The Public
AuthorityFor
Applied Education & Training

College Of Technological Studies

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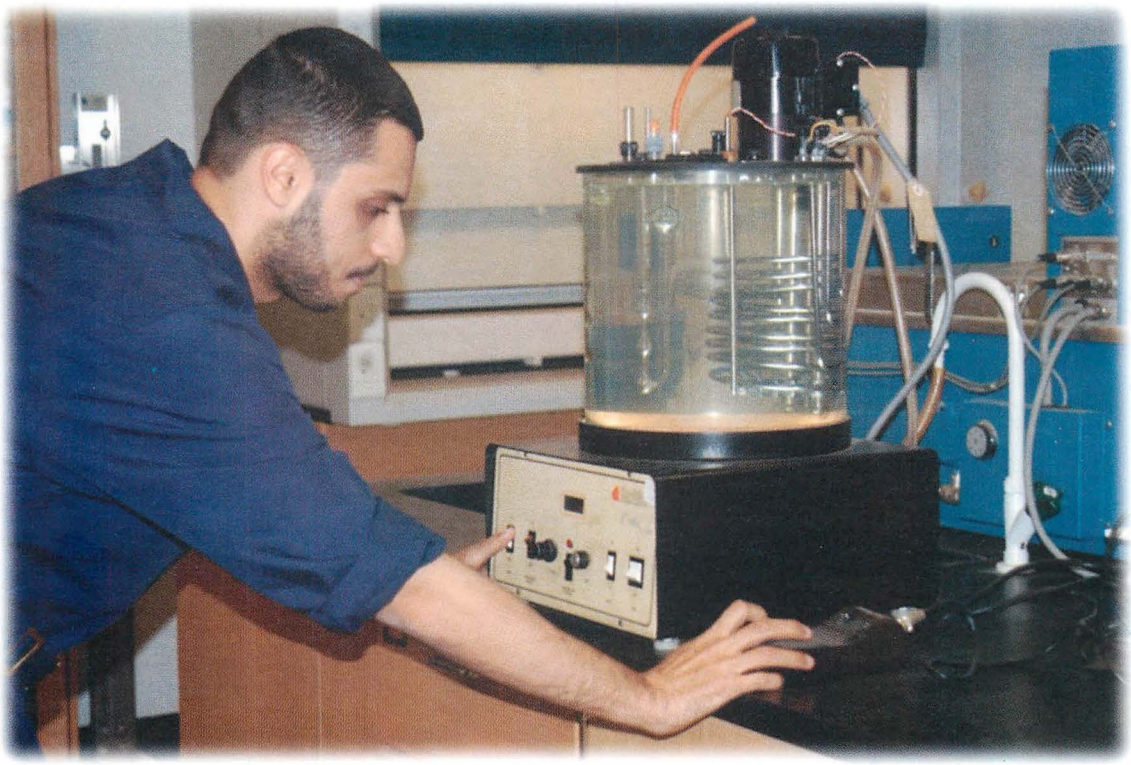

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COLLEGE OF TECHNOLOGICAL STUDIES

3. Department of Civil Engineering Technology

Overview:

The Civil Engineering Technology curriculum prepares the graduates to work in coordination with civil engineers. It aims to provide the industry with assistant engineers capable of aiding engineers in executing and supervising civil engineering projects with the ability to continue their studies towards a higher degree.

Majors:

The department offers a set of courses through which the student may specialize in one of the following fields:

- Building
- Highways
- Surveying

Laboratories

Laboratories and workshops of the department of Civil Engineering Technology are equipped with testing machines, instruments, and tools including the following:

- Soil Mechanics and Foundation Laboratory
- Highway Testing Laboratory
- Concrete and Material Testing Laboratory
- Surveying Laboratory
- Sanitary Works Workshop

Department of Civil Engineering Technology

Major: Building

1. Major Core Courses (51) Credits

Code	No.	Course Name	Credits	Pre-requisite
CES	151	Surveying	3	
CEB	161	Statics	3	
CEB	164	Concrete and Construction Materials	3	
CEB	163	Structural and Architectural Drawing	3	MEP 103
CEH	171	Soil Mechanics	3	
CEH	172	Fluid Mechanics	3	CEB 161
CEB	261	Theory of Structures	3	CEB 161
CEB	262	Strength of Materials	2	CEB 161
CEB	263	Quantity Surveying	3	CEB 200
CEB	264	Building Execution Drawings (1)	3	CEB 163
CEB	265	Reinforced Concrete (1)	3	CEB 261
CEB	266	Building Services	3	
CEB	267	Steel Structures	3	CEB 261, CEB 262
CEB	363	Computer Applications in Construction	2	CEB 264
CEB	361	Building Proper Execution	2	CEB 266, CEB 200
CEB	362	Reinforced Concrete (2)	3	CEB 265
CEB	200	Field Training (1) *	2	
CEB	300	Field Training (2) **	4	CEB 200

* *Passing 29 credits is required to register this summer course*

** *Registering in 50 major credits is required to register this course*

2. Major Elective Courses (6) Credits

Code	No.	Course Name	Credits	Pre-requisite
CES	153	Technical Reports	3	
CEB	366	Construction Management	3	CEB 200
CEB	166	Marine Structures	3	
CES	251	Surveying Works	3	CES 151
CEB	268	Contracts and Specification	3	CEB 263
CEH	273	Highways Engineering	3	CEH 171
CEH	272	Water and Sanitary Engineering	3	CEH 172
CEB	364	Building Execution Drawings (2)	3	CEB 264
CEB	365	Buil	3	CEB 265

Department of Civil Engineering Technology

Major: Highways

1. Major Core Courses (51) Credits

Code	No.	Course Name	Credits	Pre-requisite
CES	151	Surveying	3	
CEB	161	Statics	3	
CEB	164	Concrete and Construction Materials	3	
CEB	163	Structural and Architectural Drawing	3	MEP 103
CEH	171	Soil Mechanics	3	
CEH	172	Fluid Mechanics	3	CEB 161
CEB	261	Theory of Structures	3	CEB 161
CEB	262	Strength of Materials	2	CEB 161
CEB	265	Reinforced Concrete (1)	3	CEB 261
CEH	272	Water and Sanitary Engineering	3	CEH 172
CEH	273	Highway Engineering	3	
CEH	274	Road Pavement	3	CEH 171
CEH	275	Road Safety	2	
CEH	276	Traffic Engineering	3	
CEH	371	Highway Design	3	CEH 273
CEH	372	Quality Control for Roads	2	CEH 274
CEH	200	Field Training (1) *	2	
CEH	300	Field Training (2) **	4	CEH 200

* *Passing 29 credits is required to register this summer course*

** *Registering in 50 major credits is required to register this course*

2. Major Elective Courses (6) Credits

Code	No.	Course Name	Credits	Pre-requisite
CEH	370	Pavement Quantity Surveying	3	CEH 200
CEH	373	Highway Project	3	CEB 261
CEH	374	Road Construction Fundamentals	3	CEH 274
CEH	375	Traffic Analysis	3	CEH 276
CEH	376	Road Accident Analysis	3	CEH 275

Department of Civil Engineering Technology

Major: Surveying

1. Major Core Courses (51) Credits

Code	No.	Course Name	Credits	Pre-requisite
CES	151	Surveying	3	
CEB	161	Statics	3	
CEB	164	Concrete and Construction Materials	3	
CEB	163	Structural and Architectural Drawing	3	MEP 103
CEH	171	Soil Mechanics	3	
CEH	172	Fluid Mechanics	3	CEB 161
CES	251	Surveying Works	3	CES 151
CES	252	Geodesy	3	CES 251
CES	257	Surveying Planning	2	CES 251
CES	258	Aerial Surveying	3	CES 151
CEB	261	Theory of Structures	3	CEB 161
CEB	262	Strength of Materials	2	CEB 161
CEB	265	Reinforced Concrete (1)	3	CEB 261
CEH	273	Highway Engineering	3	CEH 171
CES	351	Maps Projection and Drawings	2	CES 251
CES	352	Applied Surveying	3	CES 251
CES	200	Field Training (1) *	2	
CES	300	Field Training (2) **	4	CES 200

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2. Major Elective Courses (6) Credits

Code	No.	Course Name	Credits	Pre-requisite
CES	153	Technical Reports	3	
CEB	366	Construction Management	3	CES 200
CEB	166	Marine Structures	3	
CEB	362	Reinforced Concrete (2)	3	CEB 265
CES	256	Remote Sensing	3	CES 251
CEH	272	Water and Sanitary Engineering	3	CEH 172
CEB	263	Quantity Surveying	3	CEB 200
CEB	268	Contracts and Specifications	3	CEB 263

Department of Civil Engineering Technology

CEB 161 Statics

Credits: 3 Hrs.: 4

General Principles: mechanics, fundamental concepts, units of measurements, the international system of units, numerical calculation; force vectors: scalars and vectors, vector operations, equilibrium of a particle: condition for the equilibrium of a particle, the free body diagram, force systems, equilibrium of a rigid body; simple trusses: analysis of trusses, method of joints, method of sections, and center of gravity of mass.

CEB 163 Structural and Architectural Drawings

Credits: 3 Hrs.: 6

Masonry, concrete, steel, timber and hydraulic structural detailing, sequence of site work and building techniques, building types, and architectural and electric detailing.
Prerequisite: MEP 103

CEB 164 Concrete and Construction Materials

Credits: 3 Hrs.: 5

Aggregates: basic characteristics of aggregates, physical properties, types of aggregates (normal and manufactured); cement: manufacturing Portland cement, chemical composition of cement, properties of cement, types of Portland cement and their properties, other types of cement; introduction to concrete: materials, properties of fresh concrete, production of concrete, strength properties of hardened concrete. Metals, type of steel and their uses. Types of timber and their properties, defects in timber, durability and treatment of timber.

CEB 166 Marine Structures

Credits: 3 Hrs.: 4

Coastal engineering, development of near shore wave, currents and tides, harbor structure and facilities, classification of ports according to functions and location, two-dimensional linear wave theory and its application for the estimation of different wave characteristics (length, depth, and height), the effect of shoaling on waves, wind-generated waves, tsunamis, basin oscillations and storm surge, harbor planning and construction, types of breakwaters and factors determining their selection, piers, bulk heads, dolphins and moorings.

CEB 200 Field Training (1)

Credits: 2 Hrs.: 8

Inspecting work site, safety rules, site quality control, equating architecture with structure drawing plans, excavations, concreting, foundations, form work for reinforced, matching between reinforcement drawings and implementation, identifying the content of the checklist and verifying executable work with the checklist, forming work for ground beams, damp proofing from foundations to ground beams, back filling to the entire site, and submitting final report.

CEB 261 Theory of Structures

Credits: 3 Hrs.: 5

Equilibrium of rigid bodies (beams internal forces), analysis of statically determinate structures: relationship between external load, shear force and bending moment; shear and bending
moment diagrams for beams and frames; deflection of beams, frames and trusses;, virtual work and influence lines.
Prerequisite: CEB 161

CEB 262 Strength of Materials

Credits: 2 Hrs.: 3

Section properties. Stress and strain: units of stress, axial stress, axial strain, Poison's ratio, stress–strain relationship, isotropic and anisotropic materials, shear stress and shear strain, combined stresses, oblique planes and general two-dimensional stress system, principal planes and principal stress, and plastic stress and plastic strain. Temperature stress and strain, and strain energy.
Prerequisite: CEB 161

CEB 263 Quantity Surveying

Credits: 3 Hrs.: 4

Specification, excavation and filling, plain concrete and reinforced concrete, masonry, metals, wood, finishes, bills of quantities and total estimation.
Prerequisite: CEB 200 or CES 200

CEB 264 Building Execution Drawings (1)

Credits: 3 Hrs.: 5

Introduction, basic design elements, circulation areas, different functions of spaces, stairs, lifts, escalators and utility rooms, building materials, structural systems and technicality versus form, recognized legends in various drawings, data assigned to all drawings, match concept with architecture and structure, manual drawing of basic architecture, computer-aided drawing of basic architecture, project initial drawings, site plan, layout, block plans, mass plans and areas, plans for different floors, elevations and final presentation of the project.
Prerequisite: CEB 163

CEB 265 Reinforced Concrete (1)

Credits: 3 Hrs.: 4

Design requirements, stress–strain curve for concrete, factor of safety, design of reinforced concrete beams, analysis of the balanced beams, analysis of rectangular beams, analysis of T beams, design of rectangular beam, design of T beams, specifying length of reinforced bars, design of reinforced concrete beams with compression reinforcement, development length and bond reinforcement, shear in beams, shear in non-reinforced concrete beams, shear in concrete beams with stirrups and deflections.
Prerequisite: CEB 261

CEB 266 Building Services

Credits: 3 Hrs.: 4

Fire fighting, protection and safety, design and practice, thermal and water insulation materials and their properties, fundamental mechanism of heat transfer, air-conditioning system principles, equipments, types and applications in buildings, principle of elevators 'Lifts' and escalators, and applications in buildings.

CEB 267 Steel Structures

Credits: 3 Hrs.: 4

Advantages and disadvantages of steel as structural material; types of steel and their uses; mechanical and physical properties of steel; analysis and design of members subjected to different type of loads; connection: methods and types of connection, and design of footings of steel columns.
Prerequisite: CEB 261, CEB 262

CEB 268 Contracts and Specifications

Credits: 3 Hrs.: 4

Introduction to contracts and specification, competing parties, intact subject matter, consideration, agreements, types of bids, parties responsibilities, contract documents (I), tendering, contract documents (II), statutory conditions, contract documents (III), technical conditions, specifications, methods in contracts, laws and legislations for bidding, invitation form for bidding, construction materials specification, and standards of construction activities.
Prerequisite: CEB 263

CEB 300 Field Training (2)

Credits:4 Hrs.:16

Ground floor water supply, sewage, columns form work, brick work, casting concrete and curing, electricity works conduits and other fixtures with concreting and masonry works, plastering and painting. damp proofing wet rooms, water supply fixtures. Sanitary work, down pipes, and testing sanitary and plumbing work. Finishing, heat insulation to external walls, AC ducts and equipments, electricity wiring and installations, mechanical works, interior decorations and false ceiling, flooring, roof finishing, and submission of final report.
Prerequisite: CEB 200

CEB 361 Building Proper Execution

Credits: 2 Hrs.: 4

Gain the capability of supervising the project site work, accomplish the time and cost of planning in construction field, be a successful contractor, follow up the execution to the end, and deal with the check lists.
Prerequisite: CEB 266, CEB 200

CEB 362 Reinforced Concrete (2)

Credits: 3 Hrs.: 4

Floor and roof slabs: one-way slab, bending moment and shear for beams and one-way slabs, two-way slabs, design of two-way slabs according to ACI, joist construction (hollow joist slabs), design of short and long columns, foundations and their design: spread footings, combined footing, mat or raft footing, retaining wall and prestressed concrete design.
Prerequisite: CEB 265

CEB 363 Computer Applications in Construction

Credits: 3 Hrs.: 4

Dimensional coordination; bricks: dimensions and specifications, tile flooring: granite, marble and ceramic finishing in modular practice; doors and windows: Kuwait products and standardization, doors and windows; different architectural fixtures and modular coordination, precast construction and dimensional coordination, dimensional coordination and building economy, and using computers in designing and preparing drafts by coordination.

Prerequisite: CEB 264

CEB 364 Building Execution Drawings (2)

Credits: 2 Hrs.: 4

Project topic: multistorey building with basement, establishing modular system for the project structural system (interpretation), establishing the site plotting plans, foundations, columns and ground beam plans, typical section for the under earth structure from the excavation level, manual practice and using computers; drawing: electricity layout, sanitary layout, AC layout, roof plan and rain water drainage, elevations, and sectional elevations.

Prerequisite: CEB 264

CEB 365 Building Project

Credits: 3 Hrs.: 6

Excavation and leveling works, planning of site works, concreting and curing, masonry, sanitary and plumbing works, electric mechanical installations, plastering and painting, false ceiling and interior decorations, doors and windows, carpentry and joinery, damp proofing and heat insulation, miniature representation and final presentation systems, hot water supply systems, service ducts, drainage, fire protections, design and installation of wet risers, dry risers and sprinklers, mechanical services, lifts and escalators.

Prerequisite: CEB 265

CEB 366 Construction Management

Credits: 3 Hrs.: 4

Process of management: operating level, coordinating level, strategic level. management system approaches: organization structure, hierarchical pattern, classical organization theory, bureaucracy and routine theory; project management system: quality control, finishing control, cost control, time control, planning for the project: bar chart, scheduling, critical path method (CPM), program evaluation and review technique (PERT), resource aggregation, resource allocation, and the cost and income budgets for a contract.

Prerequisite: CEB 200 or CES 200

CEH 171 Soil Mechanics and Foundations

Credits: 3 Hrs.: 5

Nature and characteristics of soils, soil classification, soil compaction, shear strength, effective stresses, consolidation, stress distribution and settlement of structures, types of foundations and their bearing capacity on soils, site investigation and characterization.

CEH 172 Fluid Mechanics

Credits: 3 Hrs.: 4

Properties of fluids: units, mass density and specific weight, fluid static; fluid flow concepts and measurements: kinematics of fluids, steady and unsteady flows, separation and capitation in fluid flow, flow measurement through pipes, flow of incompressible fluids in pipes, resistance in circular pipelines flowing full, resistance of flow in non circular sections, local loses, pipe network analysis, hydraulic structures, spillways, energy dissipaters and downstream.
Prerequisite: CEB 161

CEH 200 Field Training (1)

Credits: 2 Hrs.: 8

Students are trained to know the field work in road construction. They attend construction field tests of the base and sub-base courses, and the different surface coating materials used in Kuwait.

CEH 272 Water and Sanitary Engineering

Credits: 3 Hrs.: 5

Quantity of water and sewage, population forecasting, factors affecting consumption, rainfall and runoff, hydrology, transpiration, ground water, occurrence of aquifer, water and waste water quality, examination of water and sewage, water treatment, removal of dissolved minerals from water, ion exchange, membrane processes, control of corrosiveness, odors, ion exchange, wastewater treatment, primary treatment, secondary treatment, the activated sludge process, and advanced waste treatment.
Prerequisite: CEH 172

CEH 273 Highway Engineering

Credits: 3 Hrs.: 4

Selecting route path, cross section (right of way), contributing factors, decision making, road types and shoulders, vehicle types, traffic volumes, design speed, maximum grades, safety, horizontal alignment, general guidelines, curve length, super elevation, vertical alignment, critical grad lengths, vertical curve lengths, sight distance, junctions, layout types, selection factors (capacity), speed change lanes, grade separated junctions, signs and signposts, and road markings.
Prerequisite: CEH 171

CEH 274 Road Pavement

Credits: 3 Hrs.: 4

Pavement layers, pavement life, traffic damage estimation, soil classifications and characteristics, aggregate, bitumen, Portland cement, lime, prime coat, tack coat, soil stabilization and compaction, stability tests, treating road bases, graded mixture, treating with bitumen, treating with cement, treating with lime, treating with CaCl or NaCl, surface, flexible, rigid, thickness design, asphalt mix design (super pave design), and concrete mixture.
Prerequisite: CEH 171

CEH 275 Road Safety

Credits: 2 Hrs.: 3

Accident distributions, accident trends and patterns, road surface, centrifugal force, stopping sight distance, passing sight distance, street illumination, vehicle lights, signs and marks, side clearances, road works, signs, signals and lights, cones and barriers, temporary through traffic, accident causes and factors, society, environment, vehicle, human error, road layout, road furniture, black sites, intersection exposure function, road user activity (links and junctions), remedial measures, change the situation, traffic calming, and reducing conflict points.

CEH 276 Traffic Engineering

Credits: 3 Hrs.: 4

Traffic activity and types, field situation, future needs and requirements, planning, study area and zoning, trip studies, road users, future trips, proposals, traffic densities, speed flow determination, pedestrians, junction types, delays at priority intersections, weaving action, capacity, queuing process, congestion origination, restraint, back wave, emergency vehicles, pollutions, signalized intersections, signal cycle, phasing, capacity, effective green, conflict points, ultimate capacity, delays and optimum setting, average queue length.

CEH 300 Field Training (2)

Credits: 4 Hrs.: 16

Students participate under supervision in field jobs, while the execution of roads takes place. Material mixing, field tests, and machinery used are parts of this training program. Reports are required as work progress.
Prerequisite: CEH 200

CEH 370 Pavement Quantity Surveying

Credits: 3 Hrs.: 4

Introduction, road network scheme, pavement materials, equipments and tools, excavation and filling, number and types of layers, thicknesses, surface, layer soils, gravel and aggregate, bitumen, Portland cement, asphalt mixture, concrete, reinforced concrete, curbstone, and costs.
Prerequisite: CEH 200

CEH 371 Highway Design

Credits: 3 Hrs.: 4

General, existing network, new scheme, elements of design, requirements, links, junctions, sidewalks, utility spots, service areas, safety objects and facilities, center line, road division, surveying, general information, tools, GPS, mapping and contours, surveying software, rural road design flows, urban road design flows, comments, project application, case and situation, steps, surveys, data transfer, and design.
Prerequisite: CEH 273

CEH 372 Quality Control for Roads

Credits: 2 Hrs.: 3

Materials and standards, road construction phases, site investigation, material quality and quantity, aggregates, bitumen, granular soil, fine soil, fillings, curbstone, soil tests, relative compaction (%), field density, swelling factor (speedy), asphalt, asphalt cement, liquid asphalt, asphalt mix, layer check, sub grade, base layer, asphalt surface, and concrete surface.
Prerequisite: CEH 274

CEH 373 Highway Project

Credits: 3 Hrs.: 4

Introduction to general road and traffic problems. Case study and introduction, problem requirement, type of data for study, study format, computer software, data collection, data retrieval, data analysis, results and presentation, and proper solutions.
Prerequisite: CEB 261

CEH 374 Road Construction Fundamentals

Credits: 3 Hrs.: 4

Basic illustration of the procedures in building road layers for both flexible and rigid pavements. This includes the steps and phases of constructing each layer, service lines and utility networks, equipments needed, and field tests.
Prerequisite: CEH 274

CEH 375 Traffic Analysis

Credits: 3 Hrs.: 4

General, analysis justification, problems and requirements, trip generations, traffic classifications, public transport, freight, parking, data manipulation, collection approaches, traffic counts, speed and flow surveys, pedestrian surveys, public transport surveys, freight surveys, data retrieval, data analysis, geographic information system, selecting junction types, traffic activity, time and seasonality, forecasting, proper solutions, and cost/benefit analysis.
Prerequisite: CEH 276

CEH 376 Road Accident Analysis

Credits: 3 Hrs.: 4

Accident investigation, single accident, site investigation, study area, contributing factors, traffic activity, hazardous locations, monitoring, identification, exposure, spots, route, priority ranking, accident costs and prevention, cumulative costs, society contribution, safety audit, action plans, data manipulation, data type, collection approaches, data format, time and date, collection at site, and data retrieval and analysis.
Prerequisite: CEH 275

CES 151 Surveying

Credits: 3 Hrs.: 5

Introduction: Surveying branches. Types of Maps and Scales. Distance by chaining or taping. Maps for small areas. Areas of lands and planimeter. Leveling: use of level and adjustment, and reasons for errors. Compass and azimuths. Theodolites: use and types

CES 153 Technical Reports

Credits: 3 Hrs.: 5

Introduction, what is a report? Report topic, abstract, resources, main essay, analysis, results, and recommendations; construction: site technical reporting, maintenance report, time programming report, financial and cost reports, final conclusion, and submission of final report.

CES 200 Field Training (1)

Credits: 2 Hrs.: 8

Students are trained to use survey instruments in the field such as leveling instruments, theodolites, chains, and others. Inspect work site, water and electricity supply to the site, tools and building materials. Offices and other services. Using several types of maps and drawings.

CES 251 Surveying Works

Credits: 3 Hrs.: 5

Angular measurements, theodolites: uses and adjustments. Techeonietrv and its instruments. Traverses: Types and corrections. Topographic Drawing, contour maps, sextant and fundamentals of hydrographic surveying. Fundamentals of Aerial surveying.
Prerequisite: CES 151

CES 252 Geodesy

Credits: 3 Hrs.: 4

The geoids – Degrees of triangulation networks: specifications, shapes, observations, base lines, GPS. Adjustments of the net using: triangle equations, local, side equations. Height of observation towers, indivisibility, and types of errors. Standard deviation and probable errors. Strength of figures in the net.
Prerequisite: CES 251

CES 256 Remote Sensing

Credits: 3 Hrs.: 4

A study of telemetric transducers and equipment environmental satellite techniques for monitoring changes in Earth's physical phenomena and in aerial surveying; Types of rays: visible rays, infrared, microwaves, ultraviolet, X-rays, Gamma rays, and space Rays. Applications in aerial photogrammetry and photo interpretation.
Prerequisite: CES 251

CES 257 Surveying Planning

Credits: 2 Hrs.: 4

Horizontal curves: types and elements. Alignments using one theodolite, two theodolites, and chain from tangent – chain from long chord. Vertical curves: types and calculations of reduced levels for all points on the vertical curve. Factors affecting partitions of lands. Partitions of triangles and polygons.
Prerequisite: CES 251

CES 258 Aerial Surveying

Credits: 3 Hrs.: 4

Branches of aerial surveying: photogrammetry, photo interpretation, remote sensing, and GIS. Single vertical photograph. Stereoscopic vision. Measurements from Stereoscopic photo pairs. Flying maps: number of lines and photos. Ground control points and mosaics. Rectification. Fundamentals of Remote Sensing.
Prerequisite: CES 151

CES 300 Field Training (2)

Credits: 4 Hrs.: 16

Using several types of maps, plans, drawings and photographs. Participating under supervision in the execution of management process. Using different instruments such as levels, total stations, theodolites, tachometers, GPS, stereoscopes, and computers.
Prerequisite: CES 200

CES 351 Map Projection and Drawings

Credits: 2 Hrs.: 6

Enlargement and decrement of maps. How to draw a contour line on leveling net? Drawing of maps. Cartography and reproduction, symbols, plotting coordinates, longitudes, latitudes, radial, equator, and central projections. Equal, UTM, KTM, and Conical Projections, Calculations of projections.
Prerequisite: CES 251

CES 352 Applied Surveying

Credits: 3 Hrs.: 5

Practice on site using surveying instruments such as levels, theodolites, tachometers, plane tables, plan meters, pantographs, stereoscopes, plan meters, compass, and sextant.
Prerequisite: CES 251