APPENDICES

Appendix A – Courses Syllabi

Appendix A – 1

General, Math, and Basic Science Courses Syllabi

Chem 111

1. Course Name and code: General Chemistry – Chem 111 2.

Credit hours : 4 hrs

Contact hours: 4 hrs (3 hours lectures and 1 hour practical)

3. Instructor/coordinator: Dr. Karim M ElSawy

4. Text book and Other supplemental materials

Text book:

- Davis, Raymond Earl, Larry Peck, and George G. Stanley. General chemistry. Hampshire: Thomson Brooks/Cole, 2004.
- Ebbing, Darrell, and Steven D. Gammon. *General chemistry*. Cengage Learning, 2010.

References:

- Silberberg, Martin Stuart. Principles of general chemistry. New York: McGraw-Hill Higher Education, 2007.

Other supplemental materials

- Course materials (assignments, documents, sheets, etc.) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

Matter, Chemical calculations, Atomic structure, Bohr theory, Quantum theory, Quantum numbers, The Electron configuration of atoms, The periodic table, Gases, Solutions, Chemical kinetics, Chemical equilibrium, Thermochemistry.

B) Prerequisites: None

C) Co-requisites: None

D) Course Condition: ■ Required · Elective · Selective

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to:

1. Distinguish different forms of matter

2. Perform basic chemical calculations
3. Know the different aspects of atomic structure and relevant theories
4. Be able to correctly assign the electron configuration of arbitrary atoms and deduce related chemical properties
5. Appreciate the significance of the periodic table and be able to use it to compare the physical and chemical properties of different elements
6. Apply the gas laws to simple problems of general and chemical interest.
7. Recognize the importance of the time domain of chemical reaction through chemical kinetics and to understand factors that control progression of chemical reaction.
8. Grasp the importance of chemical equilibrium, its relation to chemical kinetics and its impact on performing chemical calculations
9. Understand the basics of thermochemistry as a subtopic of the broader field of thermodynamics.

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	B	c	d	e	f	g	h	i	j	k	L
Chem 111	■	☐		☐				■	☐	☐		

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
Chem 111	■			■	☐	☐	

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Introduction: Matter
2. Chemical calculations
3. Atomic structure, Bohr theory,
4. Quantum theory, Quantum numbers
5. The electron configuration of atoms
6. The Periodic table
7. Gases
8. Solutions

9. Chemical kinetics
10. Chemical equilibrium
11. Thermochemistry

CSC 209

8. Course Name and code: Computer Programming – CSC 209

9. Credit hours : 3 hrs

Contact hours: 4 hrs (2 hours lectures and 1 hour practical)

10. Instructor/coordinator: Dr. Hussam ALZEIN

11. Text book and Other supplemental materials

Text book:

- Stephen J. Chapman, MATLAB Programming with Applications for Engineers, CLEngineering; 1 edition 2012, ISBN-10: 0495668079

References:

- Craig S. Lent, Learning to Program with MATLAB: Building GUI Tools, Wiley; 1 edition (January 9, 2013), ISBN-10: 0470936444

Other supplemental materials

- Course materials (assignments, documents, sheets, …) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).
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12. Specific course information

A) Catalog Description

Introduction to computers and computing fundamentals in MATLAB, Data Types, Variables, Scalar and array operations, Built-In MATLAB Functions, Simple input/output statement, plotting commands, Relational and logical expressions, IF-ELSE control structure , the switch control structure, The WHILE statement , The FOR statement and looping structure, Arrays one dimensional and multidimensional Methods, Engineering Applications.

B) Prerequisites: None

C) Co-requisites: None

D) Course Condition: ■ Required · Elective · Selective

13. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to be able to

1. Describe Essential elements of MATLAB programming language
2. Describe the concept of data types, variables and assignment
3. State the notions of selection and repetition structure in MATLAB
4. State the notions of array, vector and matrix in MATLAB
5. Describe 2D Plotting
6. Develop analytic skills to solve simple engineering problem
7. write , test programs in MATLAB

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	b	C	d	e	f	g	h	i	j	k	L
CSC 209	■				□						■	

■ Highly related to Student Outcome (SO)

□ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
CSC 209	■	■				■	

■ Highly related to Student Outcome (SO)

□ To some extent related to Student Outcome (SO)

14. Brief list of topics to be covered

1. Introduction to MATLAB, The Advantages of MATLAB, Disadvantages of MATLAB, The MATLAB Environment
2. MATLAB Basics Variables and Arrays , Creating and Initializing Variables in MATLAB, Assignment Statements, Built-in Functions, Keyboard Input
3. Multidimensional Arrays, Subarrays, Special Values, Displaying Output Data
4. Scalar and Array Operations, Scalar and Array Operations, Built-in MATLAB Functions
5. Introduction to Plotting
6. MATLAB Applications:Vector Mathematics, MATLAB Applications: Matrix Operations and Simultaneous Equations
7. Two-Dimensional Plots
8. Branching Statements and Program Design, Top-Down Design Techniques, Relational and Logic Operators, The if Construct,
9. The switch Construct, MATLAB Applications: Roots of Polynomials

10. Loops and Vectorization, The while Loop , The for Loop
11. Logical Arrays and Vectorization
12. MATLAB Applications: Statistical Functions
13. MATLAB Applications: Curve Fitting and Interpolation
14. Engineering Applications

GE 104

Course Name and code: Basics of Engineering Drawing – GE 104

Credit hours: 3 hrs

Contact hours: 5 hrs (2 hours lectures and 3 hour Lab)

Instructor/coordinator: Prof. Elamir Samy Gadelmawla

4. Text book and Other supplemental materials

Text book:

- James D. Bethune, Engineering graphics with AutoCAD, 1st edition, 2008, PrenticeHall.
- Colin H. Simmons and Dennis E. Maguire, Manual of engineering drawing, 2nd edition, 2004, Elsevier Newnes, Linacre House, Jordan Hill, Oxford OX2 8DP, 200 Wheeler Road, Burlington MA 01803.

References:

- Colin H. Simmons, Dennis E. Maguire, Neil Phelps, "Manual of Engineering Drawing", 2nd edition, Elsevier, Linacre House, Jordan Hill, Oxford OX2 8DP, 2006.

Other supplemental materials

- Course materials (assignments, documents, sheets, …) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

GE 104 teaches students the basics of engineering drawing including orthographic projection, sectional views, auxiliary views, and writing dimensions. In addition, the student will learn how to draw simple engineering drawings using recent computer aided design (CAD) software.

B) Prerequisites: None

C) Co-requisites: None

D) Course Condition: ■ Required ☐ Elective ☐ Selective

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students will be able to:

1. Understand the basics of geometrical construction and sketching techniques.
2. Understand the fundamentals of orthographic projection, Sectional and auxiliary views, isometric views.

1.

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3. Draw and interpret engineering drawings.
4. Construct isometric views from two orthographic views.
5. Draw orthographic views from isometric views.
6. Draw sectional views.
7. Apply international standards of dimensioning on engineering drawings.
8. Apply recent computer technology (CAD software) to draw simple engineering drawings.

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	B	c	D	e	f	g	h	i	j	k	L
GE 105	■		☐				■				■	

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
GE 105	■	■	■			■	

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Introduction, Graphic instruments and their use
2. Basics of lettering and line types
3. Constructional geometry
4. Orthographic projection and sectional views
5. Writing dimensions and international standards
6. Isometric views
7. Computer graphics using AutoCAD

GE 105

Course Name and code: Basics of engineering technology – GE 105

Credit hours: 2 hrs

Contact hours: 1 hour lecture, 2 hours (practice)

Instructor/coordinator: Lec. Bashar Alani

4. Text book and Other supplemental materials

Text book:

- Basic of Production Engineering (Arabic Version), Engineering College, KAU, KSA.

References:

- Introduction to manufacturing , chapman

Other supplemental materials

- Course materials (assignments, documents, sheets, …) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

Basic engineering technology including casting, welding, forging, plastics forming and metal cutting. Lab includes industry tours and hands-on machine shop projects focusing on fundamental theory and operation of precision measuring instruments, hand tools, metal lathes, shaper, drills and mills M/c.

B) Prerequisites: GE 104

C) Co-requisites: None

D) Course Condition: ■ Required □ Elective □ Selective

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to:

1. Know workshop safety, bench work and marking techniques, handling machine tools, joining, casting processes.
2. Be familiar with the major classes of engineering materials.
3. Be able to locate material property data.
4. Understanding of production of different materials (Iron and steel making aluminum, copper and their alloys).
5. Understanding of metrology including standard of length, comparators, angle measurement, limits and gauge design.
6. Undertake, under supervision, workshop practice with hands-on in turning, welding, milling and metrology

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2.

3.

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	B	c	D	E	f	g	h	i	j	k	L
GE 105	■	■	☐				☐		☐		■	■

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
GE 105	■	■	☐			■	☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Introduction to manufacturing systems and industrial safety.
2. Properties of Metals, Non-ferrous Metals, Non-ferrous Alloys
3. Production of Iron and Steel, Plain Carbon and Alloy Steels, Tool Steels and the Iron-Carbon Diagram
4. Heat Treatments of Steels: Heating, Quenching, Tempering, Annealing, Aging, and Surface Hardening.
5. Production of copper and its alloys, aluminum and its alloys
6. Casting processes: sand casting, die casting.
7. Machine tools and metal cutting: characteristics of machine tools, aspects of turning, milling, drilling, shaping and grinding.
8. Hand tools: files, saws, drilling, manual threading.
9. Welding and joining: gas welding, arc welding, resistance welding, soldering, brazing, riveting.
10. Measurements: Introduction to the theory of measurements, calibers, verniers, micrometers, comparators.

GE 201

Course Name and code: Statics – GE 201

Credit hours: 3 hrs

Contact hours: 4 hrs (3 hours lectures and 1 hour tutorial)

Instructor/coordinator: Dr. Saad M. S. Mukras

4. Text book and Other supplemental materials

Text book:

- J.L. Meriam and L.G. Kraiger, Engineering Mechanics, Volume 1, Statics, Wiley.

References:

- R. C, Hibbeler, Engineering Mechanics Statics, Prentice Hall.

Other supplemental materials

- Course materials (assignments, documents, etc) will be uploaded to the College WebSite: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

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

B) Prerequisites: None

C) Co-requisites: None

D) Course Condition: ■ Required □ Elective □ Selective

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to be able to:

1. Define concepts in mechanics including; scalars, vectors, forces, moments, couples and resultants. .
2. Explain what is meant by a structure being in equilibrium
3. Analyze basic structures in equilibrium.
4. Determine the internal loads in basic structures in equilibrium (including, trusses, frames & machines).
5. Determine the centroid of a line, an area and a volume and the area and mass moment of inertia.
6. Analyze the friction forces on a body.

B) Old Relation to the student outcomes

1.

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3.

Course Code	Student Outcomes (SO)											
	a	B	c	D	E	f	g	h	i	j	k	L
GE 201	■				■						☐	

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
GE 201	■	☐				☐	

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Basic concepts, Scalars and Vectors, Units.
2. Force Systems: 2D - Rectangular Components, Moment
3. Force Systems: 2D - Couple, Resultants
4. Force Systems: 3D - Rectangular Components, Moment and Couple
5. Equilibrium in 2D: FBD, Equilibrium condition
6. Equilibrium in 3D: Equilibrium condition
7. Plane Trusses: Method of Joints, Method of Sections
8. Frames and Machines
9. Center of Mass, Centroid of Line, Area and Volume - Composite bodies
10. Beams: External Effects
11. Rectangular & Polar moment of Inertia, Radius of Gyration
12. Friction Phenomena

GE 202

Course Name and code: Dynamics – GE 202

Credit hours: 3 hrs

Contact hours: 4 hrs (3 hours lectures and 1 hour tutorial)

Instructor/coordinator: Dr. Saad M. S. Mukras

4. Text book and Other supplemental materials

Text book:

- J.L. Meriam and L.G. Kraiger, Engineering Mechanics, Volume 2, Dynamics, Wiley.

References:

- R.C. Hibbeler, Engineering Mechanics; Volume II, Dynamics, Prentice Hall.

Other supplemental materials

- Course materials (assignments, documents, etc) will be uploaded to the College WebSite: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

Kinematics of particles: curvilinear motion, and relative motion; Kinetics of particles: Newton's Law, work and energy, impulse and momentum, and impact; Kinematics of rigid body in plane motion: relative velocity and acceleration, and rotating axes, Kinetics of rigid body in plane motion: translation, fix axis rotation, general motion and work & energy. Impulse and momentum.

B) Prerequisites: GE 201

C) Co-requisites: None

D) Course Condition: ■ Required □ Elective □ Selective

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to:

1. Define particles and rigid bodies as applied to dynamics
2. Define kinetics and kinematics
3. Recall the solution approaches to kinetics of particles and rigid body problems
4. Differentiate between particles and rigid bodies with reference to dynamics
5. Analyze the position, velocity and acceleration of particles and rigid bodies
6. Apply "kinetics solution procedures" to study motion and forces in particles and rigid bodies
7. Transform physical problems into mathematical problem in order to extract the required quantities

B) Old Relation to the student outcomes

1.

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Course Code	Student Outcomes (SO)											
	a	b	C	D	e	f	g	h	i	j	k	L
GE 202	■				■		☐				☐	

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
GE 202	■	☐	☐			☐	

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Introduction to dynamics, Kinematics of Particles: Rectilinear motion
2. Kinematics of Particles: Plane & Space Curvilinear Motion
3. Kinematics of Particles: Relative Motion
4. Kinematics of Particles: Constrained motion of connected particles
5. Kinetics of Particles: Force-mass-acceleration, Work and Energy, Impulse & Momentum, Impact
6. Plane Kinematics of Rigid Bodies: Rotation
7. Plane Kinematics of Rigid Bodies: Relative Velocity & Relative Acceleration
8. Plane Kinetics of Rigid Bodies: Force-Mass-Acceleration, work and Energy, impulse momentum

GE 401

Course Name and code: Engineering Economy – GE 401

Credit hours: 3 hrs

Contact hours: 4 hrs (3 hours lectures and 1 hour tutorial)

Instructor/coordinator: Dr. Osama Mohamed Irfan

4. Text book and Other supplemental materials

Text book:

- ***Textbooks:*** Leland Blank, Anthony Tarquin., Engineering Economy, McGraw-Hill, 2012
- ***References:*** White, I. and John, A, Principles of engineering economic analysis, John Willy, 2009

Other supplemental materials

- Course materials (assignments, documents, sheets, …) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

(1) Introduction to Engineering Economy (2) Interest formulas and economics equivalence, cash flow estimation and diagrams (3) Nominal and effective interest rates(4) Comparison of alternatives and decision making based on economic considerations (5) Application of present worth and annual worth analysis (6) Break Even point and analysis (7) Depreciation and depletion methods (8)Economic analysis of Public sector projects (9) Cost Estimation – (10) Evaluating of Replacement and retention alternatives.

B) Prerequisites: None

C) Co-requisites: None

D) Course Condition: ■ Required □ Elective □ Selective

6. Specific goals for the course

A) Course Specific outcomes

By the completion of this course the student will be able to:

1. Understand and define the basic concepts and roles of engineering economy.
2. Identify main engineering economy symbols, select suitable compound interest factors (single payment, uniform series, gradient series and shifted series).
3. Understand, realize, and solve problems related to Cash flow diagrams, Applications of present worth, annual worth and future worth analysis for engineering projects, Depreciation and depletion of assets, Cost accounting.
4. Select from different alternatives.
5. Realize the basic concepts of replacement or retention of an asset.

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B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	B	c	D	e	f	g	h	i	j	k	L
GE 401	■				■	■		■	☐	☐		

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
GE 401	■			■			☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Introduction to Engineering Economy - Interest Rate and Rate of Return.
2. Simple and Compound Interest - Terminology and Symbols.
3. Cash Flows, their estimations and diagrams, Time value of money, Single payment formulas, Uniform Series formulas, gradient formulas and cash flows that are shifted.
4. Nominal and effective interest rate.
5. Formulating alternatives and making decision, (Present worth and Annual worth analysis).
6. Break – even and minimum cost analysis.
7. Depreciation economic analysis of operations.
8. Economic analysis of public projects.
9. Cost Estimation
10. Evaluating replacement alternatives and replacement study.

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2.

3.

GE 402

Course Name and code: Project Management GE 402

Credit hours: 3 hrs

Contact hours: 4 hrs (2 hours lectures and 2 hours tutorial) Instructor: Dr. Tomas U. Ganiron, Jr.

4. Text book and Other supplemental materials

Text book:

- Culture and Project Management, Omar Zein, First edition, Gower Publishing Inc., 2015.

References:

- Project Management for Supplier Organization, Adrian Taggart, First edition, Gower Publishing Inc., 2015.
- Management Science, Operations Research and Project Management, Jose Ramon Mateo, First edition, Gower Publishing Inc., 2015.
- The Essentials of Project Management, Dennis Lock, Fourth edition, Gower Publishing Inc., 2014.

Other supplemental materials

- Course materials (assignments, documents, sheets, …) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

The course gives an introduction to project management which includes initiating process, planning process, project organization, project execution process, project control & closing process. It also covers the management functions, methods of planning and program development time CPM (materials, equipment, labor, sub- contractor), the network diagram, time scaled event network, leadership ,project vision and mission, delegating, motivation, constructive & positive feedbacks, decision making , team building, engineering ethics, negotiation & contracts, risk management, conflict management, stress management & anger management, SWOT Analysis, and hands-on MS project/primavera planning.

B) Prerequisites: Pass 90 Credit hours

C) Co-requisites: None

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D) Course Condition: ■ **Required** □ **Elective** □ **Selective**

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to:

1. Assess and evaluate the factors that lay behind successful project management techniques.
2. Design a risk management program, stress management program, conflict management program and anger management program suited to the specific need of construction companies
3. Appreciate and be able to discuss the range of project management approaches.
4. Analyze the impact of resource constraints on achieving project goals.
5. Distinguish and describe the range of different techniques available in project management.
6. Evaluate the effects of organizational issues on PM.
7. Apply theoretical insights from their courses to managing effective projects.

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	B	c	D	e	f	g	h	i	j	k	L
GE 402	□	□	□	■	■	■	■	■	■	■	□	

■ Highly related to Student Outcome (SO)

□ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
GE 402	■	□	■	■	■	□	■

■ Highly related to Student Outcome (SO)

□ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Project Management Concepts

2. Initiating Process: Linking the project to the product, Problem scope, Product scope and Project scope.
3. Balancing competing demand with the triple constraint and Project success 4. Planning Process: Integrated project planning, The Work Breakdown Structure (WBS) and PERT CPM.
5. The Network Diagram, Gantt chart, Manpower leveling, Crashing and Cost plan.
6. Quality plan, Communication plan and Implementation plan.
7. Project organization, Leadership, Delegating. Power, Project vision and Project mission.
8. Motivation, Positive & constructive feedbacks, Communication, Team building and Decision making.
9. Contracts, Bidding & Awarding procedures, and Engineering code of ethics.
10. Behavioral management: Stress management, Conflict management and Anger management.
11. Project execution, Monitor and Control process
12. Computer hands on-Basic Primavera Planning
13. Computer hands on-Advanced Primavera Planning
14. Computer hands on-Basic and Advanced MS Project
15. Special topics in Career planning and Career management

GE 405

Course Name and code: Co-operative Training GE 405

Credit hours: 9 hrs

Contact hours: ---

Instructor/coordinator: Prof. Elamir Samy Gadelmawla

4. Text book and Other supplemental materials

Text book:

- N/A

References:

- N/A

Other supplemental materials

- Course Instructions are uploaded for the students on the College Web-Site: (http://qec.edu.sa).

5. Specific course information

A) Catalog Description

Cooperative Training Program is a joint effort between the College of Engineering and the public and the private sectors in the area of specialization to allow students to practice the

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skills and knowledge they have learned. Coop students are required to spend seven months of practical training in a relevant field in industry.

B) Prerequisites: 100 hours teaching.

C) Co-requisites: None

D) Course Condition: ■ Required ☐ Elective ☐ Selective

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students will be able to:

1. Apply the major discipline theoretical knowledge.
2. Practice what he gained of skills.
3. Enhance the ability of working in a team.
4. Gain the competence of adaptation (anticipating, adapting to, and promoting changes important to a profession societal purpose and the professional role).
5. Receive and practice the ethics of a profession as standards that guide professional behavior.
6. Acquire the leadership competence.
7. Have the scholarly concern for improvement.

***B)* Old Relation to the student outcomes**

Course Code	Student Outcomes (SO)											
	a	b	c	D	e	f	g	h	i	j	k	L
Stat 324	■	☐			■		☐	☐	☐	☐		

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

***C)* New Relation to the student outcomes**

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
Stat 324	■		☐	☐		☐	☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

 N/A

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Math 105

Course Name and code: Differential Calculus MATH 105 Credit hours: 3 hrs

Contact hours: 4 hrs (3 hours lectures and 1 hour tutorial)

Instructor/coordinator: Dr. Syed Shakaib Irfan

4. Text book and Other supplemental materials

Text book:

- Calculus by H. Anton, I. Bivens and S. Davis, 9th Ed.; John Wiley & Sons.

References:

- Calculus, Single Variable, G. B. Thomas, Jr., M. D. Weir, J. R. Hass and R. L. Finney, *Addison-Wesley Publishing Company,* 2014.

Other supplemental materials

- Course materials (assignments, documents, sheets, …) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

Real Numbers. Functions, Limits, Continuity. Derivatives, Differentials, Chain Rule, Implicit Differentiation. Higher Order Derivatives, Local Extrema, Concavity, Horizontal and Vertical Asymptotes, Applications of Extrema, Related Rates. Rolle's Theorem, Mean Value Theorem, Inverse Trigonometric Functions.

B) Prerequisites: None

C) Co-requisites: None

D) Course Condition: ■ Required ☐ Elective ☐ Selective

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to be able to:

1. Draw the graphs of the functions using properties of translation, symmetry etc and family of functions.
2. Find Composition of functions, new functions from old functions.

3. Evaluate limits of the functions and check the continuity of various types of functions,
4. Evaluate vertical and horizontal asymptotes.
5. Find tangent line and rate of change.
6. Find derivatives of different kinds of functions using different methods: Sum, Difference, Product, Quotient Rules and Implicit Differentiation.
7. Apply differentiation to find linear approximation, concavity and maxima or minima of functions.
8. Use Rolle's and Mean-Value Theorems.

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	b	c	D	e	f	g	h	i	j	k	L
Math 105	■				☐		☐		☐			

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
Math 105	■		☐				☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Real Numbers, Functions, New functions from old, Family of functions.
2. Limits, Asymptotes, Limits and continuity of trigonometric functions
3. Derivative function, Techniques of differentiations, Derivatives of trigonometric and inverse trigonometric functions.
4. Tangent lines, rates of change, Chain Rule, Implicit differentiation and Related rates.
5. Derivative in Graphing and Applications: Increase, Decrease, Concavity, Relative Extrema, First and Second Derivative Test.
6. Applications of Extrema, Rolle's and Mean Value Theorems.

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Math 106

Course Name and code: Integral Calculus – MATH 106

Credit hours: 3 hrs

Contact hours: 4 hrs (3 hours lectures and 1 hour tutorial)

Instructor/coordinator: Dr. Syed Shakaib Irfan

4. Text book and Other supplemental materials

Text book:

- Calculus, by H. Anton, I. Bivens and S. Davis, *John Wiley & Sons*, 9th Edition, 2010.

References:

- Calculus, Single Variable, G. B. Thomas, Jr., M. D. Weir, J. R. Hass and R. L. Finney, *Addison-Wesley Publishing Company,* 2014.

Other supplemental materials

- Course materials (assignments, documents, sheets, …) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. 5. Specific course information

A) Catalog Description

Fundamental theorem of calculus, the definite and indefinite integral. Area, volume of revolution, work, arc length. Integration of inverse trigonometric, logarithmic, exponential functions, hyperbolic and inverse hyperbolic functions. Techniques of integration: substitution, by parts, trigonometric substitution, partial fractions, miscellaneous substitutions, numerical integration, improper integral. Parametric and polar curves.

B) Prerequisites: None

C) Co-requisites: None

D) Course Condition: ■ **Require** □ **Elective** □ **Selective**

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to be able to:

1. Understand definite and indefinite integrals.
2. Calculate the limit of functions by L'Hospital's rule.

3. Apply integration to find the area between to curves, volumes, arc length and surface area of the solid of revolution.
4. Integrate various types of functions: logarithmic, exponential trigonometric, inverse trigonometric, hyperbolic functions and inverse hyperbolic functions.
5. Use various integration methods such as integration by parts, by trigonometric substitution, partial fractions to integrate various types of function.
6. Evaluate numerical integration and improper integrals.
7. Evaluate tangent lines and arc lengths for parametric and polar curves.

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	b	c	D	e	f	g	h	i	j	k	L
Math 106	■				☐		☐		☐			

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
Math 106	■		☐				☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Indefinite integral, integral by substitution and definite integral.
2. Fundamental theorem of calculus and average value of a function & its applications
3. Derivatives and integration of logarithmic and exponential functions. L'Hospital rule.
4. Evaluating definite integrals by substitution, logarithmic and other functions defined by integrals
5. Area, volume, length of a plane curve and area of surface of revolution
6. Hyperbolic functions, integration by parts, integrating trigonometric functions, trigonometric substitution and integrating rational functions by partial fractions
7. Numerical integration, improper integral.
8. Parametric & polar curves.

Math 203

1. **Course Name and code: Differential & Integral Calculus - Math 203**
2. **Credit hours: 3 hrs**

   Contact hours: 4 hrs (3 hours lectures and 1 hour tutorial)
3. **Instructor/coordinator: Dr. Mohammad Sajid**
4. **Text book and Other supplemental materials**

   Text book:

   - H. Anton, I. Bivens and S.Davis, Calculus, 9th Edition, Willey & Sons.

   References: -

   Other supplemental materials

   - Course materials (assignments, documents, sheets, etc.) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. **Specific course information**

   A) Catalog Description

Infinite series, convergence and divergence of infinite series, integral test, ratio test, root test and comparison test. Conditional convergence and absolute convergence, alternating series test. Power series. Taylor and Maclaurin series. Functions in two or three variables, their limits, continuity and differentiability, The chain rule, Directional derivatives; gradient, Tangent planes, Maxima and Minima for function in two or three variables, Lagrange multipliers, Double integral and its applications to area, volume, moments and center of mass. Double integrals in polar coordinates. Triple integral in rectangular, cylindrical and spherical coordinates and applications to volume, moment and center of mass. Vector fields, line integrals, surface integrals, Green's theorem, the divergence theorem. Stokes theorem.

   B) Prerequisites: Math 105, Math 106

   C) Co-requisites: None

   D) Course Condition: ■ Required □ Elective □ Selective

6. **Specific goals for the course**

   A) Course Specific outcomes

   By the end of this course, students are expected to:

   1. Understand the meaning of convergence of sequences.

2. Able to determine sum of infinite series.
3. Identify and use convergence tests of series
4. Understand basic concepts of functions of two or more variables.
5. Recognize maxima and minima of functions of several variables.
6. Compute the multiple Integrals and its applications
7. Understand the basic concepts of vector fields, gradient, divergence curl & their properties.
8. Understand Green's, divergence and Stock's theorems.

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	B	c	D	e	f	g	h	i	j	k	L
Math 203	■				☐		☐		☐			

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
Math 203	■		☐				☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Sequences and Monotone Sequences
2. Infinite Series
3. Divergence Test, Integral Test, p-series; Comparison, Ratio and Root Tests
4. Alternating Series Test, Conditional and Absolute Convergence
5. Maclaurin and Taylor Series; Power Series
6. Functions in two or three variables, their limits, continuity and differentiability, partial derivatives, the chain rule
7. Directional derivatives; Gradient, Tangent planes
8. Maxima and Minima for functions of two or three variables, Lagrange multipliers
9. Double Integrals and its Applications
10. Triple Integrals and its Applications

11. Vector fields and their divergence and curl
12. Line Integrals, Green's Theorem and Surface Integrals
13. Divergence Theorem and Stoke's Theorem

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Math 208

Course Name and code: Differential Equations – Math 208

Credit hours: 3 hrs

Contact hours: 4 hrs (3 hours lectures and 1 hour tutorial)

Instructor/coordinator: Prof. Gamal Attia

4. Text book and Other supplemental materials

Text book:

- Nagle, Saff and Snider, Fundamentals of Differential Equations and Boundary Value Problems, 8th Edition, Addison Wesley, USA, 2012

.References:

- Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, Inc. 10th Ed., 2011.
- G.F. Simmons –Tata M, Differential Equations with Applications and Historical Notes, cGRAW – Hill, 2nd Ed., 2010.

Other supplemental materials

- Course materials (assignments, documents, sheets,) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

Different types of first order differential equations and its applications. Linear differential equations of higher order. Linear differential equations with constant coefficients. Reduction of the order. Series solution of ordinary differential equations. Frobenius's method. Fourier series of odd and even functions. Integration of Fourier series

B) Prerequisites: Math 203

C) Co-requisites: None

D) Course Condition: ■ Required □ Elective □ Selective

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to have:

1. An ability to understand the meaning of differential equations, its types, order and degree.
2. An ability to classify and solve ordinary differential equations of first order.
3. An ability to solve ordinary differential equations of higher order.
4. An ability to find the series solution of differential equations.
5. An ability to know the applications of differential equation in engineering problems.
6. An ability to find the Fourier expansions of the functions.

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	b	c	D	E	f	g	h	i	j	k	l
Math 208	■				■		☐		☐			☐

■ Highly related to Student Outcome (SO)

☐ To some extenr related to Student Outcome(SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
Math 208	■		☐				☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Introduction to Ordinary Differential Equations (ODE).
2. Separable ODE. and Equations reduced to separable.
3. Homogeneous DE. and DE reduced to Homogeneous.
4. Exact ODE and Integrating Factors.
5. Linear and Bernoulli's DE.
6. Introduction; linear Independence**.**
7. Linear DEs with Constant Coefficients, Auxiliary Equation.
8. Non-homogenous Linear D E, Method of Undetermined Coefficients.
9. Variation of Parameters, Applications**.**
10. System of ODE.
11. Fourier series, Fourier Expansion for Odd and Even Functions.,
12. Series Solution of ODE, Equations with Analytic Coefficients, Frobenius's method.

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Math 244

Course Name and code: Advanced Linear Algebra – Math 244

Credit hours: 3 hrs

Contact hours: 4 hrs (3 hours lectures and 1 hour tutorial)

Instructor/coordinator: Prof. Ahmed Elsonbaty

4. Text book and Other supplemental materials

Text book:

- Howard A. Anton ," **Elementary linear algebra:** J W and sons 9th edition 2000.

References:

Other supplemental materials

- Course materials (assignments, documents, sheets,) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

Introduction, Euclidean n-Space, Linear Transformations , Properties of Linear, Transformations , Linear Transformations and polynomials, Real Vector Spaces, Subspaces, Linear Independence , Basis and dimension, Row spaces, column space and Nullspace, Rank and Nullity, Introduction to Inner Products space, Angle and Orthogonally in inner product space, Orthogonal Bases, Best Approximation, least squares, Change of Basis, Orthogonal Matrices

B) Prerequisites: Math 107

C) Co-requisites: None

D) Course Condition: ■ Required □ Elective □ Selective

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to:

1. Be familiar with several important concepts in linear algebra, including vector spaces, linear independence of vectors, subspaces, bases, and dimension of vector spaces
2. Be familiar with fundamentals of linear transformations and its applications**.**
3. Learn how to use linear algebra to solve problems from engineering and other fields**.**
4. Learn How to calculate the eigenvalues and eigenvectors
5. Acquire the ability to prove mathematical theorems
6. To able to apply several important concepts in linear algebra to such real world phenomena **.**
7. To prepare the student for courses that has Linear Algebra as a prerequisite**.**
8. To improve the students' ability to think logically, analytically, and abstractly**.**
9. To improve the students' ability to communicate mathematics, both orally and in writing

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	b	c	D	e	f	g	h	i	j	k	L
Math 244	■				☐		☐		☐			

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
Math 244	■		☐				☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Euclidean n-space and linear transformations from R^n to R^m.
2. Characterization of linear transformations from R^n to R^m.
3. Generalized vectors from 2- and 3-space of vectors to vectors in n-space.
4. Inner product spaces
5. Angle and orthogonality in inner product space
6. Best Approximation using least squares method.

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3.

Math 254

Course Name and code: Numerical Methods – Math 254

Credit hours: 3 hrs

Contact hours: 4 hrs (3 hours lectures and 1 hour tutorial)

Instructor/coordinator: Dr. Syed Shakaib Irfan

4. Text book and Other supplemental materials

Text book:

- Elementary Numerical Analysis *by* K Atkinson & W Han, *John Wiley & Sons*, 3rd Ed., 2004.

References:

- *Numerical Analysis,* Richard L. Burden and J. Douglas Faires, Brooks/Cole, Cengage Learning, 10th Ed., 2015.
- *Numerical Methods for Engineers with software programming Applications* by Steven C. Chapra and Raymond P. Cancle, McGraw Hill, 6th Ed., 2009.
- *Introductory Methods of Numerical Analysis* by S. S. Sastry, PHI Learning Private Limited, India, 5th Ed., 2012.

Other supplemental materials

- Course materials (assignments, documents, sheets, …) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

An introductory course in numerical methods where the following subjects will be taught to the students: Numerical Solution of non-linear equations and associated errors, convergence rate, solution of system of equations by direct and repeated methods and associated errors, Interpolation and polynomial approximation and associated errors, Numerical differentiation and integration and associated errors, Least Square Method, Introduction to numerical solutions for ordinary differential equations.

B) Prerequisites: Math 106, Math 107

C) Co-requisites: None

D) Course Condition: ■ **Required** □ **Elective** □ **Selective**

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to be able to

1. Compute root of nonlinear equations by using Newton's Method, Secant Method, Fixed Point Iteration Method etc.
2. Describe the errors arising in numerical computation.
3. Familiar with different kinds of techniques for interpolating data.
4. Define numerically definite integrals and numerical differentiation of functions.
5. Familiar with concepts of different matrices methods to solve the system of linear equations and Ability to use iterative methods to determine the solution of system of linear equations.
6. Solve initial value problems using Euler's, Taylor's and Runge-Kutta Methods.

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	b	c	D	e	f	g	h	i	j	k	L
Math 254	■				□		□		□			

■ Highly related to Student Outcome (SO)

□ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
Math 254	■		□				□

■ Highly related to Student Outcome (SO)

□ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Introduction of interpolation, polynomial interpolation.

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2. Divided differences, Newton's divided difference interpolation, error in polynomial interpolation.
3. Bisection, Newton's, secant and fixed point iteration methods for finding the roots of equations.
4. Solution of systems of linear equations, LU factorization, error in solving linear systems
5. Iteration methods (Jacobi and Gauss-Seidel Methods), the Eigen value problem
6. Gaussian numerical integration, numerical differentiation
7. Numerical solutions for ordinary differential equations: Euler's, Heun's, Taylor and Rung -Kutta method & associated error

Math 322

Course Name and code: Partial Differential Equations – Math 322

Credit hours: 3 hrs

Contact hours: 4 hrs (3 hours lectures and 1 hour tutorial)

Instructor/coordinator: Prof. Gamal Attia

4. Text book and Other supplemental materials

Text book:

- Introduction to Partial Differential Equations for Scientist and Engineers Using Mathematica, Kuzman Adzievski & Abul Hasan Siddiqi, Chapman & Hal/CRC (Taylor & Francis Group), 2014.

References:

- Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, Inc. 10th Ed., 2011.
- Nakhle H. Asmar, Partial Differential Equations with Fourier Series and Boundary value problems, Pearson International Edition, 2nd Ed., 2005.

Other supplemental materials

- Course materials (assignments, documents, sheets,) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

Gamma and Beta Functions, The Boundary Value Problem and Orthogonal System,

Expansion the Functions in Bessel and Legendre Functions, Classification of the Partial Differential Equations according the Order and Linearity, The Governing Equation of String, Solution of Wave Equation by D'almbert method and Separation of the Variable, Solution of Heat Equation by Separation of the Variable, Solution of Laplace Equation in Different Regions.

B) Prerequisites: Math 208

C) Co-requisites: None

D) Course Condition: ■ Required □ Elective □ Selective

6. Specific goals for the course

A) Course Specific outcomes

On successful completion of this course, student will be able to:

1. Understand basic concepts of Beta and Gamma functions.
2. Acquainted with concept of boundary value problem and orthogonal system.
3. Expand functions in Bessel and Legendre functions.
4. Acquainted the concepts of Partial differential equation (PDE) and its classifications.
5. Solve PDE with the help of separation of variable method.
6. Solve Wave, Heat and Laplace Equations by separation of variable method.
7. Solve Wave Equation by D'Almbert Method.

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	b	c	D	e	f	g	h	i	j	k	L
Math 322	■				■		□		□			□

■ Highly related to Student Outcome (SO)

□ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
Math 322	■		□				□

■ Highly related to Student Outcome (SO)

□ To some extent related to Student Outcome (SO)

1.

2.

3.

7. Brief list of topics to be covered

1. Gamma and Beta Functions.
2. The Boundary Value Problem and Orthogonal System.
3. Expansion the Functions in Bessel functions.
4. Legendre Functions.
5. Classification of the Partial Differential Equations according the Order and Linearity.
6. The Governing Equation of String.
7. Solution of Wave Equation by Separation of the Variable Method.
8. Solution of Wave Equation by D'almbert method.
9. Solution of Heat Equation by Separation of the Variable.
10. Solution of Laplace Equation in Different Regions.

Math 328

1. Course Name and code: Applied Operation Research - Math 328 2.

Credit hours: 3 hrs

Contact hours: 4 hrs (3 hours lectures and 1 hour tutorial)

3. Instructor/coordinator: Prof. Gamal Attia

4. Text book and Other supplemental materials

Text book:

- HamdyA.Taha (1997). Operational Research An Introduction. 7th edition, Prentice Hall, Upper Saddle River, NJ.

References:

- Winston,WayneL. (2004), Operations Research, Forth Edition, ISBN: 0-534-38058-1
- Hillier, F.S. and Lieperman, G.J. (2001), Introduction to Operation Research (7th edition), McGraw Hill.

Other supplemental materials

- Course materials (assignments, documents, sheets,) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

Definition of operations Research, modeling with linear programming, the simplex method, sensitivity analysis, duality and Post-Optimal analysis, transportation & assignment problems, network problem, integer linear programming.

B) Prerequisites: Math 107

C) Co-requisites: None

D) Course Condition: □ Required ■ Elective □ Selective

6. Specific goals for the course

A) Course Specific outcomes

On successful completion of this course, student will be able to:

1. Describe the origins and basic methodology of operations research.
2. Give examples of applications of operations research in especially in engineering field.
3. Develop linear programming formulations to represent a variety of applied problems including transportation, assignment, and network models.

4. Solve two-variable linear programming problems using the graphical method.
5. Apply the simplex algorithm to solve linear programming problems.
6. Use software to solve linear programming and integer programming problems.
7. Interpret reports generated by software outputs.
8. Explain the role of sensitivity analysis in linear programming.
9. Explain the role of duality in linear programming.
10. Construct and interpret the dual of linear programming problems.
11. Apply specialized algorithms to solve the transportation, assignment & network problems.
12. Develop integer programming formulations to represent a variety of scenarios.
13. Solve integer programming problems "by hand".

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	b	c	D	e	f	g	h	i	j	k	l
Math 328	■				■		☐		☐		☐	

■ Highly related to Student Outcome (SO)

☐ To some extenr related to Student Outcome(SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
Math 328	■	☐	☐			☐	☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. Definition of operations Research.
2. Modeling with linear programming.
3. The simplex method.
4. Big-M method & tow phase method.
5. Sensitivity analysis.
6. Duality and Post-Optimal analysis.
7. Dual simplex method.
8. Transportation & assignment problems, Hungarian method, u,v multiplier, Northwest corner method, least cost method.

9. Network problem, minimal spanning tree, shortest path problem, critical path method, Dijkstra method.
10. Integer linear programming.

Phys 104

1. Course Name and code: General Physics – Phys 104 2.

Credit hours: 4 hrs

Contact hours: 5 hrs (3 hours lectures and 2 hour lab.)

3. Instructor/coordinator: Prof. Gamaleldin Ata

4. Text book and Other supplemental materials

Text book:

- *Physics for Scientists and Engineers,* Fourth edition*, Raymond A. Serway,* Saunders College Publishing ISBN 0-03-015654-8 With Modern Physics

Other supplemental materials

- Course materials (assignments, documents, sheets, ….) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

5. Specific course information

A) Catalog Description

Electric Field: Coulomb's Law, Gauss's Law , Electric Potential, Capacitance and Dielectrics, Current and Resistance, Direct Current Circuits, Magnetic Field, Sources of the Magnetic Field, Faraday's Law, Inductance, Alternating Current Circuits, Photoelectric effect, atomic spectra Bohr's model, structure of the nucleus Radioactivity Half-life, radioactive decay.

B) Prerequisites: None

C) Co-requisites: None

D) Course Condition: ■ Required □ Elective □ Selective

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to:

1. Demonstrate acquired analytical problem solving skills and apply them to problems from different topic areas.
2. Propose and refine physical models based on observation, discussion with other observers, and physical reasoning

3. Demonstrate the ability to apply general science principles from the three topic areas
4. Demonstrate the ability to apply proportional reasoning to numerical problems.
5. Demonstrate an understanding of the concept of the charge as a physical model and draw diagrams for the description of laws of field phenomena and hence the Gauss , Faraday and Kirchhoff laws
6. Demonstrate an understanding of fundamental elements of current electricity. In particular the student will demonstrate the ability to
7. Understand the concepts of the atom and appreciate the importance of models in describing the properties and behavior of atoms and nuclei.
8. Understand the nuclear models and nuclear structures.

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	b	c	D	e	f	g	h	i	j	k	L
Phys 104	■	■	☐	■		☐	☐		☐	☐		

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
Phys 104	■	☐	☐	☐	■	■	☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

1. The charge as a physical model and draw diagrams for the description of laws of field phenomena and
2. The Gauss , Faraday and Kirchhoff laws 3. Fundamental elements of current electricity.
4. The concepts of the atom and appreciate the importance of models in describing the properties and behavior of atoms and nuclei.
5. the nuclear models and nuclear structures.

Chem 111

8. Course Name and code: General Chemistry – Chem 111

9. Credit hours : 4 hrs

Contact hours: 4 hrs (3 hours lectures and 1 hour practical)

10. Instructor/coordinator: Dr. Karim M ElSawy

11. Text book and Other supplemental materials

Text book:

- Davis, Raymond Earl, Larry Peck, and George G. Stanley. General chemistry. Hampshire: Thomson Brooks/Cole, 2004.
- Ebbing, Darrell, and Steven D. Gammon. *General chemistry*. Cengage Learning, 2010.

References:

- Silberberg, Martin Stuart. Principles of general chemistry. New York: McGraw-Hill Higher Education, 2007.

Other supplemental materials

- Course materials (assignments, documents, sheets, etc.) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).

12. Specific course information

A) Catalog Description

Matter, Chemical calculations, Atomic structure, Bohr theory, Quantum theory, Quantum numbers, The Electron configuration of atoms, The periodic table, Gases, Solutions, Chemical kinetics, Chemical equilibrium, Thermochemistry.

B) Prerequisites: None

C) Co-requisites: None

D) Course Condition: ■ Required □ Elective □ Selective

13. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to:

6. Distinguish different forms of matter
7. Perform basic chemical calculations
8. Know the different aspects of atomic structure and relevant theories
9. Be able to correctly assign the electron configuration of arbitrary atoms and deduce related chemical properties

10. Appreciate the significance of the periodic table and be able to use it to compare the physical and chemical properties of different elements
11. Apply the gas laws to simple problems of general and chemical interest.
12. Recognize the importance of the time domain of chemical reaction through chemical kinetics and to understand factors that control progression of chemical reaction.
13. Grasp the importance of chemical equilibrium, its relation to chemical kinetics and its impact on performing chemical calculations
14. Understand the basics of thermochemistry as a subtopic of the broader field of thermodynamics.

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	b	c	d	e	f	g	h	i	j	k	L
Chem 111	■	☐		☐				■	☐	☐		

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
Chem 111	■			■	☐	☐	☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

14. Brief list of topics to be covered

15. Introduction: Matter
16. Chemical calculations
17. Atomic structure, Bohr theory,
18. Quantum theory, Quantum numbers
19. The electron configuration of atoms
20. The Periodic table
21. Gases
22. Solutions
23. Chemical kinetics

24. Chemical equilibrium
25. Thermochemistry

CSC 209

15. Course Name and code: Computer Programming – CSC 209

16. Credit hours : 3 hrs

Contact hours: 4 hrs (2 hours lectures and 1 hour practical)

17. Instructor/coordinator: Dr. Hussam ALZEIN

18. Text book and Other supplemental materials

Text book:

- Stephen J. Chapman, MATLAB Programming with Applications for Engineers, CLEngineering; 1 edition 2012, ISBN-10: 0495668079

References:

- Craig S. Lent, Learning to Program with MATLAB: Building GUI Tools, Wiley; 1 edition (January 9, 2013), ISBN-10: 0470936444

Other supplemental materials

- Course materials (assignments, documents, sheets, …) are uploaded for the students use on the College Web-Site: (http://qec.edu.sa/eng/students/lectures/lectureres.asp).
-

19. Specific course information

A) Catalog Description

Introduction to computers and computing fundamentals in MATLAB, Data Types, Variables, Scalar and array operations, Built-In MATLAB Functions, Simple input/output statement, plotting commands, Relational and logical expressions, IF-ELSE control structure , the switch control structure, The WHILE statement , The FOR statement and looping structure, Arrays one dimensional and multidimensional Methods, Engineering Applications.

B) Prerequisites: None

C) Co-requisites: None

D) Course Condition: ■ Required · Elective · Selective

20. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to be able to

26. Describe Essential elements of MATLAB programming language
27. Describe the concept of data types, variables and assignment
28. State the notions of selection and repetition structure in MATLAB
29. State the notions of array, vector and matrix in MATLAB
30. Describe 2D Plotting
31. Develop analytic skills to solve simple engineering problem
32. write , test programs in MATLAB

B) Old Relation to the student outcomes

Course Code	Student Outcomes (SO)											
	a	b	C	d	e	f	g	h	i	j	k	L
CSC 209	■				☐						■	

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) New Relation to the student outcomes

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
CSC 209	■	■				■	

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

21. Brief list of topics to be covered

15. Introduction to MATLAB, The Advantages of MATLAB, Disadvantages of MATLAB, The MATLAB Environment
16. MATLAB Basics Variables and Arrays , Creating and Initializing Variables in MATLAB, Assignment Statements, Built-in Functions, Keyboard Input
17. Multidimensional Arrays, Subarrays, Special Values, Displaying Output Data
18. Scalar and Array Operations, Scalar and Array Operations, Built-in MATLAB Functions
19. Introduction to Plotting
20. MATLAB Applications:Vector Mathematics, MATLAB Applications: Matrix Operations and Simultaneous Equations
21. Two-Dimensional Plots

22. Branching Statements and Program Design, Top-Down Design Techniques, Relational and Logic Operators, The if Construct,
23. The switch Construct, MATLAB Applications: Roots of Polynomials
24. Loops and Vectorization, The while Loop , The for Loop
25. Logical Arrays and Vectorization
26. MATLAB Applications: Statistical Functions
27. MATLAB Applications: Curve Fitting and Interpolation
28. Engineering Applications

Appendix A2
Engineering Courses

CE 282: Introduction to Geotechnical Engineering

2 Credit

Catalogua Description:

The student is presented with an introductory course of engineering geology as a solid base for studying geotechnical engineering. An extensive in-class presentation of different rock types, its origin and the engineering structure of rock particles. Types and classification of rocks based on origin and strength. Weathering process. Classification of soil based on formation. Index and engineering classification of soil. Clay minerals and soil structure.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: None

Co-requisites: None

Course Category: Core Course

Textbook:

Fred, B., (1993), **Engineering Geology, Blackwell Scientific Publication,** and **Class notes** approved by the CE department council.

References:

……

Other
Supplemental

Materials: Site Uploaded; Notes, Assignments, Quizzes and Exams Model Answers, etc….

Credit and Contact Hours:

Credits: 2 hours, Contact: 3 hours (2 hours of lecture and 1 hour of tutorial per week)

Course Coordinator's Name: Associate Prof. Sherif M. ElKholy

Computer Usage: In completing the homework assignments and preparing reports.

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to demonstrate that he acquired:

1. A knowledge of geological structure of earth and earth crust.
2. A knowledge of minerals and their types and physical properties.
3. A knowledge of different rock groups and understanding of the rock cycle.
4. An understanding the formation process and properties of igneous, sedimentary, and metamorphic rock.
5. An understanding of the structural features of rock masses and their effect on rock mass quality.
6. An understanding of the origin, formation, and properties of residual and transported soil.
7. An understanding of the first principles of soil/water phase relationships.

Old Related Student Outcomes:

b) An ability to apply knowledge of mathematics, science and engineering.
j) A recognition of the need for, and an ability to engage in life-long learning.

New Related Student Outcomes:

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction	1st	3	2	1	-
Minerals	2nd & 3rd	6	4	2	-
Rocks	4th& 5th	6	4	2	-
Igneous Rocks	6th	3	2	1	-
Weathering Process	7th	3	2	1	-
Sedimentary Rocks	8th	3	2	1	-
Metamorphic Rocks	9th &10th	6	4	2	-
Structural Features of Rock Masses	11th	3	2	1	-
Origin and Composition of Soil	12th & 13th	6	4	2	-
Soil-Water Phase Relationships	14th & 15th	6	4	2	-

Prepared by:	Associate Prof. Sherif M. ElKholy	**Date: 01/03/2015**

CE 202: Mechanics of Materials

3 Credit **Catalogue**

Description:

Stresses, strains and Hook's law. Moduli of elasticity and rigidity, and Poisson's ratio. Statical determination of axial force, shear force, bending moment and torque in bars, beams and circular shafts. Load-shear-moment relationship in beams. Area properties of sections. Normal and shear stresses distributions in beams of different shapes and the shear flow. Transformation of stress and strain and Mohr's circle. Spherical and cylindrical pressure vessels. Elastic buckling of columns.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Statics (GE 201)
Co-requisites: Differential and Integral Calculus (Math 203) **Course**
Category: Core Course

Textbook:

Gere, James, "Mechanics of Materials", Thomson Learning, Latest Edition.

References: R. C. Hibbeler, **Mechanics of Materials**, Prentice Hall, Latest Edition.

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hours lecture and 1 hour tutorial; per week)

Course Coordinator's Name: Dr. Gamal A. M. Al-Saadi

Computer Usage: Writing home works and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

14. An understanding of how to calculate the internal forces.
15. Knowledge of fundamental concepts such as stresses and strains.
16. An ability to compute normal stresses due to normal forces and bending moments.
17. An ability to compute shear stresses due to shear forces and torsion for some shapes of sections.
18. Knowledge of principal stresses and strains and ability to compute them.
19. An ability to compute stresses induced in spherical and cylindrical vessels.
20. Knowledge of the elastic buckling phenomenon of columns.

Old Related Student Outcomes:

b) An ability to apply knowledge of mathematics, science and engineering
d) An ability to apply knowledge of mathematics, science and engineering
f) An ability to identify, formulate, and solve engineering problems

New Related Student Outcomes:

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Axial Forces, Shear and Bending Moments of Bars and Beams, and Load-ShearMoment Relationships	1st , 2nd	8	6	2	-
Properties of Sections, and Rotation of Section Axes	3rd, 4th	8	6	2	-
The Normal Stresses, Applications on Bending Moment-Curvature Relationships, The General Case of Normal Stresses, Applications on the general case	5th, 6th,7th, 8th	16	12	4	-
The Shear Stresses, Applications on the Shear Flow, Shear Stresses in Torsion	9th, 10th,11th	12	9	3	-
Analysis of Stresses in Two Dimensions, and Analysis of Strains in Two Dimensions	12th,13th	8	6	2	-
Spherical and cylindrical pressure vessels	14th	4	3	1	-
Elastic Buckling of Columns	15th	4	3	1	-

Prepared by:	Dr. Gamal Al-Saadi	Date: **9/3/2015**

CE 112: Survey Basics

2 Credits Catalogue

Description:

Definitions and concepts in land surveying, divisions and importance of surveying, units of measurements, introduction to theory of measurements and errors, linear measurements, angular measurements, directions, levelling and contouring, computer applications.

Course Web Address: http://www.qec.edu.sa/

Prerequisites by Topic: **Mathematics, Math 107**

Co-requisites: ……...

Course Category: Core Course

Textbook:

B. F. Kavanagh , "**Surveying Principles and Applications**", Prentice Hall, Ninth Edition, international edition, 2014.

References:

……

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, etc.

Credit and Contact Hours:

Credits: 2 hours, Contact: 3 hours (1 hour lecture and 2 hours Lab activities per week)

Course Coordinator's Name: Associate Prof. Ramadan Hassan

Computer Usage:

Adjusting levelling loops, lines, open and closed traverses and contouring.

Course Objectives:

The student will:

7. Be taught the principles and practice of engineering surveying.
8. Be able to widen his experience and skills in measuring equipment and techniques used in engineering surveying to a competent level.
9. Be acquainted the measurement errors.

10. Be able to know the topographic map characteristics.
11. Develop a team work skills.
12. Be able to develop competence and confidence in the use of modern surveying field instruments to observe, collect and process surveying data.

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to:

1. Identify the main surveying branches, instrumentation and units of measurement.
2. Illustrate the location ties-ins methods.
3. Perform linear measurements and calculate their corrections kinds.
4. Evaluate measurements errors and analyze the standard error
5. Perform the height difference measurements and levels computations 6. Compute horizontal and vertical angles from measurements
7. Compute the azimuths and bearings for the traverse sides.
8. Explain the topographic map characteristics
9. Formulate the traverse observations and traverse adjustment 10. Utilize computer applications in solving of surveying problems.

Old Related Student Outcomes

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
d) An ability to function on multidisciplinary teams
e) An ability to identify, formulate, and solve engineering problems
g) An ability to communicate effectively
j) A knowledge of contemporary issues
k)An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Basics of Surveying	1st	3	1	-	2
Introduction to Theory of Measurement and Errors	2nd	3	1	-	2
Leveling measurements	3rd, 4th ,5th	9	3	-	6
Distance Measurements	6th - 8th	9	3	-	6
Angles & Directions	9th -10th	6	2	-	4
Computer Applications (Traverse Surveys Computations and Adjustment)	11th – 12th , 13th	9	3	-	6
Topographic Survey	14th – 15th	6	2	-	4

Prepared by:	Associate Prof. Ramadan Hassan	Date: March, 12, 2015

Catalogue Description

CE 203: Structural Materials

3 Credit

:

Engineering Materials: properties, testing, specifications, statistical evaluation; Bricks, lime, gypsum, timber, metals, plastics, ceramics and glasses. Testing machines. Measuring devices. Tests: Tension, compression, bending, shear, hardness, impact. Non destructive tests

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Mechanics of Materials (CE202)
Co-requisites: None
Course Category: Core Course

Textbook:
The Testing of Engineering Materials by H.E. Davis, G. E. Troxell and G.F.W. Hauk" Fourth Edition. ISBN 0-07-015656-5C. **References:**
ASTM Standards, **-Cement and concrete research**, **-Cement and concrete composite**
Other
Supplemental
Materials: Site Uploaded; Notes**, Solved Examples**, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (2 hours lecture and 2 hours practical; per week)

Course Coordinator's Name: Dr. Gamal A. M. Al-Saadi

Computer Usage: Writing home works and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate to have the following outcomes:

21. A knowledge of the selection of the structural Materials.

22. An understanding of knowledge of the mechanical properties of different structural materials.
23. An understanding of properties, specification, and utilization of ferrous metals.
24. A knowledge of tensile, compressive, hardness, and bending Testing of metals.
25. A knowledge of properties, specification, and utilization of Bricks, Glass, Ceramics and plastics.
26. A knowledge of testing machines, measuring devices and the statistical evaluation of testing results

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
d) An ability to function on multidisciplinary teams
g) An ability to communicate effectively
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

3. an ability to communicate effectively with a range of audiences.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction, Fundamentals of Engineering Materials	1st	4	2	-	2
Testing of Materials, and Standards and specifications	2nd	4	2	-	2

Catalogue Description

Bricks and Blocks Manufacturing, Properties and utilization (clay, Calcium silicate and concrete), Ceramics, Lime, and Glasses	3rd, 4th, 5th	12	6	-	6
Plastics, Bending and shear tests	6th, 7th	8	4	-	4
Timber (selection, properties and utilization), Bending and shear tests	8th, 9th	8	4	-	4
Testing Machines, measurement devices, Metals	10th, 11th	8	4	-	4
Metals, Manufacturing, Types and Properties of ferrous metals, tension, compression, bending, shear, hardness, impact tests, and nondestructive tests	12th, 13th, 14th, 15th	16	8	-	8

Prepared by:	Dr. Gamal Al-Saadi	Date: **9/3/2015**

CE 230: Fluid Mechanics

3 Credit

:

First Course in fluid mechanics. Fluid properties. Fluid statics. Kinematics. Dynamics of an ideal fluid. Flow of real fluids. Energy equation and Bernoulli equation. Viscous effect and fluid resistance. Pipe flow. Fluid measurements.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Dynamics GE 202, Integral Calculus Math 106

Co-requisites: None

Course Category: Core Course

Textbook:

Fluid mechanics, 2010: A.K.Upadhyay, S.K.Kataria &Sons Publishing Ltd, ISBN 9789380027722

References:

Victor L. Streeter , Benjamin. Wylie and Keith Bedford "**Fluid Mechanics** " , 9th ed., Mc Graw Hill, 1998, ISBN 0070625379

Other Supplemental Materials: Site Uploaded; Notes, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hour of tutorial; per week)

Course Coordinator's Name: Associate Prof. Yousry Ghazaw

Computer Usage: Word Processor (student's choice), Spreadsheet (student's choice)

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

8. An understanding of fluid mechanics fundamentals, including concepts of mass conservation
9. Knowledge of control volume analysis.
10. An ability to apply the Bernoulli equation to solve problems in fluid mechanics.
11. An ability to use energy equations to understand pressure and velocity variations.
12. An ability to perform dimensional analysis for problems in fluid mechanics.
13. An ability to estimate "losses" in flow systems.
14. Understand of viscosity and its important in real flows.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
e) An ability to identify, formulate, and solve engineering problems
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

Catalogue Description

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Fluid properties : Dimensions and units, Viscosity.	1st	4	3	1	-
Mass, Weight, Temperature, Atmospheric pressure, Vapour pressure and surface tension.	2nd	4	3	1	-
Fluid Statics: Force, Stress, and Pressure at a point, Basic equation of fluid statics.	3rd	4	3	1	-
Units and scales of pressure Measurement Manometers	4th	4	3	1	-
Forces on Plane Areas	5th	4	3	1	-
Forces on curved Surfaces and Buoyant force	6th	4	3	1	-
Kinematics: Continuity equation	7th	4	3	1	-
Energy equation and its application :Mechanical energy of a flowing fluid, steady flow energy equation.	8th,9th	8	6	2	-
Pitot tube, orifice plate, etc	10th	4	3	1	-
Small and large orifices.	11th	4	3	1	-
Weirs	12th	4	3	1	-
Pipe lines	13th,14th ,15th	12	9	3	-

Prepared by:	Dr: Yousry Ghazaw	Date:

CE 231: Fluid Mechanics Laboratory

1 Credit

:

Measuring of temperature and atmospheric pressure. Fluid properties such as viscosity, density, surface tension for liquids. Hydrostatic pressure on fully and partially submerged plane. Flow from a hole in the side of a tank, coefficient of velocity, coefficient of contraction and coefficient of discharge, Flow over weirs, Reynolds Number, Bernoulli's theorem, Pizometric tubes, venturi meter and Pitot tube. Fluid flow and coefficient of friction in pipes.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: None

Co-requisites: Fluid mechanics CE230

Course Category: Core Course

Textbook:

3. Fluid mechanics, 2010: A.K.Upadhyay, S.K.Kataria &Sons Publishing Ltd, ISBN 9789380027722 4. Armfield Manuals U.K.

References:

2. Victor L. Streeter , Benjamin. Wylie and Keith Bedford "**Fluid Mechanics** " , 9th ed., Mc Graw Hill, 1998, ISBN 0070625379

Other Supplemental Materials: Site Uploaded; Notes, Model Answers, etc.

Credit and Contact Hours:

Credits: 1 hours, Contact: 2 hours (2 hour lab per week)

Course Coordinator's Name: Associate Prof. Yousry Ghazaw

Computer Usage: Word Processor (student's choice), Spreadsheet (student's choice)

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests, homework, and written reports:

8. Ability to conduct laboratory experiments using a hydraulic bench and many other accessories such Bernoulli's apparatus, weirs, orifice in side tank, Reynolds experiment etc.
9. Ability to conduct experiments to determine friction coefficients in pipes.
10. An understanding of the relation between fluid mechanics theory and practice

Catalogue Description

11. Ability to prepare a written report.
12. Ability to present an oral report.
13. Ability to work as part of a group.
14. An understanding of laboratory ethics

Program Old Related Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
d) An ability to function on multidisciplinary teams
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
g) An ability to communicate effectively
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program New Related Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
3. an ability to communicate effectively with a range of audiences.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introductory Lecture,	1st	2	-	-	2
Temperature and atmospheric pressure	2nd	2	-	-	2
Specific gravity, surface tension and viscosity	3rd	2	-	-	2
Hydrostatic pressure on plane surface	4th,5th	4	-	-	4
Side orifice flow	6th	2	-	-	2
Coefficient of velocity	7th	2	-	-	2

Coefficient of discharge	8th	2	-	-	2
Flow over weirs	9th	2	-	-	2
Reynolds number	10th	2	-	-	2
Bernoulli's theorem	11th	2	-	-	2
Piezometric tubes	12th	2	-	-	2
Pitot tube	13th	2	-	-	2
Fluid friction and coefficient of friction in pipes	14th , 15th	4	-	-	4

Prepared by:	**Dr: Yousry Ghazaw**	Date:

CE 304: Properties and Testing of Concrete

3 Credit

:

Cement: Manufacture, properties, types of cement, tests. Aggregate: Types, properties, grading, tests. Mixing water, concrete: proportions, mixing, handling, placing, fresh and hardened properties, tests, curing.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Structural Materials (CE203)
Co-requisites: None
Course Category: Core Course

Textbook:

3- H.Kosmatka et al., USA, "**Design and Control of Concrete Mixtures** by" 15th edition, Portland Cement Association
4- J. Newman and B. S.Choo, "**Advanced Concrete Technology**", 1st edition, ISBN 07506 5104 0, ELSEVIER, Butterworth Heinmann, 2004.

References: ASTM Standards.

Catalogue Description

Other Supplemental Materials: Site Uploaded; Notes, **Solved Examples**, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (2 hours lecture and 2 hours Lab; per week)

Course Coordinator's Name: Dr. Gamal A. M. Al-Saadi

Computer Usage: Writing homeworks and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate to have the following outcomes:

9. The Knowledge of the manufacturing, properties, types of cements.
10. The knowledge of the specifications and required tests for cement.
11. The knowledge of the properties, specification, types, grading and required tests for aggregates.
12. The knowledge of the grading and required tests for aggregates.
13. The knowledge of mixing, handling, placing and curing of concrete.
14. The knowledge of the properties, specification, and required tests for fresh concrete.
15. The ability to design and calculate the proportioning of the different constituents of a concrete mix.
16. The knowledge of the Properties and Tests of hardened concrete.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
c) 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
d) An ability to function on multidisciplinary teams
g) An ability to communicate effectively
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

3. an ability to communicate effectively with a range of audiences.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction to concrete	1st	4	2	-	2
Manufacture of Cement, Types and properties of cement, and Cement Tests	2nd, 3rd, 4th	12	6	-	6
Types and properties of Aggregates, Grading and Tests of Aggregates, and Mixing water	5th, 6th, 7th	12	6	-	6
Designing and Proportioning Concrete Mixtures, Mixing, Handling, placing, and Curing	8th, 9th, 10th, 11th	16	8	-	8
Properties and Tests of Fresh Concrete and hardened concrete	12th, 13th	8	4	-	4
Control Tests for Concrete	14th	4	2	-	2
Non-destructive tests	15th	4	2	-	2

Prepared by:	Dr. Gamal Al-Saadi	Date: **9/3/2015**

CE 305: Structural Analysis

3 Credit

Catalogue Description:

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

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Mechanics of Materials CE 202
Co-requisites: None

Course Category: Core Course

Textbook:
R. C. Hibbeler, **Structural Analysis**, 7th Edition, Pearson Prentice Hall, 2009**.**

References:
Harry H. west, ***Fundamentals of Structural Analysis*** *, John Wiley, Latest edition.*
Keenith M. Leet, Fundamentals of Structural Analysis , MacGraw Hill, Latest edition.

Other Supplemental Materials: Site Uploaded; Notes, **Solved Examples**, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hours lecture and 1 hour tutorial; per week)

Course Coordinator's Name: Prof. Hesham Ali Zieneldin

Computer Usage: Writing home works and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

1. A knowledge of stability and equilibrium of different types of structures and an ability to apply them.
2. An ability to calculate the reactions of different structures.
3. An ability to use method of joints and method of sections to solve truss problems.
4. An ability to analyze and draw shear force and bending moment diagrams of determinate beams.
5. An ability to draw normal force, shear force and bending moment diagrams of frames and analyze arches.
6. An ability to use different methods to calculate deflections for determinate structures. 7. An ability to draw influence lines for internal forces in different structures.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering

e) An ability to identify, formulate, and solve engineering problems

k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Types of structures and loads: introduction, classification of structures, loads and supports	1st, 2nd	8	6	2	-
Analysis of statically determinate structures: superposition, equilibrium, determinacy and stability, reactions computation	3rd, 4th	8	6	2	-
Analysis of statically determinate Trusses: types, method of joints, method of sections	5th, 6th	8	6	2	-

Analysis of statically determinate beams: shear force and bending moment diagrams, load-shear-moment relationships	7th, 8th	8	6	2	-
Analysis of statically determinate frames: shear force and bending moment diagrams	9th	4	3	1	-
Analysis of statically determinate arches: internal forces in a three-hinged arch	10th	4	3	1	-
Deflections of statically determinate beams: double integration, conjugate beam, and virtual work methods	11rd, 12th & 13th	12	9	3	-
Influence lines for statically determinate beams	14th, 15th	8	6	2	-

Prepared by:	Prof. Hesham Ali Zieneldin	**March 2015**

CE 320: Construction Engineering

3 Credits **Catalog**

Description:

Overview of the construction industry, earthmoving machinery and properties, excavation and lifting, loading and hauling, compaction and finishing, concrete construction, concrete form design, concrete economics, construction economics, contract construction.

Course Web Address:

http://www.qec.edu.sa/

Prerequisites by Topic:(None)

Co-requisites: ……...

Course Category: Core Course

Textbook:

S.W. Nunnally, **Construction Methods and Management**, 8th Edition, Pearson new International edition, 2014.

References:

……

Other Supplemental Materials:

Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hour of tutorial per week)

Computer Usage:
Writing home works and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

1. An ability to outline the construction engineering field.
2. An ability to recognize different types of earthmoving machinery and properties. 3. An ability to develop the skill of calculating the production of different types of earthmoving equipment
4. An ability to calculate the production of different types of earthmoving equipment.
5. An ability to employ the principal requirements for concrete formwork.
6. An ability to analyze and design concrete form.
7. An ability to categorize and calculate the different items affecting the concrete and construction economics.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering

c) 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

e) An ability to identify, formulate, and solve engineering problems

f) An understanding of professional and ethical responsibility

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Overview of the Construction Industry	1st , 2nd	8	6	2	-
Earthmoving Machinery and Properties	3rd, 4th	8	6	2	-
Excavation and Lifting	5th	4	6	2	-
Loading and Hauling	6th,7th	8	6	2	-
Compaction and Finishing	8th,	4	3	1	-
Concrete Construction	9th, 10th , 11th	12	9	3	-
Concrete Form Design	12th , 13th	8	6	2	-
Concrete Economics	14th , 15th	8	6	2	-

Prepared by:	Associate Prof. Ramadan Hassan	Date: **March 2015**

CE 353: Geotechnical Engineering

3 Credit

Catalogue Description:

The student is presented with a wide range of in-class experience in the field of geotechnical engineering in order to become comfortable with its basic theoretical and practical principles. The scope of the course is directed towards making the student aware of the influence of geotechnical engineering principles in all fields of civil engineering. The course covers the following topics; flow of water in soil, soil compaction, soil compressibility, calculation of structures settlement, shear strength of soils, lateral earth pressure, and introduction to the stability of soil side slopes.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: CE 285

Co-requisites: None

Course Category: Core Course **Textbook:**

DAS, B.M., **Principles of Geotechnical Engineering**, PWS-Kent, Boston, Massachusetts, (2005)**.**

References:

……

Other Supplemental Materials: Site Uploaded; Notes, Assignments, Quizzes and Exams Model Answers, etc….

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hours of lecture and 1 hour of tutorial per week)

Course Coordinator's Name: Associate Prof. Sherif M. ElKholy

Computer Usage: In completing the homework assignments and preparing reports. **Specific Outcomes of Instructions:**

Students who successfully complete the course will be able to demonstrate that he acquired:

1. A knowledge and understanding of soil indices and their effect on soil behavior.
2. An understanding of the principles of soil compaction and flow of water through soil.
3. The ability to analyze and investigate problems of seepage through soil and under structures.
4. An understanding of the principle of soil effective stress and stresses in soil mass due to external loading.
5. An understanding of principles of soil compressibility and the ability to analyze soil settlements.
6. An understanding of principles of soil shear strength and its effect on soil behavior under loads.
7. An understanding of the principles of soil lateral earth pressure and how to determine it.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction	1st	4	3	1	-
Soil/Water Indices	2nd	4	3	1	-
Soil Characterization and Classification	3rd	4	3	1	-
Soil Compaction	4th	4	3	1	-
Permeability of Soil	5th	4	3	1	-
Water Seepage and Flow Nets	6th	4	3	1	-
Principle of Effective Stresses	7th	4	3	1	-
Stresses in Soil Masses	8th	4	3	1	-
Soil Compressibility	9h	4	3	1	-
Primary and Secondary Settlement Analysis	10th & 11th	8	6	2	-
Shear Strength of Soils	12th & 13th	8	6	2	-
Soil Lateral Earth Pressure	14th & 15th	8	6	2	-

Prepared by:	Associate Prof. Sherif M. ElKholy	**March 1st, 2015**

CE 354: Geotechnical Engineering Lab

1 Credit

Catalogue Description:

The student is presented with a wide range of laboratory experiments that cover the physical and engineering properties of different soil types in order to become comfortable with the basic engineering soil properties that are used in soil classification and problems investigations. These

properties include moisture density relationships, soil indices, classifications and identification of soils, soil coefficient of permeability, soil compaction, soil consolidation, direct shear and unconfined strength of soil.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: CE 285

Co-requisites: CE 353 **Course**

Category: Core Course

Textbook:

Bowells, J.E., **Engineering Properties of Soils and Their Measurement,** McGraw-Hill, London, 1996.

References:

……

Other Supplemental Materials: Site Uploaded; Notes, Assignments, and Exams Model Answers, etc….

Credit and Contact Hours:

Credits: 1 hour, Contact: 2 hours (2 hours of laboratory session per week)

Course Coordinator's Name: Associate Prof. Sherif M. ElKholy **Computer Usage:** In completing the homework assignments and preparing lab reports.

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to demonstrate that:

1. He acquired an understanding of soil water phase relationships.
2. He acquired a knowledge of the procedures of collecting soil samples.
3. He will be able to perform soil lab tests and write lab reports
4. He will be able to estimate soil properties such as natural water contents, Atterberg Limits, and consolidation.
5. He will be able to apply principles of AASHTO and USCS soil classification systems.
6. He will be able to analyze results of laboratory and field compaction tests.
7. He will be able to evaluate soil shear strength parameters using unconfined and direct shear tests.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
d) An ability to function on multidisciplinary teams
g) An ability to communicate effectively (3g1 orally, 3g2 written)
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

3. an ability to communicate effectively with a range of audiences.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction and Lab Safety Regulation	1st	2	-	-	2
Soil Phase Relationships	2nd	2	-	-	2
Natural Water Content	3rd	2	-	-	2
Soil Solids Specific Gravity	4th	2	-	-	2
Particle Size Analysis of Cohesionless Soil (Sieve Analysis)	5th	2	-	-	2
Atterberg Limits	6th	2	-	-	2
Classification of Soils	7th & 8th	4	-	-	4
Compaction Test (Lab and Field)	9th & 10th	4	-	-	4
Coefficient of Permeability	11th	2	-	-	2

Consolidation Test	12th & 13th	4	-	-	4
Direct Shear Test	14th	2	-	-	2
Unconfined Compression Test	15th	2	-	-	2

Prepared by:	Associate Prof. Sherif M. ElKholy	**March 1st, 2015**

CE 370: Water and Wastewater Engineering

4 Credits

Catalogue Description:

Analysis of water distribution and wastewater collection systems, computer modeling of network systems; water treatment including coagulation, flocculation, softening, sedimentation, filtration, desalination and disinfection; wastewater treatment, principles of biological treatment systems including activated sludge, extended aeration, biological filtration, and stabilization ponds.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Fluid mechanics, CE 230

Co-requisites: .....

Course Category: Core Course **Textbook:**

Hammer, M.J. "**Water and Wastewater Technology**", Prentice Hall, USA, (Latest edition).

References:

Terence J. McGhee "**Water Supply and Sewerage**", McGraw-Hill (Latest edition) **Other Supplemental Materials:** Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credit: 4 hours, Contact: 5 hours (4 hours lectures and 1 hour tutorial) per week

Course Coordinator's Name: Associate Prof. Tarek Elmitwalli

Computer Usage: Computer applications in design of water and wastewater systems, spreadsheet

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to

11. Recognize the different types of water and wastewater pipeline material.
12. Recognize the basic information about chemistry and biology as it applies to water and wastewater technologies.
13. Recognize the different components of the water and wastewater treatment processes.
14. Determine the required water and wastewater quantity for a certain community.
15. Analyze and solve design problems in water and wastewater systems.
16. Design of the water and wastewater treatment processes.
17. Design of water distribution system.
18. Design of sewage collection system.
19. Use the internet-searching engine to find material for the case study report
20. Apply Excel spreadsheet in the design and calculation skills.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering

c) 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

e) An ability to identify, formulate, and solve engineering problems

f) An understanding of professional and ethical responsibility

h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial
Introduction and quantity of water, chemistry, biology	1st & 2nd	10	8	2
Water processing: mixing and flocculation, sedimentation, flocculator- clarifiers,	3rd, 4th & 5th	15	12	3
Water processing: filtration, turbidity removal, iron and manganese removal, precipitation softening	6th & 7th	10	8	2
Water processing: disinfection, removal of dissolved salts	8th	5	4	1
Water pipes, collection, distribution, design	9th	5	4	1
Sewer arrangement, materials and design	10th & 11th	10	8	2
Wastewater processing: considerations in plant design, preliminary treatment	12th	5	4	1
Wastewater processing: primary treatment	13th	5	4	1
Wastewater processing: secondary treatment, biological aeration, biological filtration	14th	5	4	1
Wastewater processing: tertiary treatment	15th	5	4	1

Prepared by:	Associate Prof. Tarek Elmitwalli	Date: March 2015

CE 315: Reinforced Concrete

3 Credit **Catalogue**

Description:

Fundamentals and design theories based on ultimate strength design and elastic concept. ACI Code requirements. Load factors. Analysis and design of reinforced concrete members subject to flexure, shear. Development length of reinforcement. Design of one-way and two-way slabs. Design of non-sway columns. Design of staircases.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: CE 305: Structural Analysis.

CE 304: Properties and Testing of Concrete **Co-requisites:**

Course Category: Core Course **Textbook:**

- McGregor, J.G. and Wight J.K., Reinforced Concrete: Mechanics and Design, Prentice Hall,. Latest Edition

References:

- M. Nadim Hassoun, and Akthem Al Manaseer, Structural Concrete Theory and design, John Wiley & Sons Inc, Latest Edition
- Saudi Building Code Latest Edition,
- ACI Latest Edition

Other Supplemental Materials:

Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hours recitation; per week)

Course Coordinator's Name: Assistant Prof. Dr. Ahmed Elragi

Computer Usage: Writing home works and required reports. Drawing plans and elevations of some designed applications.

Using the software package Office, and SAP2000 for analysis of some problems.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

1. An ability to conduct the knowledge of the reinforced concrete as a structural material.
2. An ability to conduct the knowledge of the mechanics of reinforced concrete members.
3. An ability to use building codes in the design of reinforced concrete structures.
4. An ability to use ultimate strength design method and elastic concept in reinforced concrete design.
5. An ability to design reinforced concrete beams and slabs subjected to flexure and shear forces.
6. An ability to compute development length, splices and deflections in reinforced concrete structures.
7. An ability to design reinforced concrete columns and staircases.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering

c) 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

e) An ability to identify, formulate, and solve engineering problems

f) An understanding of professional and ethical responsibility

h)The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in life-long learning

j)An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction, Material properties, Mechanics of reinforced concrete members	1st	4	3	1	
Ultimate strength design & elastic concept, Load factors and load combination (ACI Code)	2nd	4	3	1	
Flexural design of beams with rectangular and T cross sections, ACI code requirements	3rd,	4	3	1	
Analysis and design of beams with compression reinforcement, Reinforcement details	4th &5th	8	6	2	
Analysis and design of beams for shear and diagonal tension, ACI Code requirements	6th	4	3	1	
Design of one-way & two-way slabs, Analysis and design of continuous beams and slabs	7th ,8th 9th & 10th	16	12	4	
Development length, anchorage and splice of reinforcement. Deflections and crack control	11th	4	3	1	
Design of non-sway short and long concrete columns	12th &13th	8	6	2	
Design of different types of staircases.	14th &15th	8	6	2	

Prepared by:	Assistant Prof. Dr. Ahmed Elragi	Date: 1/3/2015

CE 317: Computer Applications in CE

3 Credit

Catalogua Description:

This course develops the problem solving skills essential for analysis and design of several applications in civil engineering and provides graduates with ability for continual development through lifelong learning. This includes the following; problem formulation, problem modeling, and constitutive modeling of different engineering materials. The course utilizes FEM-based software packages in analyzing and solving engineering problems, results verification and interpretation. The used software packages will vary depending on job market demands. Examples of packages include, but not limited to, SAP 2000, PLAXIS, Geo-Slope Suit, ANSAS, STAD Pro, Mod Flow, Pipe Net,….etc

Course Web Address: http://www.qec.edu.sa/

Prerequisites: CE315, CE 353

Co-requisites: None **Course**

Category: optional

Textbook:

The user's manual of the specified software package. There is no specific textbook for the course; however the students are encouraged to acquire any of the references mentioned below.

References:

Desai, C. and Kundu, T., "Introductory Finite Element Method", 2001, CRC. Desai, C. and Gioda, G., "Numerical Methods and Constitutive Modeling in Geomechanics", 2001, Springer

Other Supplemental Materials: Site Uploaded; Notes, Assignments, Quizzes and Exams Model Answers, etc….

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (2 hours of lecture and 1 hour of tutorial and 1 hour Lab per week)

Course Coordinator's Name: Dr. Ahmad AlSonbaty and Dr. Sherif M. ElKholy

Computer Usage: In completing the homework assignments and preparing reports.

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to demonstrate that he acquired:

1 Knowledge of several software packages used in civil engineering applications.
2. Ability to formulate and model problems using the computer capabilities.
3. Ability to model different engineering materials.
4. Ability to use several software packages according to the studied problem.

5. Ability to verify and interpret the results.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
e) An ability to identify, formulate, and solve engineering problems
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction About FEM	1st ,2nd	8	4	2	2
Modeling Attributes	3rd	4	2	1	1
Problem Formulation	4th	4	2	1	1
Constitutive modeling of materials	5th	4	2	1	1
Applications on Structures Problems	6th	4	2	1	1
Using Software Package SAP2000	7th	4	2	1	1
Applications using SAP2000 (Beams, Plane Frames and Trusses)	8th	4	2	1	1
Applications using SAP2000 (Trussed Frames and Space Frames)	9th	4	2	1	1
Applications using SAP2000 (Variety of Foundation Types)	10th	4	2	1	1

Application on Geotechnical Engineering	11th	4	2	1	1
Using Software Package Geo-Slope Suit (Stress-Strain Analysis)	12th	4	2	1	1
Using Software Package Geo-Slope Suit (Embankments Analysis)	13th	4	2	1	1
Applications using Geo-Slope Suit (Water Flow Through Soil)	14th	4	2	1	1
Applications using Geo-Slope Suit (Stability of Slopes)	15th	4	2	1	1

Prepared by:	**Dr. Ahmed Elragi**	**Date: 01/03/2015**

CE 331: Hydrology

3 Credit

Catalogue Description:
The hydrologic cycle. Fundamentals of meteorology, temperature, humidity, wind, precipitation, evaporation. Stream-flow and run-off, Groundwater flow and aquifers, wells, and intrusion in coastal aquifers. Stream-flow hydrographs. Unit hydrographs for various durations and its applications. Introduction to Water Resources management and its demand, Water Resources management in arid and semi-arid regions and its application in Saudi Arabia.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Fluid mechanics CE230

Co-requisites: None

Course Category: Core Course **Textbook:**

R.S. Gupta, "**Hydrology and Hydraulic Systems**", 2001, Waveland Press,Inc. ISBN

1577660307 **References:**

C.W. Fetter, "**Applied hydrogeology**", Merrill Publishing Company

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc. **Credit and Contact Hours:**

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hour of tutorial; per week)

Course Coordinator's Name: Associate Prof. Yousry Ghazaw

Computer Usage: Ready- made Finite elements program. Spreadsheets, writing homework's and reports.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

8. Knowledge of basic hydrologic cycle.
9. Knowledge of fundamentals of meteorology.
10. An ability to use differential equations to understand groundwater flow.
11. Knowledge of water resource management in arid and semiarid areas.
12. An ability to estimate "losses from precipitation".
13. Understand of stream flow hydrograph.
14. An ability to select solution methods appropriate for a hydrological modeling.

Relationship of course to program objectives:

This course develops the fundamentals of water resources and problem solving skills essential for the water shed management, reservoir operations, flood management and water supply.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
c) 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
j) A knowledge of contemporary issues

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introductory Lecture, The hydrologic cycle	1st	4	3	1	-
Fundamentals of meteorology: temperature,	2nd	4	3	1	-
Humidity, wind, precipitation, and evaporation.	3rd	4	3	1	-
Stream-flow and run-off.	4th	4	3	1	-
Groundwater flow and aquifers	5th	4	3	1	-
wells	6th	4	3	1	-
salt water intrusion in coastal aquifers	7th	4	3	1	-
Stream-flow hydrographs.	8th	4	3	1	-
Unit hydrographs	9th	4	3	1	-
Unit hydrographs for various durations and its applications	10th	4	3	1	-
Introduction to Water Resources management and its demand	11th	4	3	1	-
Water Resources management in arid and semi-arid regions.	12th	4	3	1	-
Application of water resources planning in Saudi Arabia	13th, 14th	8	6	2	-

Prepared by:	**Dr: Yousry Ghazaw**	Date: March 1st, 2015

CE 341: Transportation and Traffic Engineering

4 Credit

Catalogue Description:

The transportation systems and its characteristics. Transportation and society. Components of transportation systems. Vehicle motion, flow, and performance. Continues flow. Terminals. Introduction to transportation demand. Components of traffic system. Traffic stream characteristics. Traffic engineering studies. Traffic safety. Capacity of urban streets and intersections. Congestion management.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: None

Co-requisites: None

Course Category: Core Course

Textbooks:

3. Papacostas, C.S. and Prevedouros, P.D., **Transportation Engineering and Planning**, Prentice- Hall, ISBN 0-13-0814199, 2001.
4. Roess, R.P., Prassas, E.P. and McShane, W.R., **Traffic Engineering, Prentice**- Hall, ISBN 0-13-191877-X, 2004.

References: None

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 4 hours, Contact: 5 hours (4 hours lecture and 1 hour tutorial; per week)

Course Coordinator's Name: Prof. Sayed A. Habib

Computer Usage: Writing homeworks and required reports and drawing some engineering sketches.

.Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

9. Recognize the transportation systems and its characteristics.
10. Recognize the transportation and society.
11. Differentiate between the components of transportation systems.
12. Recognize vehicle motion, flow, performance, continues flow, terminals, transportation demand and traffic system.
13. Recognize the traffic stream characteristics and traffic engineering studies.
14. Explain the traffic safety.
15. Determine the capacity of urban streets and intersections.
16. Explain the congestion management.

Old Related Student Outcomes

a) An ability to apply knowledge of mathematics, science and engineering

c) 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

e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
The transportation Systems and its Characteristics	1st	4	3	1	-
Transportation and society	2nd	4	3	1	-
Components of Transportation Systems	3rd	4	3	1	-
Vehicle motion, Flow, and Performance	4th	4	3	1	-
Continues Flow	5th	4	3	1	-
Terminals & Introduction to Transportation Demand	6th 7th	4 4	3 3	1 1	- -
Components of Traffic System	8th	4	3	1	-
Traffic Stream Characteristics	9th	4	3	1	-
Traffic Engineering Studies & Traffic Safety	10th 11th	4 4	3 3	1 1	- -

Capacity of Urban Streets and Intersections	12th 13th	4 4	3 3	1 1	- -
Congestion Management	14th 15th	4 4	3 3	1 1	- -

Prepared by:	Prof. Sayed A. Habib	Date: March 1st, 2015

CE 363: Foundation Engineering

3 Credit

Catalogue Description:

This course is an advanced course in geotechnical engineering that emphasized on analysis and design of different types of foundation, retaining and sheet pile walls. The topics that are included; types of foundation, bearing capacity of shallow foundation, bearing capacity of deep foundations, pile foundations, retaining walls, and sheet pile walls.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: CE 353

Co-requisites: None

Course Category: Core Course

Textbook:

DAS, B.M., **Principles of Foundation Engineering,** PWS Engineering, Boston, Massachusetts, (2003).

References:

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Other Supplemental Materials: Site Uploaded; Notes, Assignments, Quizzes and Exams Model Answers, etc….

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hours of lecture and 1 hour of tutorial per week)

Course Coordinator's Name: Associate Prof. Sherif M. ElKholy

Computer Usage: In completing the homework assignments and preparing reports.

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to demonstrate that:

1. He acquired an understanding of failure criteria for soil failure under foundations.
2. He will be able to calculate the soil bearing capacity for different types of foundations.
3. He will be able to analyze problems of both shallow and deep foundations.
4. He will be able to design the spread footings as well as the mat foundations.
5. He will be able to investigate and analyze the stability of simple gravity and cantilever types of retaining walls.
6. He will be able to analyze the simple sheet pile walls using cantilever method.
7. He will be able to analyze and design the pile foundations and investigate the pile group action.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering

c) 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

e) An ability to identify, formulate, and solve engineering problems

f) An understanding of professional and ethical responsibility

h)The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in life-long learning

k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction and Subsurface Soil Exploration (Site Investigation)	1st	4	3	1	-
Types of Foundations	2nd	4	3	1	-
Bearing Capacity of Shallow Foundations	3rd & 4th	8	6	2	-
Analysis of Spread Foundation	5th & 6th	8	6	2	-
Design of Isolated Footings	7th & 8th	8	6	2	-
Analysis of Combined and Mat Foundations	9th & 10th	8	6	2	-
Retaining Walls	11th & 12th	8	6	2	-
Sheet Pile Walls	13th	4	3	1	-
Pile Foundation	14th & 15th	8	6	2	-

Prepared by:	Associate Prof. Sherif M. ElKholy	**March 1st, 2015**

CE 375: Steel Structures Design

3 Credit **Catalogue**

Description:

Analysis and design of roof trusses. Design of tension and compression members, columns under eccentric loadings, column bases and footings. Design of beams. Welded and bolted connections. Design of building frames. Introduction to plastic analysis. Steel building project. All according to AISC specifications.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: CE 305: Structural Analysis.

Co-requisites:

Course Category: Core Course

Textbook:

Abi Aghayere, Jason Vigil, Structural Steel Design, Latest Edition, Pearson

References:

Spiegel, Leonard and Limbrunner, G., "Applied Structural Steel design", latest Edition, Printce Hall, Inc,.
Saudi Building Code, latest edition
LRFD Latest Edition **Other Supplemental Materials:** Site Uploaded; Notes, Solved Examples, Model Answers, etc. **Credit and Contact Hours:**

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hours recitation; per week)

Course Coordinator's Name: Assistant Prof. Dr. Ahmed Elragi

Computer Usage: Writing home works and required reports.
Drawing plans and elevations of some designed applications and details of connections.
Using the software package SAP2000 for analysis of some problems. **Specific Outcomes of Instructions:**

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

8. An ability to conduct the knowledge of different applications of steel structures.
9. An ability to conduct the knowledge of the behavior and stability of steel structures.
10. An ability to design tension members and compression members.
11. An ability to design steel beams and steel beam-columns.
12. An ability to design column base plates and beam bearing plates.
13. An ability to analyze and design bolted connections.
14. An ability to analyze and design welded connections.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering

c) 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

e) An ability to identify, formulate, and solve engineering problems

f) An understanding of professional and ethical responsibility

h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in life-long learning

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction to Steel Structures	1st	4	3	1	
Roof Trusses and Bracing Systems	2nd	4	3	1	
Design of Tension Members	3rd,	4	3	1	
Design of Compression Members	4th	4	3	1	
Design of Columns and Column Bases	5th	4	3	1	
Design of Beams with adequate Lateral Support	6th& 7th	8	6	2	
Beams with Inadequate Lateral Support	8th	4	3	1	
Shear, Web Yielding and Beam Bearing Plates	9th &10th	8	6	2	
Design of Beam-Columns	11th	4	3	1	
Design of Bolted Connections	12th	4	3	1	
Several Types of Bolted Connections	13th	4	3	1	
Welded Connections	14th	4	3	1	

Introduction to Plastic Analysis	15^{th}	4	3	1	

Prepared by:	Assistant Prof. Dr. Ahmed Elragi	Date: 1/3/2015

CE 401: Concrete Technology

3 Credit **Catalogue**

Description:

In-depth study of composition, characteristics and hydration of cements; structure and properties of hardened cement paste; local aggregates; workability, strength, volume changes and permeability of concrete; failure mechanisms of plain concrete; production, handling and quality control of concrete; mix design; special concretes such as fiber reinforced concrete, ferro-cement and polymer impregnated; durability problems of concrete in the Gulf environment; preventive measures, specifications and construction techniques for local conditions. **Course Web Address:** http://www.qec.edu.sa/

Prerequisites: Structural Materials (CE 203)

Co-requisites: None

Course Category: Elective Course **Textbook:**

P.K. Mehta and P.J.M. Monteiro, "**Concrete: Structure, Properties, and Materials**", Latest Edition.

References:

1-Steven H. Kosmatica and William C. Panavese, Design and Control of Concrete Mixtures, Fourteenth Edition, Portland Cement Association.

2.- A.M. Neville, Properties of Concrete, 4th edition, A. Pitman International Text.Prentice-Hall, New Jersey, 1993.

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hours Lecture and 1 hour Tutorial; per week)

Course Coordinator's Name: Dr. Gamal A. Al-Saadi **Computer Usage:**

- Computer will be used in controlling testing machines and measuring devices, and in data analysis and in statistical evaluation of testing results.
- Using IT in searching for information in the development of concrete technology and presenting technical reports.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

9. Getting knowledge about the behavior of materials used in advanced concrete technology
10. Studying types, properties and tests of advanced concrete mixes
11. Studying volume change, permeability and failure mechanisms of concrete
12. Ability to apply quality control techniques in producing concrete
13. Understanding mixture design of special concretes for Gulf environment
14. Getting knowledge of using fibers, polymers and Ferro-cement in producing special concrete
15. Realize the behavior and properties of advanced materials used in producing concrete
16. Ability to produce special concretes to be used in the Gulf environment

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
c) 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
e) An ability to identify, formulate, and solve engineering problems
g) An ability to communicate effectively
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction, Fundamentals of concrete technology	1st	4	3	1	-

Hydration of cements; hardened cement paste; local aggregates	2nd	4	3	1	-
Workability, volume change and permeability of concrete	3rd	4	3	1	-
Strength and failure mechanisms of plane concrete	4th, 5th	8	6	2	-
Production, handling and quality control of concrete	6th, 7th	8	6	2	-
Effect of admixtures on the quality of concrete	8th, 9th	8	6	2	-
Design of special concrete mixtures using fibers, polymers and ferro-cements	10th, 11th	8	6	2	-
Durability problems of concrete in the Gulf environment	12th, 13th	8	6	2	-
Specifications and construction techniques for Gulf environment	14th, 15th	8	6	2	-

Prepared by:	Dr. Gamal Al-Saadi	Date: **1/3/2015**

CE 403: Advanced Reinforced Concrete

3 Credit **Catalogue**

Description :

Design of floor systems: ribbed and flat slabs. Design of beams for torsion, combined shear and torsion by the strength method. Design of short and long columns under eccentric loadings. Study of different structural systems for covering large dimensions halls. Analysis and design of reinforced concrete water tanks. Introduction to the design of prestressed concrete members.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: CE 315: Reinforced Concrete.

Co-requisites:

Course Category: Optional Course Textbook:

- McGregor, J.G. and Wight J.K., Reinforced Concrete: Mechanics and Design, Prentice Hall,. Latest Edition

References:

- M. Nadim Hassoun, and Akthem Al Manaseer, Structural Concrete Theory and design, John Wiley & Sons Inc, Latest Edition
- Saudi Building Code Latest Edition,

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hours recitation; per week)

Course Coordinator's Name: Assistant Prof. Dr. Ahmed Elragi

Computer Usage: Writing home works and required reports. Drawing plans and elevations of some designed applications.

Using the software package Office, and SAP2000 for analysis of some problems.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

1. Be able to conduct the knowledge of design methods of advanced reinforced concrete structures.
2. An ability to design reinforced concrete ribbed and flat slabs.
3. An ability to design reinforced concrete beams for torsion, and combined shear and torsion. 4. An ability to design reinforced concrete short and long columns subjected to eccentric loadings.
5. A knowledge of structural systems used for covering large dimensions halls.
6. An ability to design reinforced concrete water tanks.
7. Be able to conduct the knowledge of design procedure of prestressed concrete members.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering

c) 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

e) An ability to identify, formulate, and solve engineering problems

f) An understanding of professional and ethical responsibility

h)The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in life-long learning

j) A knowledge of contemporary issues

k)An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction, Review of ultimate strength design & elastic concept, ACI Code requirements	1st	4	3	1	
Analysis and design of ribbed slabs, Load distribution, Design of hidden beams,	2nd	4	3	1	
Analysis of flat slabs: construction loads, bending moments in strips. Direct design method.	3rd,	4	3	1	
Design of flat slabs: Equivalent frame method, slab deflections, details of reinforcements.	4th &5th	8	6	2	
Design of concrete beams for torsion, and combined shear and torsion.	6th	4	3	1	
Design of short and long columns subjected to eccentric loads, Interaction diagrams.	7th ,8th &9th	12	9	3	
Study of different structural systems for covering large dimensions halls.	10th & 11th	8	6	2	
Analysis and design of reinforced concrete water tanks.	12th &13th	8	6	2	
Introduction to the design of prestressed concrete members.	14th &15th	8	6	2	

Prepared by:	Assistant Prof. Dr. Ahmed Elragi	Date: 1/3/2015

CE 406: Advanced Structural Analysis

3 Credit

Catalogue Description:

Analysis of indeterminate structures; trusses, beams, plane frames and arches. Method of consistent deformation; flexibility matrix formulation; pre-strain, temperature change and support movement effects. Slope deflection method. Matrix analysis of beams and plane frame using the stiffness method. Moment distribution; sway consideration.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Structural Analysis CE 305 Co-requisites:
None

Course Category: Elective Course

Textbook:
R. C. Hibbeler, **Structural Analysis**, 7th Edition, Pearson Prentice Hall, 2009**.**

References:
Harry H. west, Fundamentals of Structural Analysis , John Wiley, Latest edition. Keenith M. Leet, Fundamentals of Structural Analysis , MacGraw Hill, Latest edition.

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hours lecture and 1 hour tutorial; per week)

Course Coordinator's Name: Prof. Hesham Ali Zieneldin

Computer Usage: Writing home works and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

8. A knowledge of different types of indeterminate structural systems.

9. A knowledge of the advantageous performance of indeterminate structures.
10. An ability to use the force method to analyze indeterminate structures.
11. An ability to use the moment distribution method to analyze indeterminate structures.
12. An ability to use the slope-deflection equations to analyze indeterminate structures.
13. An ability to use a numerical computerized method (stiffness method) for structural analysis.
14. An ability to select a solution method appropriate for a given problem.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
c) 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
e) An ability to identify, formulate, and solve engineering problems
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction to Statically Indeterminate Structural Systems, Determinacy and Stability	1st , 2nd	8	6	2	-

"The Force Method", Analysis of Indeterminate Beams, Frames, Arches and Trusses	3rd, 4th, 5th	12	9	3	-
Effect of Support Movements	6th	4	3	1	-
Effect of Temperature Change	7th	4	3	1	-
"The Moment Distribution Method", Analysis of Beams and Frames considering the Sidesway effect	8th, 9th,10th	12	9	3	-
"The Slope Deflection Equations", Analysis of Beams and Frames	11th,12th	8	6	2	-
"The Stiffness Method", Analysis of Beams and Frames	13th, 14th, 15th	12	9	3	-

Prepared by:	Prof. Hesham Ali Zieneldin	**March 1st, 2015**

CE 412: Advanced Steel Design

3 Credit

Catalogue Description:

Introduction to elastic-plastic material behavior, plastic analysis and design of continuous beams and simple frames using load resistance factor design (LRFD); design of built-up beams and plate girders, optimum proportioning of I-beam, design of composite section analysis and design for torsion, design of semi-rigid and rigid connections, computer application and usage in design of rigid frames and steel buildings.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: CE 375: Steel Structures Design **Co-requisites:**

Course Category: Optional Course **Textbook:**

Abi Aghayere, Jason Vigil**, Structural Steel Design**, Latest Edition, Pearson **References:**

Spiegel, Leonard and Limbrunner, G., "Applied Structural Steel design", latest Edition, Printce Hall, Inc,.

Saudi Building Code, latest edition

LRFD Latest Edition

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hours recitation; per week)

Course Coordinator's Name: Assistant Prof. Dr. Ahmed Elragi **Computer Usage:** Writing home works and required reports.

Drawing plans and elevations of some designed applications and details of connections.

Using the software package SAP2000 for analysis of some problems. **Specific Outcomes of Instructions:**

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

7. Be able to conduct the knowledge of Load and Resistance Factor Design method.
8. Be able to conduct the knowledge of the plastic analysis and design of beams.
9. An ability to design built-up beams and plate girders.
10. An ability to analyze and design composite sections.
11. An ability to design semi-rigid and rigid steel connections.
12. An ability to design rigid frames and steel building.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
c) 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
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction to elastic-plastic behavior of steel	1st	4	3	1	
Plastic analysis of beams	2nd	4	3	1	
Plastic design of several types of beams	3rd,	4	3	1	
Load Resistance Factor Design method	4th	4	3	1	
Tension members	5th	4	3	1	
Axially loaded columns	6th& 7th	8	6	2	
Bending members	8th	4	3	1	
Design of built-up beams	9th &10th	8	6	2	
Plate girders	11th	4	3	1	
Analysis of composite sections	12th	4	3	1	
Design of composite beams	13th	4	3	1	
Design of Semi-rigid connections	14th	4	3	1	
Design of rigid connections	15th	4	3	1	

Prepared by:	Assistant Prof. Dr. Ahmed Elragi	Date: 1/3/2015

CE 443: Design of Pavement

3 Credit

Catalogue Description:

Pavement types and loading, behavior of pavements under dynamic loads, stresses in flexible and rigid pavements, pavement components, pavement design factors, flexible highway and airport pavement design, rigid highway and airport pavement design; overlay design and computer applications; practical pavement design project of a road and airport.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: CE 205

Co-requisites: None

Course Category: Elective Course **Textbooks:**

1- Yoder, E.J. and Witczack, M.W., Principles of Pavement Design, 2nd edition, John Wiley & Sons, Inc., 1975.
2- Y. H. Huang, Y.H., Pavement Analysis and Design, Pearson Prentice Hall, 1993.

References:

Ministry of Communications, Highway Construction Standards, 1987, Federal Aviation Administration Airport Design Manual.

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hours lecture and 1 hour tutorial; per week)

Course Coordinator's Name: Prof. Sayed A. Habib

Computer Usage: Writing homeworks and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will:
1. Tell the principles of pavement types and loading 2. Recognize the behavior of pavements under dynamic loads.
3. Analyze the stresses in flexible and rigid pavements.
4. Outline pavement components and pavement design factors.
5. Design flexible and rigid pavements in highway and airport.
6. Design overlay.
7. Use computer applications.
8. Perform practical pavement design project of a road and airport.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science, and engineering principles to solve civil engineering problems in practice.
b) An ability to design and conduct experiments, and to analyze and interpret data in major recognized civil engineering areas.
c) An ability to analyze and design a system, civil engineering structure or component to meet desired goals in civil engineering applications economically viable, sustainable and acceptable socially, politically and ethically.
e) An ability to identify, formulate, and solve civil engineering problems.
h) An understanding of the impact of engineering solutions in a global, economical, environmental and societal context.

i) A recognition of the need for, and an ability to engage in, life-long learning.
k) An ability to use modern tools, techniques and skills necessary for civil engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Pavement types and loading	1st	4	3	1	-
Behavior of pavements under dynamic loads	2nd 3rd	4 4	3 3	1 1	-
Stresses in flexible and rigid pavements	4th	4	3	1	-
Pavement components	5th	4	3	1	-
Pavement design factors	6th 7th	4 4	3 3	1 1	-
Flexible highway and airport pavement design	8th 9th	4 4	3 3	1 1	-
Rigid highway and airport pavement design	10th 11th	4 4	3 3	1 1	-
Overlay design	12th	4	3	1	-
Computer applications	13th 14th	4 4	3 3	1	-
Practical pavement design project of a road and airport	15th	4	3	1	-

Prepared by:	Prof. Sayed A. Habib	Date:

CE 453: Advanced Geotechnical Engineering

3 Credit

Catalogua Description:

The student is presented with a wide range of in-class experience in the field of advanced geotechnical engineering in order to enhance his in-depth knowledge about selected topics. These geotechnical topics are considered to be essential for a civil engineer who would emphasize his carrier in the geotechnical engineering field. The scope of the course is directed towards making the student aware of the influence of selected advanced geotechnical engineering topics in several fields of civil engineering. The course covers the following topics; the stability of ground slopes; braced cuts and excavations, advanced seepage analysis in porous media; fundamentals of rock mechanics; principles of soil dynamics and liquefaction; seismic earth pressures, and seismic slope stability. The selected topics may be changed frequently according to the recent advances in geotechnical engineering and the job market demands for geotechnical engineers.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: None

Co-requisites: None

Course Category: Core Course

Textbook:

3. Das, B.M., (2005). **Principles of Geotechnical Engineering**. PWS-Kent, Boston, Massachusettes, ISBN 0534551440.
4. Das, B.M. (1992). **Principles of Soil Dynamics. Thomson-Engineering**, ISBN 0534931294. **References:**

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Other Supplemental Materials: Site Uploaded; Notes, Assignments, Quizzes and Exams Model Answers, etc….

Credit and Contact Hours:

Credits: 2 hours, Contact: 3 hours (2 hours of lecture and 1 hour of tutorial per week)

Course Coordinator's Name: Associate Prof. Sherif M. ElKholy

Computer Usage: In completing the homework assignments and preparing reports.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes through tests and homework assignments:

1. A knowledge and understanding of stability of ground slopes.
2. An understanding of the principles of soil braced cuts and excavations.
3. Ability to analyze and investigate advanced problems of seepage through porous media.
4. An understanding of the fundamentals of rock mechanics.
5. An understanding of principles of soil dynamics and liquefaction.
6. An understanding of principles of seismic earth pressures, and seismic slope stability.

Old Related Student Outcomes:

This course provides the following outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction	1st	3	2	1	-
Minerals	2nd & 3rd	6	4	2	-
Rocks	4th& 5th	6	4	2	-

Igneous Rocks	6th	3	2	1	-
Weathering Process	7th	3	2	1	-
Sedimentary Rocks	8th	3	2	1	-
Metamorphic Rocks	9th &10th	6	4	2	-
Structural Features of Rock Masses	11th	3	2	1	-
Origin and Composition of Soil	12th & 13th	6	4	2	-
Soil-Water Phase Relationships	14th & 15th	6	4	2	-

Prepared by:	Associate Prof. Sherif M. ElKholy	**Date: 01/03/2015**

CE 454: Soil Improvement and Earth Structure Design

3 Credit

Catalogua Description:

The student is presented with a wide range of in-class experience in the field of advanced foundation engineering in order to become comfortable with selected topics in foundation engineering and earth supporting structures. The scope of the course is directed towards making the student aware of advanced topics in foundation design and earth structures analysis. The course covers the following topics; subsurface site exploration; analysis of large piles and drilled shafts; analysis of laterally loaded piles; structural design of piles and pile caps; analysis and design of machine foundation; analysis and design of anchored sheet pile walls and retaining walls; beams on elastic foundation; and analysis and design of mechanically stabilized earth structures. The selected topics may be changed frequently according to the recent advances in geotechnical engineering and the job market demands for geotechnical engineers.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Geotechnical Engineering, CE 353.

Co-requisites: None

Course Category: Core Course

Textbook:

3. DAS, B.M., (2003), Principles of Foundation Engineering. PWS Engineering, Boston, Massachusetts, ISBN 0534407528).
4. Bowles, J.E., (1995). Foundation Analysis and Design. McGraw-Hill, London, ISBN 0079122477. **References:**

……

Other Supplemental Materials: Site Uploaded; Notes, Assignments, Quizzes and Exams Model Answers, etc….

Credit and Contact Hours:

3 hours of lectures per week, 1 hour of recitation per week

Course Coordinator's Name: Associate Prof. Sherif M. ElKholy

Computer Usage: In completing the homework assignments and preparing reports.

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to demonstrate that he acquired:
1. A knowledge of planning and execution subsurface site exploration.
2. An understanding of the behaviour and analysis of large piles and drilled shafts.
3. Ability to understand and analyze the behavior of laterally loaded piles.
4. Knowledge of the techniques of structural design of different types of pile caps.
5. An understanding of analysis of beams on elastic foundation.
6. An understanding of the principles of analysis and design of machine foundation.
7. An understanding of the behaviour of mechanically stabilized earth structures.

Old Related Student Outcomes:

This course provides the following outcomes:

a) An ability to apply knowledge of mathematics, science and engineering

c) 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

e) An ability to identify, formulate, and solve engineering problems

h)The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in life-long learning

j) A knowledge of contemporary issues

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction, subsurface site exploration		4			-
Large piles and pile shafts		4			-
Laterally loaded piles		6			-
Structural design of pile caps		4			-
Theory of beams on elastic foundation		6			-
Machine foundation		6			-
Design of anchored sheet pile and retaining walls		6			-
Mechanically stabilized earth structures		6			-

Prepared by:	Associate Prof. Sherif M. ElKholy	**Date: 01/03/2015**

CE 455: Highway Planning and Design

3 Credit

Catalogue Description:

Highway planning in rural and urban areas. Highway location studies. Engineering and aesthetic considerations. Geometric and structural design. Highway materials and drainage. Highway construction. Highway safety engineering. Discussion of AASHTO and Saudi highway design manuals. Complete geometric design of a two-lane highway. Introduction to computer softwares for geometric design.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Transportation and Traffic Engineering CE 341

Co-requisites: None

Course Category: Elective Course **Textbooks:**

Wright, P. H. and Dixon, K., "**Highway Engineering**," 7th Edition, Jon Wiley & Sons, ISBN 0-471-26461-X, 2007.

References: None

Other Supplemental Materials: Site Uploaded; Notes, **Solved Examples,** Model Answers, etc.

Credit and Contact Hours:

Credits: 4 hours, Contact: 4 hours (3 hours lecture and 1 hour tutorial; per week)

Course Coordinator's Name: Prof. Sayed A. Habib

Computer Usage: Writing homeworks and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will:

1. Recognize highway planning in rural and urban areas.
2. Tell highway location studies.
3. Differentiate between the geometric and structural design.
3. Recognize highway materials and drainage.
4. Design of highway mixtures.
5. Design of highway flexible pavement.
6. Outline highway safety engineering.
7. Recognize the highway construction.
8. Outline the pavement evaluation and maintenance.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering

c) 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

h)The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in life-long learning

j) A knowledge of contemporary issues

k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Highway Planning in Rural and Urban Area	1st 2nd	4 4	3 3	1 1	-
Highway Location Studies	3rd	4	3	1	-
Engineering and Aesthetic Considerations	4th	4	3	1	-
Geometric Design	5th 6th	4 4	3 3	1 1	- -
Structural Design	7th 8th	4	3	1	-
Highway Materials and Drainage	9th 10th	4 4	3 3	1 1	- -
Highway Construction	11th	4	3	1	-
Discussion of AASHTO and Saudi Highway	12th	4	3	1	-
Design ManualsComplete Geometric Design of a two -lane highway	13th 14th	4 4	3 3	1 1	- -
Introduction to Computer Software for Geometric Design.	15th	4	3	1	

Prepared by:	Prof. Sayed A. Habib	Date: 01/03/2015

CE 456: Hydraulic Engineering

3 Credit

Catalogue Description:
Steady flow in closed conduits and open channels. Pumps. Networks of pipes. Dimensional analysis and similitude. Laboratory experiments covering fluid measurements, flow through pipes, open channel, centrifugal pump.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Fluid Mechanics CE 230

Co-requisites: None

Course Category: Core Course **Textbook:**
Franzini, J. B. and Finnmore, J. E. **Fluid Mechanics with Engineering Applications**, 10th Edition, McGraw Hill, 2007**.**

Other Supplemental Materials: Site Uploaded; Notes, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hour of lab; per week)

Course Coordinator's Name: Associate Prof. Yousry Ghazaw

Computer Usage: Word Processor (student's choice), Spreadsheet (student's choice)

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

1. A knowledge of different hydraulic phenomena and an ability to apply it to solve open channel flow problems.
2. An understanding of how to calculate specific energy and critical depth in open channel flow.
3. An ability to use EXCEL spread sheet to analyze various flow profiles in open channel.
4. An ability to use continuity and energy equations to calculate various flow parameters.

5. An ability to analyze hydraulic jump and water hammer.
6. An ability to compute time of emptying or filling reservoirs and vessels under unsteady flow.
7. An ability to select solution methods appropriate for a given hydraulic problem.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
c) 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
e) An ability to identify, formulate, and solve engineering problems
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lect	Tutorial	Lab
Introduction: types of flow: open channel flow, pipe flow, steady, unsteady flow, uniform, non-uniform flow.	1st	4	3	1	-
Open channel flow: specific energy, critical flow, normal flow depth, critical flow depth, critical velocity, sub-critical flow, super-critical flow.	2nd	4	3	1	-
Humps and constrictions, Application to real life problems (Numerical examples)	3rd	4	3	1	-

Hydraulic jump (definition and analysis), alternate depths, relationship between alternate depths, Energy dissipation, Application to real life problems (Numerical examples).	4th 5th	8	6	2	-
Pipe flow, friction formula, pipe networks, Hardy Cross method, Application to real life problems (Numerical examples)	6th	4	3	1	-
Unsteady flow, flow from one reservoir to another, water hammer (definition and analysis), and relationship for pressure wave velocity and pressure change for various types of valve closure, Application to real life problems (Numerical examples).	7th 8th	8	6	2	-
Energy and momentum equations, gradually varied flow, various water surface profiles (analysis and drawings), Application to real life problems (Numerical examples)	9th	4	3	1	-
Pumps, types of pumps, cavitation's, suction, delivery and total head, shut-off head, characteristic curves of pumps, specific speed, power, efficiency.	10th 11th	8	6	2	-
Dimensional analysis, Dimensionless Numbers, Bukingham Pi Theorem, Application to real life problems (Numerical examples),	12th	4	3	1	-
Similitude and physical modeling, geometric, kinematic and dynamic similarities, Application to real life problems (Numerical examples)	13th	4	3	1	-
-Laboratory Work	14th 15th				8

Prepared by:	**Dr: Yousry Ghazaw**	Date: March 1st, 2015

CE 458: Design of Water Structures

3 Credit **Catalogue**

Description:

Design of inlet and outlet structures for irrigation canals. Cross structures; culverts, siphons and aqueducts. Energy dissipation downstream hydraulic structures. Design of Spillways, syphon spillways and dams.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Fluid mechanics CE230

Co-requisites: None

Course Category: Elective Course **Textbook:**

R.S. Gupta, "**Hydrology and Hydraulic Systems**", 2001, Waveland Press,Inc.
ISBN 1577660307 **References:**

3. Varshney et al "Theory and Design of Irrigation Structure" Vol. II.
4. P. Novak, A.I.B. Moffat, and Ma, "Hydraulic structures" Taylor & Francis Publisher 2007, ISBN 100415186268

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc. **Credit and Contact Hours:**

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hour of tutorial; per week)

Course Coordinator's Name: Associate Prof. Yousry Ghazaw

Computer Usage: Ready- made Finite elements program. Spreadsheets, writing homework's and reports.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

8. Be able to select the appropriate dimension of hydraulic structures.
9. Understand the case of loading for hydraulic structures.
10. Ability to analyze and solve design problems incorporated hydraulic structures.
11. Design of weirs, culvert, siphons, intake structures, dams and so on.
12. Be able to design (hydraulically and structurally) deferent type of hydraulic structures.
13. An ability to select solution methods appropriate for a given problem.
14. An ability to use a numerical computerized method for water structural analysis

Old Related Student Outcomes

a) An ability to apply knowledge of mathematics, science and engineering
c) 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
e) An ability to identify, formulate, and solve engineering problems
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introductory Lecture, Cross structures: Hydraulic design of Culverts (pipe, box)	1st	4	3	1	-
Structure design of Culverts	2nd	4	3	1	-
Hydraulic design of Siphons	3rd	4	3	1	-
Structure design of Siphons	4th	4	3	1	-
Hydraulic design of Aqueducts	5th	4	3	1	-
Structure design of Aqueducts	6th	4	3	1	-
Seepage underneath hydraulic structures	7th	4	3	1	-
Energy Dissipation	8th	4	3	1	-
Design of inlet and Outlet structures for irrigation canals.	9th	4	3	1	-
Hydraulic Design of weirs	10th	4	3	1	-
Hydraulic Design of Spillways	11th	4	3	1	-
Hydraulic Design of Siphon Spillways	12th	4	3	1	-
Dams	13th, 14th , 15th	12	9	3	-

Prepared by:	**Dr: Yousry Ghazaw**	**Date:** March 1st, 2015

CE 464: Project Surveying

3 Credits Catalogue

Description:

Laser systems and alignment, electronic distance measurement with high precision, total station, land subdivision and legal aspects; route surveying, hydrographical surveying, mine surveying, construction surveying, ruin surveying, industrial surveying, structure deformation measurement and monitoring, earth crustal deformation measurement.

Course Web Address:

http://www.qec.edu.sa/ **Pre-requisites by Topic**:

Survey Basics CE 112

Co-requisites: ……...

Course Category: Elective Course Textbook:

B. F. Kavanagh , "Surveying Principles and Applications", Prentice Hall, Ninth edition, Pearson Inc., 2014. **References:**

……

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hour tutorial per week)

Course Coordinator's Name: Associate Prof. Ramadan Hassan

Computer Usage:

Total Station Software, and Computer Applications for solving different surveying problems.

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to:

11. Outline the principles of EDM and the geometry of total station measurements.
12. Compute and analyze station coordinates that is collected by total station instrument.
13. Define the alignment of pipe line using laser system
14. Identify the land subdivision planning, its legal aspects and the used LIS layers.

15. Analyze the setting out data for many projects in the construction field.
16. Recognize the setting out technique of horizontal curves using deflection angles and total station techniques.
17. Apply surveying skills relevant to many surveying projects such as construction field and hydrographical surveying.
18. Recognize the fundamental of structure deformation monitoring techniques using precise leveling and GPS
19. Compute the grade lines, slope stakes, elevation differences, areas and volumes quantities.
20. Suggest the surveying location techniques for the hydrographical surveying and draw water depths contours.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
e) An ability to identify, formulate, and solve engineering problems
g) An ability to communicate effectively
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
3. an ability to communicate effectively with a range of audiences.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Background	1st	4	3	1	-
Modern EDM Instruments:	2nd	4	3	1	-
Total Station	3rd – 4th	8	6	2	-

Construction surveying	5th	4	3	1	-
Laser System , Alignment and related projects	6th	4	3	1	-
Route Surveys	7th - 8th - 9th	12	9	3	-
Land subdivision and Legal aspects	10th, 11th	8	6	2	-
Hydrographic surveying:	12th, 13th	8	6	2	-
GPS & Structure deformation monitoring : Basics, methods and applications	14th - 15th	8	6	2	-

Prepared by:	Associate Prof. Ramadan Hassan	**Date**: March 1st, 2015

CE 475: Environmental Engineering

3 Credits

Catalogue Description:

Introduction to pollution problems and impact of development on the environment. Liquid waste disposal: overland, in streams, lake and sea. Solid wastes: management, characteristics, storage, collection, disposal, and recycling. Air pollution: sources, pollutants, effects and control. Noise pollution: sources, effect and control.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Water and wastewater engineering, CE 370

Co-requisites: .....

Course Category: Elective Course

Textbook:

Mackenzie L. Davis and David A. Cornwell "**Introduction to Environmental Engineering**", McGraw-Hill, (Latest edition).

References: None

Other Supplemental Materials:

Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credit: 3 hours, Contact: 4 hours (3 hours lectures and 1 hour tutorial) per week

Course Coordinator's Name: Associate Prof. Tarek Elmitwalli

Computer Usage: Computer applications in environmental engineering, spreadsheet

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to

11. Recognize the material and energy balances for solving any environmental engineering problem.
12. Define water pollutants and their sources.
13. Define water quality management in rivers, lakes, and ground waters.
14. Recognize basic information on air and noise pollution.
15. Recognize the methods of liquid waste disposal: overland, in streams, lake and sea.
16. Recognize the different components of solid waste management.
17. Recognize the different components of hazardous waste management.
18. Analyze and solve problems in the environmental engineering systems.
19. Design of different components in the environmental engineering.
20. Use the internet searching to find the material for the course.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
c) 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
e) An ability to identify, formulate, and solve engineering problems
h)The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning

j) A knowledge of contemporary issues

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial
Introduction to environmental engineering	1st & 2nd	8	6	2
Type of reactors	3rd	4	3	1
Mass balance and water quality	4th	4	3	1
Water quality	5th	4	3	1
Wastewater treatment for reuse	6th	4	3	1
Sludge: treatment, reuse and disposal	7th & 8th	8	6	2
Solid waste: management, sources, minimization, collection and treatment	9th , 10th & 11th	12	9	3
Hazardous wastes: definition, sources and treatment	12th	4	3	1
Air pollution: definition, sources and minimization	13th & 14th	8	6	2
Noise pollution: definition, sources and minimization	15th	4	3	1

Prepared by:	Associate Prof. Tarek Elmitwalli	**Date: March 1st, 2015**

CE 490: Selected Topics in Civil Engineering

3 Credit

Catalogue Description:

State of the art subjects in the field of civil engineering. Topics tailored to cover the recent issues in this field. Topics to cover deeply some specific problems in the compulsory courses.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: None
Co-requisites: CE491 Senior Design Project-1

Course Category: Elective Course

Textbook: To be determined by the instructor.

References: *To be determined by the instructor.*

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hours lecture and 1 hour tutorial; per week)

Course Coordinator's Name: Assoc.Prof. Sherif Alkholy

Computer Usage: Internet search, writing homeworks and required reports, drawing some engineering sketches and using some softwares for analysis and design.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

8. Engineering aspects of practical civil engineering.
9. Advanced concepts and special Topics in civil engineering.
10. Case study Report (data collection, internet search, and reporting).
11. The ability to define the engineering problems, and formulate them.
12. Performing data analysis and critical thinking.
13. The ability of working in a team.

14. The ability to have the skills of ideas development and sharing with others.

Old Related Student Outcomes:

Depending on the topics, they could be any combination of a-k

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
c) 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
d) An ability to function on multidisciplinary teams
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
g) An ability to communicate effectively
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
3. an ability to communicate effectively with a range of audiences.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Depends on the selected topics	15 weeks	60	45	15	-

Prepared by:	Assoc.Prof. Sherif Alkholy	**Date: March 1st, 2015**

CE 400: Senior Design Project (SDP)

22. Course Name and code : Senior Design Project – CE 400

23. Credit hours : 3 hrs.

Contact hours : 4 hrs.

24. Coordinator/Instructor : Dr. Sherif M. ElKholy

25. Text book and Other supplemental materials

Text book:

- No specific textbook (to be determined by the project supervisor based on the scope and application of the project)

References:

- No specific textbook (to be determined by the project supervisor based on the scope and application of the project)

Other supplemental materials

- Senior Design Project Guidelines. http://www.qec.qu.edu.sa/en/Documents/Senior_Design_Project%20System.pdf

26. Specific course information

A) Catalog Description

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project, which simulates the real working condition to which the student will be

exposed after graduation. The project should be comprehensive and includes all the necessary preliminary field studies, final design drawings, bill of materials, and the total cost of the project, if any, depending on the natures of project. The SDP project shall continue for one semester. At the end of the semester, there will be a seminar held for the working team of students to present the details of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion

B) Prerequisites : Cooperative training GE 405

C) Co-requisites : None

D) Course Condition : ■ Required □ Elective □ Selective

27. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to be able to:

1. Apply knowledge of mathematics, science and engineering in solving an engineering problem.
2. Design an experiment, when applicable, collect, analyse and interpret data.
3. Design a civil engineering, component, to meet desired needs within realistic constraints including: identify design inputs and recognize constraints, apply or develop design approaches and, when relevant, realize successful system, component or process.
4. Demonstrate teamwork and project management attributes
5. Develop models and/or apply problem solving approaches for technical problems. This may include problem definition, identifying objectives, use of heuristics, generating alternative models/solutions, deciding the course of solution, explain problem solving strategies, applying models/solution and evaluating results
6. Demonstrate professional and ethical responsibilities and academic integrity
7. Organize and present technical work in written reports and in oral presentations
8. Demonstrate understanding for the broader impact of engineering solutions in a global, economic, environmental, and societal context as applicable
9. Seek information from different sources and enhance further learning independently
10. Realize current issues related to engineering problems
11. Apply techniques and capabilities of the modern engineering tools in the field of civil engineering

B) Old Relation to the student outcomes

(a) an ability to apply knowledge of mathematics, science, and engineering
(e) an ability to identify, formulate, and solve engineering problems
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) 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
(d) an ability to function on multidisciplinary teams

(f) an understanding of professional and ethical responsibility
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(j) a knowledge of contemporary issues
(g) an ability to communicate effectively
(i) a recognition of the need for, and an ability to engage in life-long learning
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

C) New Relation to the student outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
3. an ability to communicate effectively with a range of audiences.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

7. Brief list of topics to be covered

- Review previous works and collection of data related to the design.
- Defining and formulation of the problem, determination of the project objectives.
- Applying design concepts to achieve the target objective of the project.
- Where appropriate ○ Building mathematical models, ○ Conducting simulations, ○ Carrying out the planned experiments.
- Analyzing the results and evaluating the end product.
- Formulation of the suggestions, recommendations and conclusions.
- Writing the final report and preparing for the final presentation.

Prepared by:	**Dr.** Sherif ElKholy	**Date**: March 2015

Appendix A – 2

Syllabi for Modified/Developed Courses
Developed Curriculum

CE 205: Properties of Structural Materials

2 Credit

Catalogue Description:

Engineering materials: properties, testing, specifications, statistical evaluation; bricks, lime, gypsum, timber, wood, metals, and glasses. Testing machines. Measuring devices. Tests: tension, compression, bending, shear, hardness, and impact. Non-destructive tests.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Mechanics of Materials (CE202)

Co-requisites: None

Course Category: Core Course

Textbook: "The Testing of Engineering Materials", by H.E. Davis, G. E. Troxell and G.F.W. Hauk (Latest Edition). ISBN 0-07-015656-5C.

References: Mitchell's Building Series, Alan Everett, Mitchell Publishing Company Ltd.

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 2 hours, Contact: 3 hours (1 hour lecture and 2 hours practical; per week)

Course Coordinator's Name: Dr. Gamal A. M. Al-Saadi

Computer Usage: Writing homeworks and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate to have the following outcomes:

27. Getting the Knowledge of the properties of materials such as ductile and brittle materials.
28. Studying of the properties, specification, types, and required tests for metals.
29. Studying of the properties of bricks, lime, gypsum, and wood.
30. Studying of the properties, specification, and required tests for single and double shear.
31. Studying of the properties, specification, and required tests for non-destructive test.

Old ABET Program Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data

c) 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

e) An ability to identify, formulate, and solve engineering problems

f) An understanding of professional and ethical responsibility

h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in life-long learning

k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New ABET Program Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction, Classification of Engineering Materials	1st	3	1	-	2
Properties, Testing, and Specifications of Engineering Materials	2nd, 3rd, 4th, 5th, 6th	15	5	-	10
Properties of Bricks, Lime, and Gypsum	7th, 8th, 9th	9	3	-	6
Properties of Glasses	10th	3	1	-	2
Properties of Metals	11th	3	1	-	2
Properties of Timber	12th, 13th	6	2	-	4
Non Destructive Tests	14th, 15th	6	2	-	4

Prepared by:	Dr. Gamal Al-Saadi	Date: **9/3/2015**

CE 206: Structural Analysis-1

3 Credit **Catalogue**

Description:

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

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Mechanics of Materials CE 202

Co-requisites: None

Course Category: Core Course

Textbook: R. C. Hibbeler, **Structural Analysis**, 7th Edition, Pearson Prentice Hall, 2009**.**

References: *Harry H. west, Fundamentals of Structural Analysis , John Wiley, Latest edition.*

Keenith M. Leet, Fundamentals of Structural Analysis , MacGraw Hill, Latest edition.

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hours lecture and 1 hour tutorial; per week)

Course Coordinator's Name: Prof. Hesham Ali Zieneldin

Computer Usage: Writing homeworks and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

1. A knowledge of stability and equilibrium of different types of structures and an ability to apply them.
2. An ability to calculate the reactions of different structures.
3. An ability to use method of joints and method of sections to solve truss problems.
4. An ability to analyze and draw shear force and bending moment diagrams of determinate beams.
5. An ability to draw normal force, shear force and bending moment diagrams of frames and analyze arches.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyse and interpret data
d) An ability to function on multidisciplinary teams
e) An ability to identify, formulate, and solve engineering problems
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab

Types of structures and loads: introduction, classification of structures, loads and supports	1st, 2nd	8	6	2	-
Analysis of statically determinate structures: superposition, equilibrium, determinacy and stability, reactions computation	3rd, 4th	8	6	2	-
Analysis of statically determinate Trusses: types, method of joints, method of sections	5th, 6th	8	6	2	-
Analysis of statically determinate beams: shear force and bending moment diagrams, load-shear-moment relationships	7th, 8th	8	6	2	-
Analysis of statically determinate frames: shear force and bending moment diagrams	9th	4	3	1	-
Analysis of statically determinate arches: internal forces in a three-hinged arch	10th	4	3	1	-
Deflections of statically determinate beams: double integration, conjugate beam, and virtual work methods	11rd, 12th & 13th	12	9	3	-
Influence lines for statically determinate beams	14th, 15th	8	6	2	-

Prepared by:	Prof. Hesham Ali Zieneldin	

CE 212: Plane Surveying

3 Credits

Catalogue Description:

Definitions and concepts in land surveying, divisions and importance of surveying, units of measurements, introduction to theory of measurements and errors, linear measurements, angular measurements, directions, leveling and contouring, area and volume computations, computer applications.

Course Web Adresse: http://www.qec.edu.sa/

Prerequisites by Topic:

Mathematics, Math 107

Co-requisites: ……...

Course Category: Core Course

Textbook:

B. F. Kavanagh , "Surveying Principles and Applications", Prentice Hall, Ninth Edition, international edition, 2014.

References:

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Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 5 hours (2 hours lecture, 1 hour tutorial and 2 hours Lab activities per week)

Computer Usage:

Adjusting levelling loops, lines, open and closed traverses and contouring.

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to:

1. Identify the main surveying branches, instrumentation and units of measurement.
2. Illustrate the location ties-ins methods.
3. Perform linear measurements and calculate their corrections kinds.
4. Evaluate measurements errors and analyze the standard error
5. Perform the height difference measurements and levels computations
6. Compute horizontal and vertical angles from measurements
7. Compute the azimuths and bearings for the traverse sides.
8. Explain the topographic map characteristics
9. Formulate the traverse observations and traverse adjustment 10. Utilize computer applications in solving of surveying problems.
11. Compute areas and volumes.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
d) An ability to function on multidisciplinary teams
e) An ability to identify, formulate, and solve engineering problems
g) An ability to communicate effectively
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
3. an ability to communicate effectively with a range of audiences.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Basics of Surveying:	1st	5	2	1	2
Theory of Measurement	2nd , 3rd	10	4	2	4
Leveling measurements	4th ,5th, 6th	15	6	3	6
Distance Measurement	7th ,8th	10	4	2	4
Angles & Directions	9th , 10th	10	4	2	4
Topographic Survey	11th	5	2	1	2

Electronic Distance Measurement	12th	5	2	1	2
Computer Applications	13th , 14th	5	2	1	2
Areas and Volumes	15th	5	2	1	2

Prepared by:	Associate Prof. Ramadan Hassan	**Date**: March 2015

GE 582: Introduction to Geotechnical Engineering

2 Credit

Catalogua Description:

The student is presented with an introductory course of engineering geology as a solid base for studying geotechnical engineering. An extensive in-class presentation of different rock types, its origin and the engineering structure of rock particles. Types and classification of rocks based on origin and strength. Weathering process. Classification of soil based on formation. Index and engineering classification of soil. Clay minerals and soil structure.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: None

Co-requisites: None

Course Category: Core Course

Textbook:

Fred, B., (1993), **Engineering Geology, Blackwell Scientific Publication,** and **Class notes** approved by the CE department council.

References:

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Other
Supplemental
Materials: Site Uploaded; Notes, Assignments, Quizzes and Exams Model Answers, etc….

Credit and Contact Hours:

Credits: 2 hours, Contact: 3 hours (2 hours of lecture and 1 hour of tutorial per week)

Course Coordinator's Name: Associate Prof. Sherif M. ElKholy

Computer Usage: In completing the homework assignments and preparing reports.

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to demonstrate that he acquired:

1. A knowledge of geological structure of earth and earth crust.
2. A knowledge of minerals and their types and physical properties.
3. A knowledge of different rock groups and understanding of the rock cycle.
4. An understanding the formation process and properties of igneous, sedimentary, and metamorphic rock.
5. An understanding of the structural features of rock masses and their effect on rock mass quality.
6. An understanding of the origin, formation, and properties of residual and transported soil.
7. An understanding of the first principles of soil/water phase relationships.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science, and engineering principles to solve civil engineering problems in practice.

i) A recognition of the need for, and an ability to engage in, life-long learning.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction	1st	3	2	1	-
Minerals	2nd & 3rd	6	4	2	-
Rocks	4th& 5th	6	4	2	-
Igneous Rocks	6th	3	2	1	-
Weathering Process	7th	3	2	1	-
Sedimentary Rocks	8th	3	2	1	-
Metamorphic Rocks	9th &10th	6	4	2	-
Structural Features of Rock Masses	11th	3	2	1	-
Origin and Composition of Soil	12th & 13th	6	4	2	-
Soil-Water Phase Relationships	14th & 15th	6	4	2	-

Prepared by:	Associate Prof. Sherif M. ElKholy	**Date: 10/10/2015**

CE 306: Structural Analysis-2

2 Credit

Catalogue Description:

Analysis of indeterminate structures; trusses, beams, plane frames and arches. Method of consistent deformation; flexibility matrix formulation; pre-strain, temperature change and support movement effects. Moment distribution; sway consideration. Matrix analysis of beams and plane frame using the stiffness method.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Structural Analysis-1 CE 206 **Co-requisites:**
None

Course Category: Core Course

Textbook: R. C. Hibbeler, **Structural Analysis**, 7th Edition, Pearson Prentice Hall, 2009**.**

References: *Harry H. west, Fundamentals of Structural Analysis , John Wiley, Latest edition.*

Keenith M. Leet, Fundamentals of Structural Analysis , MacGraw Hill, Latest edition.

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 2 hours, Contact: 3 hours (2 hours lecture and 1 hour tutorial; per week)

Course Coordinator's Name: Prof. Hesham Ali Zieneldin

Computer Usage: Writing homeworks and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

1. A knowledge of different types of indeterminate structural systems.
2. A knowledge of the advantageous performance of indeterminate structures.
3. An ability to use the force method to analyze indeterminate structures.
4. An ability to use the moment distribution method to analyze indeterminate structures.
5. An ability to use a numerical computerized method (stiffness method) for structural analysis.
6. An ability to select a solution method appropriate for a given problem.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
c) 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
d) An ability to function on multidisciplinary teams
e) An ability to identify, formulate, and solve engineering problems
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction to Statically Indeterminate Structural Systems, Determinacy and Stability	1st , 2nd	6	4	2	-
"The Force Method", Analysis of Indeterminate Beams, Frames, Arches and Trusses	3rd, 4th, 5th	9	6	3	-
Effect of Support Movements	6th	3	2	1	-
Effect of Temperature Change	7th	3	2	1	-
"The Moment Distribution Method", Analysis of Beams and Frames considering the Sidesway effect	8th, 9th, 10th,11th	12	8	4	-
"The Stiffness Method", Analysis of Beams and Frames	12th,13th, 14th, 15th	12	8	4	-

Prepared by:	Prof. Hesham Ali Zieneldin	

CE 307: Properties and Testing of Concrete

2 Credit

Catalogue Description:

Cement: Manufacture, properties, types of cement, tests. Aggregate: Types, properties, grading, tests. Mixing water, concrete: proportions, mixing, handling, placing, fresh and hardened properties, tests, curing.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Properties of Structural Materials (CE205)
Co-requisites: None
Course Category: Core Course

Textbook: S.H.Kosmatka et al., USA, "Design and Control of Concrete Mixtures" 15th edition, Portland Cement Association.

References: ASTM Standards.
Other
Supplemental
Materials: Site Uploaded Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 2 hours, Contact: 3 hours (1 hours lecture and 2 hours Lab; per week)

Course Coordinator's Name: Dr. Gamal A. M. Al-Saadi

Computer Usage: Writing homeworks and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate to have the following outcomes:

17. Getting knowledge about the different materials composing concrete.
18. Studying the types, properties, tests of cement and aggregates.
19. Studying the aggregates for concrete (shape, size, and grading).

20. Studying mixing water and admixtures for concrete.
21. Studying of Mixing, handling, placing, compacting, and curing of concrete.
22. Studying of the properties and tests of fresh and hardened concrete.
23. Principles of concrete mix design.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction, Fundamental of Concrete	1st	3	1	-	2
Cement:	2nd, 3rd, 4th, 5th, 6th	15	5	-	10

Introduction, manufacture of cement, types and properties of cement, and cement tests					
Aggregates: Types and properties of aggregates, and Grading and tests of aggregates	7th, 8th, 9th	9	3	-	6
Mixing water, admixtures for concrete	10th, 11th	6	2	-	4
Mixing, Handling, placing, and curing	12th, 13th	6	2	-	4
Properties and Tests of Fresh and hardened Concrete	14th, 15th	6	2	-	4

Prepared by:	Dr. Gamal Al-Saadi	Date: **9/3/2015**

CE 318: Design of Reinforced Concrete Structures

4 Credit

Catalogue Description :

Fundamentals and design theories based on ultimate strength design and elastic concept. ACI Code requirements. Load factors. Analysis and design of reinforced concrete members subject to flexure, shear. Development length of reinforcement. Design of one-way and two-way slabs. Design of non-sway columns. Design of staircases. Reinforcement detailings. **Course Web Address:** http://www.qec.edu.sa/

Prerequisites: CE 306: Structural Analysis - 2

CE 307: Properties and Testing of Concrete **Co-requisites:**

Course Category: Core Course **Textbook:**

- McGregor, J.G. and Wight J.K., Reinforced Concrete: Mechanics and Design, Prentice Hall,. Latest Edition

References:

- M. Nadim Hassoun, and Akthem Al Manaseer, Structural Concrete Theory and design, John Wiley & Sons Inc, Latest Edition

- Saudi Building Code Latest Edition,
- ACI Latest Edition

Other Supplemental Materials: Site Uploaded; Notes Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 4 hours, Contact: 4 hours (4 hour lecture and 1 hours recitation; per week)

Course Coordinator's Name: Assistant Prof. Dr. Ahmed Elragi

Computer Usage: Writing home works and required reports.
Drawing plans and elevations of some designed applications.
Using the software package Office, and SAP2000 for analysis of some problems. **Specific**

Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

1. An ability to conduct the knowledge of the reinforced concrete as a structural material.
2. An ability to conduct the knowledge of the mechanics of reinforced concrete members.
3. An ability to use building codes in the design of reinforced concrete structures.
4. An ability to use ultimate strength design method and elastic concept in reinforced concrete design.
5. An ability to design reinforced concrete beams and slabs subjected to flexure and shear forces.
6. An ability to compute development length, splices and deflections in reinforced concrete structures.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
c) 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
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction, Material properties, Mechanics of reinforced concrete members	1st	5	4	1	
Ultimate strength design & elastic concept, Load factors and load combination	2nd	5	4	1	
Flexural design of beams with rectangular and T cross sections	3rd,& 4th	10	8	2	
Analysis and design of beams with compression reinforcement, Reinforcement details	5th	5	4	1	
Analysis and design of beams for shear and diagonal tension,	6th &7th	10	8	2	
Design of one-way slabs, Analysis and design of continuous beams and slabs	8th & 9th	10	8	2	
Development length, anchorage and splice of reinforcement. Deflections and crack control	10th &11th	10	8	2	
Design of non-sway short concrete columns	12th &13th	10	8	2	
Design of different types of staircases, Detailing	14th &15th	10	8	2	

Prepared by:	Assistant Prof. Dr. Ahmed Elragi	Date: 1/1/2015

CE 330: Hydraulics

3 Credit

Catalogue Description:

Steady flow in closed and open channels. Pipes networks. Dimensional analysis and similitude. Non-uniform flow. Back water curves and hydraulic jump. Pump.

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Course Web Address: http://www.qec.edu.sa/

Prerequisites: Fluid Mechanics CE 230

Co-requisites: None

Course Category: Core Course **Textbook:**

3. Gupta R.S. "Hydrology and Hydraulic Systems," Waveland Press, Inc. 2008 or latest.
4. Douglas, J.F. , Casiorek, J.M. & Swaffield, J. A., "Fluid Mechanics"**References:**
5. Victor L. Streeter , Benjamin. Wylie and Keith Bedford "**Fluid Mechanics** " , 9th ed., Mc Graw Hill, 1998, ISBN 0070625379

Other Supplemental Materials: Site Uploaded; Notes, Model Answers, etc. **Credit and Contact Hours:**

Credits: 2 hours, Contact: 3 hours (2 hour lecture and 1 hour of tutorial; per week)

Course Coordinator's Name: Associate Prof. Yousry Ghazaw

Computer Usage: Word Processor (student's choice), Spreadsheet (student's choice)

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

1. Recognize the essential parameters describing a steady flow in open channels and pipes.
2. Understand the properties of hydraulic jump.
3. Be able to calculate flow in network of pipes.
4. Be able to solve a range of problems in steady open channel flow.
5. Be able to estimate the length of backwater curves.
6. Be able to deal with different types of pump.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
c) 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
e) An ability to identify, formulate, and solve engineering problems
h)The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning

k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction: Course outlines, Review properties of water, and hydrostatic forces.	1st	3	2	1	-
Open channel flow: ***Uniform flow through open channel*** Introduction, Manning's formula for discharge through an open channel. Chezy's formula for discharge through an open channel. Discharge through rectangular, trapezoidal, and circular cross sections. Best Hydraulic section	2nd 3rd 4th 5th	12	9	3	-
Non-Uniform flow through open channel Specific energy of a flowing liquid, Specific energy diagram. Flow analysis, normal depth, critical depth and critical velocity. Froude number, hydraulic jump Alternate depths, and energy dissipation.	6th 7th 8th 9th	12	9	3	-
Gradually varied flow Gradually varied flow analysis Types of water surface profiles.	10th 11th	6	4	2	-

Pumps: Introduction, Types of pumps Suction-delivery and total head. Characteristic curves of pumps, system curves. Pump selection.	12th 13th 14th 15th	12	9	3	-

Prepared by:	**Dr: Yousry Ghazaw**	**Date**: March 2015

CE 403: Advanced Reinforced Concrete

3 Credit **Catalogue**

Description :

Design of floor systems: ribbed and flat slabs. Design of beams for torsion, combined shear and torsion by the strength method. Design of short and long columns under eccentric loadings. Study of different structural systems for covering large dimensions halls. Analysis and design of reinforced concrete water tanks. Introduction to the design of prestressed concrete members.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: CE 318: Design of Reinforced Concrete Structures. **Co-requisites:**

Course Category: Optional Course **Textbook:**

- McGregor, J.G. and Wight J.K., Reinforced Concrete: Mechanics and Design, Prentice Hall,. Latest Edition

References:

- M. Nadim Hassoun, and Akthem Al Manaseer, Structural Concrete Theory and design, John Wiley & Sons Inc, Latest Edition
- Saudi Building Code Latest Edition,

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hours recitation; per week)

Course Coordinator's Name: Assistant Prof. Dr. Ahmed Elragi

Computer Usage: Writing home works and required reports.
Drawing plans and elevations of some designed applications.
Using the software package Office, and SAP2000 for analysis of some problems.

.Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

1. Be able to conduct the knowledge of design methods of advanced reinforced concrete structures.
2. An ability to design reinforced concrete ribbed and flat slabs.
3. An ability to design reinforced concrete beams for torsion, and combined shear and torsion. 4. An ability to design reinforced concrete short and long columns subjected to eccentric loadings.
5. A knowledge of structural systems used for covering large dimensions halls.
6. An ability to design reinforced concrete water tanks.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science, and engineering principles to solve civil engineering problems in practice.
c) An ability to analyze and design a system, civil engineering structure or component to meet desired goals in civil engineering applications economically viable, sustainable and acceptable socially, politically and ethically.
e) An ability to identify, formulate, and solve civil engineering problems.
f) An ability to understand professional, social and ethical practices and responsibilities.
h) An understanding of the impact of engineering solutions in a global, economical, environmental and societal context.
i) A recognition of the need for, and an ability to engage in, life-long learning.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab

Introduction, Review of ultimate strength design & elastic concept, ACI Code requirements	1st	4	3	1	
Analysis and design of ribbed slabs, Load distribution, Design of hidden beams,	2nd	4	3	1	
Analysis of flat slabs: construction loads, bending moments in strips. Direct design method.	3rd,	4	3	1	
Design of flat slabs: Equivalent frame method, slab deflections, details of reinforcements.	4th &5th	8	6	2	
Design of concrete beams for torsion, and combined shear and torsion.	6th	4	3	1	
Design of short and long columns subjected to eccentric loads, Interaction diagrams.	7th ,8th &9th	12	9	3	
Study of different structural systems for covering large dimensions halls.	10th & 11th	8	6	2	
Analysis and design of reinforced concrete water tanks.	12th &13th	8	6	2	
Introduction to the design of prestressed concrete members.	14th &15th	8	6	2	

Prepared by:	Assistant Prof. Dr. Ahmed Elragi	Date: 1/1/2014

CE 418: Structural Analysis-3

3 Credit

Catalogue Description:

Analysis of 3-D frames and trusses, shells, soil structure interaction problems, structures under dynamic loading and other indeterminate structures.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Structural Analysis-2 CE 306 **Co-requisites:**
None

Course Category: Elective Course

Textbook: C Kassimali, Matrix Analysis of Structures, latest Edition, Cengage Learning.

References: Billington D. P., Thin Shell Concrete Structures, McGraw-Hill, Latest Edition

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hours lecture and 1 hour tutorial; per week)

Course Coordinator's Name: Prof. Hesham Ali Zieneldin

Computer Usage: Writing homeworks and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

15. A knowledge of different types of advanced indeterminate structural systems.
16. An ability to analyze 3-D frames and trusses.
17. An ability to analyze shells.
18. An ability to model and analyze soil-structure interaction problems.
19. An ability to analyze structures under dynamic loading.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
c) 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
d) An ability to function on multidisciplinary teams
e) An ability to identify, formulate, and solve engineering problems
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction to special structure analysis problems	1st	4	3	1	-
Analysis of 3D Trusses	2nd,3rd	8	6	2	-
Analysis of 3D Frames	4th , 5th	8	6	2	-
Shell Structures.	6th,7th, 8th , 9th	16	12	4	-
Soil Structure Interaction	10th ,11th, 12th	12	9	3	-

Introduction to Structural Dynamics	13th, 14th 15th	12	9	3	-

Prepared by:	Prof. Hesham Ali Zieneldin	

CE 443: Design of Pavement

3 Credit

Catalogue Description:

Pavement types and loading, behavior of pavements under dynamic loads, stresses in flexible and rigid pavements, pavement components, pavement design factors, flexible highway and airport pavement design, rigid highway and airport pavement design; overlay design and computer applications; practical pavement design project of a road and airport.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: CE 205

Co-requisites: None

Course Category: Elective Course

Textbooks:

1- Yoder, E.J. and Witczack, M.W., Principles of Pavement Design, 2nd edition, John Wiley & Sons, Inc., 1975.

2- Y. H. Huang, Y.H., Pavement Analysis and Design, Pearson Prentice Hall, 1993.

References:

Ministry of Communications, Highway Construction Standards, 1987, Federal Aviation Administration Airport Design Manual.

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model

Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hours lecture and 1 hour tutorial; per week)

Course Coordinator's Name: Prof. Sayed A. Habib

Computer Usage: Writing homeworks and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will:

1. Tell the principles of pavement types and loading 2. Recognize the behavior of pavements under dynamic loads.
3. Analyze the stresses in flexible and rigid pavements.
4. Outline pavement components and pavement design factors.
5. Design flexible and rigid pavements in highway and airport.
6. Design overlay.
7. Use computer applications.
8. Perform practical pavement design project of a road and airport.

Old Related Student Outcomes:

c) 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

e) An ability to identify, formulate, and solve engineering problems

h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in life-long learning

k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors**.**

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Pavement types and loading	1st	4	3	1	-
Behavior of pavements under dynamic loads	2nd 3rd	4 4	3 3	1 1	-
Stresses in flexible and rigid pavements	4th	4	3	1	-
Pavement components	5th	4	3	1	-
Pavement design factors	6th 7th	4 4	3 3	1 1	-
Flexible highway and airport pavement design	8th 9th	4 4	3 3	1 1	-
Rigid highway and airport pavement design	10th 11th	4 4	3 3	1 1	-
Overlay design	12th	4	3	1	-
Computer applications	13th 14th	4 4	3 3	1	-
Practical pavement design project of a road and airport	15th	4	3	1	-

Prepared by:	Prof. Sayed A. Habib	**Date**: March 2015

CE 447: Highway Engineering

2 Credit

Catalogue Description:

Highway planning and capacity. Geometric design. Intersections. Highway materials and drainage. Bituminous mixtures design. Flexible pavement design. Highway construction. Pavement evaluation and maintenance.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: CE 343

Co-requisites: None

Course Category: Core Course

Textbooks:

Wright, P. H. and Dixon, K., "Highway Engineering," 7th Edition, Jon Wiley & Sons, ISBN 0471-26461-X, 2007 .

References:

- Rogers, M. "Highway Engineering," Wiley-Blackwell; 2nd edition, ISBN-10: 1405163585, ISBN-13: 978-1405163583, 2008.
- Mannering, F. L., Washburn, S. S. and Kilareski, W. P. "Principles of Highway Engineering and Traffic Analysis," Wiley; 4th edition, ISBN-10: 0470290757, ISBN-13: 9780470290750, 2008.

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 2 hours, Contact: 4 hours (2 hours lecture, 1 hour tutorial and 1 hour laboratory; per week)

Course Coordinator's Name: Prof. Sayed A. Habib

Computer Usage: Writing homeworks and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will:

1. Recognize highway planning and capacity.
2. Differentiate between the geometric and structural design.
3. Recognize highway materials and drainage.
4. Design of highway mixtures.
5. Design of highway flexible pavement.
6. Recognize the highway construction.
7. Outline the pavement evaluation and maintenance.

Old Related Student Outcomes:

b) An ability to design and conduct experiments, as well as to analyze and interpret data

c) 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

e) An ability to identify, formulate, and solve engineering problems

h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in life-long learning

k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Highway Planning and Capacity	1st 2nd	4	2	1	1
Geometric Design	3rd 4th	4 4	2 2	1 1	1 1
Intersections	5th 6th	4	2	1	1
Highway Materials and Drainage	7th 8th	4 4	2 2	1 1	1 1
Bituminous Mixtures Design	9th 10th	4 4	2 2	1 1	1 1

Flexible Pavement Design	11th 12th	4 4	2 2	1 1	1 1
Highway Construction	13th 14th	4 4	2 2	1 1	1 1
Pavement Evaluation and Maintenance	15th	4	2	1	1

Prepared by:	Prof. Sayed A. Habib	**Date**: March 2015

CE 448: Construction and maintenance of Highways

3 Credit

Catalogue Description:

Highways construction materials; asphalt concrete mix design; asphalt plants operation; material placement and compaction methods; quality control; earthwork, roadside requirements; construction standards; pavement performance and evaluation; pavement distress identification; surface treatments; overlay design; pavement recycling techniques. **Course Web Address:** http://www.qec.edu.sa/

Prerequisites: None

Co-requisites: CE 447

Course Category: Core

Course **Textbooks:**

Wright, P. H. and Dixon, K., "Highway Engineering," 7th Edition, Jon Wiley & Sons, ISBN 0471-26461-X, 2007.

References:

- Watson, J. P., "Highway Construction and Maintenance," 2nd Edition, 1994, Longman, ISBN10: 0582234123, ISBN-13: 978-0582234123.
- O'Flaherty, C. A., "The Location, Design, Construction and Maintenance of Road Pavements," 4th Edition, 2001, CRC Press, ISBN-10: 0750650907, ISBN-13: 978-0750650908.
- Wright, P. H. and Dixon, K. "Highway Engineering," 7th Edition, 2007, John Wiley and Sons, ISBN 0-471-26461-X.

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 2 hours, Contact: 4 hours (2 hours lecture, 1 hour tutorial and 1 hour laboratory; per week)

Course Coordinator's Name: Prof. Sayed A. Habib

Computer Usage: Writing homeworks and required reports and drawing some engineering sketches.

Specific Outcomes of Instructions:

Students who successfully complete the course will:

1. Recognize highways construction materials.
2. Design of asphalt concrete mix.
3. Recognize asphalt plants operation, material placement and compaction methods.

4. Recognize the quality control; earthwork, roadside requirements, construction standards.
5. Recognize pavement performance and evaluation.
6. Be able to analyze the pavement distress.
7. Outline surface treatments.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
c) 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
e) An ability to identify, formulate, and solve engineering problems
g) An ability to communicate effectively
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Highways construction materials	1st	4	3	1	-
Asphalt concrete mix design	2rd 3th	4 4	3 3	1 1	- -
Asphalt plants operation	4th	4	3	1	-
Material placement and compaction methods	5th	4	3	1	-
Quality control	6th	4	3	1	-
Highway Materials	7th	4	3	1	-
Earthwork	8th	4	3	1	-
Roadside requirements	9th	4	3	1	-
Construction standards	10th	4	3	1	-

Pavement performance and evaluation	11th	4	3	1	-
Pavement distress identification	12th	4	3	1	-
Surface treatments	13th	4	3	1	-
Overlay design	14th	4	3	1	-
Pavement recycling techniques	15th	4	3	1	-

Prepared by:	Prof. Sayed A. Habib	Date:

CE 457: Open Channel Hydraulics

3 Credit

Catalogue Description:

Steady and unsteady flow in open channels. Uniform and non-uniform flow. Back water curve and its analysis. Sediment transport. Design of erodible channel. Dimensional analysis and modeling. Spillway and siphon spillway.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Fluid Mechanics CE330

Co-requisites: None **Course**

Category: Core Course

Textbook:

- Gupta R.S. "Hydrology and Hydraulic Systems," Waveland Press, Inc. 2008 or latest.

References:

6. Henry M. Morris and James M. Wiggert. " Applied hydraulics in engineering" latest edition, John Wiley &Sons.
7. Victor L. Streeter , Benjamin. Wylie and Keith Bedford "**Fluid Mechanics** " , 9th ed., Mc Graw Hill, 1998, ISBN 0070625379

Other Supplemental Materials: Site Uploaded; Notes, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hour of tutorial; per week)

Course Coordinator's Name: Associate Prof. Yousry Ghazaw

Computer Usage: Word Processor (student's choice), Spreadsheet (student's choice)

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

1. Recognize the essential parameters describing steady flow, unsteady flow, uniform flow and nonuniform flow in open channels.
2. Be able to calculate back water curves.
3. Be able to deal with erodible channel.
4. Be able to design alluvial channels.
5. To understand the concepts of dynamic similarity and be able to use dimensional analysis to design and interpret laboratory experiments.
6. Be able to deal with sediment transport and erosion in open channel.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering

c) 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

e) An ability to identify, formulate, and solve engineering problems

g) An ability to communicate effectively

h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in life-long learning

k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

3. an ability to communicate effectively with a range of audiences.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab

Introduction: Course outlines, Review of basic principle of hydraulics.	**1st**	4	3	1	-
Flow in open channels: Characteristics of open flow. Empirical open channel formulas. Friction factors in open channel flow, hydraulic efficiency of section. Energy regimes in open channel Flow transitions, hydraulic jump. ***Non uniform flow*** Computation of water surface profile in an irregular channel, Flow profile in flood plains.	**2nd** **3rd** **4th** **5th**	16	12	4	-
Mechanics of sedimentation Hydraulic properties of sediments Movement of sediment in the bed. Suspended sediment load Total sediment load Bed geometry and flow resistance in alluvial channels, Reservoir sedimentation.	**6th** **7th** **8th** **9th** **10th** **11th** **12th**	28	21	7	-
Hydraulic structures: Weirs and Siphon Spillways.	**13th**	4	3	1	-
Dimensional analysis and Similitude (hydraulic model studies): Geometric, kinematics and dynamic similitude (examples) Dimensionless numbers, Buckingham pi theorem (examples)	**14th** **15th**	8	6	2	-

Prepared by:	**Dr: Yousry Ghazaw**	**Date**: March 2015

CE 459: Groundwater Hydrology

3 Credit

Catalogue Description:

Introduction to Surface and Groundwater Hydrology, Hydrological cycle and major processes. Monitoring of hydro-meteorology. Precipitation, meteorological, and stream flow data analysis, storage and supply of groundwater; basic differential equations for flow in confined and unconfined aquifers. Steady and unsteady groundwater flow problems; groundwater recharge; saline water intrusion and environmental aspects of groundwater; groundwater in Saudi Arabia.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Hydrology CE331

Co-requisites: None **Course**

Category: Core Course

Textbook:

Karamouz, M., A. Ahmadi, and M. Akhbari. "Groundwater Hydrology: Engineering, Planning, and Management," CRC Press; 1st edition, 2011.
Mays, L.W., and D.K. Todd "Groundwater Hydrology," John Wiley and Sons, Inc,
2005, ISBN-10: 0471452548, ISBN-13: 9780471452546. **References:**
Bear, J. "Hydraulics of Groundwater," Dover Publications, 2007, ISBN-10: 0486453553, ISBN-13: 978-0486453552.8.

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hour of tutorial; per week)

Course Coordinator's Name: Associate Prof. Yousry Ghazaw

Computer Usage: Ready- made Finite difference program. Spreadsheets, writing homework's and reports.

Specific Outcomes of Instructions:

Students who successfully complete the course will demonstrate the following outcomes by tests and homework:

- Realize the need of hydrology as an engineering science essential for the planning, design and operation of water resource systems
- Recognize the essential parameters describing a groundwater flow.
- Develop an understanding of the flow in confined and unconfined aquifers.
- Develop an understanding of steady and unsteady flow problems.
- Understand the mechanism of wells. Develop an understanding of groundwater recharge and saline water intrusion and environmental aspects of groundwater. Realize groundwater aspects in Saudi Arabia.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering

c) 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

j) A knowledge of contemporary issues

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics**.**

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Introduction to groundwater hydrology:	1st	4	3	1	-
Hydrological process related to groundwater hydrology:	2nd 3rd	4	3	1	-
Occurrence, storage and supply of groundwater:	4th	4	3	1	-
Basic differential equations for flow in confined and unconfined aquifers:	5th 6th 7th	4	3	1	-
Steady and unsteady groundwater flow problems:	8th 9th 10th	4	3	1	-
Groundwater recharge, saline water intrusion, and environmental aspects of groundwater:	11th 12th 13th	4	3	1	-
Case studies related to groundwater in Saudi Arabia:	14th 15th	4	3	1	-

Prepared by:	**Dr: Yousry Ghazaw**	**Date**: March 2015

CE 462: Engineering Surveying

3 Credits **Catalogue**

Description:

Electronic distance measurement with high precision, total station, topographic mapping and earthworks computations, Laser systems and alignment, Precise leveling, construction surveying, route surveying, Underground surveying, Global Positioning System (GPS) and its Applications.

Course Web Address:

http://www.qec.edu.sa/

Prerequisites by Topic: Plane Surveying CE 212

Co-requisites: ……...

Course Category: Elective Course

Textbook:

Barry Kavanagh and Diane K. Slattery, "Surveying with Construction Applications", Prentice Hall, Eighth Edition, Published 12/26/2013, ISBN-10: 0132766981.

References:

Charles D. Ghilani, Paul R. Wolf , 2011, " Elementary Surveying: An Introduction to Geomatics", 13th Edition, Prentice Hall.

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, etc.

Credit and Contact Hours:

Credits: 3 hours, Contact: 4 hours (3 hour lecture and 1 hour tutorial per week)

Computer Usage:

Total Station Software, and Computer Applications for solving different surveying problems.

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to:

21. Outline the principles of EDM and the geometry of total station measurements.
22. Compute and analyze station coordinates that is collected by total station instrument.
23. Define the alignment of pipe line using laser system
24. Analyze the setting out data for many projects in the construction field.
25. Recognize the setting out technique of horizontal curves using deflection angles and total station techniques.
26. Apply surveying skills relevant to many surveying projects such as construction field and underground surveying.
27. Recognize the fundamental of GPS and its applications
28. An ability to perform earth work calculations.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
g) An ability to communicate effectively
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k)An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
3. an ability to communicate effectively with a range of audiences.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial	Lab
Background	1st	4	3	1	-
Laser System , Alignment and related projects	2nd	4	3	1	-
Precise leveling:	3rd	4	3	1	-
Modern EDM Instruments and Total Station:	4th - 5th	8	6	2	-
Topographic mapping and Earthworks:	6th-7th	8	6	2	-
Construction surveying:	8th - 9th	8	6	2	-
Route Surveys:	10th- 11th- 12th	12	9	3	-
Underground surveying:	13th	4	3	1	-
GPS	14th - 15th	8	6	2	-

Prepared by:	Associate Prof. Ramadan Hassan	Date:

CE 474: Design and Operation of Water and Wastewater Treatment Plants

3 Credits

Catalogue Description:

Theory and practice in sanitary engineering including the concepts of processing, design, economic evaluation and computer analysis; using practical considerations in the design and operation of treatment units and the combining of unit processing in water and wastewater treatment plants; field trips will be organized to visit various types of treatment plants in operation.

Course Web Address: http://www.qec.edu.sa/

Prerequisites: Water and wastewater engineering, CE 370

Co-requisites: ……

Course Category: Elective Course

Textbook:

T.D. Reynolds, Unit Operations and Processes in Environmental Engineering, Brooks/Code Engineering Division, (Latest edition).

References:

Other Supplemental Materials: Site Uploaded; Notes, Solved Examples, Model Answers, etc.

Credit and Contact Hours:

Credit: 3 hours, Contact: 4 hours (3 hours lectures and 1 hour tutorial) per week

Course Coordinator's Name:

Associate Prof. Tarek Elmitwalli

Computer Usage: Computer applications in environmental engineering, spreadsheet

Specific Outcomes of Instructions:

Students who successfully complete the course will be able to

21. Describe the chemical and physical processes in water and wastewater treatment.
22. Recognize main processes in biological wastewater treatment.
23. State and describe sustainable treatment of water and wastewater.
24. Design of the main units in conventional and sustainable treatment of the water and wastewater.
25. Develop the main units in sludge treatment.
26. Explain the methods of controlling the design and operation and treatment of water and wastewater.
27. Calculate, evaluate and interpret the results.

Old Related Student Outcomes:

a) An ability to apply knowledge of mathematics, science and engineering

c) 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

e) An ability to identify, formulate, and solve engineering problems

f) An understanding of professional and ethical responsibility

K) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

New Related Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Topics to be covered:

Topics	Week / Date	Contact Hours	Lectures	Tutorial
Introduction, mass balances and flow models and reactors	1st & 2nd	8	6	2
Type of reactors	3rd	4	3	1
Preliminary unit operations and processes	4th	4	3	1
Design and operation of coagulation and flocculation units	5th	4	3	1
Design and operation of sedimentation tanks	6th	4	3	1
Design and operation of filters	7th	4	3	1
Design and operation of Ammonia removal, adsorption units, ion exchange and membrane units	8th & 9th	8	6	2
Design, operation, modelling of activated sludge systems and trickling filters systems	10th , 11th & 12th	12	9	3
Design and operation of stabilization ponds and aerated lagoons units	13th	4	3	1
Design and operation of anaerobic and aerobic digestions, and solids removal units	14th & 15th	8	6	2

Prepared by:	Associate Prof. Tarek Elmitwalli	**Date**: March 2015

Capstone Courses (Training and SDP)

CE 400: Senior Design Project (SDP)

1. Course Name and code : Senior Design Project – CE 400

2. Credit hours : 3 hrs.

Contact hours : 4 hrs.

3. Coordinator/Instructor : Dr. Sherif M. ElKholy

4. Text book and Other supplemental materials

Text book:

- No specific textbook (to be determined by the project supervisor based on the scope and application of the project)

References:

- No specific textbook (to be determined by the project supervisor based on the scope and application of the project)

Other supplemental materials

- Senior Design Project Guidelines. http://www.qec.qu.edu.sa/en/Documents/Senior_Design_Project%20System.pdf

5. Specific course information

A) Catalog Description

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project, which simulates the real working condition to which the student will be exposed after graduation. The project should be comprehensive and includes all the necessary preliminary field studies, visibility studies, final design drawings, bill of materials, and the total cost of the project, if any, depending on the natures of project. The SDP project shall continue for one semester. At the end of the semester, there will be a seminar held for the working team of students to present the details of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion

B) Prerequisites : Cooperative training GE 405

C) Co-requisites : None

D) Course Condition : ■ Required □ Elective □ Selective

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students are expected to be able to:

1. Apply knowledge of mathematics, science and engineering in solving an engineering problem.
2. Design an experiment, when applicable, collect, analyse and interpret data.
3. Design a civil engineering, component, to meet desired needs within realistic constraints including: identify design inputs and recognize constraints, apply or develop design approaches and, when relevant, realize successful system, component or process.
4. Demonstrate teamwork and project management attributes
5. Develop models and/or apply problem solving approaches for technical problems. This may include problem definition, identifying objectives, use of heuristics, generating alternative models/solutions, deciding the course of solution, explain problem solving strategies, applying models/solution and evaluating results

6. Demonstrate professional and ethical responsibilities and academic integrity
7. Organize and present technical work in written reports and in oral presentations
8. Demonstrate understanding for the broader impact of engineering solutions in a global, economic, environmental, and societal context as applicable
9. Seek information from different sources and enhance further learning independently
10. Realize current issues related to engineering problems
11. Apply techniques and capabilities of the modern engineering tools in the field of civil engineering

B) Old Relation to the student outcomes

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
c) 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
d) An ability to function on multidisciplinary teams
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
g) An ability to communicate effectively
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

C) New Relation to the student outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

3. an ability to communicate effectively with a range of audiences.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

7. Brief list of topics to be covered

- Review previous works and collection of data related to the design.
- Defining and formulation of the problem, determination of the project objectives.
- Applying design concepts to achieve the target objective of the project.
- Where appropriate ○ Building mathematical models, ○ Conducting simulations, carrying out the planned experiments.
- Analyzing the results and evaluating the end product.
- Formulation of the suggestions, recommendations and conclusions. Writing the final report and preparing for the final presentation.

Prepared by: Dr. Sherif ElKholy **Date**: March 2015

CE 491: Senior Design Project 1

1. Course Name and code : Senior Design Project 1 **CE 491**

2. Credit hours : 3 hrs **Contact hours :** 4 hrs

3. Coordinator : Dr. Sherif M. ElKholy

4. Text book and Other supplemental materials

Text book:

- No specific textbook (to be determined in consultation with the supervisor based on the scope and application of the project)

References:

- No specific textbook (to be determined in consultation with the supervisor based on the scope and application of the project)

Other supplemental materials -

Senior Design Project Guidelines.

- http://www.qec.qu.edu.sa/en/Documents/Senior_Design_Project%20System.pdf

5. Specific course information

A) Catalog Description

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project which simulates the real working condition to which the student will be exposed after graduation. The project should be comprehensive and includes all the necessary

preliminary studies, final design drawings, bill of quantities, and the total cost of the project. The graduation project shall continue for one semesters. At the end of the semester, there will be a seminar held for the working team of students to present the details of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion.

B) Prerequisites **:** Complete 100 Credit hours

C) Co-requisites **:** None

D) Course Condition **:** ■ Required □ Elective □ Selective

6. Specific goals for the course

A) Course Specific outcomes By the end of this course,

students are expected to be able to:

- Define and formulate engineering problems.
- Gather and extract relevant information through internet and library searches.
- Operate effectively within a team.
- Generate alternative solutions to engineering problems and consequently identify the appropriate and realistic solution among the various alternatives.
- Make a design for a component, or a system that meets the desired needs □ Prepare and deliver effective presentations.

B) Old Relation to the student outcomes

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
c) 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
d) An ability to function on multidisciplinary teams
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
g) An ability to communicate effectively
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

C) Relation to the student outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
3. an ability to communicate effectively with a range of audiences.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

7. Brief list of topics to be covered

- Survey, internet search, data collection
- Defining and formulation of the problem, determination of the project objectives Building the mathematical model, applying the design concepts to the target object or the experimental set
- Comparing the alternative solutions to end with the best design considering the realistic constraints
- Writing the Final Report, preparation of the Final presentation

Prepared by: Dr. Sherif ElKholy **Date**: March 2015

CE 492: Senior Design Project 2

Course Name and code **:** Senior Design Project 2 – CE 492

1. **Credit hours** **:** 2 hrs
   Contact hours **:** 3 hrs
2. **Coordinator** **:** Dr. Sherif ElKholy
3. **Text book and Other supplemental materials**

Text book:

- No specific textbook (to be determined in consultation with the supervisor based on the scope and application of the project)

References:

- No specific textbook (to be determined in consultation with the supervisor based on the scope and application of the project)

Other supplemental materials -

Senior Design Project Guidelines.

- http://www.qec.qu.edu.sa/en/Documents/Senior_Design_Project%20System.pdf

5. Specific course information

A) Catalog Description

The student is assigned, among a team of students and one or more faculty professors, the design of an applied project which simulates the real working condition to which the student will be exposed after graduation. The project should be comprehensive and includes all the necessary preliminary studies, final design drawings, bill of quantities, and the total cost of the project. At the end of the semester, there will be a seminar held for the working team of students to present the details of the project. The working team will be orally examined and evaluated based on the presentation as well as the oral discussion.

B) Prerequisites **:** Senior Design Project 1 CE 491

C) Co-requisites **:** None

D) Course Condition **:** ■ Required □ Elective □ Selective

6. Specific goals for the course

A) Course Specific outcomes By the end of this course,

students are expected to be able to:

- Design a system, a component, a system or a process that meets the desired needs and which reflects considerations to environment, economy, society and safety where appropriate
- Operate effectively within a team.
- Verify and validate a design product against specified requirements.
- Apply accurately, knowledge of mathematics, science and engineering to analyses a system, component or process. □ Prepare and deliver effective presentations.

B) Relation to the student outcomes

a) An ability to apply knowledge of mathematics, science and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
c) 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
d) An ability to function on multidisciplinary teams
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
g) An ability to communicate effectively
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

C) Relation to the student outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
3. an ability to communicate effectively with a range of audiences.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

7. Brief list of topics to be covered

- Where appropriate ○ Conducting simulations,
  - ○ Prepare and develop the final output of the project and/or carrying out the planned experiments
- Analyzing the results and evaluating the end product against project objectives.
- Formulation of the suggestions, recommendations and conclusions.
  Writing the final report and preparing for the final presentation

Prepared by: Dr. Sherif ElKholy **Date**: March 2015

GE 406

1. **Course Name and code: Summer Training – GE 406**
2. **Credit hours: 2 hrs.** **Contact hours: ---**
3. **Instructor/coordinator: Prof. Elamir Samy Gadelmawla**
4. **Text book and Other supplemental materials**

Text book:

- N/A

References:

- N/A

Other supplemental materials

- Course Instructions are uploaded for the students on the College Web-Site: (http://qec.edu.sa).

5. **Specific course information**

A) Catalog Description

Cooperative Training Program is a joint effort between the College of Engineering and the public and the private sectors in the area of specialization to allow students to practice the skills and knowledge they have learned. Coop students are required to spend seven months of practical training in a relevant field in industry.

B) Prerequisites: 100 hours teaching.

C) Co-requisites: None

D) Course Condition: ■ Required **☐ Elective** **☐ Selective**

6. **Specific goals for the course**

A) Course Specific outcomes

By the end of this course, students will be able to:

8. Apply the major discipline theoretical knowledge.
9. Practice what he gained of skills.
10. Enhance the ability of working in a team.
11. Gain the competence of adaptation (anticipating, adapting to, and promoting changes important to a profession societal purpose and the professional role).

12. Receive and practice the ethics of a profession as standards that guide professional behavior.
13. Acquire the leadership competence.
14. Have the scholarly concern for improvement.

B) **Old Relation to the student outcomes**

Course Code	Student Outcomes (SO)											
	a	b	c	D	e	f	g	h	i	j	k	L
GE 406	■	☐			■		☐	☐	☐	☐		

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

C) **New Relation to the student outcomes**

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
GE 406	■		☐	☐		☐	☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

 N/A

GE 407: Cooperative Training

1. **Course Name and code: Cooperative Training – GE 407**
2. **Credit hours: 7 hrs.**

   Contact hours: ---
3. **Instructor/coordinator: Prof. Elamir Samy Gadelmawla**
4. **Text book and Other supplemental materials**

   Text book:

   - N/A

   References:

   - N/A

   Other supplemental materials

   - Course Instructions are uploaded for the students on the College Web-Site: (http://qec.edu.sa).
5. **Specific course information**

   A) Catalog Description

Cooperative Training Program is a joint effort between the College of Engineering and the public and the private sectors in the area of specialization to allow students to practice the skills and knowledge they have learned. Coop students are required to spend seven months of practical training in a relevant field in industry.

B) Prerequisites: 100 hours teaching.

C) Co-requisites: None

D) Course Condition: ■ Required ☐ Elective ☐ Selective

6. Specific goals for the course

A) Course Specific outcomes

By the end of this course, students will be able to:

15. Apply the major discipline theoretical knowledge.
16. Practice what he gained of skills.
17. Enhance the ability of working in a team.
18. Gain the competence of adaptation (anticipating, adapting to, and promoting changes important to a profession societal purpose and the professional role).
19. Receive and practice the ethics of a profession as standards that guide professional behavior.
20. Acquire the leadership competence.
21. Have the scholarly concern for improvement.

***B)* Old Relation to the student outcomes**

Course Code	Student Outcomes (SO)											
	a	b	c	D	e	f	g	H	i	j	k	L
GE 407	■	☐			■		☐	☐	☐	☐		

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

***C)* New Relation to the student outcomes**

Course Code	Student Outcomes (SO)						
	1	2	3	4	5	6	7
GE 407	■		☐	☐		☐	☐

■ Highly related to Student Outcome (SO)

☐ To some extent related to Student Outcome (SO)

7. Brief list of topics to be covered

 N/A