3 , 0 , 1 )
13.	381CE-2	Computer Applications in Civil Engineering	2 ( 1 , 2 , 1 )
14.	355CE-3	Steel Structures	3 ( 3 , 0 , 1 )
15.	322CE-3	Soil Mechanics (2)	3 ( 2 , 2 , 1 )
16.	462CE-3	Surveying (2)	3 ( 2 , 2 , 1 )
17.	431CE-3	Highway Engineering	3 ( 2 , 2 , 1 )
18.	423CE-3	Foundation Engineering	3 ( 3 , 0 , 1 )
19.	491CE-2	Graduation Project (1)	2 ( 2 , 0 , 0 )
20.	414CE-3	Water Resources Planning and Management	3 ( 3 , 0 , 1 )
21.	432CE-3	Transportation and Traffic Engineering	3 ( 3 , 0 , 1 )
22.	472CE-3	Environmental Engineering	3 ( 3 , 0 , 1 )
23.	433CE-2	Construction Equipment and Methods	2 ( 2 , 0 , 1 )
24.	492CE-2	Graduation Project (2)	2 ( 2 , 0 , 0 )
25.	Sub Total		68 ( 57 , 24 , 22 )
25.	391CE-0	Cooperation Field Training	0 ( 0 , 0 , 0 )

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Study Plan for Civil Engineering Program per Semester

1st Year: Preparatory			
1 <sup>st</sup> Semester			
Course #	Course Title	Credits	Pre- Requisite
140 TECH-3	Computer Skills	3	....
140 MATH-2	Introduction of Mathematics	2	....
140 SKL-2	Learning, Thinking and Research Skills	2	....
140 ENGL-2	English Language: Reading Skills	2	....
141 ENGL-2	English Language: Writing Skills	2	....
142 ENGL-2	English Language: Listening and Speaking Skills	2	....
143 ENGL-2	English Language: Grammars	2	....
<b>Total Credits</b>		<b>15</b>	
2 <sup>nd</sup> Semester			
Course #	Course Title	Credits	Pre- Requisite
150 MAN-1	Occupational Ethics	1	....
150 MATH-4	Algebraic Sciences	4	....
150 SKL-2	Communication Skills	2	....
150 ENGL-3	English Language: Speaking	3	....
151 ENGL-2	Report Writing	2	....
<b>Total Credits</b>		<b>12</b>	
2nd Year			
1 <sup>st</sup> Semester			
Course #	Course Title	Credits	Pre- Requisite
101 CHEM-3	General Chemistry	3	....
104 PHYS-4	Principles of General Physics	4	....
106 MATH-3	Integral Calculus	3	....
107 MATH-3	Algebra & Analytical Geometry	3	....
107 ENGL-3	Technical Writing for Engineers	3	....
<b>Total Credits</b>		<b>16</b>	
2 <sup>nd</sup> Semester			
Course #	Course Title	Credits	Pre- Requisite
111 IC-2	Introduction to Islamic Culture	2	....
101 GE-3	Statics	3	107 MATH
203 MATH-3	Advance Calculus	3	106 MATH
102 GE-2	Introduction of Engineering Design	2	....
108 ENGL-2	Communication Skills for Engineers	2	107 ENGL
105 PHYS-4	Advanced Physics	4	104 PHYS
<b>Total Credits</b>		<b>16</b>	
3rd Year			
1 <sup>st</sup> Semester			

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Course #	Course Title	Credits	Pre- Requisite
112 IC-2	Islamic Culture (2)	2	....
204 MATH-3	Differential Equations	3	106 MATH
204 GE-3	Computer Programming for Engineers	3	....
241 CE-3	Strength of Materials	3	101 GE
261 CE-3	Surveying (1)	3	....
203 GE-3	Engineering Drawing	3	....
<b>Total Credits</b>		<b>17</b>	

2<sup>nd</sup> Semester

Course #	Course Title	Credits	Pre- Requisite
221 CE-3	Soil Mechanics (1)	3	....
211 CE-3	Fluid Mechanics	3	....
324 STAT-3	Engineering Probability and Statics	3	....
201 ARAB-2	Language Skills	2	....
205 GE-3	Dynamics	3	101 GE
251 CE-3	Structural Analysis (1)	3	241 CE
<b>Total Credits</b>		<b>17</b>	

4th Year

1<sup>st</sup> Semester

Course #	Course Title	Credits	Pre- Requisite
312 CE-3	Hydraulics	3	211 CE
352 CE-3	Reinforced Concrete (1)	3	241 CE
254 MATH-3	Numerical Methods	3	204 MATH
342 CE-3	Properties and Testing of Materials	3	241 CE
353 CE-3	Structural Analysis (2)	3	251 CE
306 GE-2	Engineering Economy	2	....
<b>Total Credits</b>		<b>17</b>	

2<sup>nd</sup> Semester

Course #	Course Title	Credits	Pre- Requisite
313 CE-3	Hydrology	3	312 CE
371 CE-3	Sanitary Engineering	3	....
354 CE-3	Reinforced Concrete (2)	3	352 CE
381 CE-2	Computer Application in Civil Engineering	2	204 GE
355 CE-3	Steel Structures	3	353 CE
322 CE-3	Soil mechanics (2)	3	221 CE
391 CE-0	Field Summer Training	....	....
<b>Total Credits</b>		<b>17</b>	

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5th Year			
1 <sup>st</sup> Semester			
Course #	Course Title	Credits	Pre- Requisite
462 CE-3	Surveying (2)	3	261 CE
431 CE-3	Highway Engineering	3	....
423 CE-3	Foundation Engineering	3	322 CE
113 IC-2	Islamic Culture (3)	2	....
407 GE-2	Management of Engineering Projects	2	306 GE
202 ARAB-2	Arabic Writing	2	....
491 CE-2	Graduation Project (1)	2	....
<b>Total Credits</b>		<b>17</b>	
2 <sup>nd</sup> Semester			
Course #	Course Title	Credits	Pre- Requisite
114 IC-2	Islamic Culture (4)	2	....
414 CE-3	Water Resources Planning and Management	3	313 CE
432 CE-3	Transportation and Traffic Engineering	3	431 CE
472 CE-2	Environmental Engineering	3	371 CE
433 CE-2	Construction Equipment and Methods	2	....
492 CE-2	Graduation Project (2)	2	491 CE
<b>Total Credits</b>		<b>15</b>	

## General University Course Description

### 104PHYS-4 Principles of General Physics

4 (3,2,1)

Physics and Measurement, Motion One Dimension, Vectors, Motion in Two Dimension, The laws of Motion, Circular Motion and other application of Newton's Law, Energy of a system, Conservation of Energy, Linear Momentum and Collisions, Rotation of rigid objects about a fixed axis, Angular Momentum, static Equilibrium and Elasticity.

### 101CHEM-3 General Chemistry

3 (3,0,0)

This course will introduce the student to the basic vocabulary used in different branches of chemistry, and to major concepts in the field (eg. Stoichiometry, thermochemistry,) with emphasis on problem solving. The course topics included general chemistry concepts. Thermochemistry, bonding, solid-state structures, fundamentals of organic chemistry including polymers. Solution chemistry, thermodynamics, kinetics, equilibrium, acids and bases, electrochemistry, and nuclear chemistry. Use of computer for data acquisition and multimedia resources. Introduction to atomic theory, chemical reactions, bonding, stoichiometry, nomenclature, gas laws, colligate properties, colloids and solutions. Oxidation-reduction reactions, kinetics. Acid and base equilibria, buffers, translation elements, solubility, complex ions, hybridization. Laboratory study of the chemical properties and semi-micro qualitative analysis of the representative group elements of the periodic table.

### 106MATH-3 Integral Calculus

3 (3,0,1)

In this course, students will learn the basics of the calculus of functions of one variable. They will also apply these ideas to a wide range of problems to improve their ability to think critically, to analyse a problem and solve it using a wide array of tools. The course topics include function and graphs, polynomials, exponential, logarithmic and trigonometric functions. Limits and continuity, limits at infinity, infinite limits, properties of continuous functions, and the intermediate value theorem. The derivative, techniques of differentiation, chain rule, implicit differentiation, L'Hopital's rule, and application. Integration, definite and indefinite integral, fundamental theorem of calculus, integration by substitution, integration by parts, improper integrals, and application.

### 107MATH-3 Algebra & Analytical Geometry

3 (3,0,1)

Systems of linear equations, matrices, types of matrices, algebraic of matrix, inverse of matrices, determinants, Cramer's rule. Vectors in two and three dimensions and properties of vectors, scalar (dot) and cross products. Distance formula, gradient (or slope), positive and negative slopes, Inclination, parallel and

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perpendicular lines, straight line general formula, perpendicular distance from a point to a line, the general formula of circle. Conic sections: the parabola, the ellipse, the hyperbola. Rectangular, polar and spherical coordinates; curves in polar coordinates. Equations of lines and planes in space, surfaces.

#### 107ENGL-3 Technical Writing for Engineers

This course will enable the student to improve his ability to write expository essays. The course topics include Investigation of topic-selection processes, development of thesis statements, outlining as it relates to support for a selected thesis statement, both in sentence and slug-style, and practice and emphasis on critical thinking skills.

#### 203MATH-3 Advanced Calculus

3 (3,0,1)

Infinite Sequences, 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, Vector valued functions, their limits, continuity, derivatives and integrals. Motion of particle in space, tangential and normal components of acceleration. Function in two or three variables, their limits, continuity, partial derivatives, chain Rule, directional derivatives, tangent planes and normal lines to equations, Extreme of Functions of Several Variables, Lagrange Multipliers, 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, the moment and centre of mass. Vector fields, line integrals, surface integrals, Green's theorem, and the divergence theorem. Stoke's theorem

**Prerequisites:** 106Math-3

#### 108ENGL-2 Communication Skills for Engineers

2 (2,0,1)

The use of good English: gather ideas and information, to organize ideas relevantly and coherently; engage in debates; participate in group discussions; face interviews; present scientific seminars; make oral presentations; transfer information from non-verbal to verbal texts and vice versa; take part in social and professional communication

**Prerequisites:** 107ENG

#### 105PHYS-4 Advanced Physics

4 (3,2,1)

Atomic structure: electronics configuration, classification of elements, energy levels. Crystal structure: lattice, symmetry, space group, examples for simple structure. Electrical properties of materials and electricity: classification of materials. Magnetic properties of materials and magnetism. Thermal properties of materials: thermal energy, thermoelectric power (See back Effect). Mechanical properties of matter (Young's modulus, tensile materials)

**Prerequisites:** 104 PHIS -4

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**204MATH-3 Differential Equations**

3 (3,0,1)

Introduction and classification, solutions of first order differential equations and their applications, (Growth and decay problems and linear motion problems). Solutions of higher order linear differential equations and their applications (spring problem and projectile problems). Laplace transforms and its applications, linear systems of differential equations. Series solutions of differential equations. Fourier series

**Prerequisites:** 106 Math-3

**254MATH-3 Numerical Methods**

3 (3,0,0)

Types of errors, errors analysis. Numerical solutions of nonlinear equations of single variables: fixed point iteration method, bisection method, false position method, Newton-Raphson method, secant method. Numerical solutions of a system of linear equations: Gauss-Jordon iterative method. Gauss-Jordon iterative method with partial and complete pivoting. Interpolation: Lagrange interpolation formula, divided differences, Newton interpolation, Numerical differentiation. Numerical integration. Introduction to numerical solutions of ordinary differential equations

**Prerequisites:** 204 MATH

**324STAT-3 Engineering Probability and Statistics**

3 (3,0,0)

Concepts of statistics and its applications in science and engineering, measure of central tendency, measure of dispersion, regression, correlation, and their applications. Concepts of probability and its applications in science and engineering, probability axioms, conditional probability, independent probability for events, some probability distributions and random variables: discrete and continuous random variables, distributions for applications in engineering such as Poisson and Weibull distributions and other probability distributions are important for engineers, time series, computer applications using statistical software

**111ISL-2 Introduction to Islamic Culture**

2 (2,0,0)

The meaning of Islamic creed, its most important terminology and characteristics. Moderation of the people of Sunnah. Explanation of different ranks of the Islamic religion: Islam, Faith and charity. Belief in the Oneness of the lordship (Divinity) of ALLAH, Belief in the Oneness of the worship of ALLAH. Testimony that there is no god but ALLAH: its meaning, its term, its pillars, and its invalidator. Worship: definition, types, its terms and its pillars. Belief in the Oneness of the Names and the Attributes of ALLAH: Its meaning and the pathway of the people of Sunnah, and examples of some divine attributes, and the benefits of faith in Names and attributes. Warning on invalidators of belief in Oneness of ALLAH: GREAT shirk, great disbelief, and rules on clear disbelief, and signs of disbelief, and the dangers of disbelief. Great hypocrisy and signs of hypocrites. Explanation of adulterators of belief in oneness of ALLAH: Lesser associating partners (Shirk) to of ALLAH, lesser disbelief and lesser hypocrisy. Innovation in Islamic Religion:

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### قسم الهندسة المدنية

definition, judgement, types, and examples. Definition of Loyalty an Enmity; judgement and manifestations of sanctioned loyalty, and forbidden loyalty, and the rules pertaining dealing with the disbelievers.

#### 112ISL-2 Islamic Culture 2

2 (2,0,0)

Believes based on scientific basis and methodologies deduced from the Holy Qur'an, Biography of Prophet Muhammad, Peace be upon him (PBUH), and other well known Islamic references. The concept of ethics in Islam. The rules of Islam in dealing with instincts through ethics and moral rules.

The Islamic ethics and values necessary for their daily life. Explain that Islam is a religion that takes care of both daily life and the hereafter through solid historical examples. The Islamic solutions for daily life problems. Explain the effect of applying the Islamic ethics and values on community.

#### 201ARAB-2 Language Skills

2 (2,0,0)

تعريف الكلمة: لغة واصطلاحاً. أقسام الكلمة: اسم، وفعل، وحرف. علامات الاسم: (أل) التعريف، التثنية، والحديث عنه. أقسام الاسم من حيث الإعراب والبناء: معرب، ومبني. أقسام الفعل: ماضٍ، وأمر، ومضارع. العلامة التي يعرف بها كل فعل، وحكمه من حيث الإعراب والبناء. تعريف الكلام. صور ائتلاف الكلام ست. تعريف الإعراب، وبيان أنواعه، مع بيان ما يشترك فيه الاسم والفعل، وما يختص به كل واحد منهما، وبيان العلامات الأصول والفروع. مما خرج عن الأصل في إعرابه سبعة أبواب: خمسة في الأسماء:

الأسماء الستة، المثني وما ألحق به، جمع المذكر السالم وما ألحق به، الجمع بالألف والتاء المزدتين وما ألحق به في حالة النصب، الممنوع من الصرف في حالة الجر.

واثنان في الأفعال:

الأفعال الخمسة، الفعل المضارع المعتل الآخر في حالة الجزم. الصرف: الميزان الصرفي-المجرد والمزيد. المعاجم: طريقة الكشف في المعاجم العربية المختلفة. الأدب والنصوص: من القرآن لكريم سورة الحجرات من أولها إلى آخر الآية رقم(12)

من الحديث الشريف: خطبة الوداع، أو بعض الأحاديث المختارة ذات التوجيه الاجتماعي والسلوكي. من الشعر والنثر: مختارات شعرية ونثرية تمثل الأدب العربي.

#### 113ISL-2 Islamic Culture 3

2 (2,0,0)

Believes based on scientific basis and methodologies deduced from the Holy Qur'an, Biography of Prophet Muhammad, Peace be upon him (PBUH), and other well known Islamic references. The concept of ethics in Islam. The rules of Islam in dealing with instincts through ethics and moral rules.

The Islamic ethics and values necessary for their daily life. Explain that Islam is a religion that takes care of both daily life and the hereafter through solid historical examples. The Islamic solutions for daily life problems. Explain the effect of applying the Islamic ethics and values on community.

#### 202ARAB-2 Arabic Writing

رؤية الجامعة: الريادة في التعليم والتعلم والبحث العلمي لبناء مجتمع معرفي مبتكر ومنافس دولي.  
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تعليمنا يُحقق الرؤية

### قسم الهندسة المدنية

اصطلاحاً. أقسام الكلمة: اسم، وفعل. وحرف تعريف الكلمة: لغة، علامات الاسم: (ال) التعريف، التنوين، والحديث عنه. أقسام الاسم من حيث الإعراب والبناء: معرب، ومبني. أقسام الفعل: ماض، وأمر، ومضارع. العالمية التي يعرف بها كل فعل، وحكمه من حيث الإعراب والبناء. تعريف الكالم. صور انتالف الكالم ست. تعريف الإعراب، وبيان أنواعه، مع بيان ما يشترك فيه الاسم والفعل، وما يختص به كل واحد منهما، وبيان العالمات الأصول والفروع. مما خرج عن الأصل في إعرابه سبعة أبواب: خمسة في الأسماء السماء السنة المثني وما ألحق به جمع المذكر السالم وما ألحق به الجمع بالالف والتاء المزيدتين وما ألحق به في حالة النصب الممنوع من الصرف في حالة الجر. واثنان في الأفعال: الأفعال الخمسة الفعل المضارع المعتل الآخر في حالة الجزم. الصرف: الميزان الصرفي المجرد والمزيد-المعجم: طريقة الكشف في المعجم العربية المختلفة. الأدب والنصوص: من القرآن الكريم سورة الحجرات من أولها إلى آخر الآية رقم 22 من الحديث الشريف: خطبة الوداع، أو بعض الأحاديث المختارة ذات التوجيه الاجتماعي والسلوكي. من الشعر والنثر: مختارات شعرية ونثرية تمثل الأدب العربي.

#### 114ISL-2 Islamic Culture 4

2 (2,0,2)

Believes based on scientific basis and methodologies deduced from the Holy Qur'an, Biography of Prophet Muhammad, Peace be upon him (PBUH), and other well known Islamic references. The concept of ethics in Islam. The rules of Islam in dealing with instincts through ethics and moral rules.

The Islamic ethics and values necessary for their daily life. Explain that Islam is a religion that takes care of both daily life and the hereafter through solid historical examples. The Islamic solutions for daily life problems. Explain the effect of applying the Islamic ethics and values on community

### College Courses Descriptions

#### 101GE-3 Statics

3 (3,0,1)

Basic concepts and principles of statics. Vector operations. Equilibrium of particles in two and three dimensions. definition of moment and couple; reduction of systems forces; equilibrium of rigid bodies; statically determinate structures including beams, trusses, frames, and machines; internal forces; shear force and bending moment diagrams in beams; friction and its applications, centroid and center of gravity of lines, areas, and volumes; moment of inertia and radius of gyration.

Prerequisites: 107Math-3

#### 102GE-2 Introduction to Engineering Design

2 (2,0,1)

Introduction to active learning, teamwork, team dynamics, team norms and communication, conducting effects meetings and quality assessment. Understanding the seven habits of highly qualified professionals. Organization of work and design notebook. Reverse engineering and design project. Computer modeling and heuristics for solving problems, stochastic process, optimization and expert systems. Schedule and time management.

#### 204GE-3 Computer Programming for Engineers

3 (3,0,1)

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### تعليمنا يُحقق الرؤية

### قسم الهندسة المدنية

Computer organization and hierarchy of programming language, Fortran 90 as a high level language, arithmetic computations, algorithm design, selection statements, repetition statements, debugging and testing of programs, logical and character data type, data files and formatted outputs, array processing, subprograms, introduction to derive data types and structures, numerical applications. Analysing and design of civil engineering structural systems through the uses of computers. Emphasis will be placed on available computer software used in engineering projects and industry in civil engineering disciplines

#### 203GE-3 Engineering Drawing

3 (1,4,1)

Introduction to drawing, Drawing equipment and use, Skills of Freehand Sketching, Methods of Projection: Orthographic, Isometric Dimensioning of View. Third View Prediction, Primary and Successive Auxiliary Views. Intersections of Surfaces and Bodies. Development of Surfaces. Sectioning. Introduction to Assembly Drawings. Introduction to computer graphics, Engineering Applications.

#### 205GE-3 Dynamics

3 (3,0,1)

Basic considerations (Vector operations, Newtonian mechanics), Engineering applications of virtual work, Kinematics of particles, Newton's law, Equations of motion, Work and energy, Impulse momentum, and vibrations.

**Prerequisites:** 101GE-3 Static

#### 306GE-2 Engineering Economy

2 (2,0,1)

Introduction to Engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects. Basic management process approach, strategies and planning methods, project planning and scheduling, Bar chart, critical path methods, PERT method, resource leveling and allocation, time cost trade off. Construction and organizational approaches, leadership elements and decision-making, computer applications.

#### 407GE-2 Management of Engineering Projects

2 (2,0,1)

Characteristics of Construction Industry; project delivery systems; the design and construction process; construction contracting; construction planning; project control, conceptual cost estimation; and Quality and Safety Management.

**Prerequisites:** 306GE-2

### Departmental Course Descriptions

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### تعليمنا يُحقق الرؤية



قسم الهندسة المدنية

**241 CE-3 Strength of Material**

3 (3, 0, 1)

Stress, strain, and Hook's law. Moduli of elasticity and rigidity, and Poisson's ratio. Statical determination of axial force, shear force, bending moment and torque in bars, beams and circular shafts. Load-shear-moment relationship in beams. Section kinematics; strain and stress distribution and their resultants. Normal and shear stress distributions in beams of different shapes. Transformation of stress and strain, Mohr's circle. Spherical and cylindrical pressure vessels. Elastic buckling of columns

**Pre-requisite:** 101GE.

**261CE-3 Surveying 1**

3 (2, 2, 1)

Introduction to the basic surveying theory and practice; Units of measurements and conversions; Error analysis; Distance measurements by taping; Levelling; Angle measurements; Traversing and traverse computations; Topographic surveying and mapping; Area and volume computations; Circular curves; Use of surveying software such as Wolfpack and Surfer.

**221CE-3 Soil Mechanics 1**

3 (2, 2, 1)

Introduction to soil and soil mechanics, Soil composition, Soil type and structure, Index properties, Identification and Classification of soils, Site Investigation, Compaction of soils.

**221 CE-3 Fluid Mechanics**

3 (2, 2, 1)

Introduction and basic concepts of fluid mechanics, fluid properties, pressure and fluid statics in immersed surfaces, stability of floating bodies, fluid kinematic, energy equation, momentum equation, flow and losses in pipes, flow measurements, and dimensional analysis

**251 CE-3 Structural Analysis11**

3 (3, 0, 1)

Types of structures, supports and loads. Idealization of structures and loads. Geometric stability and determinacy. Analysis of determinate trusses, beams, plane frames and arches. Reaction computations axial force, shear force and bending moment diagrams. Internal force releases. Load-shear-moment relationship. Differential equation of elastic curve. Deflections by integration, moment-area, conjugate-beam and virtual work methods. Influence lines of determinate structures.

**Pre-requisite:** 241CE-3.

**312 CE-3 Hydraulics**

3 (2, 2, 1)

Analysis of pipe flow networks, concepts of fluid flow, types of flow, states of flow, geometric properties of channel sections, velocity distribution in open channels, flow resistance and boundary layer theory, design of channel sections, energy considerations in open channels: specific energy and discharge diagrams,

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### قسم الهندسة المدنية

momentum considerations in open channels: specific force diagram and hydraulic jump. Gradually varied flow, hydraulic machines: pumps and turbines.

**Pre-requisite:** 211CE-3.

#### CE-3 Reinforced Concrete 1

3(3, 0, 1)

Fundamentals and design theories based on ultimate strength design and elastic concept using ACI code. ACI Code requirements. Load factors. Analysis and design of reinforced concrete members subject to flexure, shear and diagonal tension in accordance to ACI strength method. Development length of reinforcement, deflection and crack controls in reinforced concrete members.

**Pre-requisite:** 241CE-3.

#### 342 CE-3 Properties of Testing of Materials

3 (2, 2, 1)

Methods of sieve analysis, density, absorption, and abrasion of sand and concrete aggregates. Normal consistency, setting times, compressive and tensile strengths of cements. Design and testing of concrete mixes for required workability, compressive, tensile, flexure strength and modulus of elasticity at various ages. Strength tests: on concrete cores, using Schmidt hammer and ultrasonic waves. Tensile test for reinforcing steel, and calculation of elastic modulus. Tests on isotropic and anisotropic materials and use of dial and electrical strain gages. Finding the Brinell Hardness number of various materials. Tension tests on ductile and brittle materials. Non-destructive testing on concrete.

**Pre-requisite:** 241CE-3

#### 353 CE-3 Structural Analysis 2

3 (3, 0, 1)

Analysis of indeterminate structures: trusses, beams, plane frames and arches. Method of consistent deformation and flexibility matrix formulation. Pre-strain, temperature change and support movement effects. Slope deflection method, matrix analysis of beams and plane frame using the stiffness method, moment distribution, sway consideration and analysis of non-prismatic members.

**Pre-requisite:** 251CE-3

#### 313 CE-3 Hydrology

3 (2, 2, 1)

The hydrologic cycle, Fundamentals of meteorology: (Temperature, humidity, Wind, Precipitation, Evaporation, Transpiration, and Infiltration), Stream flow and runoff, Stream flow hydrograph and Unit hydrograph, Groundwater flow, Types of aquifers and hydraulics of wells, Salt water intrusion in coastal aquifers.

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**Pre-requisite:** 312CE-3

### 371 CE-3 Sanitary Engineering

3 (2, 2, 1)

Source of water supply; quantity of water and wastewater; quality of water supply; drinking water standard; water treatment system; coagulation-flocculation; sedimentation; filtration; disinfection; softening; iron and manganese removal; taste and odour removal; collection and distribution of water; characteristics of wastewater; effluent standard; wastewater collection; wastewater treatment processes

### 354 CE-3 Reinforced Concrete 2

3 (3, 0, 1)

Design of one-way, two-way, ribbed and flat slabs floor systems. Design for “torsion” and “combined shear and torsion” by the strength method. Design of continuous beams. ACI moment redistribution for minimum rotation capacity. Design of columns under axial and eccentric loadings, short and long columns, staircases, and types of concrete footings.

**Pre-requisite:** 352CE-3

### 381 CE-2 Computer Application in Civil Engineering

2 (1, 2, 1)

Study different applications in civil engineering through the use of computers. Emphasis will be placed on available computer software used in engineering projects and industry in civil engineering disciplines.

**Pre-requisite:** 204 GE

### 355 CE-3 Steel Structures

3 (3, 0, 1)

Analysis and design of roof trusses. Design of tension and compression members, columns under eccentric loadings, column bases and footings. Design of beams, welded and bolted connections. Different loads on different steel bridges. Design of steel bridges beams using Influence lines.

**Pre-requisite:** 353CE-3

### 322 CE-3 Soil Mechanics 2

3 (2, 2, 1)

Principle of Effective Stress, Permeability and capillarity of soils, seepage and Flow's nets, Stress distribution of soils, Compressibility and settlement, Consolidation Behaviour, Shearing strength of soils. Lateral earth pressure and Retaining walls

**Pre-requisite:** 221CE-3

### 462 CE-3 Surveying 2

3 (2, 2, 1)

Electronic surveying measuring equipment, introduction to the application of geographic information systems (GIS) and global positioning system (GPS) for civil engineering, introduction to photogrammetry,

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Geometric principles, Survey camera, Photo-interpretation, Applications of photogrammetry, Plotting instruments, Remote sensing, Computer applications

**Pre-requisite:** 261CE-3

**431 CE-3 Highway Engineering**

3 (2, 2, 1)

Highway planning, design criteria and controls, cross sectional elements, sight distances, Geometric Design: horizontal and vertical alignments, intersections, Surface and Sub-surface Drainage. Highway Pavement Materials and Mix Design, Structural Design of Pavement Thickness (flexible and rigid pavement), Pavement Maintenance.

**423 CE-3 Foundation Engineering**

3 (3, 0, 1)

Site exploration and selection. Types of foundations. Bearing capacity of shallow foundations. Mat Foundations. Foundation settlement. Deep foundations. Pile Foundations. Sheet pile structures. Slopes stability.

**Pre-requisite:** 322CE-3

**491 CE-2 Graduation Projects 1**

2 (2, 0, 1)

Choosing the topic, establishing the project, literature review, preparing for/or preliminary conducting the experiments, collecting the field data & developing the mathematical / computer model if applicable, writing the first part of the project along with any preliminary findings.

At the beginning of the semester, the students propose a topic on which they are supposed to work as a group. Project students meet in class weekly, discuss their research, and screen their progresses for peer and faculty critique and suggestions. At the end of the semester, students present their thesis projects to the supervising committee.

**414 CE-3 Water Resources Planning and Management**

3 (3, 0, 1)

Global water availability ,water Use by Sector, water Scarcity, water resources in Saudia Arabia , sustainable management of Water Resources, economic analysis of alternative water plans, design, and operation of water resources systems using mathematical optimization and models, linear Programming, river Basin Planning, system performance Indicators, river Basin modelling and flood Management.

**Pre-requisite:**313CE-3

**432 CE-3 Transportation and Traffic Engineering**

3 (3, 0, 1)

Transportation systems; vehicle characteristics and human reactions; traffic flow characteristics; highway capacity analysis; intersection control and design; public transportation; urban transportation planning;

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قسم الهندسة المدنية

parking and terminal facilities; transportation safety; intelligent transportation systems and computer applications; introduction to railways, waterways, airports, and pipelines

**Pre-requisite:** 431CE-3

**472 CE-2 Environmental Engineering**

**3 (2, 0, 1)**

Environment Chemistry; Greenhouse gas, causes of global warming and climate change. Energy and Matter: classification of material flow, material balance equations. Carbon Footprint Reduction: clean energy, energy efficiency, innovative techniques to control CO<sub>2</sub> emissions. Pollution: Water Pollution, Air Pollution, and Noise Pollution, measurements, causes & effects and control. Solid Waste Management: reduce, reuse, and recycle, MSW landfill. Environmental Assessment Method definition, importance, main features, Well-known tools such as LEED, Case study in Saudi Arabia.

**Pre-requisite:** 371CE-3

**433 CE-2 Construction Equipment and Methods**

**2 (2, 0, 1)**

Overview of the construction industry. Earthmoving machinery and operations: excavation and lifting, loading & hauling, compacting & finishing, productivity estimation. Reinforced concrete construction and concrete form design. Construction economics.

**492 CE-2 Graduation Projects 2**

**2 (2, 0, 1)**

Continuation of part I of the project including : running and finalizing the experimental program or the mathematical / computer model, analysing the result, and findings and drawing the conclusion, writing the complete project report, presenting and defending the project.

Throughout the semester, the students try to implement what they proposed in graduation project-I as a group. Project students meet in class or lab weekly, segregate the work into sub-projects, and integrate the individual works in order to reach their target, and faculty critique and suggestions. At the conclusion of the semester, students present their design projects along with the thesis to the supervising committee.

**Pre-requisite:** 491CE-2