New Program of Building & Construction Degree According to Bologna Process

By
Subject Area Board

Engineering Technical College, Maysan

Southern Technical University
2023/2024

Building & Contraction Degree Program

Basic Information

Qualification awarded	Bachelor Degree in Building & construction
Qualification Type/Level	TVQF/7 Bachelor
Number of Years/credits	4 years; 240 ECTS
Mode of Study	Full-Time
Name of the Course Director and other contact information	Head of Department
Language of Teaching	English, Arabic

General Information

Program Profile	Please read new Degree Program Profile
Key Learning Outcomes	
Occupational Profile/s of Graduates	
Access to further study	

Assessment methods, examination regulations, and grading

Assessment is normally by means of a written examination; in some cases, there are intermediate exams during the course; other elements (participation in discussion, written or oral reports, commentary of texts etc.) are foreseen in specific course units and are described in the Course Unit Profiles.

New Degree Program Profile

Title (of the degree program):	**Building & construction**
Awarding institution:	**Southern Technical University**
Level (TVQF)	**7 Bachelor**
Field of study:	**Building & Construction study**
Main focus:	**The degree program aims to ensure an up-to-date formation in the broad field of Building & Construction, with emphasis on abilities and competences useful for self-employment or employment in Building & Construction companies or services or as Building & Construction experts for private companies or public services.**
Key learning outcomes on completion	**The graduates will have the general and specific competences that enable them to operate alone or in teams to ensure the necessary Building & construction services for private or public enterprise. These competences are:** • **General competences:** **1- Having a critical thinking, analysis, and synthesis.** **2- Recognizing and solving problems.** **3- Making logical decisions.** **4- Leading effectively and Empower others.** **5- Working independently and with teamwork.** **6- Executing the acquired scientific knowledge in real-life practical situations.** • **Specific competences** • **Reading construction plans.**

	• **Supervising the implementation of buildings.** • **Design and analysis of reinforced concrete & Steel Structures.** • **Project management, especially construction projects.** • **Drawing construction plans and drawings.** • **Conducting laboratory tests and taking samples for construction tests.** • **Work on surveying devices such as the Level, theodolite, and the Total station device** • **Work on modern programs for engineering and construction design and drawing**
Main learning activities:	**The main learning activities can be achieved through Lectures, individual study, exercise course, program based learning, practical placement, group work, seminars, discussion, small project and summer training.**
Occupations that the graduate will be qualified for:	**Project Manager, Site Manager, Construction Engineer & Inspector, QA-QC Manager or Engineer, Planner Engineer, Surveyor Engineer, Laboratory Tester, Construction Designer, Drawing Reviewer.**

First year	Semester 1		ENGINEERING MECHANICS-I	CONSTRUCTION MATERIALS-I	Principles Survey-I	MATHEMATICS	Engineering Geology	HUMAN RIGHTS and DEMOCRACY	
	ECTS	30	6	7	7	4	4	2	
	HOURS	750	150	175	175	100	100	50	
	Teaching Hours	375	60	75	90	60	60	30	
	Workload hours	375	90	100	85	40	40	20	
	Semester 2		ENGINEERING MECHANICS-2	CONSTRUCTION MATERIALS-2	Principles Survey-2	ENGINEERING DRAWING	Principle of Computer	ENGLISH SKILLS-I	
	ECTS	30	6	7	7	5	3	2	
	HOURS	750	150	175	175	125	75	50	
	Teaching Hours	375	60	75	90	75	45	30	
	Workload hours	375	90	100	85	50	30	20	

Year 1: Semester 1

No.	Subject	T	P	C	ECTs
1	ENGINEERING MECHANICS-I	4	0	4	6
2	CONSTRUCTION MATERIALS-I	2	3	4	7
3	PRINCIPLES SURVEYING-I	2	4	3	7
4	PRINCIPLES MATHEMATICS	4	0	2	4
5	Engineering Geology	4	0	2	4
6	HUMAN RIGHTS and DEMOCRACY	2	0	1	2
	SUM	18	7	16	30

Year 1: Semester 2

No.	Subject	T	P	C	ECTs
1	ENGINEERING MECHANICS-2	4	0	4	6
2	CONSTRUCTION MATERIALS-2	2	3	4	7
3	PRINCIPLES SURVEYING-2	2	4	3	7
4	ENGINEERING DRAWING	2	3	2	5
5	Principle of Computer	1	2	1	3
6	ENGLISH SKILLS-I	2	0	1	2
	SUM	13	12	15	30

T: Theoretical, P: Practical, C: Credit

First Year / First Semester

Semester 1	ECTs	Hours	Teaching Hours	Workload Hours
	30	750	375	375
ENGINEERING MECHANICS-I	6	150	60	90
CONSTRUCTION MATERIALS-I	7	175	75	100
PRINCIPLES SURVEYING-I	7	175	90	85
P. MATHEMATICS-I	4	100	60	40
Engineering Geology	4	100	60	40
HUMAN RIGHTS and DEMOCRACY	2	50	30	20

➢ Course Description:

Course Title	**ENGINEERING MECHANICS-I**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**1st Year – 1st Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**90**

Learning outcomes

The student will know the manner of dealing with forces acting on bodies, the relation between the force and its components, the principal of moments & couples. Another purpose was to help the student to develop the logical, orderly processes of thinking which characterizes the engineer.

Assessment methods

- Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- Introduction to mechanics, Force systems, Scalar & vector quantities, Parallelogram law, Triangle law, Forces & components.
- Moment of a force, Varignon`s theorem, Applications
- Couples, Resolution of a force into a force & a couple.
- Resultant of force systems, Resultant of concurrent force system, Resultant of parallel force system, Resultant of non-concurrent force system.
- Equilibrium of force system, Free body diagram, Equilibrium of concurrent force system, Equilibrium of parallel force system, Equilibrium of non-concurrent force system.
- Types of beams, Supports, and loads, Equilibrium of beams.
- Trusses, Analysis of trusses, method of Joint , method of section .

Course Reference(s)

Engineering Mechanics / F.L. Singer
Engineering Mechanics / Mclean & Nelson
Engineering Mechanics / J.F. Shelley
Engineering Mechanics / A. Higdon & W.B. Stiles
Mechanics for Engineers / Statics / F.P. Beer , E.R. Johnston,Jr

➢ Course Description:

Course Title	**CONSTRUCTION MATERIALS-I**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**7**
Year - Semester	**1st Year – 1st Semester**
Language	**Arabic**
Teaching Hours	**75**
Workload hours	**100**

Learning outcomes

The student will know the properties of Construction Materials, Teaching the students the properties of construction materials, their standard specifications, & standard tests.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports
- Mid exam / Final exam.

course content

- **Theoretical Syllabus**
- Physical properties & standard specification for construction materials, Types of metallic materials, Non metallic materials.

- Clay bricks: Definition, Classification, Properties, Types, Advantages & disadvantages of clay bricks, Type of defects, Standard specification.
- Sand-lime brick: Properties, Standard tests & specification.
- Glass bricks, Concrete bricks: Properties, Standard tests & specification.
- Concrete blocks: Types, Uses, Engineering properties, Standard specification.
- Cellular concrete blocks: Properties, Standard tests & specification.
- Building stone: Definition, Classification, Uses & properties.
- Bonding materials: Classification, Chemical composition, properties & uses of common bonding materials, Standard tests & specification (Cement mortar, Cement lime mortar, Gypsum).
- Flooring materials (Tiles & concrete flags): Types, Properties, Standard tests & specification.
- **Practical Syllabus**
- Recognition of laboratory, Using of balances.
- Clay brick tests: Density, Dimension, Absorption, Compressive strength, Efflorescence, Analysis of soluble salts, Porosity
- Sand-lime brick tests: (Density, Absorption, Compressive strength).
- Concrete bricks & block tests: (Density, Absorption, Compressive strength).
- Cellular concrete block tests: (Density, Absorption, Compressive strength).
- Bonding materials (gypsum) tests: Fineness, Standard consistency, Time of setting of gypsum, Compressive strength, Tensile strength of gypsum.
- Tile tests: (Dimension, Total absorption, Face absorption, Modulus of rupture).
- Concrete flags :(Absorption , Fracture strength) .

Course Reference(s)

Materials of Construction / R.C. Smith .
Civil Engineering Materials / N. Jackson .
Iraqi Standard Specification .
American Society for Testing Materials (ASTM) .
انشاء المباني / يوسف الدواف

➢ Course Description:

Course Title	**PRINCIPLES SURVEYING-I**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**7**
Year - Semester	**1st Year – 1st Semester**
Language	**English**
Teaching Hours	**90**
Workload hours	**85**

Learning outcomes

Introducing the fundamentals, purposes, & the required calculations of the plane surveying to the student as well as qualifying him to use the different kinds of surveying instruments in designing & executing the projects of civil engineering .

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports
- Mid exam / Final exam.

course content

Theoretical Syllabus

- General basics of surveying, fundamentals of surveying, units of measurements, Plotting scale.

- Linear measurements. Means for measuring distances, Direct method of horizontal distances measurement, Target survey, Details, Electronic distance measuring instruments.
- Errors in surveying. Types of errors, Accuracy and precision, Principles of errors scattering theory.
- Obstacles to measuring.
- Traversing. Types of traverse, Coordinates measurement, Traverse adjustment.
- Leveling. Types of leveling, leveling instrumentation, leveling by taping, Trigonometric leveling, Sources of errors in leveling (vertical, horizontal).
- **Practical Syllabus**
- Basic fundamentals of surveying.
- Using tape and chain in the linear measurement and perpendicular construction.
- Details survey by measuring tape and obstacles to measuring.
- Traversing, types of traverse.
- Training how to use leveling instrument.
- Height difference between two points from one station of level.
- Trigonometric leveling.
- Close leveling.

Course Reference(s)

- **المساحة المستوية والمائية د علي شكري – كلية الهندسة – جامعة** الاسكندرية
- المساحة المستوية د فوزي الخالصي – وزارة التعليم العالي والبحث العلمي
- Text book of surveying / S.K.Husain M.S.Naga Raj.
- Surveying / Narinder Singh
- Surveying for construction / William Irvine

➢ Course Description:

Course Title	**PRINCIPLES MATHEMATICS**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**4**
Year - Semester	**1st Year – 1st Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**40**

Learning outcomes

This subject will develop the ability of student in using mathematics in engineering applications; also the student will learn different methods in equation expressions, formation multi kinds of curves related to civil engineering applications.

Assessment methods

Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- Limits
- Derivatives of algebraic functions , Chain rule , Second and higher order derivative , Application in mechanics
- Trigonometric functions, Inverse of trigonometric function ,
- Logarithmic and exponential functions,
- Hyperbolic functions , Relation between the hyperbolic functions and exponential functions

- Derivatives of trigonometric functions
- Derivatives of inverse of trigonometric functions, Derivative of hyperbolic functions
- Derivative of logarithmic and exponential functions , Derivative of au, loga u, Logarithmic method in derivatives
- Applications of derivatives
- Integration of algebraic functions
- Applications of indefinite integration and finite integration
- Integration of trigonometric functions and inverse Trigonometric functions
- Integration of lnx, ,au,eu
- Methods of integration
- Area by calculus (Rectangular method ,Trapezoidal rule, Simpson rule)
- Area under curve , Area between two curves
- Volume by revolution (Disk strip ,Washer strip, Shell strip)
- Length of the plane curve , Area of surface of revolution
- Matrices (Inverse Matrix)
- Matrices (Grammar Method)

Course Reference(s)

- Calculus "Seven Edition" By H. Anton , I.Bivens , S. Davis
- Advanced Engineering Mathematics , By C.R. Wylie ,
- Calculus , By Thomas

➢ Course Description:

Course Title	**Engineering Geology**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**4**
Year - Semester	**1st Year – 1st Semester**
Language	**Arabic**
Teaching Hours	**60**
Workload hours	**40**

Learning outcomes

The student will be able to gain the information about the earth materials (soils , rocks) , their minerals, properties, and their engineering applications. Also the student will learn the effect of soils and rocks foundations on the stability of structures.

Assessment methods

Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- Introduction to the earth science, crust and interior of the earth
- Minerals and physical properties
- Factors effecting on the mineral physical properties
- Mineral classification
- Clay minerals, Minerals Expansive soil
- Rocks, Classification of rocks ,igneous rocks
- Sedimentary rocks, classification of sedimentary rocks
- Metamorphic rocks, Stabilization of rock slopes
- An engineering classification of rock materials
- Weathering and erosion, weathering agents on structures
- Soil, Soil profile, Soil forming processes
- Properties of engineering soil
- Properties of engineering rocks
- Geological structure , Dipping layer
- Folds, Conformities and Disconformities
- Faults, Joints, Effect of Faults and Joints on structures
- Surface water and underground water
- Site investigation
- Mass movement, causes of mass movement, classification of mass movement, creep, creep causes and treatment, landslides, causes of landslides, Earthquake due to landslides
- Geological investigation, Geophysical investigation
- Geological sites of reservoirs, Ground reservoirs, Underground reservoirs
- Dams and tunnels, Type of Dams, loads on Dams, Classification of tunnels and nomenclature, Construction of tunnels.

Course Reference(s)

- Plummer C., Diane H., 2007, " Physical Geology", Mc-Graw Hill, Eleventh edition
- ن . دنكان . ترجمة كنانة محمد ثابت,1980,"الجيولوجيا الهندسية وميكانيك الصخور" , المكتبة الوطنية بغداد
- كنانة محمد ثابت & محمد عمر العشو ,1993"أسس الجيولوجيا للمهندسين", الموصل , جامعة الموصل

➢ Course Description:

Course Title	**HUMAN RIGHTS and DEMOCRACY**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**2**
Year - Semester	**1st Year – 1st Semester**
Language	**Arabic**
Teaching Hours	**30**
Workload hours	**20**

Learning outcomes

تتناول هذه المقالة المبادئ والمفاهيم العامة لحقوق الإنسان من منظور قانوني
وجهة نظر، أهم الحقوق، المساهمة الفكرية الغربية في تنمية حقوق الإنسان والحقوق السياسية وأساليب الانتخاب، أساسية ضمانات الانتخابات العامة، أهم النظريات الداعمة للإنسان الحقوق والوسائل السلمية لحماية حقوق الإنسان ومفهوم وتاريخ الديمقراطية خصائص النظام الديمقراطي.
الدفاع عن كرامة الإنسان والمساهمة في تغيير حياة الإنسان للأفضل من حيث:
تغيير في القيم والمشاعر - وتغيير في السلوك، وتعزيز فكرة الاجتماعية عدالة. تقوية الارتباط بين الفرد والجماعة والدولة ودولتها المؤسسات. تعزيز مشاعر التضامن مع الآخرين. تنمية مهارات رصد المخالفات والتعامل مع المخالفين. مهارات الدعم في الفهم قضايا حقوق الإنسان. تعزيز طرق التدريس التفاعلية. تحسين طرق المشاركة في الشؤون العامة - المواطنة. تعليمات تنفيذ العقود الحكومية رقم 2 لسنة 2014

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports

course content
• حقوق الانسان في التاريخ المعاصر والحديث • المنظمات الغير حكومية وحقوق الانسان • حقوق الانسان في الدساتير العراقية • حقوق الانسان الاقتصادية والاجتماعية والثقافية • ضمانات واحترام وحماية حقوق الانسان على الصعيد الدولي • الديمقراطية في العالم الثالث • الحريات الأساسية • حرية الامن والفكر والتعليم والصحافة والمجتمع • حرية التجارة والصناعة • الأحزاب السياسية والحريات العامة

First Year / Second Semester

Semester 2	ECTs	Hours	Teaching Hours	Workload Hours
	30	750	375	375
ENGINEERING MECHANICS-2	6	150	60	90
CONSTRUCTION MATERIALS-2	7	175	75	100
PRINCIPLES SURVEYING-2	7	175	90	85
ENGINEERING DRAWING	5	100	75	50
Principle of Computer	3	100	45	30
ENGLISH SKILLS-I	2	50	30	20

➢ Course Description:

Course Title	**ENGINEERING MECHANICS-2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**1st Year – 2nd Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**90**

Learning outcomes

The student will know the manner of dealing with forces acting on bodies, the relation between the force and its components, the principal of moments & couples. Another purpose was to help the student to develop the logical, Principles of dynamics, Rectilinear translation, Kinetics of rectilinear translation.

Assessment methods

- Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- Friction , Theory of friction , Angle of friction , Types of friction , Wedges ,Applications.
- Centroids of areas & lines , Centroids by integration , Centroids of composite areas , Applications.
- Moment of inertia , Polar moment of inertia , Radius of gyration , Transfer formula for moment of inertia , Moment of inertia for composite areas , Product of inertia , Moment of inertia with respect to inclined axes , Mohr` circle for moment of inertia .
- Principles of dynamics , Kinematics & kinetics , Motion of a particle , Fundamental Equations of kinetics for a particle , Effective force on a particle.
- Rectilinear translation , Rectilinear motion with constant acceleration , Free falling bodies .

- Kinetics of rectilinear translation (Analysis as a particle) , Dynamic Equilibrium in translation (Analysis as a rigid body) .

Course Reference(s)

Engineering Mechanics / F.L. Singer
Engineering Mechanics / Mclean & Nelson
Engineering Mechanics / J.F. Shelley
Engineering Mechanics / A. Higdon & W.B. Stiles
Mechanics for Engineers / Statics / F.P. Beer , E.R. Johnston,Jr

➢ Course Description:

Course Title	**CONSTRUCTION MATERIALS-2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**7**
Year - Semester	**1st Year – 2nd Semester**
Language	**Arabic**
Teaching Hours	**75**
Workload hours	**100**

Learning outcomes

The student will know the properties of Construction Materials, Teaching the students the properties of construction materials, their standard specifications, & standard tests.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports

course content

- **Theoretical Syllabus**

- Water proofing materials: Classification, (Liquid, Rigid & semi-rigid water proofing materials), Types & uses.
- Polymers: Definition, Classification, Chemical composition, Uses.
- Epoxy: Definition, Properties, Types & uses.
- Steel: Composition & classification, Properties, Uses & standard tests.
- Metallic materials (nonferrous): Classification & use.
- Timber (wood): Classification, Properties, Seasoning, Types of defect, Standard tests.
- Insulating materials: Types, Properties.
- Acoustical materials: Types, Properties.
- Protective coating (paints): Composition, Types.
- Glass: Classification, Properties, Uses.
- Bituminous materials (Asphalt): Sources & type, Chemical composition, Properties, Uses & tests.
- Plastic: Properties & classification.
- **Practical Syllabus**
- Standard specification for water proofing materials
- Standard specification of epoxy.
- Timber (wood): Compressive strength parallel & perpendicular to fiber test, Modulus of rupture.
- Steel: (Tensile strength test).
- Standard specification for insulating materials.
- Standard specification for acoustical materials.
- Standard specification for paints.
- Standard specification for glass.
- Bituminous materials (Asphalt) tests: Softening point, Penetration, Flash point, & ductility.
- Standard specification for plastics.
- Standard specification for polymers .

Course Reference(s)

Materials of Construction / R.C. Smith .
Civil Engineering Materials / N. Jackson .

Iraqi Standard Specification .
American Society for Testing Materials (ASTM) .
انشاء المباني / يوسف الدواف.
انشاء المباني / زهير ساكو ، آرتين ليفون

➢ Course Description:

Course Title	**PRINCIPLES SURVEYING-2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**7**
Year - Semester	**1st Year – 2nd Semester**
Language	**English**
Teaching Hours	**90**
Workload hours	**85**

Learning outcomes

Introducing the fundamentals, purposes, & the required calculations of the plane surveying to the student as well as qualifying him to use the different kinds of surveying instruments in designing & executing the projects of civil engineering.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports

course content

Theoretical Syllabus

- Bearing and angles. Methods of angles measurement and bearing calculation.

- Vertical sections, Longitudinal sections, Calculation of cut and fill.
- Contour lines: Method of drawing and construction.
- Areas and volumes: Volume computation from cross-section, Volume from topographic maps and grid net, Volume computation from contour maps.

- **Practical Syllabus**
- Topographic survey using level instrument.
- Level test by two pegs methods.
- Area computation.
- Details survey by stadia method.
- Details survey using alidade and planometry.

Course Reference(s)

- المساحة المستوية والمائية د علي شكري – كلية الهندسة –جامعة الاسكندرية
- المساحة المستوية د فوزي الخالصي – وزارة التعليم العالي والبحث العلمي
- **Text book of surveying / S.K.Husain M.S.Naga Raj.**
- **Surveying / Narinder Singh**
- **Surveying for construction / William Irvine**

➢ Course Description:

Course Title	**ENGINEERING DRAWING**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**5**
Year - Semester	**1st Year – 2nd Semester**
Language	**English**
Teaching Hours	**75**
Workload hours	**50**

Learning outcomes

Introducing the fundamentals of engineering drawing to the student so that he can be qualified to express his thoughts, draw & execute the projects related to civil engineering.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports

course content

- Geometric operations / projections / isometrics / sections

Introduction to defined the engineering drawing and introduction about AutoCAd software in engineering drawing

- Windows setting, limits, grid, snap, object snap
- Draw menu, line, polyline, ray, construction line
- Polygon, arc, circle, rectangle, ellipse
- Modify-part one
- Modify -part two
- Dimensions
- Hatching
- Text
- Layers
- Perspective
- Ortho graphic projection

The first and third angle projection method

Draw the projection with the first angle projection method

- Printing
- Drawing the projection with the third angle projection method
- Tools
- Drawing the three projection with the first and third angle
  - Drawing the three projection with the first and third angle and see the difference between them
  - Finding third projection after knowing the other two projections
  - Draw Isometric after knowing two or three projection
  - Sectional theory, cutting projection drawing
  - Sectional theory, cutting projection drawing
  - Drawing section from defined sections

- Draw partial section
- Draw half section
- Draw offset sections
- Introduction about descriptive geometry
- Projection of point
- Representation of straight line
- Projection of line and surface on auxiliary plane
- Section of bodies and determination of true shape of section

Course Reference(s)

- Engineering Drawing (plan and solid geometry) / N.D.Bhatt
- الهندسة الوصفية / د يوسف نيقولا
- AutoCad 2009, 2D training manual / K.S.Kurland
- AutoCad user guide / http:/www.autodesk.com
- الرسم الهندسي / هاشم عبود العيسوي و يوسف حسين الراضي

➢ Course Description:

Course Title	**Principle of Computer**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**3**
Year - Semester	**1st Year – 2nd Semester**
Language	**English**
Teaching Hours	**45**
Workload hours	**30**

Learning outcomes

The student must know how to deal with operating system as a good user of windows from installing (formatting) to maintain the general component ,also the student deals with Microsoft programs as (word, Excel, Power point) .In addition the student must knowing how to deal with internet and E-mail.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports

course content

- Introduction to computer , computer component (hardware , software)
  - Operating system (windows) , installing windows (formatting)
  - Start menu , desktop , taskbar , mouse applications
  - My computer , My documents , drivers , folders , files , cut , copy , paste , shortcut , right click menu
  - Setting menu , control panel
  - Microsoft word 2007 (program view , office button)
  - Menu (home icons)
  - Menu (insert icons)
  - Menus (page layout , review , view , design)
  - Icons (symbols , equation)
  - Practical exercises
  - Microsoft excel 2007 (program view , office button)
  - Home icons
  - Insert icons
  - Page layout icons
  - Formula icons , view icons
  - Data icons , chart wizard
  - Practical exercises
  - Microsoft power point 2007 (program view , office button)
  - Insert icons , design icons
  - Animations icons , slid show icons
  - Practical exercises
  - Viruses , types of viruses , protection from viruses
  - Internet , internet explorer , starting , menus of internet explorer
  - E-mail : yahoo , hotmail
  - Search engines , google , yahoo , search information
  - Practical exercise

Course Reference(s)

- Computer Skills (2) , د محمد بلال الزغبي و أحمد الشرايعة و أمجد هديب
- Internet Explorer , By S.Haag , J. T. Perry & A. Phillips
- Exel a comprehensive approach By K. Stewart
- Computers & Internet (IC3), By د محمد بلال الزغبي
- Word By S. Haag , J.T. Perry & A. Phillips

➢ Course Description:

Course Title	**ENGLISH SKILLS-I**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**2**
Year - Semester	**1st Year – 2nd Semester**
Language	**English**
Teaching Hours	**30**
Workload hours	**20**

Learning outcomes

- Gained ability to write, read, speak and listen English language correctly.
- Acquired a comprehensive understanding of techniques and etiquette of formal letter writing and E-mail writing.
- Improved conversational ability in familiar social situations.
- Attained enhanced vocabulary and improved language skills.

Assessment methods

- Tutorial
- Assignments
- Quizzes
- Midterm exam
- Final exam.

course content
Grammar, Parts of Speech – Introduction and Identification, vocabulary, Nouns, Pronouns, Punctuation, Spelling and Capitalization, Written Communication, Formal letter writing, E-Mail writing (Application, Complaints, Apology, Rejection, Recommendation, Follow-up etc., Oral Communication, Situational conversation in pairs.

Second year	Semester 1		Strength of Materials 1	Fluid Mechanics 1	Applied Survey 1	Advanced Mathematics-1	Concrete Technology 1	ENGLISH SKILLS-2	جرائم حرب البعث البائد
	ECTS	30	6	6	6	3	5	2	2
	HOURS	750	150	150	150	75	125	50	50
	Teaching Hours	375	60	75	75	30	75	30	30
	Workload hours	375	90	75	75	45	50	20	20
	Semester 2		Strength of Materials 2	Fluid Mechanics 2	Applied Survey 2	Advanced Mathematics-2	Computer Applications-1	Building Constructions	
	ECTS	30	6	6	6	3	3	6	
	HOURS	750	150	150	150	75	75	150	
	Teaching Hours	345	60	75	75	30	45	60	
	Workload hours	405	90	75	75	45	30	90	

Year 2: Semester 1

No.	Subject	T	P	C	ECTs
1	Strength of Materials - 1	4	0	4	6
2	Fluid Mechanics - 1	2	3	3	6
3	Applied Survey - 1	2	3	3	6
4	Advanced Mathematics - 1	2	0	2	3
5	Concrete Technology-1	2	3	2	5
6	ENGLISH SKILLS-2	2	0	1	2
7	جرائم حزب البعث البائد	2	0	1	2
	SUM	16	9	16	30

Year 2: Semester 2

No.	Subject	T	P	C	ECTs
1	Strength of Materials - 2	4	0	4	6
2	Fluid Mechanics - 2	2	3	3	6
3	Applied Survey - 2	2	3	3	6
4	Advanced Mathematics - 2	2	0	2	3
5	Computer Applications - 1	1	2	2	4
6	Building Constructions	4	0	3	5
	SUM	15	8	17	30

T: Theoretical, P: Practical, C: Credit

Second Year / First Semester

Semester 1	ECTs	Hours	Teaching Hours	Workload Hours
	30	750	375	375
Strength of Materials - 1	6	150	60	90
Fluid Mechanics - 1	6	150	75	75
Applied Survey - 1	6	150	75	75
Advanced Mathematics-2	3	75	30	45
Concrete Technology-1	5	125	75	50
ENGLISH SKILLS-2	2	50	30	20
جرائم حزب البعث البائد	2	50	30	20

➢ Course Description:

Course Title	Strength of Materials - 1

Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**2nd Year – 1st Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**90**

Learning outcomes

The student must know the relations between externally applied loads and their internal effects on bodies (Strains, Deformations , and Stresses).

Assessment methods

- Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- **Simple stress: Analysis of internal forces , Simple stress , Shearing stress , Bearing stress.**
- **Riveted & Welded Connections: Types of riveted joints , Strength of a simple lap joint , Structural riveted joints , Welded constructions.**
- **Simple Strain: Stress-strain diagram , Hooke's law , Axial deformation , Poisson's ratio , Biaxial & Tri-axial deformations , Statically indeterminate members , Thermal stresses.**
- **Torsion: Derivation of torsion formulas , Longitudinal shearing stress , Shear flow.**
- **Shear and Moment in Beams: Shear & moment , Shear & moment diagrams , Relations between load ; shear & moment.**

Course Reference(s)

- Strength of Materials / Ferdinand L. Singer & Andrew Pytel.
- Strength of Materials / R. S. Khurmi.
- Solution of Problems in Strength of Materials and Mechanics of Solids / S. A. Urry & P.J. Turner.

➢ Course Description:

Course Title	**Fluid Mechanics - 1**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**2_{nd} Year – 1_{st} Semester**
Language	**English**
Teaching Hours	**75**
Workload hours	**75**

Learning outcomes

This subject will introduce fluid mechanics and establish its relevance in civil engineering. Develop the fundamental principles underlying the subject. Demonstrate how these are used for the design the pipe network and related apparatus and the simple hydraulic components.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports
- Mid exam / Final exam.

course content

- **Theoretical Syllabus**
- SI Units, dimensions, symbols, abbreviations
- Development of fluid mechanics, properties of fluids; density, specific weight, viscosity, compressibility, surface tension, capillarity etc. Characteristics of flow; discharge, velocity, pressure, shear etc.
- Fluid static's; absolute and gauge pressure, pressure measurement; Bourdon gauge, piezometer column, simple manometer, differential manometers. Hydrostatic forces on plane and curved surfaces, center of pressure.
- Kinematics of fluid flow; classification of types of flow; streamlines, stream tube, path lines, flow net; continuity equation.
- Energy equation for steady flow; potential, kinetic and flow energy; hydraulic grade line and energy line; cavitations; power; solution of flow problems; jet trajectory.
- Momentum in fluid flow; impulse momentum principle; momentum correction factor; forces on pressure conduits ; forces on stationary blades ; forces on moving blades ;jet reaction ; application of momentum equation to fluid flow problems .
- Steady flow in pressure conduits; laminar and turbulent flow; critical flow; general equation for conduit friction; friction for laminar flow; friction for turbulent flow ; pipe roughness ; friction factor charts ; empirical equations for pipe flow; economical diameter of pipes.
- **Practical Syllabus**
- General looking for the instruments in the fluid laboratory; How to write the practical report.
- Properties of fluid;
- a- density measurement
- b- viscosity measurement
- c- surface tension
- d- capillarity
- Pressure measurement devices ;
- a- barometers

- b- Manometers; 1.piezometers, 2.open U-tube manometer, 3.inclined manometer, 4. Differential manometer.
- c- Balancing of the force; 1.piston type, 2.bell type, 3.ring type.
- d- Borden gauge.
- Calibration of pressure gauges
- Center of pressure of submerged surface in liquid

Course Reference(s)

1. Douglas, J.F. et al; 2011 (Fluid Mechanics). Prentice Hall.
2. Durgaiah D. R.; 2002 (Fluid Mechanics and Machinery). New Age international publishers.
3. White, F. M.; 1994 (Fluid Mechanics).3rd ed. McGraw-Hill, New York.
4. Khurmi, R.S.; 1994 (Hydraulics, Fluid Mechanics and Hydraulic Machines). S. Chand and Co. Ltd.

➢ Course Description:

Course Title	**Applied Survey - 1**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**2nd Year – 1st Semester**
Language	**English**
Teaching Hours	**75**
Workload hours	**75**

Learning outcomes

Introducing the fundamentals, purposes & the required calculations of the applied surveying to the students as well as qualifying him to use the different kinds of surveying instruments in design & execution of civil engineering projects.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports
- Mid exam / Final exam.

course content

Theoretical Syllabus

- Theodolites , Principle of construction
- Measuring Horizontal angles
- Measuring angles in vertical plane
- Directions , Whole circle bearing , Reduce Bearing
- Traverse Surveys , Bearings , forward & Back bearing
- Close circle traverse, coordinates calculations
- Close connected traverse , coordinates calculations
- Tacheometry , stadia tacheometry , Inclined sights
- Electromagnetic distance measurement(EDM), basic concept, systems
- Total station, Field Techniques, point location, missing line measurements
- Resection , Azimuth, elevation , Layout Positions and area computation
- Motorized Total stations, Automatic ,remote control, computerized
- Horizontal Curves, Kinds, computations.

Practical Syllabus

- Measuring horizontal & vertical angles by using different kinds of theodolites.
- Construct close connected & close circle traverses to survey small area.
- Computations of the coordinates of stations traverse & plotting a traverse , Problems in inverse computation.
- Measuring H. distances & vertical distances by using tachometer , By using theodolite with sub tense-bar.
- Measuring slope , Horizontal & vertical distances by using EDM instrument.
- Measuring area by using total station , Solve problems , Standard deviation.

- Setting out curves & calculation , Curves field work surveying.

Course Reference(s)

- **Surveying for construction / William Irvine , FRICS.**
- **Text book of surveying / S.K. Husain , M.S. Naga. Raj.**
- **Elements of photogrammetry / Wolf , Pual R.**
- المساحة المستوية / د . فوزي الخالصي
- المساحة المستوية والمائية / د . علي شكري

➢ Course Description:

Course Title	**Advanced Mathematics-1**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**3**
Year - Semester	**2nd Year – 1st Semester**
Language	**English**
Teaching Hours	**30**
Workload hours	**45**

Learning outcomes

The student must know the advanced theories in mathematics needed in construction engineering.

Assessment methods

Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- Multiple integrals ,double integrals , area by double integration , triple integrals , volume by double and triple integrations.

- Polar coordinates , curves by polar coordinates ,area by polar double integrations , cylindrical and spherical coordinates, equations of solids
- Ordinary differential equations of first order ,separable , homogeneous , exact and not exact , linear and Bernoulli first order equations , general and condition solutions , applications
- Linear differential equations with constant coefficients, homogeneous and non-homogeneous equations, equation of higher order, general and condition solutions , applications.
- Partial derivatives with two and more two variables , higher- order partial derivatives , chain rule for partial derivatives , maxima & minima of function of two variables , saddle point and relative extrema.
- Vector analysis , dot and cross product of vector functions , velocity and acceleration ,gradient of vector fields,divergance and curl of vector fields .
- Equations of the lines and surfaces in space , intersection of lines and surfaces using vectors , lagrange multipliers with two and more constraints.

Course Reference(s)

- Advanced Engineering Mathematics /C. Ray Wylie
- Engineering mathematics / G. S . Sharma &I . J. S . Sarna
- Applied Mathematics for Engineers & physicists / Pipes & Harvill .

➢ Course Description:

Course Title	**Concrete Technology 1**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**5**
Year - Semester	**2nd Year – 1st Semester**
Language	**Arabic**
Teaching Hours	**75**
Workload hours	**50**

Learning outcomes

Introducing the fundamentals of engineering drawing to the student so that he can be qualified to express his thoughts, draw & execute the projects related to civil engineering.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports

course content

- **Theoretical Syllabus**
- Composition of concrete; Functions of the paste and aggregate ; General properties of ordinary concretes .
- Concrete – making materials – Portland Cement ; basic constitutes of cement ; Chemical formulas and processes .
- Manufacture of Portland cement ; Chemical analysis of Portland cement ; major compounds in Portland Cement; Influence of composition upon characteristics of Portland cement .
- Properties of Portland cement : Fineness of cement ; Consistency of cement paste ; Hydration reactions in cement paste ; Hydration of cement ; heat of Hydration ; setting and hardening of cement : time of setting , soundness of cement , strength of cement paste , loss of ignition .
- Types of Portland cement : Ordinary ; Modified ; Rapid hardening ; low heat ; Sulphate resisting . Other types : High–early strength ;Pozzolana–cement and pozzolanas;Slag cement ; Blast – Furnas - slag ; Masonry cement ; Expansive cement ; Aluminous cement ; White Portland ; Fly – ash ; Anti – bacterial ; Hydrophobic cement ; Waterproof cement ; Natural cement .
- CONCRETE AGGREGATES :
- Preliminary remarks ; general characteristics ; data needed for proportioning mixtures ; sampling aggregate; particle shape and texture ; bond of aggregates ; specific gravity ;unit weight and voids ; porosity and absorption, moisture content ; Gradation ; sieve analysis ; maximum size of aggregates ; fineness modulus , practical grading ; gap – graded aggregates; oversize and undersize ; all – in aggregates ; bulking of sand ; soundness of aggregates ; handling and storing aggregates ; Deleterious substances : organic impurities ; alkali – aggregates reaction ; alkali – carbonate reaction ; thermal properties of aggregates .

- WATER : Mixing water ; Curing water .
- ADMIXTURES :
- Accelerators : Retarders ; Water – Reducing Admixture; super plasticizers ;Workability admixtures ; Air –entraining Admixtures ; Expansion – producing Admixtures; Pozzolanic materials ;Bonding admixtures; Curing aids ; Water Proofers ; Colouring agents ; Surface hardeners .
- FRESH CONCRETE :
- Introduction ; Properties of fresh concrete :(Workability; Consistency ; Segregation ; Bleeding ; Unit weight) .
- Measurement of workability and Consistency .
- Factors affecting workability .
- Air – Entrainment ; Measurement of Entrained – Air : (Volumetric ; Gravimetric and Pressure methods)
- Unit weight ; yield ; Cement factor .
- Manufacture of concrete: Batching; Mixing ; Conveying ; Placing ; Compacting ; and Curing of concrete .

- **Practical Syllabus**
- General information about different types of balances , specifications and experiment reports .
- CEMENT TESTS :
- Consistency of Cement paste .
- Initial and final setting times of cement paste .
- Compressive Strength of cement mortar .
- Tensile Strength of cement mortar .
- Soundness of cement (by Autoclave &Le – chatelier method) .
- Fineness of cement (blain method and by sieving) .
- Loss of ignition .
- Scientific visit .
- AGGREGATE TESTS :
- Sampling of coarse and fine aggregate .
- Unit weight and voids of coarse aggregate .
- Unit weight and voids of fine aggregate .
- Sieve analysis of coarse aggregate .
- Sieve analysis of fine aggregate .
- Specific gravity and absorption for coarse aggregate .
- Specific gravity and absorption for fine aggregate .

- Bulking of sand .
- Moisture content in coarse and fine aggregate .
- Los –Angeles abrasion test for coarse aggregate .
- Materials finer than sieve No. 200 in coarse and fine aggregate .
- Salt and sulphate content in fine aggregate .
- Organic material content in fine aggregate .
- Chloride ion content .
- Mixing water tests (Sulphates ; Chlorides ; Organic materials … etc
- Tests related with admixtures and their effects on fresh and hardened concretes .
- The student must learn the physical , mechanical , & chemical characteristics of the main components used in concrete , as well as accomplishing all the related laboratories tests . The student will learn also the characteristics of the fresh concrete & the admixtures of concrete .
- FRESH – CONCRETE TESTS :
- Measurement of Workability and Consistency :
- (Slump test ; Compacting Factor test ; Remoulding test ; Vebe test ; Flow test ; Ball –penetration test).
- Bleeding test ; Unit weight and Air – content tests .

Course Reference(s)

- "Properties of Concrete ", A.M.NEVILLE, 3 rd. Ed. , A pitman International Text. (1981) .
- "Composition and properties of Concrete ", TROXELL , AVIS , and KELLY , Mc Graw - Hill book Company (1968) .
- D.F. ORCHARD, "Concrete Technology", Vol. 1,2&3, (1978) .
- ASTM , BRITISH , and IRAQI specifications for concrete works .
- د.احمد علي العريان و د. عبد الكريم محمد عطا " تكنولوجيا الخرسانة : مواد الخرسانة المسلحة وصناعتها" ، الجزء الاول ،الطبعة الثانية ، عالم الكتب (1975).
- د.كنانة محمد ثابت و د.رياض حامد الدباغ ويوسف عمرو "مبادئ الجيولوجيا الهندسية " ، جامعة الموصل (1979) .
- د.محمود امام تكنولوجيا الخرسانة
- د.مؤيد نوري الخلف والست هناء عبد يوسف تكنولوجيا الخرسانة

➢ Course Description:

Course Title	**ENGLISH SKILLS-2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**2**
Year - Semester	**2nd Year – 1st Semester**
Language	**English**
Teaching Hours	**30**
Workload hours	**20**

Learning outcomes

Developing speaking skills and understanding its basic rules to take the way to the acquisition of the ability to use technical keywords in their work and the capability of communicating with other engineers correctly .

Assessment methods

- Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- **Revision, vocabulary and comprehension**
- **Present continuous, comparative and superlative adjective, vocabulary.**
- **Time clauses, this and that, vocabulary and comprehension.**
- **If clauses, vocabulary and comprehension**
- **This and that, expletive there, prepositions**
- **Past perfect, past perfect continuous, vocabulary and comprehension**

- **Relative pronouns, relative clauses**
- **Past perfect, Past perfect continuous, vocabulary and comprehension**
- **Used to, Infinitives, passive voice**
- **Passive voice, coordinating conjunctions, subordinating conjunction**
- **Future perfect, future perfect continuous, vocabulary and comprehension**
- **Writing a composition, comprehension**
- **Technical English (1), Keywords, English use**

Course Reference(s)

- Headway plus for beginners
- Any Grammar and comprehension for technical learning
- https://www.coursera.org/browse/physical-science-and-engineering/electrical-e ngineering
- https://link.springer.com/book/10.1007/978-981-10-8624-3
- https://progressivecollege.ie/courses/early-learning-and-care-qqi-level-major-award/?gad=1&gclid=EAIaIQobChMI_Nqu2tqA_wIVZ4VoCR2O0woLEAAYASAAEgI9WvD_BwE

➢ Course Description:

Course Title	**جرائم حزب البعث البائد**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**2**
Year - Semester	**2nd Year – 1st Semester**
Language	**Arabic**
Teaching Hours	**30**
Workload hours	**20**

Learning outcomes

تتناول هذه المقالة المبادئ والمفاهيم العامة لجرائم حزب البعث البائد المحظور

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports

course content

- **منهاج جرائم حزب البعث البائد المحظور – وزارة التعليم العالي والبحث العلمي – دائرة الدراسات والتخطيط والمتابعة – لكافة الجامعات الحكومية والأهلية**

Second Year / Second Semester

Semester 2	ECTs	Hours	Teaching Hours	Workload Hours
	30	750	345	405
Strength of Materials 2	6	150	60	90
Fluid Mechanics 2	6	150	75	75
Applied Survey 2	6	150	75	75
Advanced Mathematics-2	3	75	30	45
Computer Applications1	4	100	45	55
Building Constructions	5	125	60	65

➢ Course Description:

Course Title	**Strength of Materials 2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**2_{nd} Year – 2_{nd} Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**90**

Learning outcomes
The student must know the relations between externally applied loads and their internal effects on bodies (Strains, Deformations , and Stresses).

Assessment methods
- Homework. - Attending classroom / Class quiz /Class participants. - Mid exam / Final exam.

course content
➢ Stresses in Beams: Derivation of flexure formulas , Economic sections , Unsymmetrical beams , Analysis of flexure action , Formula for horizontal shear stress. ➢ Beams Deflections: Theorem of area-moment method , Double integration method.

- Combined Stresses:Combined axial & flexural loads , Kern of a section , Loads applied off axes of symmetry , Stress at a point , Mohr's circle , Transformation of strain components.
- Columns: Critical loads , Long columns by Euler's formula , Intermediate columns , Empirical formulas.

Course Reference(s)

- Strength of Materials / Ferdinand L. Singer & Andrew Pytel.
- Strength of Materials / R. S. Khurmi.
- Solution of Problems in Strength of Materials and Mechanics of Solids / S. A. Urry & P.J. Turner.

➢ Course Description:

Course Title	**Fluid Mechanics 2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**2nd Year – 2nd Semester**
Language	**English**
Teaching Hours	**75**
Workload hours	**75**

Learning outcomes

This subject will introduce fluid mechanics and establish its relevance in civil engineering. Develop the fundamental principles underlying the subject. Demonstrate how these are used for the design the pipe network and related apparatus and the simple hydraulic components.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports

course content

- **Theoretical Syllabus**
- Minor head losses; loss at entrance, losses due to contraction; losses due to expansion ; loss in pipe fittings ; loss in bend and elbows, etc .
- Solution of practical pipeline problems; pipeline with pumps.
- Equivalent pipes; branching pipes; pipes in series; pipes in parallel. Hazen-Williams's formula.
- Pipe networks; Hardy cross method; computer aided pipe - network analysis.
- Fluid measurements ; measurement of fluid properties ; measurement of static pressure ; velocity measurement by different methods ; measurements of discharge ; nozzles ; coefficients of contraction ; coefficients of velocity; coefficients of discharge; Venture tube ;nozzle meter ; elbow meter; rote meter.
- Hydraulic similitude; geometric similarity; kinematics similarity ; dynamic similarity; Reynolds number , Froude number , Mach number , Weber number, Euler number; scale ratios ; models ; dimensional analysis .
- Unsteady flow problems; discharge with varying head. Unsteady flow in pipes. Water hammer. Surge tanks.
- **Practical Syllabus**
- Hydrostatic forces on submerged surfaces;
- a- hydrostatic force on a horizontal plane
- b- hydrostatic force on a vertical plane
- c- hydrostatic force on inclined plane.
- Flow measurements;
- a- Pitot-Static tube
- b- Venture meter
- c- orifice meter
- Reynolds number and type of flow; Laminar flow, Turbulent flow.
- Losses in pipes;
- a- Major losses in pipes (frictional losses)
- b- Miner losses in pipes (elbows and valves).

Course Reference(s)

1. Douglas, J.F. et al; 2011 (Fluid Mechanics). Prentice Hall.
2. Durgaiah D. R.; 2002 (Fluid Mechanics and Machinery). New Age international publishers.
3. White, F. M.; 1994 (Fluid Mechanics).3rd ed. McGraw-Hill, New York.
4. Khurmi, R.S.; 1994 (Hydraulics, Fluid Mechanics and Hydraulic Machines). S. Chand and Co. Ltd.

➢ Course Description:

Course Title	**Applied Survey 2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**2nd Year – 2nd Semester**
Language	**English**
Teaching Hours	**75**
Workload hours	**75**

Learning outcomes

Introducing the fundamentals, purposes & the required calculations of the applied surveying to the students as well as qualifying him to use the different kinds of surveying instruments in design & execution of civil engineering projects.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports

course content

Theoretical Syllabus

- Vertical Curves , Kinds , Computations
- Setting out construction , small & large building
- Balancing thermal furnaces
- Tunnel surveying
- Arial photogrammetric surveying
- Photogrammetric traditional surveying
- Photogrammetric Instruments &Flight design
- Computer Programs
- Global Positioning System (GPS)
- Geographic Information system (GIS)
- Field measurements by using total station and calculations, for for certain projects

Practical Syllabus

- Setting out small building & roadway.
- Practical problems in tunnel surveying.
- Practical problems in hydrographic surveying.
- Applying exercises in computer lab.
- Basic measurements of photograph using pocket stereo-scope , Using mirror stereoscope.
- Applying measuring on Arial photographs by using plotters such as Wild B8S & Wild ALO autograph.
- Field measurements or lab calculation for certain project.

Course Reference(s)

- Surveying for construction / William Irvine , FRICS.
- Text book of surveying / S.K. Husain , M.S. Naga. Raj.
- Elements of photogrammetry / Wolf , Pual R.
- د . فوزي الخالصي المساحة المستوية /

- المساحة المستوية والمائية / د . علي شكري

➢ Course Description:

Course Title	**Advanced Mathematics-2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**3**
Year - Semester	**2nd Year – 2nd Semester**
Language	**English**
Teaching Hours	**30**
Workload hours	**45**

Learning outcomes

The student must know the advanced theories in mathematics needed in construction engineering.

Assessment methods

Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- Complex numbers and functions , demoivres theorem, roots ,argand diagram, cauchy – rehmann equations.
- Limits , Infinite sequences , convergence and divergence , infinite series , geometric and ordinary series , positive and alternative series , test of convergences
- Power series , maclaurin series taylor and trigonometric series .
- Fourier series for periodic function , euler coefficients , applications
- Green,s theorem for enclosed curves , line integral
- Matrices , Adjoins & inverses , solving linear equations using the inverse of matrix , determinants and cramer method to solve linear equations , Gaussian elimination and gauss-seidel elimination.

• Improper integration and Laplace transform of some common functions , properties of Laplace transform.

Course Reference(s)

- Advanced Engineering Mathematics /C. Ray Wylie
- Engineering mathematics / G. S . Sharma &I . J. S . Sarna
- Applied Mathematics for Engineers & physicists / Pipes & Harvill .

➢ Course Description:

Course Title	**Computer Applications-1**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**4**
Year - Semester	**2nd Year – 2nd Semester**
Language	**English**
Teaching Hours	**45**
Workload hours	**55**

Learning outcomes

- The student must know the use of engineering software programs related to its rules and theories has been taught to student previously.
- To prepare them to carry out experimental investigation and analysis at later stages of graduation. Module Learning Outcomes Upon completion of the course,
- students should be able to Using a computer operating system.
- Using computer software to solve mathematical problems.

- Using Microsoft office to write reports, Tables, graphical diagrams and other works.
- Ability to write basic computer codes (Programming).

Assessment methods

- Tutorial
- Assignments
- Quizzes
- Midterm exam
- Final exam.

course content

- Introduction to computer , computer component (hardware , software)
- Operating system (windows) , installing windows (formatting), Start menu , desktop , taskbar , mouse applications.
- My computer , My documents , drivers , folders , files , cut , copy , paste , shortcut , right click menu, Setting menu , control panel.
- Microsoft word 2007 (program view , office button), Menu (home icons), Menu (insert icons).
- Menus (page layout , review , view , design), Icons (symbols , equation)
- Microsoft excel 2007 (program view , office button).
- Home icons, Insert icons, Page layout icons, Formula icons , view icons, Data icons , chart wizard.
- Microsoft power point 2007 (program view , office button).
- Insert icons , design icons, Animations icons , slid show icons.
- Internet , internet explorer , starting , menus of internet explorer .
- E-mail : yahoo , Hotmail.
- Search engines , google , yahoo , search information
- Surfer
- Practical exercise.

➢ Course Description:

Course Title	**Building Constructions**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**5**
Year - Semester	**2nd Year – 2nd Semester**
Language	**Arabic**
Teaching Hours	**60**
Workload hours	**65**

Learning outcomes

- In this subject the student will learn ;Soil investigation and soil bearing capacity , foundation types , building of walls by many masonry types (brick , stone , block , ….) , forms types and scaffoldings , beams and columns , roofs and floor constructions , thermal and acoustical isolations, damp proofing , finishing works .

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports

course content

- Site investigation , phases of site and soil investigation .
- Methods of soil investigation , open-pit , boring and auger , standard and cone test methods .
- Bearing capacity , calculation and determination in filed and laboratory , increasing of bearing capacity and its relation with foundation design .
- Excavation and filling work , cut and fill , shoring system , angle of repose ,failure of embankment , layers of filling .

- Types of foundations , excavation , shoring system , reinforcing and concrete casting , drying of site work .
- Pile foundations ,bored and driven piles , sheet piles , capping of piles.
- Masonry stone work , stone building types and specifications , building under ground level , above ground level , preparation of stone building .
- Brick and block works ,British and Flemish arrangements , procedure to construct walls, connections between old and new walls .
- Hollow cavity walls , their specifications and components , reinforced walls.
- Thermal insulation materials , specification and types ,thermal transmittance factor , resistance concept .
- Acoustical insulation and fire resistance for building
- Concrete Forms, timber forms(specification and components), bracing for roofs and columns .
- Slip and travel forms , components and operation .
- Scaffolding ,types ,components ,uses .
- Columns classification , reinforcement , shape of their failures ,spiral reinforcement .
- Beams ,types ,timber ,steel , and concert beams pre-cast pre- stress beams.
- Floors and roofs , timber , jack arching
- Concrete floors and roofs , one way , two way ,and ribbed slabs , composite , cellular , arch and shell roofs.
- Lift slab system and space frame roofing .
- Damp proofing materials , application and treatment of roofs , basement and walls .
- Floor finishing , tiles and ceramics
- Inner wall finishing by Gypsum , paints ,and Gypsum board .
- External wall finishing by cement mortars , stone tiles and painting .
- Modern finishing materials , specification , benefits and application system .
- Doors and windows and upstairs rails .
- Type of maintenances , preservation and periodical maintenances .
- Type of failure in building , causes and measures.
- Treatment of building failures , special materials uses for treatment

Course Reference(s)

- Handbook of building construction 2006
- Building design and construction handbook 2001
- انشاء المباني / زهير زاكو
- Internet’s references

Third year	Semester 1		Analysis and Design of Concrete Structure - 1	Soil Mechanics 1	Theory of Structure-1	Highway Engineering	Engineering Analysis	ENGLISH SKILLS-3
	ECTS	30	6	6	6	6	4	2
	HOURS	750	150	150	150	150	100	50
	Teaching Hours	330	60	75	60	60	45	30
	Workload hours	420	90	75	90	90	55	20
	Semester 2		Concrete Technology 2	Soil Mechanics 2	Theory of Structure-2	Engineering Management & Construction Equipment	Numerical Analysis	Engineering Statistics
	ECTS	30	6	6	6	5	4	3
	HOURS	750	150	150	150	125	100	75
	Teaching Hours	360	75	75	60	60	45	45
	Workload hours	390	75	75	90	65	55	30

Year 3: Semester 1

No.	Subject	T	P	C	ECTs
1	Analysis and Design of Concrete Structure - 1	4	0	4	6
2	Soil Mechanics 1	2	3	3	6
3	Theory of Structure1	4	0	4	6
4	Highway Engineering	2	2	4	6
5	Engineering Analysis	3	0	2	4
6	ENGLISH SKILLS 3	2	0	1	2
	SUM	17	5	18	30

Year 3: Semester 2

No.	Subject	T	P	C	ECTs
1	Concrete Technology 2	2	3	3	6
2	Soil Mechanics 2	2	3	3	6
3	Theory of Structure-2	4	0	4	6
4	Engineering Management & Construction Equipment	4	0	3	5
5	Numerical Analysis	3	0	2	4
6	Engineering Statistics	3	0	1	3
	SUM	18	6	16	30

T: Theoretical, P: Practical, C: Credit

Third Year / First Semester

Semester 1	ECTs	Hours	Teaching Hours	Workload Hours
	30	750	330	420
Analysis and Design of Concrete Structure - 1	6	150	60	90
Soil Mechanics 1	6	150	75	75
Theory of Structure-1	6	150	60	90
Highway Engineering	6	150	60	90
Engineering Analysis	4	100	45	55
ENGLISH SKILLS-3	2	50	30	20

➢ Course Description:

Course Title	**Analysis and Design of Concrete Structure - 1**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**3rd Year – 1st Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**90**

Learning outcomes

To develop an understanding of performance and design methodology for basic reinforced concrete structural elements.

Assessment methods

- Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- Analysis of the structures:
- Loads, Load combinations, Safety provisions of the ACI code, Analysis of beams and frames, ACI moment coefficients, Arrangement of live load.
- Materials:
- Properties of concrete in compression, Modulus of elasticity, Stiffness, Properties of concrete in tension, Shrinkage and Temperature effects, Reinforcing steels for concrete.
- Flexural analysis and design of beams:
- Reinforced concrete beam behavior, Analysis of tension-reinforced rectangular beams, Design of rectangular beams, Design aids, Practical

considerations in design of beams, Rectangular beam with tension and compression reinforcement, T-beams.

- Shear and diagonal tension in beams:
- Diagonal tension in homogeneous elastic beams, Reinforced concrete beams without shear reinforcement, Reinforced concrete beam with web reinforcement, ACI code provisions for shear design, Effect of axial forces, Deep beams.
- Analysis and Design for torsion:
- Torsion in plain concrete members, Torsion in reinforced concrete members, Torsion plus shear, ACI code provisions for torsion design.
- Bond, Anchorage and development length:
- Fundamentals of flexural bond, Bond strength and development length, ACI- code provisions for development of tension reinforcement, Anchorage of tension bars by hooks, Development of bars in compression, Bar cutoff and bend points in beams, bar splices.
- Short columns:
- Axial compression, Lateral ties and spirals, Compression plus bending of rectangular columns, Strain compatibility analysis and interaction diagrams, Circular columns, ACI-code provisions for column design, Design aids, Biaxial bending, Load contour method.
- Serviceability:
- Cracking in flexural members, ACI-code provisions for crack control, Control of deflections, Immediate deflections, deflections due to long term loads, ACI-code provisions for control of deflections, Deflections due to shrinkage and temperature changes.

Course Reference(s)

- ACI 318-11: Building Code Requirements for Structural Concrete and Commentary
- "Design of Concrete Structures" by A.H. Nilson, D. Darwin, C.W. Dolan, 14th Ed.,McGraw-Hill.
- "Design of Reinforced Concrete ACI 318-05 Code Edition." J.C. McCormac and James Nelson, 7th Ed, Wiley.
- "Design of Reinforced Concrete: A Fundamental Approach", by E.G. Nawy, 5th Ed.,Prentice Hall.
- "Reinforced Concrete Fundamentals" by P.H. Ferguson, J.E. Breem, J.O. Jirsa, John Wiley & Sons, New York, 1988.
- "Practical Design of Reinforced Concrete" by Russell S. Fling, John Wiley & Sons.
- "Reinforced Concrete Design" by C.K. Wang, and C.G. Salmon, 6th Ed., Harper Collins.
- "Structural Concrete: Theory and Design" by M.N. Hassoun, Addison Wesley.
- "Reinforced Concrete Slabs" by R. Park and W.L. Gamble, Second Edition, Wiley–Interscience
- "Reinforced Concrete Design", by Chu-Kia Wang and Charles G. Salmon,
- "Reinforced Concrete Design" 7th edition, Limbrunner & Aghayere

➢ Course Description:

Course Title	**Soil Mechanics 1**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**3rd Year – 1st Semester**
Language	**English**
Teaching Hours	**75**
Workload hours	**75**

Learning outcomes

The student should understand the nature of soil , its formation , classification and engineering properties . The student should also know the behavior of soil under stresses , the effect of water flowing inside the soil , the using of soil as a construction material . The different methods used for testing the soil in laboratory and field should also be given to the student .

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports
- Mid exam / Final exam.

course content

- **Theoretical Syllabus**
- Soil formation , Types of soil
- Geotechnical properties , Mineralogical composition
- Weight –volume relationships , Grain size distribution , Soil classification
- Hydraulic properties , Permeability of soil
- 1 Seepage & flow net construction
- Effective stress & Pore water pressure
- Soil stabilization , Mechanical and chemical stabilization.
- **Practical Syllabus**
- Field collection of a soil sample
- Water content determination
- Liquid &Plastic limits test
- Shrinkage limit test
- Specific gravity of soil solids
- Total soluble salts & Organic matter content
- Particle size analysis (Mechanical method)
- Particle size analysis (Hydrometer method)

- Classification of soil
- Moisture- unit weight relationship (Compaction test)
- Determination of in-place density of soil
- Permeability tests (Constant & Falling head)

Course Reference(s)

1. Soil Mechanics (Principles & Practice) / G.E. Barnes
2. Principles of Geotechnical Engineering / B.M. Das
3. Soil Mechanics and Foundation Engineering / B. Singh , S. Prakash
4. Engineering Properties of Soils and their Measurements / J.E. Bowles
5. Soil Testing for Engineers / T.W. Lamb.

➢ Course Description:

Course Title	**Theory of Structure-1**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**3rd Year – 1st Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**90**

Learning outcomes

The student will be able to define all types of structures and their stability, define the methods of determination of the structure deformation under the load , study the methods of analysis and internal forces determination of determinate and indeterminate structures ,study the methods used for analysis of structural elements due to moving loads using the influence lines. The student will also learn the methods of structural analysis and the theories used, application of different methods of structural analysis and the methods of presenting the actual structure, connection between the theoretical analysis and the actual engineering structures.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports
- Mid exam / Final exam.

course content

- Introduction
- Definition of engineering structures
- Classification of engineering structures
- Forces applied on engineering structures
- Types of loads and supports
- Stability and determinacy of structures
- Method used for stability of engineering structure
- Stability and determinacy of beams
- Stability and determinacy of trusses
- Stability and determinacy of rigid frames
- Statically determinate structures
- Statically determinate beams
- Drawing of shear force and bending moments diagram
- Analysis of statically determinate truss
- Statically determinate rigid frames
- Drawing of shear force and bending moments diagram
- Influence line for statically determinate structures
- Moving concentrated loads
- Criteria for maxima
- Absolute maximum bending moment

Course Reference(s)

- **Elementary theory of structures / Yuan Y. Hsieh**
- **Structural analysis / Russell C. Hibbeler**
- **Structural and Stress Analysis / T.H.G. Megson**

- **Fundamentals of structural analysis/ Kenneth M. Leet, Chia Ming Hang and Anne M. Giberl**

➢ Course Description:

Course Title	**Highway Engineering**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**3rd Year – 1st Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**90**

Learning outcomes

The student must learn the geometrical engineering design of highways , The structural design of flexible & rigid pavements . The student must learn also, All the site works that may be needed for road construction & maintenance of pavements . The student can be able to accomplish the important tests of soil layers , asphalt and concrete pavements as well as he will have an important information about airport & railway engineering .

Assessment methods

Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- **Theoretical Syllabus**
- Highways classification according to their functions , locations, and pavements types
- Highway alignments and alternatives , points of inflections , topography terrain maps , cross-section elements , profiles , and horizontal and vertical curves

- Horizontal curves , angle of inflections , middle ordinates , external distance , centrifugal forces , minimum radius and design speed .
- Spiral curves and super elevation concepts .
- Vertical curves , crest and sag curves , under crossing clear distance , minimum length and grades .
- Sight distances , stopping and passing , at grade intersection , at vertical curves , relation between length of curve and required sight distance and between middle ordinate distance .
- Traffic volumes , counting , traffic volume correction factors , level of service (LOS) , AADT, ADT , DHV , …..
- Traffic loads ,equivalent single axle load (ESALs) , tandem axle load, tridem axle loads , load damage factor , growth factor , stresses on pavements .
- Design of flexible pavement, pavement layers , charts for design
- Design of rigid pavement, pavement layers , charts for design
- Railway cross section elements and embankments , specifications
- Airports orientations , runway and taxiway specifications , signals and marking .
- Sub-grade works , grading , cut and fill sections , soil classification (AASHTO , UCS) , Leveling and compactions
- Sub-base works , stockpiles , specifications , spreading , leveling and compactions
- Base works , macadam and untreated base , stabilized base (bitumen , lime , cement treated base) .
- Prime and tack coats, specifications and applications .
- Asphalt plants (types and units) , crushers
- Asphalt mixtures (Hot and Cold) , specifications
- Job mix , preparations in laboratory and plants , applications in the fields
- Asphalt pavement constructions , placing , spreading , pavers , rollers , field tests , leveling and thickness controlling .
- Super pave asphalt , specifications , aggregate grading , binder standards (PERFORMANCE GRADING PG) , new tests of bitumen and mixtures .
- Rigid pavement , layers , fixed and slip forms , joints and reinforcing , control of leveling , and finishing
- Drainage systems , culverts , siphon , ditches and filters
- Highway furniture and control devices
- **Practical Syllabus**
- Fine and coarse aggregate tests
- Asphalt sampling, Penetration Test, Ductility Test

- Loss on Heating Test, Softening Point Test
- Saybolt Viscosity Test, Flash and Fire Points Test
- California Bearing Ratio (CBR) Test
- Extraction test, Theoretical Maximum Specific Gravity of HMA (Gmm)
- Marshall Test

Course Reference(s)

- Road design manual / 2007
- A Policy on geometric design of highway and streets / 2001
- The handbook of highway engineering / 2006
- Super pave fundamentals , FHWA , NHI # 131053
- Internet's references

➢ Course Description:

Course Title	**Engineering Analysis**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	
Year - Semester	**3rd Year – 1st Semester**
Language	**English**
Teaching Hours	**45**
Workload hours	**55**

Learning outcomes

- The student must know the advanced theories in mathematics & its applications in construction engineering .

Assessment methods

- Tutorial
- Assignments
- Quizzes
- Midterm exam
- Final exam.

course content

- Ordinary differential equations ,liner differential equations , homogeneous linear equations of the second order , general solution . basis initial value problem , homogeneous linear differential equations of arbitrary order n , equations of order n with constant coefficients , non homogeneous equations solving by the method of undetermined coefficient .
- Applications of O.D.E of undetermined coefficient method in:, beam & column , beam-column, beam on elastic foundation , modeling : forced oscillation (dynamics analysis) .
- Singular function : unit step function , unit impulse function ,unit moment function .
- Applications of O.D.E of integration method in beams .
- Fourier series ,Eular formulas , fourier series for any period (2L) , odd and even functions , Half – rang expansion , applications of fourier series in construction engineering .
- Partial differential equations , one dimensional wave equation , free longitudinal vibration of beam, free transverse vibration of beam, one dimensional heat equation , consolidation equation , two dimensional Laplace equation .

Course Reference(s)

- Advanced engineering mathematics / Erwin kreyszig
- Applied mathematics for engineering & physicists / pipes &harvill
- Numerical methods for engineers / S.C. Chapra & R. P. Canale

➢ Course Description:

Course Title	**ENGLISH SKILLS-3**
Academic year	**2023/2024**

Course Code	
Credits (ECTS)	**2**
Year - Semester	**3rd Year – 1st Semester**
Language	**English**
Teaching Hours	**30**
Workload hours	**20**

Learning outcomes

The goal is to study English language and gain knowledge of it as benefit engineers in general, and to develop speaking skills and understand its basic rules taking the way to the acquisition of the ability to use technical key words in their work and the capability of communicating with other engineers correctly.

Assessment methods

- Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- Revision, vocabulary and comprehension
- Phrasal verbs, vocabulary and comprehension
- Academic writing (1), introduction
- English words with more than one meaning, vocabulary and comprehension
- Present tenses, vocabulary and comprehension
- Past tenses, vocabulary and comprehension
- Future tenses, vocabulary and comprehension
- Types of Essays, vocabulary and comprehension
- Punctuation, passive voice, vocabulary and comprehension
- Writing technical e-mails, vocabulary and comprehension

- Academic writing (1), writing a paragraph
- Technical English (2), keywords, vocabulary and comprehension
- Grammar revisions

Course Reference(s)

- Headway plus for beginners
- Any Grammar and comprehension for technical learning
- https://www.coursera.org/browse/physical-science-and-engineering/electrical-e ngineering
- https://link.springer.com/book/10.1007/978-981-10-8624-3
- https://progressivecollege.ie/courses/early-learning-and-care-qqi-level-major-award/?gad=1&gclid=EAIaIQobChMI_Nqu2tqA_wIVZ4VoCR2O0woLEAAYASAAEgI9WvD_BwE

Third Year / Second Semester

Semester 2	ECTs	Hours	Teaching Hours	Workload Hours
	30	750	360	390
Concrete Technology 2	6	150	75	75
Soil Mechanics 2	6	150	75	75
Theory of Structure-2	6	150	60	90
Engineering Management & Construction Equipment	5	125	60	65
Numerical Analysis	4	100	45	55

Engineering Statistics	**3**	**75**	**45**	**30**

➢ Course Description:

Course Title	**Concrete Technology 2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**3rd Year – 2nd Semester**
Language	**Arabic**
Teaching Hours	**75**
Workload hours	**75**

Learning outcomes
The objectives of this subject are to give information about: Properties of Fresh and hardened concrete; durability of concrete; Concrete mix design; Special types of concrete; as well as, In-situ tests.

Assessment methods
- Homework. - Attending classroom / Class quiz /Class participants. - Mid exam / Final exam.

course content
• **Theoretical Syllabus**

- General information about composition of concrete & properties of fresh concrete.
- Properties of hardened concrete.
- Kinds of strength.
- Factors affecting strength of hardened concrete.
- Factors affecting test results of strength of hardened concrete.
- Concrete mix design.
- Field adjustment.
- Elasticity, dimensional stability (shrinkage & creep).
- Durability of concrete.
- Special types of concrete.
- In-situ tests.

- **Practical Syllabus**

- Review about cement and aggregates tests.
- Fresh concrete tests: (Air content, Slump test, Compacting factor test, and V-B test).
- Factors affecting compressive strength of concrete:
- (a) Effect of water/cement ratio;
- (b) Effect of cement content;
- (c) Effect of age;
- (d) Effect of end condition of specimen and capping;
- (e) Effect of dimensions of specimen;
- (f) Effect of curing conditions (Normal curing, Untreated curing, Autoclaved curing, Hot water curing); and
- (g) Effect of shape of specimen.

- Indirect Splitting Tensile strength of concrete.
- Flexural test (Modulus of rupture) of concrete.
- Modulus of elasticity and Poisson's Ratio of concrete.
- Project about mix design of concrete using (ACI, BRITISH, and CP : 110) methods.
- Light weight concrete tests.
- In-situ Tests: (Rebound – Hammer Test, Ultrasonic Pulse Velocity Test, Load test, and Core test).

Course Reference(s)

- A.M. Neville, "Properties of concrete", 3rd. Ed., A Pitman International Text (1998).
- Troxell, Davis, and Kelly, "Composition and properties of concrete", McGraw-Hill book Company (1986).
- Iraqi (IS), British (BS), and American (ASTM) Standards for concrete testing.

➢ Course Description:

Course Title	**Soil Mechanics 2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**3rd Year – 2nd Semester**
Language	**English**
Teaching Hours	**75**
Workload hours	**75**

Learning outcomes

The student should understand the nature of soil , its formation , classification and engineering properties . The student should also know the behavior of soil under stresses , the effect of water flowing inside the soil , the using of soil as a construction material . The different methods used for testing the soil in laboratory and field should also be given to the student .

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports
- Mid exam / Final exam.

course content

- **Theoretical Syllabus**
- Contact pressure and stress distribution
- Compressibility & Consolidation , Consolidation test , Settlement analysis
- Shear strength of soil , Mohr-Coulomb theory , Cases of shearing tests , Types of shearing tests .
- Lateral earth pressure and retaining structures
- Special types of soils , Collapsing & swelling soils.
- **Practical Syllabus**
- Consolidation test.
- Unconfined compression test.
- Direct shear test.
- Triaxial compression test.
- California Bearing Ratio test.
- Collapsing test.
- Swelling test.
- Relative density determination.

Course Reference(s)

1. Soil Mechanics (Principles & Practice) / G.E. Barnes
2. Principles of Geotechnical Engineering / B.M. Das
3. Soil Mechanics and Foundation Engineering / B. Singh , S. Prakash
4. Engineering Properties of Soils and their Measurements / J.E. Bowles
5. Soil Testing for Engineers / T.W. Lamb

➢ Course Description:

Course Title	**Theory of Structure-2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**3rd Year – 2nd Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**90**

Learning outcomes

The student will be able to define all types of structures and their stability, define the methods of determination of the structure deformation under the load , study the methods of analysis and internal forces determination of determinate and indeterminate structures ,study the methods used for analysis of structural elements due to moving loads using the influence lines. The student will also learn the methods of structural analysis and the theories

used, application of different methods of structural analysis and the methods of presenting the actual structure, connection between the theoretical analysis and the actual engineering structures.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports
- Mid exam / Final exam.

course content

- Approximate analysis for statically indeterminate structures
- Elastic deformation of structures (Beams, Truss, Rigid frames)
- Virtual work method (Unit load method)
- conjugate-beam method
- Slope-deflection method for statically indeterminate beams and rigid frames
- Without joint translation
- With joint translation
- Moment distribution method without joint translation
- Fixed-end moment
- Element stiffness
- Distribution factor, carry-over factor
- Distribution of external moment applied to a joint
- The process of locking and unlocking :one joint
- The process of locking and unlocking :two joint
- Modified stiffness factor
- Moment distribution method with joint translation

- Analysis of statically indeterminate rigid frames with one degree of freedom
- Computer applications

Course Reference(s)

- Elementary theory of structures / Yuan Y. Hsieh
- Structural analysis / Russell C. Hibbeler
- Structural and Stress Analysis / T.H.G. Megson
- Fundamentals of structural analysis/ Kenneth M. Leet, Chia Ming Hang and Anne M. Giberl

➢ Course Description:

Course Title	**Engineering Management & Construction Equipment**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**5**
Year - Semester	**3rd Year – 2nd Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**65**

Learning outcomes

Engineering Management: The student will learn the fundamentals of engineering management, planning, & costs, explained by solved problems for different construction projects.

Construction Equipment : The student must know the manual & technical skill to supervise different projects that use different types of construction equipments after graduate .

Assessment methods

Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- Introduction and historical review of project management.
- Work breakdown structure and management triangle theory.
- Critical path method (CPM): Calculation of activity durations, float time, calculation of critical path, advantages and disadvantages and examples.
- Program (Project) evaluation and review technique (PERT): Calculation of activity most likely durations, float time, calculation of critical path, advantages and disadvantages and examples.
- Description of activity durations, crantt chart as outline of critical path description, advantages and disadvantages and examples.
- Crashing time method, description, advantages and disadvantages and examples.
- Economical study on time value of money, advantages and and examples.
- Introduction ,the role of equipments in various projects and its important in economic constructions , the controlling of material and equipments during construction stages .
- Arrangement of machines records , regular and annual maintenance ,the factors affecting the efficiency during work ,the factors affecting the selection and owning of machines and calculating the working cost, the standard and special equipments.
- Excavation equipments, hoes, dragline , trench , and tunnel excavators , types and work efficiency, application and examples .
- Road excavator equipments , shovel, grader , bulldozer ,and scraper , types , work efficiency , productivity , benefit and cost , application and examples.
- Trucks , rear dump truck , bottom dump truck , their capacities and numbers ,the factors affecting their efficiency ,application and examples .
- Compactors, compactors with vibrators , for clay soils , granular soils , asphalt layers , steel, sheep foot, and pneumatic rollers ,manual vibrating

compactors ,action of compacting , methods of compacting different types of soils and asphalt , site laboratory tests.

- Concrete mix plants , components and specifications , truck mixer and their specifications ,specification of aggregates and cement and their test , concrete spreader at the site .
- Cranes ,winch ,lifting apparatus, fork cranes , jacks, multistory building cranes.

Course Reference(s)

- Working & tools of builders / G. Barder.
- Construction Planning, Equipment & Methods / R. L. Peurifoy & W. B. Ledbetter.
- Construction Methods and Management / S.W. Nunnally
- Construction Method & Management / S.W. Nunnally
- Project Planning & Control with PERT & CPM / B.C. Punmia & K.K. Khandelnal.
- Construction Planning Equipment & Methods / Peurifoy .

➢ Course Description:

Course Title	**Numerical Analysis**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**3**
Year - Semester	**3rd Year – 2nd Semester**
Language	**English**
Teaching Hours	**45**
Workload hours	**55**

Learning outcomes

- The student must know the advanced theories in mathematics & its applications in construction engineering .

Assessment methods

- Tutorial
- Assignments
- Quizzes
- Midterm exam
- Final exam.

course content

- Numerical methods , numerical methods in non linear equations , solution of equations by iteration :fixed- point method , Newton – Raphson method
- Interpolation: ,linear interpolation , quadratic interpolation, Newtons forward difference formula , Newtons backward difference formula, lagrangian interpolation , numerical integration & differentiation .
- Numerical methods in linear algebra , system of linear equations , Gauss elimination , Lu factorization , Choleskys method , Gauss Jordan elimination ,inverse matrix by elimination method , system of linear equations solution by iteration: ,Gauss - Seidel Iteration , Jacobi method iteration , Eigen value & Eigen vector .
- Numerical methods for differential equation , Euler method , Modified Euler method , Runge Kutta method -4th order .
- Application of engineering analysis and numerical methods in Matlab program

Course Reference(s)

- **Advanced engineering mathematics / Erwin kreyszig**
- **Applied mathematics for engineering & physicists / pipes &harvill**
- **Numerical methods for engineers / S.C. Chapra & R. P. Canale**

➢ Course Description:

Course Title	**Engineering Statistics**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**3**
Year - Semester	**3rd Year – 2nd Semester**
Language	**English**
Teaching Hours	**45**

Workload hours	30

Learning outcomes

This course description provides a brief summary of the most important characteristics of the course and the expected learning outcomes of students to demonstrate whether they have made the most of the available learning opportunities. It must be linked to the description of the program.

Assessment methods

- Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- Statistics-Types of Statistics
- Data-Population-Sample-Variable
- Frequency Distribution
- Class Boundaries-Class Width-Class Mark
- Relative and Percentage Frequency
- Graphical Presentation I
- Graphical Presentation II
- Statistical Notations I
- Statistical Notations II
- Measures of Central Tendency I
- Measures of Central Tendency II
- Measures of Variation I
- Measures of Variation II
- Measures of Skewed. Correlation
- Preparatory week before the final Exam

Course Reference(s)

- Elementary Statistics, Author Allan G. Bluman, Printed by McGraw-Hill, 1997.
- جامعة الموصل- - المدخل الى الاحصاء تؤل فٌ د.خاشع محمود الراوي طباعة

Fourth year	Semester 1		Analysis and Design of Concrete Structure-2	Foundation Engineering-1	ISO	Construction Drawing	Graduation Project 1	ENGLISH SKILLS-4
	ECTS	30	7	7	5	6	3	2
	HOURS	750	175	175	125	150	75	50
	Teaching Hours	315	60	60	60	60	45	30
	Workload hours	435	115	115	65	90	30	20
	Semester 2		Design of Steel Structures	Foundation Engineering-2	Estimation and Specification	Environmental Engineering	Graduation Project 2	Computer Applications2
	ECTS	30	7	7	5	5	3	3
	HOURS	750	175	175	125	125	75	75
	Teaching Hours	330	60	60	60	60	45	45
	Workload hours	420	115	115	65	65	30	30

Year 4: Semester 1

No.	Subject	T	P	C	ECTs
1	Analysis and Design of Concrete Structure-2	4	0	5	7
2	Foundation Engineering-1	4	0	5	7
3	ISO	4	0	3	5
4	Construction Drawing	0	4	4	6
5	Graduation Project 1	0	3	1	3
6	ENGLISH SKILLS 4	2	0	1	2
	SUM	14	7	19	30

Year 4: Semester 2

No.	Subject	T	P	C	ECTs
1	Design of Steel Structures	4	0	5	7
2	Foundation Engineering-2	4	0	5	7
3	Estimation and Specification	4	0	3	5
4	Environmental Engineering	2	2	3	5
5	Graduation Project 2	0	3	1	3
6	Computer Applications2	1	2	1	3
	SUM	15	7	18	30

T: Theoretical, P: Practical, C: Credit

Fourth Year / First Semester

Semester 1	ECTs	Hours	Teaching Hours	Workload Hours
	30	750	315	435
Analysis and Design of Concrete Structure-2	7	175	60	115
Foundation Engineering-1	7	175	60	115
ISO	5	125	60	65
Construction Drawing	6	150	60	90
Graduation Project 1	3	75	45	30
ENGLISH SKILLS-4	2	50	30	20

➢ Course Description:

Course Title	**Analysis and Design of Concrete Structure-2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**7**
Year - Semester	**4th Year – 1st Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**115**

Learning outcomes

Students will build on their knowledge of reinforced concrete design to understand the behavior of reinforced concrete and to design practical reinforced concrete components.

Assessment methods

- Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- Analysis and design of slabs:

Types of slabs, Design of one way slabs, Temperature and shrinkage reinforcement, Behavior of two-way edge supported slabs, Two-way column supported slabs, Direct design method for column supported slabs, Depth limitation of the ACI code, Equivalent frame method, Shear design in flat plates and flat slabs, Openings in slabs.

- Slender columns:

Concentrically loaded columns, Compression plus bending, ACI criteria for non sway frames versus sway frames, ACI moment magnifier method for non

sway frames, ACI moment magnifier method for sway frames, Second-order analysis for slenderness effects.

- Concrete building systems:

Floor and roof systems, Panel, curtain and bearing walls, shear walls, ACI code provisions for shear wall design.

- Prestressed Concrete:

Principles of prestressed concrete, Methods of prestressing, prestressing steel, concrete for prestressed construction.

- Prestressed Concrete:

Elastic flexural analysis, Flexural strength, Flexural design based on concrete stress limits.

- Prestressed concrete:

Shape selection, Tendon profiles. Loss of prestress.

Course Reference(s)

- ACI 318-11: Building Code Requirements for Structural Concrete and Commentary
- "Design of Concrete Structures" by A.H. Nilson, D. Darwin, C.W. Dolan, 14th Ed., McGraw-Hill.
- "Design of Reinforced Concrete ACI 318-05 Code Edition." J.C. McCormac and James Nelson, 7th Ed, Wiley.
- "Design of Reinforced Concrete: A Fundamental Approach", by E.G. Nawy, 5th Ed., Prentice Hall.
- "Reinforced Concrete Fundamentals" by P.H. Ferguson, J.E. Breem, J.O. Jirsa, John Wiley & Sons, New York, 1988.
- "Practical Design of Reinforced Concrete" by Russell S. Fling, John Wiley & Sons.
- "Reinforced Concrete Design" by C.K. Wang, and C.G. Salmon, 6th Ed., Harper Collins.
- "Structural Concrete: Theory and Design" by M.N. Hassoun, Addison Wesley.

- “Reinforced Concrete Slabs” by R. Park and W.L. Gamble, Second Edition, Wiley–Interscience
- "Reinforced Concrete Design", by Chu-Kia Wang and Charles G. Salmon
- “Reinforced Concrete Design” 7th edition, Limbrunner & Aghayere
- Urry & P.J. Turner.

➢ Course Description:

Course Title	**Foundation Engineering-1**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**7**
Year - Semester	**4th Year – 1st Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**115**

Learning outcomes

The student will learn the basic of foundation engineering , soil investigation , calculation of bearing capacity of soil , selection and design of different types of foundation .

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports
- Mid exam / Final exam.

course content

- Soil investigation : Collecting samples , No. of holes , Depth of bore holes , Laboratory tests , Report writing.
- Bearing capacity theories , Factors affecting bearing capacity , Settlement calculations .
- Design of shallow foundations .

Course Reference(s)

- **Principles of Foundation Engineering , Fifth Edition , By Braja-M. Dass , California University 2006 .**
- **Foundation Analysis & Design / Bowles**
- **Foundation Engineering / Peck , Hunson & Tharnborm**

➢ Course Description:

Course Title	**ISO**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**5**
Year - Semester	**4th Year – 1st Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**65**

Learning outcomes

The student must know the quality , total management of quality , its elements, specifications , standardization , classification & its application in addition to international standard organization (ISO) systems .

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports
- Mid exam / Final exam.

course content

- Quality definition , Standards , Factors affecting quality.
- Quality determinate , Methods for determining quality.
- Total quality control , Definition , Historical , Elements.
- Systems used in total quality control & management.
- Application of total quality control , Properties , Stages & Advantages of applications , Examples (total quality control in industry of concrete).
- Quality control of material used in production , Specification , Right decision , Example.
- Quality control , Methods , Statistical method , Examples.
- Quality control charts.
- Quality control cost.
- Specification , specification & standardization fundamentals , Properties , Importance , Tolerance, Examples.
- Rings of improving quality.
- International organization for standardization ISO , Definition , Introduction , Using
- Advantages of applications of ISO 9000.
- ISO 9000 & total quality control management.
- ISO 9000 family.
- Civil engineering & ISO .
- ISO 14000 environmental management system.

Course Reference(s)

- الضبط المتكامل لجودة الانتاج / د . محمود سلامة عبدالقادر
- **ISO 9000 / Rolhery**
- الجودة في المنظمات الحديثة / مأمون الداركة ، طارق الشباكي
- دليل ضبط الجودة في صناعة الخرسانة / د. روحي الشريف
- أنظمة ادارة الجودة والبيئة **ISO 9000 , ISO 14000** / أ .د محمد عبدالوهاب العزاوي
- **Applying ISO 9000 Quality Management Systems / Arora S.C.**

➢ Course Description:

Course Title	**Construction Drawing**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**6**
Year - Semester	**4th Year – 1st Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**90**

Learning outcomes

The student will learn to draw all kinds of details related to civil works (structural maps for concrete & steel) as well as to read & execute the projects & plans which were drawn previously.

Assessment methods

Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- Introduction to define the civil drawing & all application in engineering & industrial fields between the engineer & worker .
- Concrete drawing & how to take the longitudinal & cross sections in multistory buildings . Show details of roofs , beams , columns , stairs , footing .
- Reinforced concrete footings , Wall footing , Isolated , Combined , Strap , Continuous , Raft foundations .
- Reinforced concrete columns and cross sections.
- Shear walls and staircase, type of staircase, reinforcement details

- Reinforced concrete beams :
- Simple beam , simple beam with cantilever , fixed beam , Continuous beam , Girder, type of reinforcement cut-of and bent-up method.
- Reinforced concrete slabs (Types of slabs) :
- One way slabs , Two way slabs , Flat slabs , Ribbed & hollow – block slabs with all reinforcement details.
- Building joints , Types of joints , Expansion joints , Construction joints .
- Introduction to define the steel drawing, steel column base plat connection
- Beam – column connections (Riveted , Welded , Bolts)
- Pre-stressed concrete, Water tanks and.
- Architectural details : Floors & roofs types , Their materials , Finishing methods , Doors & windows , Types of doors & windows according to their uses .
- Elevators
- Municipal engineering drawing :Water distribution systems : Internal water networks for building (cold & hot) , Water treatment station , Sewage network systems for building .
- Irrigation works drawing : Regulators , Pipes , Box culverts , Siphon , Weirs , Bridges .

Course Reference(s)

- Manual of Standard Practice for Detailing Reinforced Concrete Structures (ACI 315-747) .
- Reinforced Concrete Designer's Handbook / Reynolds , C.E. &Steed Man . J.C.
- Foundation Analysis & Design / Bowles J.E.
- A Manual of Engineering Drawing for Students & Drafts / French . T.E.
- Structural Details in Concrete / M.Y.H. Bangash
- Irrigation Principles & Practices / Israclson .
- The design of prestressed concrete bridges / ROBERT BENIM
- Detailing for steel construction, second edition, AISC.
- الكود المصري لتصميم المشأت الكونكريتية رقم 203 / دليل التفاصيل الانشائية

➢ Course Description:

Course Title	**Graduation Project 1**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**3**
Year - Semester	**4th Year – 1st Semester**
Language	**English**
Teaching Hours	**45**
Workload hours	**30**

Learning outcomes

- In general, upon completion of the GP, students are expected to:
- Ability to collect and analyze data, and finally draw conclusions through experimentation and simulation.
- Ability to identify, formulate and solve engineering problems
- Ability to design a system, component or process with defined constraints.
- Ability to implement designed solutions
- Ability to conduct literature review in the project domain.
- Ability to communicate effectively through written reports and oral presentations.
- Ability to function in multidisciplinary teams.
- learn the skilled needed by a System Analyst to be , professional and a successful.
- Learn Positive thinking.

- Use current techniques, skills, and tools necessary for computing Practices.

Assessment methods

- Tutorial
- Assignments
- Quizzes
- Midterm exam
- Final exam.

course content

- Different projects supervised by staff members .

➢ Course Description:

Course Title	**ENGLISH SKILLS-4**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**2**
Year - Semester	**4th Year – 1st Semester**
Language	**English**
Teaching Hours	**30**
Workload hours	**20**

Learning outcomes

This course aims to develop students' knowledge, understanding and fluency in their use of the English language and to build their skills as effective communicators in daily activities and universal topics. Students improve

their control of language by reading and viewing a range of texts, listening to various audios, practicing speaking, and discovering grammar that used in everyday activities; in addition to learning an intermediate skill of writing.

Assessment methods

- Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- **Grammar revision, vocabulary and comprehension**
- **Cause and effect clauses, State verbs, vocabulary and comprehension**
- **Academic writing (2), writing technical report**
- **Types of sentences in English (1), vocabulary and comprehension**
- **Types of sentences in English (2), vocabulary and comprehension**
- **Result clauses, vocabulary and comprehension**
- **conjunctions, vocabulary and comprehension**
- **Punctuation, vocabulary and comprehension**
- **Writing CV, passive voice, vocabulary and comprehension**
- **Technical writing, technical sentences, vocabulary and comprehension**
- **Writing essays, vocabulary and comprehension**
- **Writing summary and abstract**
- **Paraphrasing**

Course Reference(s)

- Headway plus for beginners
- Any Grammar and comprehension for technical learning
- https://www.coursera.org/browse/physical-science-and-engineering/electrical-e ngineering
- https://link.springer.com/book/10.1007/978-981-10-8624-3

- https://progressivecollege.ie/courses/early-learning-and-care-qqi-level-major-award/?gad=1&gclid=EAIaIQobChMI_Nqu2tqA_wIVZ4VoCR2O0woLEAAYASAAEgI9WvD_BwE

Fourth Year / Second Semester

Semester 2	ECTs	Hours	Teaching Hours	Workload Hours
	30	750	330	420
Design of Steel Structures	7	175	60	115
Foundation Engineering-2	7	175	60	115
Estimation and Specification	5	125	60	65
Environmental Engineering	5	125	60	65
Graduation Project 2	3	75	45	30

Computer Applications2	**3**	**75**	**45**	**30**

➢ Course Description:

Course Title	**Design of Steel Structures**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**7**
Year - Semester	**4th Year – 2nd Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**115**

Learning outcomes

After successful completion of this course the student will be able to understand the behavior and design of different types of structural steel members and connections. He will gain an educational experience in the design of simple steel structures.

Learning Outcomes

- **Basic understanding of the AISC specifications for design of steel structures.**
- **Knowledge of the design of steel members including connections.**
- **Knowledge of serviceability issues in design.**

Assessment methods

- Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- **Introduction: classification of steel structures;**
- **Structural steel: scope of use, properties and behavior, merits and demerits, shapes of rolled sections; Loads and load combinations; design approaches and philosophies.**
- **Tension members: Types, sections and shapes, net & effective net area, design of tension members according to AISC ASD ; examples & problems.**
- **Compression members: introduction, Euler's formula for buckling, allowable compressive stresses according to AISC ASD; Design of compression members: using ASD equations, using allowable stress & allowable load tables, design of laced columns and other built-up sections, column splices examples & problems.**
- **Beam-columns: introduction, stresses in beam-columns, effective length of columns, design of beam-columns according to AISC ASD, method of determination initial trial section, method of equivalent load, examples & problems.**
- **Beams: types & sections; review of beam theory, local buckling considerations, lateral torsional buckling considerations; allowable bending stresses & shear stresses according to AISC ASD, local web yielding, deflection limitations according to AISC ASD, design of gantry girders, design of beams using tables & charts; examples & problems.**
- **Design of column base plates: base plates of axially loaded columns; design of base plates under axial load and moment (cases of eccentricity).**

- **Simple connections: modes of failure, bearing type connections, friction (or slip critical) type connections, ASD design requirements for bolted, riveted & welded connections; problems.**
- **Framed connections (welded and bolted): Classification of framing systems according to AISC; Design of different types of beam-to- beam and beam-to-column connections.**
- **Design of trusses: Types; Load Calculation; roofing sheets, sag rods, purlins, design of tension & compression truss members.**

Course Reference(s)

- Applied Structural Steel Design, L. Spiegel & G.E. Limbrunner, 4th ed., Prentice Hall, 2002.
- Manual of steel construction, 13th ed., American Institute of Steel Construction, 2005.
- Structural Steel Designer's Handbook, R. L. Brockenbrough, F. S. Merritt, 3rd ed., McGraw-Hill, 1994.
- Building Design and Construction Handbook ; Frederick S. Merritt (Deceased) Jonathan T. Ricketts, Sixth Edition, McGRAW-HILL.

➢ Course Description:

Course Title	**Foundation Engineering-2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**7**
Year - Semester	**4th Year – 2nd Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**115**

Learning outcomes

The student will learn the basic of foundation engineering , soil investigation , calculation of bearing capacity of soil , selection and design of different types of foundation .

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports
- Mid exam / Final exam.

course content

- Deep foundations ,Types of piles , Method of execution, Bearing capacity of single pile , Bearing capacity of pile group , Design of piles , Design of piles cap , Settlement of piles .
- Lateral earth pressure .
- Design of concrete retaining walls .
- Design of sheet piles.
- Slope stability ,Types & factors affecting slope stability, Methods of analysis for clays & sand .
- Soil improvement , Soil improvement by compaction & additives .
- Introduction to soil reinforcement .

Course Reference(s)

- **Principles of Foundation Engineering , Fifth Edition , By Braja-M. Dass , California University 2006 .**
- **Foundation Analysis & Design / Bowles**
- **Foundation Engineering / Peck , Hunson & Tharnborm**

➢ Course Description:

Course Title	**Estimation and Specification**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**5**
Year - Semester	**4th Year – 2nd Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**65**

Learning outcomes

The student will be able to make approximate and detailed estimates of buildings, specify the proper method of measurement, do the rate analysis for different items of works. He will also be able to write the technical specifications for various civil engineering works. Finally, he will get thorough knowledge on the types of contracts and the general and special conditions related to them.

Assessment methods

- Home assignment
- Class assignment/Class quiz/Class participants
- Seminars/theory & practical reports
- Mid exam / Final exam.

course content

- Introduction: engineering projects &estimation, definition of estimation, benefits of estimation, factors affecting cost estimation, types of estimation, practical examples on approximate estimation.
- General rules in quantitative survey: Principles in selecting units of measurement for items, various units and modes of measurement for different items of works, details of quantities measuring.
- rate analysis, factors affecting the cost of materials and labour, Plants and equipment -hour costs based on total costs and Outputs, Overhead charges, rates for various items of construction of civil engineering works, problems and examples on rate analysis
- Methods of working quantities for various items of works, Measurement and abstract sheets and recording, excavation and fill works for wall footings, estimation of walls and other items of buildings up to D. P. C. level, methods used to calculate the length of various works: method of strips and center lines method, examples and problems.
- Earthworks for various engineering projects: irrigation channels, roadway embankments, methods used for calculating earthwork quantities and volumes, Mass diagrams, calculations of excavation volumes due to cut works (grid leveling method and triangular method), examples and problems.
- Estimation of masonry works, basic units and materials used, Estimation of walls construction, damp proofing used, brick works, block works, stone works, examples and problems
- Estimation of concrete works, primary materials used, mixing of concrete materials, types of concrete mixers, calculating quantities of concrete materials, examples and problems
- Estimation of concrete works quantities for spread and combined footings
- Estimation of concrete works quantities for lintels, beams, roofs, columns and stairs
- Estimation of form works quantities for lintels, beams, roofs, tie beams, columns and arches
- Reinforcement calculations for beams, roofs, columns and footings, specifications
- Finishing works: types, estimation of outside and inside finishing works, plastering, painting, brick and stone coating, glass works, specifications
- Estimation of tiles works: tiles, mosaic, ceramic, porcelain, … etc, specifications
- Estimation of sanitary, sewage, plumbing and electrical works

- Estimation of materials used in flexible and rigid pavements, estimation of curbstones used in curbs
- Estimation of materials used in industrial sheds and steel buildings, columns and base plates, beams and bearing plates, connections, floors and roofs.
- Machines and equipment used in executing various works, Cost of owning and operating construction machines; depreciation, investment and operational costs. Profits, payment and indirect project costs.
- Technical specifications: definition, scope, resources and types of specifications, role of specifications in engineering project quality and estimated cost, technical specifications for various works.
- Computer-aided estimation, Using spread sheet applications and other software packages in estimation
- Valuation: Principles, purpose and function of valuation, Factors affecting the valuation of properties, Valuer and his duties.
- Contracts: definition, types of contracts, Identification of rules, standards, related to the contracts of civil engineering works and related items, general and special conditions for civil engineering works.

Course Reference(s)

- تخمين ومواصفات الأعمال الإنشائية، المهندس غانم عبد الرحمن بكر.
- التخمين والمواصفات، مدحت فضيل فتح الله.
- شروط المقاولات لأعمال الهندسة المدنية بقسميها الأول والثاني، وزارة التخطيط والتعاون الإنمائي، **2005**.
- المواصفات الفنية العامة، المكتب الاستشاري في معهد التكنولوجيا/بغداد، طبعة أولى، **1982**.
- **Construction, Planning & Technology, Rajiv Gupta, 1984.**
- **Construction, Planning Equipment & Methods, R.L. Peurifoy et al, 7th ed., 2006.**
- **General technical conditions and specifications, book -1 / 2, specification of materials workmanship of civil engineering works, 2nd ed., 2002.**
- **Building construction handbook, R. Chudley and R. Greeno, 5th ed., Elsevier Butterworth-Heinemann, 2004.**
- **Practical Standard Methods of Measurement Cost Estimating in the Design Stage, Hong-Kong, 2001,.**
- **The civil engineering handbook / edited by W.F. Chen and J.Y. Richard Liew, 2nd ed., by CRC press LLC, Ch. 1, Construction, 2003.**

➢ Course Description:

Course Title	**Environmental Engineering**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**5**
Year - Semester	**4th Year – 2nd Semester**
Language	**English**
Teaching Hours	**60**
Workload hours	**65**

Learning outcomes

The students will be able to do :

1- Discuss different environment categories.

2- Apply mass and energy balance criteria to environment relationship and process.

3- Identify the eco system on plant earth.

4- Assess environment risks.

5- Analysis and design water distribution networks and wastewater disposal system.

6- Explain the different water and wastewater treatment, Air control technique s and Solid waste management's techniques.

7- Apply the principle of green energy to future development.

Assessment methods

Homework.

- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content
• **Theoretical Syllabus** • Introduction • Environmental measurements • Material & energy balance • Environmental Chemistry • Eco system • Environmental risks • Water Quality • Water Supply • Water Distribution system • Water Intake structure , pumping station for water and wastewater • Water Treatment • Wastewater treatment • Wastewater Disposal system design • Air resources energy • Solid waste management • Green Engineering • **Practical Syllabus** • Temperature test , Taste and odor test • Color test • Determination of : Total solids (T.S.), Volatile Solid (V. S.) , Non-Volatile solid , Suspended solids (S.S.) , dissolved Solids (D.S.) and settle-able solids • Electrical Conductivity (E.C.) test and pH Value test • Hardness test and Sulphate test • Chloride test and residual Chlorine test

- Dissolved Oxygen test and Organic Matter test
- Biochemical oxygen Demand test (BOD), Chemical Oxygen Demand (COD), Oil and grease Test, Phosphate test
- Phenols test
- Nitrogen Compound determination test : Nitrate (NO3), Nitrite (NO2)
- Heavy Metals Tests (Atomic Absorption Method)
- Continue Heavy Metals Tests (Atomic Absorption Method)
- Jar Test
- Radiation (α , γ and β)
- Alkalinity
- Noise Measurement

Course Reference(s)

- Davis M. l. and S. J. Masten " Principles of environmental engineering and science " Mcgraw – Hill companies Inc. , USA , 2004.
- Mihelcic J. R. and J. B. Zimmorman " Environmental engineering fundamentals, Sustainability , Design", john Willey & sons, USA , 2010.
- Swamee P. K. and A. K. Sharma " Design of water supply pipe network" Wiley interscience , A. John Wiley & sons Inc. Publication , 2008.

➢ Course Description:

Course Title	**Graduation Project 2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**3**
Year - Semester	**4th Year – 2nd Semester**
Language	**English**
Teaching Hours	**45**
Workload hours	**30**

Learning outcomes

- In general, upon completion of the GP, students are expected to:
- Ability to collect and analyze data, and finally draw conclusions through experimentation and simulation.
- Ability to identify, formulate and solve engineering problems
- Ability to design a system, component or process with defined constraints.
- Ability to implement designed solutions
- Ability to conduct literature review in the project domain.
- Ability to communicate effectively through written reports and oral presentations.
- Ability to function in multidisciplinary teams.
- learn the skilled needed by a System Analyst to be , professional and a successful.
- Learn Positive thinking.
- Use current techniques, skills, and tools necessary for computing Practices.

Assessment methods

- Tutorial
- Assignments
- Quizzes
- Midterm exam

- Final exam.

course content

- Different projects supervised by staff members .

➢ Course Description:

Course Title	**Computer Applications 2**
Academic year	**2023/2024**
Course Code	
Credits (ECTS)	**3**
Year - Semester	**4th Year – 2nd Semester**
Language	**English**
Teaching Hours	**45**
Workload hours	**30**

Learning outcomes

Developing speaking skills and understanding its basic rules to take the way to the acquisition of the ability to use technical keywords in their work and the capability of communicating with other engineers correctly .

Assessment methods

- Homework.
- Attending classroom / Class quiz /Class participants.
- Mid exam / Final exam.

course content

- General description of the ROBOT structural program, Starting the Programs , Creating a new Structure .
- Creating the Model (Beam, Column, Slab or plate, wall or surface and solid) using Graphical Interface .
- Menus bar (file, edit, view, tools, select, geometry)
- Application examples of structural engineering in ROBOT program (analysis and design of concrete beam, column, slab, shear walls and multi-story building subjected to floor load, wind load, earthquake load temperature load and pre-stress load)
- Analysis and design of foundation (isolated, strip raft and pile footing using ROBOT and Rivit programs)
- Analysis and design of steel structure
- Various applications in civil engineering using structural programs such as
- 1.Rivit program for analysis and design of concrete beams.
- 2. SAP2000 program for analysis and design of slabs.
- 4. Etabs for analysis and design of various types of bridges
- 4. staadpro program.
- 5. CSI columns
- 6. AutoCAD land development desktop for roads design
- Mini project .

Course Reference(s)

- STAAD. pro 2006 Getting Started & Examples Manual / esearch Engineer .
- Structural Analysis / R.C. Hibbeler .
- نظرية الانشاءات / د. عبدالفتاح ديوان و أحمد فهمي

- تصميم المنشآت الخرسانية والمنشآت مسبقة الجهد / د. علاء محمود حسين النجميaward/?gad=1&gclid=EAIaIQobChMI_Nqu2tqA_wIVZ4VoCR2O0woLEAAYASAA
- د لؤي الشذر روبست الاحتزافي 2017 باستخذام بزناهج الاوتبدسك التصوين والتحليل الإنشائي