King Abdulaziz University

DEPARTMENT OF CIVIL ENGINEERING

Civil Engineering Program

2009-2010

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INTRODUCTION

Civil engineering is the profession which designs, constructs, operates and manages the basic systems that make civilization possible and which assesses the impacts of such systems on the natural environment. The civil engineer must deal with the human impact of engineering, social, moral, legal and environmental issues that concern us to a far greater degree than ever before. As a matter of fact, civil engineering has played a key role in the development of the Kingdom of Saudi Arabia during the past several decades.

The Department of Civil Engineering is one of the major and active engineering departments at King Abdulaziz University (KAU) since 1395H/1975G. It offers B.Sc., M.Sc. (thesis and non-thesis options) as well as Ph.D. degrees in civil engineering. The Department has a strong highly qualified and experienced full-time faculty comprising 11 professors, 10 associate professors, 13 assistant professors, and 4 lecturers, apart from the supporting laboratory and secretarial staff.

Civil engineering programs are intended to satisfy the needs of the country. The rapid introduction of modern materials, measurement techniques, construction methods and management tools require properly trained civil engineers. The civil engineering program and its objectives are continuously updated keeping in view these factors.

The civil engineering program B. Sc. at KAU is designed to develop knowledgeable and creative engineers with strong capabilities for innovation and management. Civil Engineering graduates have a wide variety of employment opportunities in both the private as well as the public sectors. Civil engineering has become an extremely diverse field with many areas of application.

VISION

"A distinguished learning and research community in Civil Engineering knowledge."

MISSION

"Offer high-quality education and conduct innovative research in Civil Engineering to provide sustainable solutions for societal needs."

OBJECTIVES

The educational program of the Civil Engineering department at King Abdul-Aziz University is preparing its graduates to:

1. Have the necessary knowledge of engineering fundamentals for successful professional careers in civil engineering.

2. Demonstrate professional skills and actively participate in the sustainable development of the society.
3. Continue to learn and adapt to an evolving professional environment.

PROGRAM OUTCOMES

The graduating students from Civil Engineering Department will have the following outcomes:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- An ability to function on multi-disciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for, and an ability to engage in life-long learning.
- A knowledge of contemporary issues.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

PROGRAMS OFFERED

The Department of Civil Engineering offers B.Sc., M.Sc. (thesis and non-thesis) and Ph.D. programs as follows.

- **B.Sc. Program**
  The student has to earn a minimum of 155 credit hours to obtain a B.Sc. degree in civil engineering.
- **M.Sc. Degree (Thesis Option)**
  The requirement for M.Sc. degree (thesis option) consists of 27 credit hours of course work, a seminar (1 credit hour) and a M.Sc. thesis (8 credit hours). The graduate student can choose one of the following specializations: construction engineering, environmental engineering, geotechnical engineering, structural engineering, transportation engineering, or water resources engineering.
- **M.Sc. Degree (Non- Thesis Option)**
  The requirement for M.Sc. degree (non-thesis option) consists of 39 credit hours of course work, master's project (3 credit hours) and a comprehensive exam. The graduate student can choose one of the following specializations: construction engineering,

environmental engineering, geotechnical engineering, structural engineering, transportation engineering or water resources engineering.

- **Ph.D.**
  The Department of Civil Engineering is the first department in the Faculty of Engineering at KAU that offers a Ph.D. program. The doctoral degree requirements are 30 credit hours of coursework and a Ph.D. dissertation (12 credit hours). This program was started in the Fall Semester 1422H/2001G. The doctoral student can choose one of the following specializations: construction engineering, environmental engineering, geotechnical engineering, structural engineering, transportation engineering or water resources engineering.

CAREER OPPORTUNITIES

Graduates of the Department of Civil Engineering have career opportunities in the following organizations:

- Ministry of Water and Electricity.
- Ministry of Municipalities and Rural Affairs.
- Ministry of Communications.
- Ministry of Planning and Economy.
- Ministry of Defense and Aviation.
- Ministry of Interior.
- Ministry of Education.
- Ministry of Hajj.
- Ministry of Health.
- Saline Water Conversion Corporation.
- Saudi Arabian Airlines.
- Saudi ARAMCO.
- Municipalities.
- Presidency of Meteorology and Environment (PME).
- Semi-Government Organizations.
- Private Organizations.
- All organizations that have an engineering department.
- Consultant and engineering offices.

DEPARTMENTAL FACILITIES

The Department has well equipped laboratory facilities with experienced and qualified technicians and supporting staff. The following are the laboratory facilities of the department.

- **Strength of Materials Laboratory:** for studying the mechanical behavior of different materials.
- **Surveying Laboratory:** for measuring and setting out coordinates, distances, angles and elevations using surveying instruments.
- **Cement and Aggregate Laboratory:** for studying the properties of cement and aggregates.
- **Concrete Technology Laboratory:** for mixing, casting and testing of fresh and hardened concrete.
- **Soil Mechanics Laboratory:** for experimental studies of general properties and mechanical behavior of soils and rocks.
- **Foundation Engineering Laboratory:** For experimental studies of soils and rocks for foundation design.
- **Heavy Structures and Pre-stressed Concrete Laboratory:** for studying behavior of R.C. structural members and pre-stressed members under loads.
- **Hydraulics Laboratory:** used for experimental studies of the basic principles of flow of water.
- **Environmental Engineering Laboratory:** for studying techniques of control of environmental quality by physical, chemical, and biological processes; water and wastewater analysis.
- **Advanced Hydraulics Laboratory:** for testing hydro-machinery, determining rainfall-runoffs and making hydrographs.
- **Traffic Engineering Laboratory**: used for traffic data analysis and studies.
- **Asphalt Laboratory:** used for asphalt and pavement materials testing.
- **Computer Laboratory**: has software for different courses and computer applications in civil engineering.

UNDERGRADUATE CURRICULUM

The undergraduate curriculum consists of the University-required courses, the Faculty-required courses, the Departmental core courses and a minimum of two Departmental elective courses, making a total of 155 credit hours to be earned by a student for obtaining a B.Sc. degree in Civil Engineering. Some twenty-five departmental elective courses covering all the major branches of civil engineering are offered. A student has the liberty to select the electives with a view to gaining a broad-based education in several fields of civil engineering or to pursue a more specialized education in one particular area of his interest.

PROGRAM REQUIREMENTS AND CURRICULUM

Units required for the B.Sc. degree in the Department of Civil Engineering are as follows:

Requirements	Cr. Units
General University Requirements	27
University Requirements for Science Track	14
Faculty Requirements	37
Departmental Requirements	77
Total	**155**

General University Required Core Courses (27 Cr. Units)

Course	Title	Cr. Units	Prerequisite
CPIT 100	Computer Skills	3	-
COMM 101	Communication Skills	3	-
ELCS 101	English Language I (for Science)	3	-
ELCS 102	English Language II (for Science)	3	ELCS 101
MATH 110	Calculus I	3	-
PHYS 110	General Physics I	3	-
CHEM 110	General Chemistry I	3	-
BIO 110	General Biology (1)	3	-
STAT 110	General Statistics (1)	3	-
TOTAL		**27**	

University Required Core Courses for Science Track (14 Cr. Units)

Course	Title	Cr. Units	Prerequisite
ISLS 101	Islamic Culture (1)	2	-
ISLS 201	Islamic Culture (2)	2	ISLS 101
ISLS 301	Islamic Culture (3)	2	ISLS 201
ISLS 401	Islamic Culture (4)	2	ISLS 301
ARAB 101	Arabic Language(1)	3	-
ARAB 201	Arabic Language(2)	3	ARAB 101
TOTAL		**14**	

Faculty Required Core Courses (37 Cr. Units)

Course No.	Course Title	Cr. Units	Prerequisite
MATH 202	Calculus II	3	MATH 110
MATH 203	Calculus III	3	MATH 110
MATH 204	Differential Equations	3	MATH 202
MATH 205	Series and Vector Calculus	3	MATH 202, MATH 203
PHYS 202	General Physics II	4	PHYS 110, MATH 110
PHYS 281	General Physics Laboratory	1	PHYS 110
CHEM 281	General Chemistry Laboratory	1	CHEM 110
IE 200	Engineering Communication Skills	2	ELCS 102
IE 201	Introduction to Engineering Design I	3	COMM 101, ELCS 102
IE 202	Introduction to Engineering Design II	2	IE 201, E 200
EE 201	Structured Computer Programming	2	100 CPIT
EE 251	Basic Electrical Engineering	4	PHYS 202
IE 255	Engineering Economy	3	MATH 110
MENG 102	Engineering Graphics	3	-
TOTAL		**37**	

Table (A) Departmental Requirements Core Courses (77 Cr. Units)

Course No.	Course Title	Cr. Units	Prerequisite
MENG 130	Basic Workshop	2	MENG 102
MEP 290	Fluid Mechanics	3	PHYS 281 & MATH 202
CE 201	Engineering Mechanics (Statics)	3	IE 200 & PHYS 281
CE 202	Strength of Materials	4	CE 201,MENG 130 & MATH 203
CE 321	Construction Management	3	IE 255
CE 332	Geology for Civil Engineers	3	CE 202 & CHEM 281
CE 333	Geotechnical Engineering	4	CE 332, IE 202 & EE 251
CE 340	Structural Analysis-I	3	CE 202 , EE 201& MATH 205
CE 341	Materials of Construction	4	CE 202 & CHEM 281
CE 342	Reinforced Concrete Design - I	3	CE 340 , CE 341 & IE 202
CE 352	Hydraulics	3	MEP 290 , IE 202 & MATH 204
CE 353	Hydrology & Water Resources Engineering	3	CE 352
CE 371	Surveying	3	MATH 202 & MENG 102
CE 381	Transportation Engineering	3	CE 371 & ARAB 201
CE 390	Summer Training	2	CE 321,CE 332, CE 340, CE 341,CE 352
CE 400	Civil Engineering Fundamentals	1	CE 321,CE 333,CE 342, CE 352, CE 381
CE 422	Construction Engineering	3	CE 321, CE 342 & ISLS 301
CE 434	Foundation Engineering	3	CE 333
CE 440	Structural Analysis -II	3	CE 340
CE 442	Reinforced Concrete Design -II	3	CE 342
CE 461	Environmental Engineering	4	CE 352
CE 482	Highway Design & Construction	4	CE 381 & CE 341
CE 499	B.Sc. Project	4	CE 321,CE 333,CE 342, CE 352, CE 381
CE-xxx	Elective from CE Dept.	3	
CE-xxx	Elective from CE Dept.	3	
Total		**77**	

Table (B) Departmental Requirements Elective Courses (6 Cr. Units)

Course No.	Course Title	Cr. Units	Prerequisite
CE 423	Construction Estimating & Scheduling	3	CE 422
CE 424	Construction Contracting	3	CE 321
CE 435	Applications in Foundation Engineering	3	CE 434
CE 439	Soil Improvement	3	CE 434
CE 441	Design of Steel Structures	3	CE 340
CE 444	Advanced Reinforced Concrete Design	3	CE 442
CE 451	Design of Hydraulic Structures	3	CE 352
CE 457	Water Resources Planning & Management	3	CE 353
CE 465	Wastewater Reclamation and Reuse	3	CE 461
CE 471	GPS and GIS Applications	3	CE 371
CE 483	Traffic Engineering	3	CE 381
CE 486	Flexible Pavement Maintenance	3	CE 381 & CE 341
CE 497	Special Topic in Civil Engineering	3	Dept. Approval

Total credit Units required for graduation is 155.

1st Year, (Prep. Year)

1st semester

Course No.	Course Title	Cr. Units	Prerequisites
ELCS 101	English Language I (for Science)	3	-
MATH 110	Calculus I	3	-
CPIT 100	Computer Skills	3	-
PHYS 110	General Physics I	3	-
Total		12	

2nd semester

Course No.	Course Title	Cr. Units	Prerequisites
ELCS 102	English Language II (for Science)	3	ELCS 101
CHEM 110	General Chemistry I	3	-
COMM 101	Communication Skills	3	-
BIO 110	General Biology I	3	-
STAT 110	General Statistics I	3	-
Total		15	

2nd Year (Newcomers to the Faculty of Engineering)

1st semester

Course No.	Course Title	Cr. Units	Prerequisites
MATH 202 /	Calculus II	3	MATH 110
ISLS 101	Islamic Culture (1)	2	-
MENG 102	Engineering Drawings	3	-
IE 201	Introduction to Engineering Design I	3	COMM 101, ELCS 102
IE 200	Engineering Communication Skills I	2	ELCS 102
PHYS 281 / CHEM 281	General Physics Lab / General Chemistry Lab	2	PHYS 110 / CHEM 110
Total		15	

2nd semester

Course No.	Course Title	Cr. Units	Prerequisites
MATH 203	Calculus III	3	MATH 110
ARAB 101	Arabic Language (1)	3	-
EE 201	Structured Computer Programming	2	CPIT 100
IE 255	Engineering Economy	3	MATH 110
PHYS 202	General Physics II	4	PHYS 110
Total		15	

3rd Year

1st semester

Course No.	Course Title	Cr. Units	Prerequisites
ARAB 201	Arabic Language(2)	3	ARAB 101
CE 201	Engineering Mechanics (Statics)	3	IE 200 & PHYS 281
CE 371	Surveying	3	MATH 202 & MENG 102
IE 202	Introduction to Engineering Design II	2	IE 201 & E 200
MATH 204	Differential Equations	3	MATH 202
MENG 130	Basic Workshop	2	MENG 102
Total		16	

2nd semester

Course No.	Course Title	Cr. Units	Prerequisites
CE 202	Strength of Materials	4	CE 201,MENG 130 & MATH 203
EE 251	Basic Electrical Engineering	4	PHYS 202
ISLS 201	Islamic Culture (2)	2	ISLS 101
MATH 205	Series and Vector Calculus	3	MATH 202, MATH 203
MEP 290	Fluid Mechanics	3	MATH 202 PHYS 281
Total		16	

4th Year

1st semester

Course No.	Course Title	Cr. Units	Prerequisites
CE 321	Construction Management	3	IE 255
CE 332	Geology for Civil Engineers	3	CE 202 & CHEM 281
CE 340	Structural Analysis-I	3	CE 202 , EE 201& MATH 205
CE 341	Materials of Construction	4	CE 202 & CHEM 281
CE 352	Hydraulics	3	MEP 290 , IE 202 & MATH 204
Total		16	

2nd semester

Course No.	Course Title	Cr. Units	Prerequisites
ISLS 301	Islamic Culture (3)	2	ISLS 201
CE 333	Geotechnical Engineering	4	CE 332, EE 251,IE 202
CE 342	Reinforced Concrete Design - I	3	CE 340,CE 341, IE 202
CE 381	Transportation Engineering	3	CE 371 & ARAB 201
CE 353	Hydrology & Water Resources Engineering	3	CE-352
CE 390	Summer Training	2	CE 321,CE 332,CE 340, CE 341,CE 352
Total		17	

5th Year

1st semester

Course No.	Course Title	Cr. Units	Prerequisites
ISLS 401	Islamic Culture (4)	2	ISLS 301
CE 400	Civil Engineering Fundamentals	1	CE 321,CE 333,CE 342, CE 352,CE 381
CE 422	Construction Engineering	3	CE 321,CE 342, ISLS 301
CE 434	Foundation Engineering	3	CE 333
CE 461	Environmental Engineering	4	CE 352
CE 499	B.Sc. Project	4	CE 321,CE 333,CE 342, CE 352,CE 381
Total		17	

2nd semester

Course No.	Course Title	Cr. Units	Prerequisites
CE 440	Structural Analysis -II	3	CE 340
CE 442	Reinforced Concrete Design -II	3	CE 342
CE 482	Highway Design & Construction	4	CE 381 & CE 341
CE xxx	Elective from CE Dept.	3	CE 340
CE xxx	Elective from CE Dept.	3	CE 342
Total		16	

A TYPICAL PROGRAM FOR CIVIL ENGINEERING STUDENTS

COURSE DESCRIPTION

CE 201 Engineering Mechanics (Statics) (3:2,3)
Vector operations. Equilibrium of a particle. Free body diagram. Moment of forces about a point and about an axis. Equivalent systems. Equilibrium of a rigid body in two and three dimensions. Trusses (method of Joints and sections) . Frames and machines. Dry friction.
Prerequisite: IE 200 & PHYS 281

CE 202 Strength of Materials (4:3, 3)
Review of statics, internal reactions. Concept of stress. Concept of strain, Stress-strain relations. Deformation of axially loaded members. Torsion of circular members. Normal force, shear force and bending moment diagrams. Flexure and shearing stresses in beams. Transformation of plane stresses. Concept of design of beams. Concept of beam deflection. Concept of buckling of columns. Laboratory experiments.
Prerequisite: CE 201 & MENG 130 & MATH 203

CE 321 Construction Management (3:3, 0)
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.
Prerequisite: IE 255

CE 332 Geology for Civil Engineers (3:3, 0)
Introduction to engineering geology, earth surface and physical properties of earth materials, geological processes, types and classification of rocks, physical and mineralogical properties of rocks, basics of structural geology, soil formation and properties, clay minerals, groundwater.
Prerequisite: CE 202 & CHEM 281

CE 333 Geotechnical Engineering (4:3, 3)
Weight-volume relationships. Physical properties of soil. Soil classification. Permeability and seepage. Shear strength. Compressibility, consolidation and settlement. Introduction to lateral earth pressure and slope stability
Prerequisite: CE 332 & IE 202 & EE 251

CE 340 Structural Analysis I (3:2, 3)

Basic principles. Analysis of statically determinate trusses, beams, frames, arches, suspension cables. Influence lines for statically determinate structures. Deflection of structures. Buckling of columns.
Prerequisite: CE 202 & EE 201 & MATH 205

CE 341 Materials of Construction (4:2, 3)

Manufacturing, Properties and Tests of metals, aggregate, cementing materials, fresh and hardened PC concrete, asphalt concrete, masonry, wood and plastics. Design and production of PC concrete and asphalt mixtures. Computer applications in mix design.
Prerequisite: CE 202 & CHEM 281

CE 342 Reinforced Concrete Design I (3:3,0)

Introduction to properties of concrete and reinforcing steel. Behavior of reinforced concrete under flexure and shear. Introduction to ACI-Code. Types of loads ant their factors. Ultimate strength method of design. Analysis and design of singly and doubly reinforced sections. Analysis and design of T-section. Design of beams against shear forces. Design of one-way slab and stairways. Development length. Design of isolated, combined and wall footings.
Prerequisite: CE 340 , CE 341 & IE 202

CE 352 Hydraulics (3:2, 3)

Pipe flow analysis and design. Steady flow in closed conduits and networks. Steady uniform flow in open channels. Non-uniform flows in open channels. Flow measurements. Hydraulic machinery (i.e. Pumps and hydraulic turbines), urban storm drainage, Hydraulic structures, Computer simulation and analysis.
Prerequisite: MEP 290 & IE 202 & MATH 204

CE 353 Hydrology and Water Resources Engineering (3:3, 0)

Principles of hydrology and water resources engineering. Objectives of water resources development. Water demand. Hydrologic cycle. Measurement and analysis of precipitation, evaporation, infiltration and stream flows. Water balance. Reservoirs, Dams and Spillways. Conjunctive use of surface and groundwater. Planning for water resources development. Economical analysis of water resources projects.
Prerequisite: CE 352

CE 371 Surveying (3:2, 3)

Introduction to the basic surveying theory and practice; Units of measurements and

conversions; Error analysis; Distance measurements by taping; Leveling; 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).
Prerequisite: MATH 202 & MENG 102

CE 381 Transportation Engineering (3:3, 0)

Transportation as a system; human and vehicle characteristics; traffic flow characteristics; highway capacity analysis; highway control devices; public transportation; urban transportation planning; parking facilities; transportation safety; intelligent transportation system and computer applications; introduction to railway, waterway, airport and pipeline.
Prerequisite: CE 371 & ARAB 201

CE 390 Summer Training (10 weeks) (2:0, 0)

Field training conducted under the supervision of a faculty member. The student must submit a detailed technical report by the end of training period, explaining what he learned during this training.
Prerequisite: CE 321 & CE 332 & CE 340 & CE 341 & CE 352

CE 400 Civil Engineering Fundamentals (1:0, 2)

The course is designed to review the basic fundamentals of civil engineering. The students will be exposed to the different fields of Civil Engineering.
Prerequisite: CE 321 & CE 333 & CE 342 & CE 352 & CE 381

CE 422 Construction Engineering (3:3, 0)

Types, selection, utilization, and unit cost of construction equipment regarding soil compaction and stabilization, excavation and earthmoving operations. formwork design. detailed cost estimation for civil works. project control.
Prerequisite: CE 321, CE 342 & ISLS 301

CE 423 Construction Estimating & Scheduling (3:3, 0)

Drawings of a typical civil engineering project. quantity take-off. pricing. use of computer programs in estimating. identification of activities and their sequence. scheduling of activities using critical path method. resource leveling and allocation. time-cost trade-off. using PERT technique. Project scheduling using MS Project and Primavera software.
Prerequisite: CE 422

CE 424 Construction Contracting (3:3, 0)

Participants in a construction contract. Contract definition. Types of contracts; formation principles of a contract, performance or breach of contractual obligations. Analysis and comparison of the different kinds of construction contracts. Bidding logistics. Legal organizational structures. types and uses of specifications. Sample of different forms of contracts utilized in construction.
Prerequisite: CE 321

CE 434 Foundation Engineering (3:3, 0)

Site exploration and selection. Types of foundations. Bearing capacity of shallow foundations. Foundation settlement. Deep foundations. Lateral earth pressure. Retaining walls. Computer applications
Prerequisite: CE 333

CE 439 Soil improvement (3:3,0)

Principles of soil improvement. Types of improvement and factors influencing them. Mechanical and hydro improvements. Physical and chemical improvements. Computer applications.
Prerequisite: CE 434

CE 440 Structural Analysis II (3:3, 0)

Analysis of statically indeterminate structures by method of consistent deformations. Method of slope-deflection and moment distribution. Influence lines for statically indeterminate structures. Approximate methods for analysis of multi-sections forms. Classical stiffness method of structural analysis. Direct stiffness method for trusses.
Prerequisite: CE 340

CE 441 Design of Steel Structures (3:3, 0)

Properties of steel. Types of loads. Philosophy of allowable stress design (ASD) method. Analysis and design of tension and compression members. Axially loaded columns. Base plate. Design of beams for flexure and shear. Beams with cover plates. Unsymmetrical bending. Deflection. Design of beams-column. Bolted and welded connections.
Prerequisite: CE 340

CE 442 Reinforced Concrete Design II (3:3, 0)

Review ACI 318- Code provisions. Design of Continuous Beams and Frames: Continuity of reinforced concrete structures, load combinations. Design of Two-way slabs: Edge supported

vs. column supported slab systems (DDM). Design of rectangular and circular Reinforced Concrete Columns, Axialy and eccentrically loaded columns, interaction diagrams. Slender columns and biaxial bending.
Prerequisite: CE 342

CE 444 Advanced Reinforced Concrete Design (3:3, 0)

Introduction to Prestressed Concrete, ACI provisions. Types of Prestressing. Losses, Stresses, Deflection, Flexural and Shear Strengths of P.S.C. Retaining Walls, Types and Forces on R.W., Design of R.W.. Design and Construction of R.C. Water Tanks. Water-Proofing, Loads Detailing of Reinforcements, Joints. Design of Circular and Rectangular Tanks.
Prerequisite: CE 442

CE 451 Design of Hydraulic Structures (3:3, 0)

Types. Advantages and functions of hydraulic structures. Flow through orifices. Culverts. Under gates. Over weirs and spillways. Energy dissipation below hydraulic structures. Hydraulic design of culverts. Weirs. Spillways. Aqueducts. Syphons. Regulators and dams. Computer applications.
Prerequisite: CE 352

CE 457 Water Resources Planning and Management (3:3, 0)

Objectives of water resources planning and management. Project formulation and economic evaluation. Planning for multi purpose projects. Systems analysis and design. Mathematical modeling and optimization. Risk analysis. Techniques and methodologies of environmental impact assessment (eia) and applications to water and public projects. Computer applications.
Prerequisite: CE 353

CE 461 Environmental Engineering (4:3, 3)

In this course, the physical, chemical, mathematical and biological principles for defining, quantifying, and measuring environmental quality are described. Next, the processes by which nature assimilates waste material are described and the natural purification processes that form the bases if engineering systems are detailed. Finally, the engineering principles and practices involved in the design and operation of conventional environmental engineering works are covered at length.
Prerequisite: CE 352

CE 465 Wastewater Reclamation and Reuse (3:2, 3)

Potential reuse applications. Sources of water for reuse. Treatment technologies suitable for

water reuse applications. Criteria for each type of reuse application. The overall procedures for determining the feasibility and planning of water reuse systems as well as the management structure of reuse projects. The management of the biosolids resulting from the treatment of wastewater and related regulations governing their use and disposal. Each student has to prepare and work on a mini-research/project throughout the course and present/submit it at the end of the course.

Prerequisite: CE 461

CE 471 Remote Sensing (3:2, 3)

Introduction to the basic for GPS and GIS applications; Geodesy: introduction, the ellipsoid and geoids, geodetic position , geoids undulation ,deflection of the vertical, geodetic coordinate system ; Map Projection : projections used in state plane coordinate systems, UTM projection; GPS : overview of GPS, differential GPS, GPS static survey, GPS kinematic survey; GIS: introduction to GIS, GIS data sources and data format, creating GIS databases, GIS applications, use of surveying software such as GeoMedia and Leica Geo Office).

Prerequisite: CE 371

CE 482 Highway Design and Construction (4:3,3)

Characteristics of driver, pedestrian vehicle, and traffic flow; affecting highway design; geometric design of highways; layouts of intersections, interchanges and terminals; highway drainage; review of highway paving materials; design of asphalt paving mixtures; pavement design; highway construction and supervision; categorize common pavement surface distress and associated correction activates; introduction to maintenance management system; computer applications on highway geometric design.

Prerequisite: CE 341 & CE 381

CE 483 Traffic Engineering (3:3,0)

Traffic Engineering studies and measurement; traffic flow theory and queuing theory; highway capacity analysis; parking analysis and layout design; traffic signs, marking and channelization; signalized intersection design and operation; roundabout design and management; ITS applications in traffic engineering; computer application in traffic engineering.

Prerequisite: CE 381

CE 497 Special Topics in Civil Engineering (3:3,0)

An in depth study of some civil engineering subjects aimed at enhancing knowledge and understanding of the student in the selected areas.

Prerequisite: Chairman's Approval

CE 499 Senior Project (4:2,4)

Team-work on a civil engineering capstone design project involving comprehensive design experience; exposure to professional practice with practitioner involvement. Preparation of the project report and its presentation.

Prerequisite: CE 321 & CE 333 & CE 342 & CE 352 & CE 381

COURSE SYLLABI

Course

CE 201- Engineering Mechanics (Statics) (3:2,3) - Required Course

Prerequisite

IE 200: Engineering Communication Skills and PHYS 281: Physics lab.

Course Description (2009-2010 Catalog Data)

Vector operations. Equilibrium of a particle. Free body diagram. Moment of forces about a point and about an axis. Equivalent systems. Equilibrium of a rigid body in two and three dimensions. Trusses (method of Joints and sections) . Frames and machines. Dry friction.

Textbook

Hibbeler, R. C., "Engineering Mechanics", Prentice Hall, 10th edition, 2004.

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Find the resultant of a system of concurrent forces by parallelogram laws and Cartesian vector notation in 2D & 3D. (magnitude and direction)
2. Apply and solve equations of equilibrium for a particle and for a rigid determinate structure in 2D & 3D.
3. Determine the moment of a force about a point and a line and the moment of a couple in 2D and 3D. (magnitude and vector)
4. Reduce a system of forces and couples to a single force and determine its point of application.
5- Calculate the forces in truss members using method of joints and method of sections.
6- Analyze the forces acting on the members of pin-connected frames and machines.

Course Topics and their Duration:

Topic No.	Duration in weeks
1. General Principles	0.5
2. Force Vectors	2.5
3. Equilibrium of a Particle	2
4. Force System Resultants	3
5. Equilibrium of a Rigid Body	0.5
6. Equilibrium in Two Dimensions	0.5
7. Equilibrium in Three Dimensions	1.5
8. Structural Analysis (trusses and frames)	3.5
Total	14

Class Schedule

Three lecturer sessions per week, 50-mintus each.

Office Hours

11:30-2:30 P.M. Sat, Mon, Wed**.**

Course Contribution to Professional Component

Eng. Science: 100%

Eng. Design: 0%

Grade Distribution

Work Product	Homework	Midterms	Quizzes	Final
Maximum grade	5%	30%	20%	45%

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	4				4						

*__LOL__: (4) Analysis.

Prepared by:

Eng. Abdul-Aziz Al-Mohamady (Coordinator)
Phone: 6402000/68117.

Last Updated: December 2009.

Course: CE-202: Strength of Materials (4: 3,3) Required Course

Course Description (2009-2010 Catalog Data)	Review of statics, internal reactions. Concept of stress. Concept of strain, Stress-strain relations. Deformation of axially loaded members. Torsion of circular members. Normal force, shear force and bending moment diagrams. Flexure and shearing stresses in beams. Transformation of plane stresses. Concept of design of beams. Concept of beam deflection. Concept of buckling of columns. Laboratory experiments.
Prerequisite Courses:	CE-201: Engineering Mechanics (Statics), MENG 130: Basic Workshop, and MATH 203: Differentiation, Integration & Vector.
Textbook:	R. C. Hibbeler, "MECHANICS of MATERIALS", 7th SI edition, Prentice-Hall, Pearson Education, 2008. ISBN-10 981-06-7994-7 ISBN-13 978-981-06-7994-1
References:	NONE
Course Learning Objectives:	By the completion of the course, the students should be able to: 1. Determine the internal resultant loadings including axial ,shear, bending and torsion and draw their distribution diagrams. 2. Evaluate stress and strain due to individual and combined loads. 3. Demonstrate the ability to transform stresses to arbitrary axis. 4. Explain the concept of beam design. 5. Calculate beam deflection. 6. Explain the concept of buckling.

	Sr. No.	Course Topics	Duration in Weeks
Course Topics and their Duration:	1	Introduction, Review of Statics and Concept of Stress	2
	2	Concept of Strain	1
	3	Stress-Strain Relations	1
	4	Deformation of Axially Loaded Members	1.5
	5	Torsion of Circular Members	1
	6	Normal Force, Shear Force and Bending Moment Diagram	1.5
	7	Flexure Stress in Beams	1.5
	8	Shearing Stresses in Beams	1.5
	9	Transformations of Plane Stress	1
	10	Concept for Beam Design	0.5
	11	Concept of Beam Deflection	0.5
	12	Concept of Buckling of Columns	0.5
Laboratory Experiments:	1 2 3 4	Tension Test Torsion Test Poisson's Ration and Modulus of Elasticity Flexural Stress Distribution Test	

Class Schedule:	Two lecturer sessions per week, 80-mintus each. The class is equipped with a complete multimedia to facilitate active cooperative learning such as computer and data show. Laboratory/tutorial meets up to 3 hours once a week.

Course Contribution:	ABET category content as estimated by faculty member who prepared this course description.	
	Engineering Science:	3.8 Credits or 95%
	Engineering Design:	0.2 Credits or 5%

Course Relationship to Program Outcomes:	Program Outcomes	a	b	c	d	e	f	g	h	i	j	k
	Highest Attainable LOL*	**4**	**3**			**3**						

*__LOL__: (1) Knowledge, (2) Comprehension, (3) Application, (4) Analysis, (5) Synthesis, and (6) Evaluation.

Prepared by:
Dr. Mohammed K. Basalamah
Civil Engineering. Dept., Rm. 289 Bldg. H.
Email: **mbasa2000@gmail.com**
Mobile: 050 560 3575

Contact:

Two lecturer sessions per week meets on:	SUN & TUE	19.00 - 20:20
Laboratory/tutorial meets once a week on:	MON	19:00 - 21:50

Updated:
February, 2010.

Course: CE 321 – Construction Management **(3:3, 0)- Required Course**

Prerequisite: IE 255: Engineering Economy.

Course Description: (2009-2010 Catalog Data)

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

Textbook(s):

"Construction Management", Daniel W. Halpin, 3rd Edition, 2006, John Wiley & Sons, New York.

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Recognize the construction industry environment including its characteristics, parties involved, legal structure, functions of management and the different types of construction projects.
2. Recognize the different activities involved in the development stages of construction projects.
3. Develop schedules and cash flow for construction projects using the critical path method (CPM).
4. Recognize types of construction estimates.
5. Recognize professional issues such as quality management, material management process, construction safety, and Value Engineering Technique.
6. Understand professional and ethical responsibility.

Course Topics and their Duration:

Course Topics	Duration (Weeks)
1. The Construction Environment	1.0
2. Legal Structure and Functions of Management	1.0
3. Design phase	1.5
4. Bidding phase	0.5
5. Saudi Tender Regulation	0.5
6. Construction Phase	2.0
7. Quality Management, Construction Safety, and Value Engineering	1.5
8. Engineering Ethics	0.5
9. Project planning	1.0
10. Project Scheduling using CPM	2.5
11. Resource Management	0.5

13. Material MGMT	0.5
T O T A L	14

Class Schedule

Two lecturer sessions per week 13:00 – 14:20 .S.T.

Office Hours

11:00-12:00 S…W; 9:00 -10:00 ..M..

Course Contribution to Professional Component

Eng. Science: 100%

Eng. Design: 0%

Grade Distribution

Work Product	4 Exams	Final	Project
Maximum grade	18%	18%	10%

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	4					2					2

*__LOL__: (2) Comprehension, (4) Analysis.

Prepared by: Dr. Mahmoud A. Taha

Phone: 02-6402000 X 68906.

Last Updated: February 2009

Course: CE 332 – Geology for Civil Engineers (3: 3,0)- Required Course

Course Description: (2006-7 Bulletin Data)

Introduction to engineering geology, earth surface and physical properties of earth materials, geological processes, types and classification of rocks, physical and mineralogical properties of rocks, basics of structural geology, soil formation and properties, clay minerals, groundwater.

Pre-requisite: CE –202 Strength of Materials, CHEM 281 General Chemistry Laboratory

Textbook(s):

Mathewson, C.C., Engineering Geology, Bell & Howell Co., Columbus, OH 43216, USA, latest edition.
Dunn, I.S., Anderson, L.R. and Keifer, F.W., Fundamentals of Geotechnical Analysis, John Wiley and Sons, Inc., N.Y., USA, latest edition.
Das, B.M., Properties of Soils , Engineering Press, Inc. San Jose, CA, USA., latest edition

References:

-McLean,A.C. and Gribble,C.D. Geology for Civil Engineers.
-Waltham,T. Foundations of Eng. Geology

Course Learning Objectives

By the completion of the course, the students should be able to:
1.Explain geology, earth surface features and processes
2.Discuss rock formation and rock types.
3.Describe minerals and their physical properties
4.Recognize structural features of earth crust and engineering considerations
5.Determine weight-volume relationships
6.Classify rocks and soils. according to engineering systems

Course Topics and their Duration:

Sr. No.	Course Topics	Duration in Weeks
1	**INTRODUCTION:** -Engineering geology and civil engineering; Earth surface; -Physical properties of earth materials	 0.5 0.5
2	**PHYSICAL GEOLOGY:** -Surface processes; Work of Wind, River and Sea. -Weathering of rocks; physical and chemical weathering. -Landslides and Earthquakes	0.5 1.0 0.5
3	**PETROLOGY:** -Rock formation processes; -Types and properties of rocks; Igneous, sedimentary and metamorphic rocks -Tutorial: Lab study of rock specimens; -Types and properties of rocks; Igneous, sedimentary and metamorphic rocks	 0.5 0.5 0.5 0.5
4	**MINERALOGY:** -Physical properties of minerals; -Tutorial: Lab study of mineral specimens; Hardness and streak	0.5 0.5
5	**ENGINEERING CLASSIFICATION of ROCKS:** -Rock substance classification -Tutorial: Lab study of Schmidt hammer test; -Rock mass classification; -Tutorial: Lab. Study of rock cores for RQD.	 0.5 0.25 0.5 0.25

6	**STRUCTURAL GEOLOGY:** -Introduction to plate tectonics; -Dip and strike. Folds; Faults; Joints; Engineering considerations.	 0.5 1.0 0.5
7	**SOIL FORMATION:** -Weathering and soils; -Important soil types. **CLAY MINERALS:** Types of clay minerals; -Particle forces.	0.5 0.5 0.5 0.5
8	**WEIGHT-VOLUME RELATIONSHIPS:** -Introduction to weight-volume relationships; -exercises	 0.5,0.5
9	**SOIL CLASSIFICATION:** Grain size distribution by mechanical and hydrometer methods; Atterberg limits; soil classification systems; AASHTO, and Unified soil classification systems.	 0.5 0.5
10	student presentations.	0.5, 0 5, 0.5 0.5

Class Schedule

Lectures: Two 1 hour and twenty minutes sessions per week There is no formal laboratory work in this course; however the students study rocks and minerals specimens, test rock cores for rock substance classification and determine Rock Core Recovery and Rock Quality Designation. Reports on Tutorials are encouraged.

Course Contribution

Eng. Science: 100 %
Eng. Design: 0 %

***Course Relationship to Program Outcomes*:**

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	**3**								**2**		

*__LOL__:1.Knowledge 2. Comprehension 3.Application 4. Analysis 5.Synthesis 6. Evaluation

Prepared by:

Dr. Zaki A Baghdadai

Last Updated:

Dec 2009

***Contact Grades*:**

Civil Eng. Dept., Room 219 Building H , E-mail: baghdadiz @ yahoo.com

Office Hours: TBA

TBA

Course: CE 333 Geo-technical Engineering (4: 3, 3) - Required Course

Course 2006: Weight-volume relationships. Physical properties of soil. Soil classification. Permeability and seepage. Shear strength. Compressibility, consolidation and settlement. Introduction to lateral earth pressure and slope stability.

Prerequisite: CE-332 Geology for Civil Engineers, EE 251 Basic Electrical Engineering and IE 202 Introduction to Engineering Design II.

Textbook(s): Das, B. M. Principles of Geo-technical Engineering (latest ed.)

References: Dunn, et Al. Fundamentals of Geo-technical Analysis(latest ed.)

Course Learning Objectives:

By the completion of the course, the students should be able to:

1. Solve for weight –volume relationship problems
2. Solve for soil classification
3. Identify and express properties of cp,[acted soil.
4. Solve for soil stresses: in situ and from applied loads.
5. Apply principles of shear strength for solving shear problems.
6. Apply principles of compression for solving compressibility problems.
7. Apply principles of equilibrium for solving lateral earth pressure problems.
8. Apply principles of fluid flow for solving permeability and seepage problems.
9. Discuss and analyze stability of slopes
10. Conduct experiment, analyze and interpret data.

Course Topics and their Duration:

Sr. No.	Course Topics	Duration in Weeks
1	Review of weight-volume relations; Engineering classification of soil; Site investigation.	1
2	Soil water; Soil permeability	1
3	Seepage	1
4	In-situ stresses; Stresses in a soil mass; Mohr circle of stress;	2

	Stresses due to external loads	
5	Compressibility of soils	2.5
6	Shear strength of soils	2.5
7	Soil compaction	1.5
8	Lateral earth pressure	1.5
9	Slope stability	1

Class Schedule:

Lectures: Two 1 hour and twenty minutes sessions per week There is laboratory work in this course; each lab. session is of 3 hours duration. Lab Reports on lab. experiments are required.

Course Contribution:

Eng. Science: 100 %
Eng. Design: 0 %

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	**2**	**2**					**1**				**2**

Prepared by:

*LOL:1.Knowledge 2. Comprehension 3.Application 4. Analysis 5.Synthesis 6. Evaluation

Last Updated:

Dr Muhammed Z. Gutub

December, 2009

Contact:

Civil Eng. Dept., Room 203 Building H , E-mail:

mgutub@hotmail.com

Office Hours:

Course **CE 340 – Structural Analysis I (3:2,3) - Required Course**

Prerequisites CE 202: Strength of Materials, EE 201: Structured Computer programming, and MATH 205: Series & Vector calculus.

Course Description (2009-2010 Catalog Data) Basic principles. Analysis of statically determinate trusses, beams, frames, arches, suspension cables. Influence lines for statically determinate structures. Deflection of structures. Buckling of columns.

Textbook R. C. Hibbeler , " Structural Analysis" 6th ed. PEARSON Prentice Hall, 2006

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Discuss statically determinacy of beams, frames, trusses in 2D space
2. Analyze statically determinate beams and frames by computing the supports reactions, internal resisting forces, and drawing normal force (N), shear force (V), and bending moment (BM) diagrams
3. Analyze statically determinate three hinged arches by computing external reactions and internal resting forces
4. Construct influence lines (IL) for different functions including reactions, shearing force, and bending moment in statically determinate beams .Also be able to maximize certain function by setting the critical location and pattern of the live load (LL) on the beam
5. Calculate deflections for determinate trusses using virtual work method, and for beams, and frames using virtual work method, double integration method, moment area method, and conjugate beam method
6. Calculate loads and stresses Buckling of columns using Euler's formula

Course Topics and their Duration:

Topics	chapter	# of weeks
1- Basic principals, Review of main topics of Static & Strength of Materials	1	1
2- Stability and Determinacy of Determinate Structures	2	1
3- Statically Determinate Trusses, Determinacy & Stability , Method of Joints, Method of Sections, and Combined Method	3	1
4- Statically Determinate Beams. Reactions, Internal Forces. Axial Force, Shear Force, and Bending Moment Diagrams using Method of sections (expressions), and Step-by-Step procedure (summation)	4	1
5- Statically Determinate Frames. Stability & Determinacy, Reactions, Internal Forces. (N), (V), (BM) diagrams	4	1
6- Types of Arches. Analysis of three Hinged Arches. Suspension Cables	5	1

7- Influence Lines (IL) for Statically Determinate Beams	6	2
8- Deflection of Trusses using the Virtual Work Method. Deflection of Beams and Frames using the Double Integration Method, the Moment Area Method, the Virtual Work Method, and the Conjugate Beam Method	8	4
9- Buckling of Columns.	Hand out	2
Total Number of weeks		**14**

Class Schedule

Two lecturer sessions per week, 80-mintus each.
+ One session tutorial

Office Hours

Lectures Su, Tu 8:00 – 9:20**,** Tu 2:30-5:30

Course Contribution to Professional Component

Eng. Science: 95 %

Eng. Design: 5 %

Grade Distribution

Work Product	Homework	Tests	Med Term Exam	Final Exam
Maximum grade	**15%**	**20 %**	**25 %**	**40 %**

Course Relationship to Program Outcomes:

Program Outcomes	ABET Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
Highest Attainable LOL*	4				4						3

*__LOL__: (1) *__LOL__: (3) Application and (4) Analysis.

Prepared by:

Dr. Talal A. Radain
Phone: 6952793 / 6402000 ext: 52793 or 684231

Last Updated:

December 2009

Course **CE 341 - Materials of Construction** **(4:2,3) - Required Course**

Prerequisite CE 202: Strength of Materials and CHEM 281: Chemistry Lab

Course Description (2009-2010 Catalog Data) Manufacturing, Properties and Tests of metals, aggregate, cementing materials, fresh and hardened PC concrete, asphalt concrete, masonry, wood and plastics. Design and production of PC concrete and asphalt mixtures. Computer applications in mix design.

Textbook Mamlouk, Michael S. and Zaniewski John P. M, "Materials for Civil and Construction Engineers", 2nd edition, Pearson and Printice Hall, USA, 2006.

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Describe manufacturing process, types, and utilization of metals (steel and aluminum), aggregate, Portland cement, Asphalt, masonry, wood, and plastics.
2. Interpret materials of construction concepts such as behavior, by identifying physical, chemical, and mechanical properties of metals (steel and aluminum), aggregates, fresh and hardened concrete, Asphalt, masonry, wood, and plastics
3. Determine weight - volume relations, and grain size distribution of combined aggregate (Blending of aggregate),
4. List factors affecting durability of Portland cement concrete.
5. Design of Portland cement concrete and hot asphalt HMA mixtures.
6. Practice long life learning through locating sources of information and reporting the results and recognizing contemporary issues related to construction materials.

Course Topics and their Duration:

Topic No.	Duration in weeks
1. Materials Engineering Concepts	2
2. Metals (steel and aluminum)	1.5
3. Aggregates	2.5
4. Cementing Materials	2.5
5. Portland Cement Concrete	2.5
6. Asphalt Cement Concrete	1
7. Masonry & Tiles	1
8. Wood	1
Total	14

Class Schedule Two lecturer sessions per week, 80-mintus each.
Laboratory/tutorial meets once a week , 3 hours

Office Hours S.M. 9:00 – 10:00

Course Contribution to Professional Component

Eng. Science: 85 %

Eng. Design: 15 %

Grade Distribution

Work Product	Quizzes & HW	Lab Reports	Field Trip	Midterm	Term Paper	Final
Maximum grade	**10%**	**15%**	**5%**	**25%**	**5%**	**40%**

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**									
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	4	4	5	3					3		

*__LOL__: (3) Application, (4) Analysis, and (5) Synthesis.

Prepared by:

Dr. Waleed H. Khushefati.
Phone: 6402000/68223.

Last Updated: Dec. 2009

Course CE 342 - Reinforced Concrete Design (I) Required Course

Prerequisite: CE 340 – CE 341 – IE 202

Course Description: (2008 Catalog Data)

Introduction to properties of concrete and reinforcing steel. Behavior of reinforced concrete under flexure and shear. Introduction to ACI-Code. Types of loads ant their factors. Ultimate strength method of design. Analysis and design of singly and doubly reinforced sections. Analysis and design of T-section. Design of beams against shear forces. Design of one-way slab and stairways. Development length. Design of isolated, combined and wall footings.

Textbook(s):

Hasson, M. N. and Al-Manseer, A. "Structural Concrete- Theory and Design", 4 th Edition, John Wiley $ Sons, Inc. 2008.

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Analyze and design rectangular sections
2. Analyze and design T and L-shape beams
3. Design beams for shear
4. Design one-way slab
5. Design isolated, combined and wall footings
6. Specify the Development Length of steel reinforcement

Course Topics and their Duration:

Topic No.	Duration in weeks
10- Introduction and revision, materials and properties of concrete and reinforcing bars.	1.5
11- Analysis and design of singly reinforced concrete beams, ACI safety code provisions.	1.5
12- Analysis and Design of doubly reinforced concrete beams	1.5
13- Analysis and design of T and L reinforced concrete beams.	1.5

15- Analysis and Design of continuous beam for flexure using ACI moment coefficients method.	1.5
16- Analysis and design of Reinforced Concrete solid one-way slabs. .	1.5
17- Footings: types, loads, bearing pressure, size, single, combined and wall footings	2
18- Design for bond, anchorage and development length.	1.5
Total	14

Class Schedule Two lecture sessions per week

Office Hours Su, Tu 11:00 – 12:20

Course Contribution to Professional Component Eng. Science: 88 %

Eng. Design: 12 %

Grade Distribution

Work Product	Homework	Quizzes	Design Project	Laboratory	Final
Maximum grade	**10%**	**30%**	**10%**	**10%**	**40%**

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	2	2	2	2	2		2				2

***LOL**: (1) Knowledge and Comprehension, (2) Application and Analysis, (3) Synthesis and Evaluation.

Prepared by: Dr. Rashad Husein
Phone: 6402000/68108

Last Updated: September 2009

Course **CE 352- Hydraulics (3:2,3) - Required Course**

Prerequisite: MEP 290 - Fluid Mechanics, IE 202 - Introduction to Engineering Design II & MATH 204 - Differential Equations

Course Description: (2008 Catalog Data) Pipe flow analysis and design. Steady flow in closed conduits and networks. Steady uniform flow in open channels. Non-uniform flows in open channels. Flow measurements. Hydraulic machinery (i.e. Pumps and hydraulic turbines), urban storm drainage, Hydraulic structures, Computer simulation and analysis.

Textbook(s): Ned H. C. Hwang and Robert J. Houghtalen, Fundamentals of Hydraulic Engineering Systems, 3rd edition, Prentice Hall, 1996

References: Roberson, J.A., Cassidy J.J., Chaudhry, M.H., Hydraulic Engineering, 2nd edition, John Wiley & sons, inc.,1997

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Design and analyze of flow in pipelines and water distribution systems and using computer models for simulation.
2. Study, Analyze and Design uniform and Non-uniform flow in different types of open channels.
3. Study the flow measurements methods in pipes and open channel.
4. Identify and select different types of pumps and learn about cavitation phenomenon.
5. Study, analyze and design storm water sewer systems.
6. Identify different types of dams and reservoirs

Course Topics and their Duration:

Topic No.		Duration in weeks
1-	Pipelines and Pipe Networks	4
2-	Open Channel Flow	3
3-	Hydraulic Machinery (Water Pumps and	2
4-	Storm Water Network	2
5-	Hydraulic Structures	2
6-	Flow Measurements	1
Total		14

Class Schedule Two lecturer sessions per week
Laboratory meets once a week, 3 hours

Office Hours 10 - 11 A.M. Sat, Mon.

Course Contribution to Professional Component

Eng. Science: 25 %

Eng. Design: 75 %

Grade Distribution

Work Product	Home work	Midterm	Quizzes	Lab	Term Project	Final
Maximum grade	**10%**	**20%**	**15%**	**10%**	**10%**	**35%**

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	1	4	2								2

***LOL**: **1. Knowledge 2. Comprehension 3. Application 4. Analysis
5. Synthesis 6. Evaluation

Prepared by:

Dr. Abdullah Al-Ghamdi.
Phone: 695-1761.

Last Updated: Fall 1430-1431 H (Fall 2009)

Course **CE 353 - Hydrology and Water Resources Engineering (3:3,0) - Required Course**

Prerequisite: CE 352 – Hydraulics

Course Description: (2008 Catalog Data)

Principles of hydrology and water resources engineering. Objectives of water resources development. Water demand. Hydrologic cycle. Measurement and analysis of precipitation, evaporation, infiltration and stream flows. Water balance. Reservoirs, Dams and Spillways. Conjunctive use of surface and groundwater. Planning for water resources development. Economical analysis of water resources projects.

Textbook(s): Linsley, Kohler and Paulhus, "Hydrology for Engineers", 1988

References:

1. Chow, Maidment and Mays, "Applied Hydrology", 1988.
2. Ram S. Gupta, “Hydrology and Hydraulic systems”, 1989.
3. Niel S. Grigg, "Water Resources Planning", 1995.

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Identify the Importance of water for human activities and the water resources engineering.
2. Understand and review the global water resources especially S. A.
3. Define the Global Hydrologic Cycle and calculate the Hydrologic items in SA.
4. Analyze the rainfall and runoff data.
5. Identify technical, economical and social factors affecting dam type, site selection, forces of gravity dams and factors cause dam failure
6. Identify and formulate the groundwater flow, aquifers and wells

Course Topics and their Duration:

Topic No.	Duration in weeks
1. Introduction to water resources	2
2. Water Demand	2
3. Engineering Hydrology	1
4. Evaporation & Transpiration	2
5. Precipitation	1
6. Rainfall Runoff relationship	2
7. Hydraulic structures (dams)	2
8. Groundwater Hydrology	2
Total	14

Class Schedule Two lecturer sessions per week

Office Hours 10 - 11 A.M. Sat, Mon., Wed; 11 - 12 A.M. Sun., Tues.

Course Contribution to Professional Component Eng. Science: 75 %

Eng. Design: 25 %

Grade Distribution

Work Product	Homework	Midterms	Quizzes	Field trip	Term Paper	Final
Maximum grade	**10%**	**20%**	**10%**	**10%**	**10%**	**40%**

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	2						4				4

***LOL**: **1. Knowledge 2. Comprehension 3. Application 4. Analysis
5. Synthesis 6. Evaluation

Prepared by: Prof. Omar S. Aburizaiza ,

Dr. Maged H. Hussein

Last Updated: Fall 1430-1431 H

Course: **CE 371 – Surveying (3: 2, 3) - Required Course**

Prerequisite: . **MATH 202, MENG 102**

Course Description: Introduction to the basic surveying theory and practice; Units of measurements and conversions; Error analysis; Distance measurements by taping; Leveling; 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.

Textbook(s): ELEMENTARY SURVEYING (Twelve Edition 2008) by Paul R. Wolf/ Russel C. Brinker

References:

1. SURVEYING (Seventh Edition), by Francis H. Moffitt/ Harry Bouchard
2. SURVEYING WITH CONSTRUCTION APPLICATIONS by Barry F. Kavanagh

Course Learning Objectives

By the completion of the course, the students should be able to:

1. **Explain** the surveying fundamentals, and errors.
2. **Apply** different techniques for surveying observations, such as distance, elevations, and angles.
3. **Analyze** and **calculate** the unknown surveying parameters, and map productions.
4. **Calculate** area and volume from ground data and maps.
5. **Design** of simple circular curve, and stakeout by deflection angles.

Course Topics and their Duration:

Sr. No.	Course Topics	Duration in Weeks
1	**Introduction to surveying.** 1.Definition of surveying, classification of surveying, specialized surveys. 2.Units of measurement, accuracy and precision, significant figures, rounding off numbers.	0.5 0.6
2	**Error analysis.** 3.Definition of error, sources of errors, types of error, elimination of errors. 4.Mean value, residuals, standard error, variance weighted measurements and their adjustments. 5.Error propagation.	0.3 0.3 0.5
3	**Distance measurements.** 6. Methods: pacing, stadia, taping, electronic distance measurements, and others equipment: surveying tapes, EDM instruments. 7. Error and corrections.	1.1 0.2
4	**Elevation measurements [leveling].** 8. Methods: differential leveling, trigonometric leveling, and profile leveling. 9. Equipment: automatic level, tilting level, and theodolite T16	1.4 1.3
5	**Angle measurements.** 11. Horizontal angles: azimuths, bearings, deflection angles, angles to the right, and others Vertical and zenith angles. 12. Techniques.	0.5 0.7
6	**Traversing and traverse computations.** 13. Open and closed traverses. 14. Traverse classifications according to measured	0.3 0.7

7	**Topographic surveys.** 16. Contour lines. 17. Maps and scales.	 0.3 0.3
8	**Area and volume computations.** 19. Methods of area and volume calculations. 20. Area and volume computations from maps.	 0.4 0.9
9	**Circular curves.** 21.Definition of circular curve parameters. 22.Derivation of formulas. 23.Curve layout by deflection angles.	 0.4 0.3 0.8

Lectures: Two 2 hour sessions per week. There is 10 laboratory work in this course

Course Relationship to Program Outcomes:

Program Outcomes	ABET Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
Highest Attainable LOL*	2	4		2							3

***LOL**: 1.Knowledge , 2. Comprehension , 3.Application ,4. Analysis, 5.Synthesis , 6. Evaluation

Prepared by: Dr. Adel S. Elkomy

Last Updated: January, 2010 G

Contact Office Hours: Sat, Mon, Wed: 8-10 AM

Course: **CE – 381: Transportation Engineering (3:3,0)- Required Course**

Course Description: Transportation as a system; human and vehicle characteristics; traffic flow characteristics; highway capacity analysis; highway control devices; public transportation; urban transportation planning; parking facilities; transportation safety; intelligent transportation system and computer applications; introduction to railway, waterway, airport and pipeline.

Prerequisites: CE- 371 and ARAB 201

Textbook(s): *Transportation Engineering- An Introduction*
C. Jotin Khisty and B. Kent Lall, 3rd Edition, Prentice Hall, 2003.

Reference(s): *Traffic and Highway Engineering*, Nicholas Garber and Lester Hoel, 2nd Edition, PWS Publishing Company, 1997.

Highway Capacity Manual, Special Report 209, Transportation Research Board, 2000.

Manual of Uniform Traffic Control Devices, Ministry of Communications, Kingdom of Saudi Arabia.

Course Learning Objectives: After successful completion of the course, the students should be able to:

1. *Recognize* the function and scope of Transportation Engineering
2. *Identify* Driver, User, vehicle and Roadway characteristics and *Analyze* the interaction among the parameters.
3. *Analyze* Speed-Volume-Density, *Perform* Highway Capacity Analysis and *Describe* Traffic Control System Components and Devices
4. *Recognize* problems and issues of Parking, Accident, Public Transport and ITS

5. *Describe* Transportation Planning Process and apply Traffic Forecasting Methods. *Prepare* Transportation Impact Analysis Report.
6. *Describe* basic components of Railway, Waterway, Airport and Pipeline.

Course Topics and Their Duration:

	Course Topics	Duration in Weeks
1	Introduction, Transportation system components, Transport modes, specialties in transportation engineering	1.0
2	Characteristics of drivers and vehicles	1.0
3	Traffic flow theory	2.0
4	Highway Capacity Analysis	1.0
5	Intersection control and design	1.0
6	Parking Study	0.75
7	Public transportation	0.75
8	Transportation planning	2.5
9	Transportation safety	1.0
10	Intelligent transportation system	0.5
11	Computer application	1.0
12	Introduction to Railway, Waterway, Airport and Pipeline	1.5

Class Schedule:

- Three 1-hour sessions per week (S M W @ 10:00 A.M.)

Course Contribution to Professional Component:

- Engineering Science: 100%
- Engineering Design: 0%

Course Relationship to Program Outcomes:

Program Outcomes	ABET Outcomes										
	a	b	c	d	e	f	g	h	i	J	k
Highest Attainable level of Learning **	**-**	**-**	**-**	**-**	**4**	**2**	**3**	**-**	**2**	**2**	**2**

**1 : Knowledge 2. Comprehension 3. Application 4. Analysis 5. Synthesis 6. Evaluation

Prepared By: Dr. Md. Jobair Bin Alam

Last Updated: October 2009

Course **CE 390 – Summer Training** **(2:0,0) - Required Course**

Prerequisite: CE 321 - Construction Management, CE 332 - Geology for Civil Engineers, CE 340 - Structural Analysis-I, CE 341 - Materials of Construction, CE 352 - Hydraulics

Course Description:

(2008 Catalog Data)

Field training conducted under the supervision of a faculty member. The student must submit a detailed technical report by the end of training period, explaining what he learned during this training.

Textbook(s): None

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Formulate an objective that identifies the training purpose and describe the expected outcomes of the training activity.
2. Describe a professional organizational structure and Break-down a work environment into its units and work functions.
3. Complete important tasks on time and with high quality.
4. Apply principles of engineering practices related to CE specializations.
5. Communicate, clearly and concisely, training details and gained experience, both orally and in writing, using necessary supporting material.

Course Topics and their Duration:

Topic No.	Duration in weeks
1. Acquaint the trainee with the company working environment, organizational structure, regulations, products, customers, engineering units, and quality system.	2

3. Allocate the trainee to a project team and allow him to study and collect necessary data about the project.	1
4. Work as a team member to execute assigned tasks with the following objectives: ▪ Apply principles of engineering practices related to CE specialization. ▪ Enhance team work skills. ▪ Relate practical work to his theoretical engineering ▪ Use modern engineering tools such as equipment and ▪ Use project management techniques. ▪ Complete assigned tasks on time with high quality. ▪ Develop personal communication skills.	6

Class Schedule

Oral Presentation after submitting a written training report; both evaluated by at least 2 faculty members

Course Contribution to Professional Component

Eng. Science: 0%

Eng. Design: 0%

Others: 100%

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*				3		3	3		3		3

*__LOL__: 3. Application

Prepared by:

Eng. Abdul-Aziz Al-Mohamady (Coordinator)
Phone: 6402000/68117.

Last Updated:

Course

CE 400 Civil Engineering Fundamentals (1:0, 2) - Required Course

Prerequisite:

CE 321 - Construction Management, CE 333- Geotechnical Engineering,
CE 342 - Reinforced Conc. Design- I, CE 352 – Hydraulics,
CE 381 - Transportation Engineering

Course Description: (2008 Catalog Data)

The course is designed to review the basic fundamentals of civil engineering. The students will be exposed to the different fields of Civil Engineering.

Textbook(s):

None

Reference Books:

Text books, handouts and lecture notes of the above mentioned prerequisite courses.

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Review the fundamentals of Civil Engineering.

Course Topics and their Duration:

Topic No.	Duration in weeks
1. Introduction	1
2. Building Structural Fundamentals	3
3. Principals of Construction Management	2
4. Soil Properties and Basic Foundations Engineering	2
5. Basics of Surveying and Transportation Engineering Fundamentals	2
6. Fundamentals of Water Conveyance and Basics of Environmental Engineering	2
7. Ethics and Professional matters	2
Total	14

Class Schedule

Class meets once a week for 2 hours (tutorial)

Course Contribution to Professional Component

Eng. Science: 100%

Eng. Design: 0 %

Grade Distribution

Work Product	Class Participation	Final Exam
Maximum grade	30%	70%

Prepared by: Dr. Samir Mansoury (Coordinator)

Phone: 6402000/68

Last Updated: January 2010

Course: CE 422– Construction Engineering (3:3, 0)- Required Course

Prerequisite: ISLS 301:Islamic Studies (3), CE 321: Construction Management, and CE 342: Concrete Design I.

Course Description:

(2009-2010 Catalog Data) Types, selection, utilization, and unit cost of construction equipment regarding soil compaction and stabilization, excavation and earthmoving operations. formwork design. detailed cost estimation for civil works. project control.

Textbook(s):

1. "Construction Planning, Equipment, and Methods. 7th edition. By R.L. Peurify and C. J. Schexnayder. McGraw Hill, 2006.
2. Construction Estimating Using Excel. Steven J. Peterson, Prentice Hall, 2007.

Course Learning Objectives

By the completion of the course, the students should be able to:

1) Describe the characteristics of certain construction equipment e.g. Dozers, Scrapers, Compactors, Excavating equipment, and Trucks.
2) Calculate the productivity and unit cost of using certain construction equipment e.g. Dozers, Scrapers, Compactors, Excavating equipment, and Trucks.
3) Design a wooden formwork system for a slab, wall and column.
4) Prepare detailed cost estimation for civil works.
5) Evaluate the performance of a project using Earned Value metrics.
6) Practice long life learning through identifying new course topics, locating sources of information, and reporting the results.

Course Topics and their Duration

Course Topics	Duration (Weeks)
1. Construction Productivity	0.5
2. Labor & EQP cost	1.5
3. Compaction and Stabilization Equipment	1.0
4. Machine Equipment Power Requirements	1.0
5. Dozers, Excavators, Compactors, Graders & Hauling	3.5
6. Q.S & detailed estimate of Civil Works	3.0
7. Project Control	1.0
8. Formwork Design	2.0
9. Life Long Learning	0.5
T O T A L	14

Class Schedule Two lecturers per week 11:00-12:20 .S.T.

Office Hours 9:00-10:00 S.M.W.

Course Contribution to Professional Component

Eng. Science: 90%
Eng. Design: 10%

Grade Distribution

Work Product	Exam #1	Exam #2	Exam #3	Exam #4	Exam # 5	Term Paper
Maximum grade	10%	15%	15%	30%	20%	10%

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*					4				2		2

LOL: (2) Comprehension, (4) Analysis

Prepared by: Dr. Mahmoud A. Taha

Phone: 6402000 X 68906.

Last Updated: December 2009

Course: CE 423-Construction Estimating & Scheduling. (3:3,0) - Elective Course

Prerequisite: CE 422- Construction Engineering.

Course Description (2009-2010 Catalog Data)

Drawings of a typical civil engineering project. quantity take-off. pricing. use of computer programs in estimating. identification of activities and their sequence. scheduling of activities using critical path method. resource leveling and allocation. time-cost trade-off. using PERT technique. Project scheduling using MS Project and Primavera software.

Textbooks

1. Construction Estimating Using Excel. Steven J. Peterson, Prentice Hall, 2007.
2. R.S. Means Cost Data.
3. Computer-Based Construction Project Management. Tarek Hegazy. Prentice Hall 2002.

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Prepare detailed cost estimate for civil works according to Master Format 2004.
2. Prepare construction schedules using precedence diagram with complex logic.
3. Construct a linear schedule for a project of a repetitive nature
4. Perform resource management: loading, leveling and time-cost trade off.
5. Perform PERT analysis.
6. Use computer-based scheduling software to develop and communicate a schedule for a construction project.

Course Topics and their Duration

Topic No.	Duration in weeks
9. Introduction to Estimating	1.0
10. The quantity take off	3.0
11. Putting costs to the estimate	1.0
12. Finalizing the bid	1.0
13. Precedence diagram with complex logic	1.5
14. Scheduling Repetitive Projects	1.0
15. Resource Allocation & Leveling	1.5
16. Time-Cost Tradeoff	1.0
17. Schedule Updating	1.0
18. Probabilistic Networks	1.0
T O T A L	14

Class Schedule Two lecturers per week 11:00-12:20 .S.T.

Office Hours S…. 11:00-12:20, ..M.. 10:00-11:00, ….W, 11:00 – 12:20.

Course Contribution to Professional Component

Eng. Science: 100%

Eng. Design: 0%

Grade Distribution

Work Product	Homework	Two Midterms	Pop Quizzes	Project	Final
Maximum grade	5%	40%	5%	10%	40%

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*					4	2					4

*__LOL__: (2) Comprehension and (4) Analysis.

Prepared by

Dr. Mahmoud A. Taha
Phone: 6402000 X 68906.

Last Updated December 2009

Course: CE 424-Construction Contracting. (3:3,0) Elective Course

Prerequisite: CE 321- Construction Management.

Course Description (2009-2010 Catalog Data): Participants in a construction contract. Contract definition. Types of contracts; formation principles of a contract, performance or breach of contractual obligations. Analysis and comparison of the different kinds of construction contracts. Bidding logistics. Legal organizational structures. types and uses of specifications. Sample of different forms of contracts utilized in construction.

Textbook(s): "Construction Contracting," 6th Edition, Richard H. Clough and Glenn A. Sears.

Reference(s): "Construction Contract Administration," Charles S. Phillips. 1999.

Course Learning Objectives: By the completion of the course, the students should be able to:

1. Identify and deal with the respective roles of design professionals, owner/developers and prime contractors in the design and construction process.
2. Understand the different types of construction contracts and how the construction supervisors role may be affected by them.
3. Learn how to recognize, develop and manage a documentation system.
4. Understand the effects of changes as they are encountered and develop methods to react to potential conflicts resulting from changes.
5. Know how to handle schedule impacts, delays, accelerations, suspensions and disruption of time related work activities.

Course Topics and their Duration:

Topic No.	Duration in weeks
19. Contract Definition	1.0
20. Company Organization	1.5
21. Contractual Relationships	1.0
22. Drawings and Specifications	1.5
23. Managing General Conditions	3.0
24. Implementing the Contract	4.0
25. Site Management Documents	2.0
T O T A L	14

Class Schedule Two lecturers per week 11:00-12:20 .S.T.

Office Hours: S…. 11:00-12:20, ..M.. 10:00-11:00, ….W, 11:00 – 12:20.

Course Contribution to Professional Component:

Eng. Science: 100%

Eng. Design: 0%

Grade Distribution:

Work Product	Homework	Two Midterms	Project	Final
Maximum grade	10%	40%	10%	40%

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*				3							4

*__LOL__: (3) Application, and (4) Analysis.

Prepared by:

Dr. Mahmoud A. Taha
Phone: 6402000 X 68906.

Last Updated: December 2009

Course: **CE 434 – Foundation Engineering (3: 3, 0)- Required Course**

Description: (2008 Bulletin

Site exploration and selection. Types of foundations. Bearing capacity of shallow foundations. Foundation settlement. Deep foundations. Lateral earth pressure. Retaining walls. Computer applications**.**

Pre-requisite: CE 333.

Textbook(s): References:

Das, B.M., Principles of Foundation Engineering (latest ed.)

Bowles, J.E., Foundation Analysis and Design (latest ed.)

Course Learning Objectives:

By the completion of the course, the students should be able to:

1. Know the different types of foundations and their advantages.
2. Describe the methodology and techniques of soil exploration.
3. Apply bearing capacity theories and allowable pressure equations to shallow foundations.
4. Apply different methods of calculating soil layers deformations to evaluate foundation settlements.
5. Know types and benefits of mat foundations and evaluate their bearing capacity.
6. Know types of deep foundations, classifications of piles and apply methods of evaluating the bearing capacity and settlement of piles.

Course Topics and their Duration:

Sr. No.	Course Topics	Duration in Weeks
1	Introduction to foundation engineering and its importance. Classification of foundations exploration	1
2	Site exploration	1
3	Bearing capacity of shallow foundations	2
4	Allowable settlements Review of elastic and consolidation settlements	1.5
5	Combined footings. Mat foundations; types and bearing capacity.	2.5
6	Allowable bearing pressure in sand based on settlement	1
7	Deep foundations; types and bearing capacity	3.5
8	Review of lateral earth pressure. Retaining walls.	1.5

Class Schedule: **The class meets twice a week and each session is 1 hr 20 min. long.**

Course Contribution:

Eng. Science: 75 %
Eng. Design: 25 %

Course Relationship to Program Outcomes:

Program Outcomes	ABET Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
Highest Attainable LOL*	3		3		3			1			3

*__LOL__: 1.Knowledge 2. Comprehension 3.Application 4. Analysis 5. Synthesis 6. Evaluation

Prepared by:

Dr. Abdulghany O. Sabbagh

Last Updated:

Dec 2009

Contact:

Civil Engineering Department Room 248 E mail: agsabbagh@yahoo.com

Office Hour:___

Course: CE 435 Applications in Foundation Engineering (3: 3, 0) Elective Course

Course 2009: Introduction to foundation engineering; purpose and classification of foundations; site exploration and foundation selection; loads and calculations of allowable pressures and settlements ; foundations in variety of conditions; foundations on fill and improved ground; combined footings; slope stability; computer applications.

Prerequisite: CE-434 Foundation Engineering.

Textbook(s): Das, B. M. Principles of Foundation Engineering (latest ed.)

References: Bowles, J, E,, Foundation Analysis and Design (latest ed)

Course Learning Objectives:

By the completion of the course, the students should be able to:

1. know purpose and classification of foundations.
2. explain site exploration and foundation selection.
3. know types of loads on foundations.
4. calculate allowable pressures and settlements.
5. solve for variety of footing conditions.
6. analyze foundations on different ground conditions
7. analyze slope stability
8. use computer programs for slopes and foundations

Course Topics and their Duration:

Sr. No.	Course Topics	Duration in Weeks
1	Introduction to Foundation Engineering, purpose and classification of foundations.	1
2	Site exploration and foundation selection	1
3	Types of loads on foundations: gravity and lateral loads.	1
4	Calculations of allowable pressures and settlements.	1
5	Comparative selection of footing sizes: interaction within a group; relative settlement between footings; applications in selecting footing sizes; effect of close proximity; effect of unequal loads; effect of intermixed footing types; effect of adjacent excavations	3
6	Foundations on slopes and foundations on layered soils.	1

7	Foundations on fill and improved ground	1
8	Combined footings; lateral friction loads on footings; foundations on expansive soils; introduction to liquefaction.	1
9	Slope stability; analysis of stability of earth slopes.	2
10	Computer applications: shallow and deep foundations. Slope stability	2

Class Schedule: Lectures: Two 1 hour and twenty minutes sessions per week

Course Contribution:

Eng. Science: 75 %
Eng. Design: 25 %

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	**3**						**1**				**3**

***LOL**:1.Knowledge 2. Comprehension 3.Application 4. Analysis 5.Synthesis 6. Evaluation

Prepared by:

Prof. Zaki A. Baghdadi and Dr Ahmed M. Khan

Dated December 2009

Contact:

Civil Eng. Dept., Rooms 219 / 250 Building H ,

E-mail: baghdadiz@yahoo.com / akhan@kau.edu.sa

Office Hours: TBA

Grades Distribution: TBA

Course: **CE 439 – Soil Improvement (3: 3,0)- Elective Course**

Course Description: (21/12/2009)

Principles of soil improvement. Types of improvement and factors influencing them. Mechanical and hydro improvements. Physical and chemical improvements. Computer applications.

Textbook(s):

Pre-requisite: CE – 434 Foundation Engineering

Reference(s*):*

Hausmann, Manfred R. "Engineering Principles of Ground Modification", McGraw-Hill Publishing Company, N.Y., USA, 1990

Ingles and Metcalf," Soil Stabilization", Butterworths Pty. Ltd., Sydney, 1972.

Course Learning Objectives

By the completion of the course, the students should be able to:

1.Define ground improvement and ground improvement techniques.
2.Express purpose of compaction and methods of laboratory and field compaction..
3.Describe deep compaction techniques.
4.Explain principles of soil densification
5.Discuss properties of compacted cohesive and cohesion-less soils.
6.Describe geo-synthetics and their uses.
7 .Describe pre-loading and purpose of vertical drains.
8.Solve for preloading without and with drains, analyze and design combined vertical and radial drainage system.
*9.*Describe modification by admixtures
10.Discuss cement stabilization including mix design
11.*Discuss* lime stabilization including mix design.
12.*Present* a selected topic on soil improvement.

***Course Topics and their Duration*:**

Sr. No.	Course Topics	Duration in Weeks
1	**INTRODUCTION** Purpose of the course; Options when encountering problematic soils; Ground improvement techniques; The traditional objectives and emerging trends.	1
2	**MECHANICAL MODIFICATION(COMPACTION)** Compaction purposes; Laboratory compaction; Field shallow compaction. **Deep** compaction techniques; pre-compression; Heavy tamping and dynamic consolidation; vibro-compaction; Compaction grouting	2

3	**PRINCIPLES OF SOIL DENSIFICATION** Moisture content; Compaction effort; Soil type and preparation; Confinement.	1
4	**PROPERTIES OF COMPACTED COHESIVE SOILS** The effect of compaction on strength; over-compaction; stress-strain behavior of compacted soils; **The** effect of compaction on compression; swelling; shrinkage and permeability.	2
5	**PROPERTIES OF COMPACTED COHESION_LESS SOILS** Compactibility ; Shear strength; Liquefaction ; Collapse.	1 .
6	**GEOSYNTHETICS** Types of geo-synthetics; Uses of geo-synthetics, Filtration; Separation; Reinforcement; Erosion control.	1
7	**PRELOADING AND VERTICAL DRAINS** Purpose of pre-loading; Purpose of vertical drains; Methods of vertical draining; sand drains and geo-synthetic drains. **Preloading** without vertical drains; Preloading with vertical drains. **Radial** consolidation; Combined vertical and redial consolidation.	3
8	**MODIFICATION BY ADMIXTURES** Uses of admixtures; Types of Admixtures; Cement stabilization; **Soil**-cement-water reactions; Engineering benefits of cement stabilization. **Lime** stabilization; Types of lime; Soil-lime reactions; Engineering benefits of lime stabilization.	3
9	**Student presentations**.	1

Class Schedule Lectures: Two 1 hour and twenty minutes sessions per week.

Course Contribution

.
Eng. Science: 80 %
Eng. Design: 20 %

***Course Relationship to Program Outcomes*:**

Program Outcomes	ABET Outcomes										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**J**	**k**
Highest Attainable LOL*	**5**		**3**		**5**						**3**

*LOL:1.Knowledge 2. Comprehension 3.Application 4. Analysis 5.Synthesis 6. Evaluation

Prepared by:

Dr. Ahmed M. Khan

Last Updated:

December, 2009

Contact

Civil Eng. Dept., Room 250 Building H , E-mail akhan@kau.edu.sa
Office Hours: 10-11 daily

Grades:

HW :10%; Quizzes: 10 %; Mid Term:25 %; Term Paper: 10; Lecture Notes and Attendance:5% Final: 40%

Course **CE 440 - Structural Analysis (II)** **(3:3,0) - Required Course**

Prerequisite CE 340 - Structural Analysis (I)

Course Description (2009-2010 Catalog Data) Analysis of statically indeterminate structures by method of consistent deformations. Method of slope-deflection and moment distribution. Influence lines for statically indeterminate structures. Approximate methods of analyze of multi-sections forms. Classical stiffness method of structural analysis. Direct stiffness method for trusses.

Textbook K.Leet and C.M.Uang, "Fundamental of Structural Analysis" , 2nd edition, McGraw-Hill Companies, 2005.

Course Learning Objectives By the completion of the course, the students should be able to:

1. Analyze indeterminate structures by methods of consistent deformation, Slope-deflection Equation, moment distribution, classical stiffness method and approximate methods.
2. Derive expressions of influence line for beams with one redundant by consistent deformations and schematic influence diagrams by Muller Breslau's principal for statically indeterminate structures.
3. Analysis trusses using direct stiffness method.

Course Topics and their Duration:

Topic No.	Duration in weeks
1. Introduction & Revision	1.0
2. Method of consistent deformation	2.0
3. Influence line for indeterminate structures	1.0
4. Approximate analysis of indeterminate Structures	1.5
5. Method of Slope-deflection Equation	2.0
6. Method of Moment distribution	2.5
7. Classical Stiffness method	2.0
7. Direct Stiffness method	2.0
Total	14

Class Schedule Three lecturer sessions per week, 50-mintus each.

Office Hours S.M.W. 10:00 - 11:00

Course Contribution to Professional Component

Eng. Science: 100 %
Eng. Design : 0%

Grade Distribution

Work Product	Homework	Midterms	Quizzes	Final
Maximum grade	**10%**	**50%**	**0%**	**40%**

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	4				4		3				

*__LOL__: (3) Application , (4) Analysis.

Prepared by:

Prof. Samir A. Ashour
Phone: 6402000/684, 6952228

Last Updated: June 2008

Course **CE 441-Design of Steel Structures** **(3:3,0) - Elective Course**

Prerequisite CE 340- Structural Analysis I

Course Description (2009-2010 Catalog Data) Properties of steel. Types of loads. Philosophy of allowable stress design (ASD) method. Analysis and design of tension and compression members. Axially loaded columns. Base plate. Design of beams for flexure and shear. Beams with cover plates. Unsymmetrical bending. Deflection. Design of beams-column. Bolted and welded connections.

Textbook

1. AISC Manual of Steel Construction
2. Structural Design by Jack C. Mc Cormac, 3rd Edition
3. Applied Structural Steel Design by Leonard Spiegel and George F. Limbrunner.

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Analyze tension and compression members, flexural members, beam-column s, bolted connections and welded connection.
2. Design of tension and compression members, flexural members, beam-column s, bolted connections and welded connection.

Course Topics and their Duration:

Topic No.	Duration in weeks
1. Introduction:	0.5
2. Tension members:	2
3. Compression members:	2.5
4. Flexural members:	3
5. Bending and axial stress:	2
6. Bolted connections:	2
7. Welded connections:	2
Total	14

Class Schedule Three lecturer sessions per week, 50-mintus each.

Office Hours Sat., Mon., Wed. 9:30-11:00 am.

Course Contribution to Eng. Science: 50%

Professional Component

Eng. Design: 50%

Grade Distribution

Work Product	Homework	Midterms	Final
Maximum grade	10%	50%	40%

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*			6		4						4

***LOL**: (4) Analysis, and (6) Synthesis.

Prepared by:

Prof. Samir A. Ashour
Room 259 – Building H, Tel. Ext.: 68496

Last Updated:

December 2009

Course **CE 442 - Reinforced Concrete Design (II)** **(3:3,0) - Required Course**

Prerequisite: CE 342 - Reinforced Concrete Design (I)

Course Description (2009-2010 Catalog Data)

Review ACI 318- Code provisions. Design of Continuous Beams and Frames: Continuity of reinforced concrete structures, load combinations. Design of Two-way slabs: Edge supported vs. column supported slab systems(DDM). Design of rectangular and circular Reinforced Concrete Columns:, Axialy and eccentrically loaded columns, interaction diagrams. Slender columns and biaxial bending.

Textbook

Hasson, M. N. & Al-Manaseer,A., "Structural Concrete- Theory and Design", 4th Edition, Wiley, 2008.

References

" Building Code Requirements For Structural Concrete and Commentary"- ACI 318M-08.
Saudi Building Code (SBC).

Course Learning Objectives

By the completion of the course, the students should be able to :

1. Recognize and define basic knowledge of material properties and reinforced concrete behavior.
2. Design of two-way solid slabs using the moment coefficient method (Method 2).
3. Design of two-way slabs using the Direct-Design Method.
4. Design of short columns.
5. Design of long (Slender) columns.
6. Apply Computer calculation.

Course Topics and their Duration:

Topic No.	Duration in weeks
1. Review of knowledge gained in CE 342	1.5
2. RC slab: different types; behavior of one-way and two-way	1.0
3. Analysis and design of two-way edge supported slabs by method of coefficients (method 2).	1.0
4. Analysis and design of two-way solid slab using the direct	2
5. Analysis and design of two-way beamless slab by direct design	2

7. Analysis and design of Short column under Uni-axial loading;	2
8. Analysis and design of Short columns under Bi-axial loading.	1
9. Analysis and design of slender columns; ACI code provisions; design charts.	2
Total	14

Class Schedule Three lecturer sessions per week, 50-mintus each.

Office Hours Sun., Tues : 08:00 -09:15 am.

Course Contribution to Professional Component

Eng. Science: 50 %

Eng. Design: 50 %

Grade Distribution

Work Product	Homework	Quizzes	2 Major	Final
Maximum grade	**5%**	**25%**	**30%**	**40%**

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*			5		4						3

*__LOL__: (3) Application, (4) Analysis, and (5) Synthesis.

Prepared by: Prof. Faisal F. Wafa .
Phone: 6951814.

Last Updated: December 2009

Course **CE 444- Advanced Reinforced Concrete Design (3:2,3) - Elective Course**

Prerequisite CE 442: Reinforced Concrete Design (II)

Course Description (2009-2010 Catalog Data) Introduction to Prestressed Concrete, ACI provisions. Types of Prestressing. Losses, Stresses, Deflection, Flexural and Shear Strengths of P.S.C. Retaining Walls, Types and Forces on R.W., Design of R.W.. Design and Construction of R.C. Water Tanks. Water-Proofing, Loads Detailing of Reinforcements, Joints. Design of Circular and Rectangular Tanks.

Textbook

Course Learning Objectives By the completion of the course, the students should be able to:

1. Analysis and Design of Prestressed Concrete Members
2. Analysis and Design of Retaining Walls
3. Design of Circular Tanks
4. Design of Rectangular Tanks

Course Topics and their Duration:

Topic No.	Duration in weeks
1. Analysis and Design of Prestressed Concrete	3
2. Analysis and Design of Retaining Walls	4
3. Design of Circular Tanks	3
4. Design of Rectangular Tanks	4
Total	14

Class Schedule

Office Hours 11:30-2:30 P.M. Sat, Mon, Wed**.**

Course Contribution to Professional Component Eng. Science: %

Eng. Design: %

Grade Distribution

Work Product	Homework	Midterms	Quizzes	Final
Maximum grade	15	30	15	40

Course Relationship to Program Outcomes:

Program Outcomes	ABET Outcomes										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*			**6**		**3**						3

*LOL: 1. Knowledge 2. Comprehension 3. Application 4. Analysis
5. Synthesis 6. Evaluation

Prepared by:

Prof. Faisal F. Wafa .
Phone: 6951814.

Last Updated: December 2009.

Course **CE 451- Design of Hydraulic Structures (3:3,0) – Elective Course**

Prerequisite: CE 352- Hydraulics

Course Description: (2008 Catalog Data) Types. Advantages and functions of hydraulic structures. Flow through orifices. Culverts. Under gates. Over weirs and spillways. Energy dissipation below hydraulic structures. Hydraulic design of culverts. Weirs. Spillways. Aqueducts. Syphons. Regulators and dams. Computer applications.

Textbook(s):

1. Novak, Moffat, Nalluki, and Nararyanan Hydraulic Structures, 2007, ,Taylor and Francis. (available at Alsheqri Book Store at Students' Affairs Building).
2. Golze, A. R. , Hand book of Dam Engineering, Van Nostrand Reinhold Company.
3. Design of Small Canal Structures, United States Bureau of Reclamation.
4. Hand outs

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Analyze and design different dams and select the proper dam for any practical problem he may encounter in his professional life.
2. Analyze and design different spillways.
3. Design and supervise the construction of conveyance structures.
4. Design various protection structures.
5. Design of various energy dissipation structures.

Course Topics and their Duration:

Topic No.	Duration in weeks
Elements of Dam Engineering	1
Embankment dam engineering	2
Concrete Dam Engineering	2
Spillways and Outlet Works	2
Energy Dissipations	2
Dam Safety	1
Diversion works	2
Total	14

Class Schedule Two lecturer sessions per week

Office Hours 10 - 11 A.M. Sat, Mon**.**

Course Contribution to Professional Component

Eng. Science: 20 %

Eng. Design: 80 %

Grade Distribution

Work Product	Assignment	Midterm	Quizzes	Term Project	Final
Maximum grade	**10**	**25**	**15**	**15**	**35**

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**F**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	**1**		**3**								**2**

*__LOL__: 1. Knowledge, 2. Comprehension, 3.Application, 4. Analysis, 5.Synthesis 6. Evaluation.

Prepared by:

Dr. Abdullah Alghamdi.
Phone: 6402000/68237.

Last Updated: Fall 1430-1431 H

Course **CE 457 Water Resources Planning and Management (3:3,0) – Elective Course**

Prerequisite: CE 353 Hydrology and Water Resources Engineering

Course Description: (2008 Catalog Data) Introduction to planning and management principles; evaluation of alternatives by the principles of engineering economy; levels of planning; planning approach and planning environment; project formulation; project evaluation; Environmental considerations in planning; System analysis in water planning; multipurpose and multi objective projects.

Textbook(s):

Neil, S. Grigg., Water Resources Planning, McGraw Hill, USA, 1995.
Alvin, S. Goodman, Principles of Water Resources Planning, Prentice-Hall, Inc., USA, 1984.
Neil, S. Grigg., Water Resources Management , McGraw Hill, USA,1999.

Course Learning Objectives

By the completion of the course, the students should be able to:

1. To introduce senior students in civil engineering to the principles of Water Resources planning and management of basic projects
2. To develop students ability to apply these principles to Water projects.

Course Topics and their Duration:

Topic No.	Duration in weeks
1. PLANNING, MANAGEMENT AND PUBLIC PROJECTS	3
2. ELEMENTS OF PROJECT FORMULATIONS AND	3
3. ORGANIZATION FOR WATER PROJECTS	2
4. ECONOMICS AND MULTI OBJECTIVE EVALUATION	2
5. INFORMATION, COMPUTERS ,MATHEMATICAL SYSTEM	4
6. ANALYSIS OF RISK AND UNCERTAINTY AND OTHER STUDIES INVOLVING PROBABILITIES	1
Total	15

Class Schedule

Two lecturer sessions per week
Laboratory meets once a week, 3 hours

Office Hours 10 - 11 A.M. Sat, Mon**.**

Course Contribution to Professional Component

Eng. Science: 100 %

Eng. Design: 0 %

Grade Distribution

Work Product	Home work	Midterm	Quizzes	Term Project	Final
Maximum grade	**10**	**20**	**10**	**20**	**40**

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*					4		6				6

*__LOL__: (1) Knowledge (2) Comprehension (3) Application (4) Analysis, (5) Synthesis (6) Evaluation.

Prepared by:

Dr. Abdullah M. Mohorjy .
Phone: 6402000/51411.

Last Updated: Fall 1430-1431 H

Course **CE 461 - Environmental Engineering (4 :3,3) - Required Course**

Prerequisite: CE 352 – Hydraulics

Course Description: (2008 Catalog Data) In this course, the physical, chemical, mathematical and biological principles for defining, quantifying, and measuring environmental quality are described. Next, the processes by which nature assimilates waste material are described and the natural purification processes that form the bases if engineering systems are detailed. Finally, the engineering principles and practices involved in the design and operation of conventional environmental engineering works are covered at length.

Textbook(s): Peavy, Rowe and Tchobanoglous. Environmental engineering, McGraw-Hill, 1985.

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Define environmental quality
2. Quantify environmental quality
3. Measure environmental quality
4. Understand the principles involved in environmental engineering.
5. Apply engineering principles and practice in the design and operation of environmental engineering works.

Course Topics and their Duration:

Topic No.	Duration in weeks
1. Environment and Human Interaction	1
2. Water Quality: Definitions, Characteristics, and Perspective	3
3. Engineered systems for Wastewater Treatment and Disposal	3
4. Air Quality: Definitions, Characteristics, and Perspective	2
5. Engineered Systems for Air Pollution Control	2
6. Solid Waste: Definitions, Characteristics, and Perspective	1
7. Engineered Systems for Solid Waste Management	2
Total	14

Class Schedule Three lectures per week
Laboratory meets once a week , 3 hours

Office Hours 10 - 11 A.M. Sat, Mon. and Wed.

Course Contribution to Professional Component

Eng. Science: 75 %

Eng. Design: 25 %

Grade Distribution

Work Product	Home work	Exams	Lab	Final
Maximum grade	15%	30%	15%	40%

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*		3	5		4		3			2	4

***LOL**: **1. Knowledge 2. Comprehension 3. Application 4. Analysis
5. Synthesis 6. Evaluation

Prepared by: Dr. Saleh F. Magram

Last Updated: Fall 1430-1431 H

Course **CE 465 Wastewater Reclamation and Reuse (3:2,3) – Elective Course**

Prerequisite: CE 461 Environmental Engineering

Course Description: (2008 Catalog Data)

Potential reuse applications. Sources of water for reuse. Treatment technologies suitable for water reuse applications. Criteria for each type of reuse application. The overall procedures for determining the feasibility and planning of water reuse systems as well as the management structure of reuse projects. The management of the biosolids resulting from the treatment of wastewater and related regulations governing their use and disposal . Each student has to prepare and work on a mini-research/project throughout the course and present/submit it at the end of the course.

Textbook(s):

Handbook of wastewater reclamation and reuse, Donald R. Rowe, Isam Mohammed Abdel-Magid, CRC Press, 1995

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Understand the basic concepts and issues involved in wastewater reclamation, recycling and reuse .
2. Understand major issues involved in developing water and biosolids reclamation criteria .
3. Select appropriate treatment technologies for reclaiming and reusing wastewater .
4. Assess the suitability of reclaimed water for any reuse application .
5. Apply knowledge of water and wastewater engineering for designing water reclamation processes .
6. Understand the procedures for planning and managing water reclamation projects .

Course Topics and their Duration:

Topic No.	Duration in weeks
1. Introduction	(5 hr)
2. Water Reclamation and Reuse Criteria: and assessment	(4 hr)
3. Agricultural and Landscape Irrigation	(3 hr)
4. Industrial Water Reuse	(2 hr)
5. Groundwater Recharge with Reclaimed Water	(2 hr)
6. Recreational/Environmental Enhancement.	(2 hr)
7. Water Reclamation Inside Buildings	(2 hr)

9. Reuse and Disposal of Wastewater Biosolids	
10. Planning and Managing Water Reuse	
Total	48 hr

Office Hours

10 - 11 A.M. Sat, Mon**.**

Course Contribution to Professional Component

Eng. Science: 50 %

Eng. Design: 50 %

Grade Distribution

Work Product	Homework	Midterm	Term Project	Field Trip	Final Exam
Maximum grade	10	30	10	10	40

Course Relationship to Program Outcomes:

Program Outcomes	**ABET Outcomes**										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*			4		5		6				6

*__LOL__: (1) Knowledge (2) Comprehension (3) Application (4) Analysis, (5) Synthesis (6) Evaluation.

Prepared by:

Dr. Saleh F. Magram
Phone: 6402000/68237.

Last Updated:

Fall 1430-1431 H

Course: **CE 471 – GPS and GIS Applications (3: 2, 3) - Elective Course**

Prerequisite: **CE 371- Surveying**

Course Description

Introduction to the basic for GPS and GIS applications; Geodesy: introduction, the ellipsoid and geoids, geodetic position , geoids undulation ,deflection of the vertical, geodetic coordinate system ; Map Projection : projections used in state plane coordinate systems, UTM projection; GPS : overview of GPS, differential GPS, GPS static survey, GPS kinematic survey; GIS: introduction to GIS, GIS data sources and data format, creating GIS databases, GIS applications, use of surveying software such as GeoMedia and Leica Geo Office).

Textbook(s):

ELEMENTARY SURVEYING (Twelfth Edition 2008) by Charles D. Ghilani and Paul R. Wolf.

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Explain geodetic principals, and coordinate Systems.
2. Explain map projection and UTM projection.
3. Describe GPS system, software, and applications.
4. Describe GIS system, software, and GIS applications.
5. Integration between GPS and GIS systems.

Course Topics and their Duration:

Sr. No.	Course Topics	Duration in Weeks
1	**Introduction to Geodesy.** 1. The Ellipsoid and Geoids. 2. Geodetic Position and Ellipsoidal Radii of Curvature. 3. Geoids Undulation and Deflection of the Vertical. 4. Geodetic Position Computations. 5. Geodetic Coordinate System. 6. Three-Dimensional Coordinate Computations.	0.4 0.4 0.3 0.4 0.5 0.5
2	**Map Projection.** 7. Projections used in State Plane Coordinate Systems. 8. Lambert Conformal Conic Projection, Direct Problem, and Inverse problem. 9. Transverse Mercator Projection, Direct Problem, and Inverse problem. 10. Data Reduction to State Plane Coordinate Grids.	0.5 0.75 0.75 0.5
3	**Introduction to GPS.** 11. Overview of GPS, and GPS Signal.	0.4 0.4

	12. Reference Coordinate Systems for GPS. 13. Errors in GPS Observations. 14. Differential GPS. 15. Field Procedures in GPS Static Surveys, and Sources of Errors in GPS Work. 16. GPS Kinematic Surveys, and Errors. 17. Data Processing and Analysis.	0.3 0.4 1.5 0.5 1.5
4	**Introduction to GIS.** 18. GIS Data Sources and Classifications. 19. Spatial Data, and Data Format Conversions. 20. Creating GIS Databases. 21. GIS Analytical Functions and Applications.	0.5 0.5

Class Schedule Lectures: Two 2 hour sessions per week. There is 10 laboratory work in this course

Eng. Science: 100 %
Eng. Design: 0.00 %

Course Relationship to Program Outcomes:

Program Outcomes	ABET Outcomes										
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	**2**	**4**		**1**							**3**

*__LOL__:1,2 Knowledge and Comprehension 3, 4 Application and Analysis 5 ,6 Synthesis and Evaluation

Prepared by: Dr. Adel S. El-komy

Last Updated: December, 2009 G

Contact Office Hours: Sat, Mon, Wed: 8-10 AM

Course: CE – 482: Highway Design and Construction (4:3,3)- Required Course

Course Description: Characteristics of driver, pedestrian vehicle, and traffic flow affecting highway design; geometric design of highways; layouts of intersections, interchanges and terminals; highway drainage; review of highway paving materials; design of asphalt paving mixtures; pavement design; highway construction and supervision; categorize common pavement surface distress and associated correction activates; introduction to maintenance management system; computer applications on highway geometric design.

Prerequisites: CE- 341: Materials of Construction and
CE- 381: Transportation Engineering

Textbook(s): *Highway Engineering*. Paul H. Wright and Karen K. Dixon, 7th Edition, John Wiley & Sons, Inc.

Course Learning Objectives: After successful completion of the course, the students should be able to:

1. *Explain* the elements of geometric design of highways and use appropriate methods to calculate value of each element.
2. *Identify* various types of at-grade and grade-separated intersections configurations.
3. *Identify* method used for pavement drainage and technique used to control erosion in highway drainage.
4. *Design* a paving mixture according to the local design practice using local materials.
5. *Design* flexible pavements using the AASHTO design method.
6. *Define* different types of pavement distresses and maintenance activities, and *identify* the common causes of pavement distress.

Course Topics and Their Duration:

Course Topics		**Duration in Weeks**
1	Driver, Pedestrian, and Vehicle Characteristics	0.5
2	Traffic Flow Characteristics	0.5
3	Geometric Design of Highways	4.0

4	Intersections, Interchanges, and Parking Facilities	2.0
5	Highway Drainage	1.0
6	Design of High Quality Paving Materials	2.0
7	Design of Flexible Pavements	1.5
8	Highway Construction	1.0
9	Highway Maintenance and Rehabilitation	1.5

Class Schedule:

- Two 80-minute sessions per week (S T @ 9:300 A.M.)

Course Contribution to Professional Component:

- Engineering Science: 60%
- Engineering Design: 40%

Course Relationship to Program Outcomes:

Program Outcomes	ABET Outcomes										
	a	b	c	d	e	f	g	h	i	J	k
Highest Attainable level of Learning **		**3**	**5**	**3**	**1**	**1**	**1**	**1**			**2**

** 1 : Knowledge 2.Comprehension 3. Application 4. Analysis 5. Synthesis 6. Evaluation

Prepared By: Dr. Shaher Zahran

Last Updated: January 2010

Course: CE – 483: Traffic Engineering (3:3,0)- Elective Course

Course Description: Traffic Engineering studies and measurement; traffic flow theory and queuing theory; highway capacity analysis; parking analysis and layout design; traffic signs, marking and channelization; signalized intersection design and operation; roundabout design and management; ITS applications in traffic engineering; computer application in traffic engineering.

Prerequisites: CE- 381: Transportation Engineering

Textbook(s): *Traffic Engineering*, 3rd Edition, Roger P. Roess, Elena S. Prassas, and William R. McShane, Prentice Hall, 2004.

Reference(s): *Traffic and Highway Engineering*, Nicholas Garber and Lester Hoel, 2nd Edition, PWS Publishing Company, 1997.

Highway Capacity Manual, Special Report 209, Transportation Research Board, 2000.

Manual of Uniform Traffic Control Devices, Federal Highway Administration, Washington, D.C., 2002.

Course Learning Objectives: After successful completion of the course, the students should be able to:

1. Explain traffic system components and functions. *Describe* the characteristics of traffic stream parameters and *analyze* their functional implications on traffic operation.
2. *Identify* different traffic flow parameters and queue characteristics, *Explain* macroscopic and microscopic relationships among the parameters.
3. *Analyze* highway capacity for urban and rural roads, *Apply* the capacity and level of service concepts highway performance analysis, planning and design.

4. *Perform* speed, volume and delay studies, parking study and *Analyze* traffic data. *Prepare* Traffic Study Reports.
5. *Describe* functional parameters of signalized intersection and, *Design* signal phases and roundabout.
6. *Define* application of Intelligent Transport System (ITS) and *Demonstrate* expertise on usage of computer models in Traffic operation and management.

Course Topics and Their Duration:

	Course Topics	Duration in Weeks
1	Introduction, scope and responsibilities of Traffic Engineering	1.0
2	Characteristics of traffic stream parameters	1.0
3	Analysis of Traffic flow parameters, application of traffic flow theory and queuing theory	2.0
4	Highway Capacity Analysis and application in planning and design	2.0
5	Traffic Study: Speed-Flow-Density data collection and analysis	1.5
6	Parking Study- Demand assessment and facility design	1.0
7	Signalized intersection design and performance analysis	1.5
8	Roundabout design and traffic operation management	1.0
9	ITS Application in Traffic Engineering	1.0
10	Application of computer models – HCS, SIDRA, SYNCHRO, AIMSUN	2.0

Class Schedule:

- Two 80 minute sessions per week (.S T @ 11:00 A.M.)

Course Contribution to Professional Component:

- Engineering Science: 80%

- Engineering Design: 20%

Course Relationship to Program Outcomes:

Program Outcomes	ABET Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
Highest Attainable level of Learning **	**-**	**4**	**4**	**-**	**4**	**2**	**3**	**-**	**2**	**2**	**2**

**1 : Knowledge 2. Comprehension 3. Application 4. Analysis 5. Synthesis 6. Evaluation

Prepared By: Dr. Md. Jobair Bin Alam

Last Updated: October 2009

Course: **CE - 486: Flexible Pavement Maintenance (3:3,0)- Elective Course**

Course Description: Essential terminologies and concepts of preservating existing highway asphalt pavements; characterizing flexible pavement distresses and identifying possible cause of distresses; relating pavement distress types and distress severity to cost-effective repair alternatives; simple procedure to inventory pavement conditions and select maintenance methods

Prerequisites: CE- 341: Materials of Construction and
CE- 381: Transportation Engineering

Textbook(s): *Instructor Lecture presentations and Handouts*

Course Learning Objectives: After successful completion of the course, the students should be able to:

1. Define the common. terminologies used in pavement maintenance and rehabilitation
2. *Identify* various types of maintenance activates and *explain* the major differences between corrective maintenance activities and rehabilitation concepts
3. Accrue practical information on the subject of surface treatments overview including of crack sealing materials and application methods; and pothole patching decisions
4. Accrue essential information on milling, recycling; and constructing non-structural overlays
5. Accrue practical knowledge on surface treatments for low-volume roads and parking facilities
6. Implement simple procedure to inventory pavement conditions and select maintenance methods

Course Topics and Their Duration:

Course Topics		Duration in Weeks
1	INTRODUCTION Definition of Flexible Pavement Maintenance and the concept of serviceability Definition of Preventive Maintenance VS Rehabilitation	1
2	Identification of pavement distresses and Severity	1
3	Characterization of Flexible Pavement Distresses	1
4	Identification of Possible Causes of Flexible Pavement Distresses	1
5	Categorization of Maintenance Activates	1

6	Recommended Treatment Practices For Pothole Patching and Repair Crack Treatments Treatments for Surface Defects	4
7	Milling and surface leveling treatments	1
8	Design of Non-structural overlays and ULTRA-THIN Asphalt Overlay	2
9	Design of overlays to restore the pavement structural capacity (stability)	2

Class Schedule:

- Two 80-minute sessions per week (S T @ 9:300 A.M.)

Course Contribution to Professional Component:

- Engineering Science: 50%
- Engineering Design: 50%

Course Relationship to Program Outcomes:

Program Outcomes	ABET Outcomes										
	a	b	c	d	e	f	g	h	i	J	k
Highest Attainable level of Learning **			**5**		**3**			**2**	**3**		**6**

** 1 : Knowledge 2.Comprehension 3. Application 4. Analysis 5. Synthesis 6. Evaluation

Prepared By: Dr. Shaher Zahran

Last Updated: January 2010

Course **CE 499 – Senior Project** **(4:2,4) - Required Course**

Prerequisite: CE 321 - Construction Management, CE 333- Geotechnical Engineering, CE 342 - Reinforced Conc. Design- I, CE 352 – Hydraulics, CE 382 - Transportation Engineering

Course Description: (2008 Catalog Data) Team-work on a civil engineering capstone design project involving comprehensive design experience; exposure to professional practice with practitioner involvement. Preparation of the project report and its presentation.

Textbook(s): TBA

Course Learning Objectives

By the completion of the course, the students should be able to:

1. Understand and practice the basic concepts and elements of engineering design for a multidisciplinary civil engineering project.
2. Practice group learning and teamwork by working on a multidisciplinary project.
3. Improve oral and written communication skills.
4. Do integrated project planning, scheduling, and cost analysis for a moderately-sized, civil engineering project.

Course Topics and their Duration:

Topic No.	Duration in weeks
1. Project selection and team formation	1
2. Problem Definition	2
3. Literature review and data collection	3
4. Problem formulation:	3
- Knowledge integration	---
- Operational and realistic constraints	---
- Design objectives	---
- Evaluation criteria	---
5. Design options and initial layout	2
6. Work plan and budgeting	1
7. Progress report and oral presentation	1
8. Implementation phase	7
9. Design refinement	3
10. Final report and oral presentation	3

Class Schedule 2 general audience oral presentations of 30 minutes each

Course Contribution to Professional Component

Eng. Science: 0%

Eng. Design: 100%

Course Relationship to Program Outcomes:

Program Outcomes	ABET Outcomes										
	a	**b**	**c**	**d**	**E**	**f**	**g**	**h**	**i**	**j**	**k**
Highest Attainable LOL*	3	5	5	3	3	3	3	3	3	3	3

*LOL: 1. Knowledge 2. Comprehension 3. Application 4. Analysis
5. Synthesis 6. Evaluation

Prepared by: Dr. Mahmoud A. T. Salem (Coordinator)

Phone: 6402000/68906.

Last Updated: January 2010