

School			
Major		Bachelor of Engineering in Surveying Engineering	
General Education Requirements			
Code	Title	Credits	Description
ENGL201	Composition and Research Skills	3	This course focuses on the development of writing skills appropriate to specific academic and professional purposes; the analysis and practice of various methods of organization and rhetorical patterns used in formal expository and persuasive writing; the refinement of critical reading strategies and library research techniques; and the completion of an academically acceptable library research paper. Prerequisites: ENGL150, ENGL151.
ENGL251	Communication Skills	3	The objectives of this course are to improve students' writing skills for academic purposes by developing effective use of grammatical structures; analytical and critical reading skills; a sensitivity to rhetorical situation, style, and level of diction in academic reading and writing; and competence in using various methods of organization used in formal writing.
ARAB200	Arabic Language and Literature	3	This course is a comprehensive review of Arabic Grammar, Syntax, major literature and poetry styles, formal and business letters.
CULT200	Introduction to Arab - Islamic Civilization	3	The purpose of this course is to acquaint students with the history and achievements of the Islamic civilization. Themes will include patterns of the political and spiritual leadership; cultural, artistic, and intellectual accomplishments Prerequisites: ENGL051, ENGL101, ENGL151.
Core Requirements			
Code	Title	Credits	Description
MATH210	Calculus II	3	The course material includes hyperbolic functions and their inverses and their derivatives integration techniques, improper integrals, sequences, infinite series, power series, Taylor and Maclaurin series and application of power series. The mathematical software Maple will be introduced and used in support of the comprehension of the material. Prerequisites: MATH160
MATH225	Linear Algebra with Applications	3	Introduction to the systems of linear equations and matrices, Gaussian eliminations, matrix operations, inverses, types of matrices, determinants and their applications, vector spaces, subspaces, linear independence, basis and dimension, rank and nullity, inner product spaces and orthogonal bases, eigenvalues and eigenvectors, applications from other disciplines such as physics, computer science, and economics.
MENG225	Engineering Drawing & CAD	3	This course consists in two parts: 2 D and 3D. It can be defined as a tool in order to generate accurate drawings due to scales in 2 D and in 3 D. It focuses on drawings related to engineering. Drawings may be [descriptive], describing an object_ a tool, _they may represent the first step of design (Design of tools and machines).
PHYS220	Physics for Engineers	3	Electricity, Electric Field and Electric Potential, Magnetism, Biot-Savart Law, Ampere's Law, Faraday's Law, Fluid Mechanics, Wave Motion, Sound Waves, Superposition and Standing Waves, Temperature, Heat, Laws of Thermodynamics.
MATH220	Calculus III	3	This text covers basic topics on infinite series, lines and planes in space, cylinders and quadric surfaces, functions of several variables, limits and continuity, Partial derivatives, chain rule, directional derivatives, Gradient vector, tangent planes, double and triple integrals, areas, moments, center of mass, volumes, double integrals in polar forms, triple integrals in cylindrical and spherical coordinates, line integrals, vector fields Green's theorem, surface integrals, Stokes theorem, and the divergence theorem. Students are required to solve extensive number of problems and computer assignment using the mathematical software package Maple.

EENG250	Electric Circuits I	3	Introduce techniques of DC circuit analysis (Node, Mesh, Superposition, & Source Transformation) containing ideal and dependent sources. Covers real power calculations, perform equivalent resistive circuits. Introduce concept of Thevenin and Norton equivalent circuits, basic concept of mutual inductance, and determine the transient responses of RL, RC, parallel and series RLC. Prerequisites: ENGL051. Co-requisites: MATH210
MATH270	Ordinary Differential Equations	3	First-order equations, linear and non-linear differential, linearization, numerical and qualitative analysis, second-order equations, existence-uniqueness theorem, series solutions, Bessel s and Legendre s functions, Laplace transforms, systems of differential equations, applications and modeling of real phenomena. Prerequisite: MATH 220.
MENG250	Statics	3	This course treats only rigid-body mechanics and forms a suitable basis for the design and analysis of many types of structural, mechanical, _electrical devices encountered in engineering. As the course name suggests, this course deals with the equilibrium of bodies that are either at rest _move with constant velocity. Therefore, this Statics course provides the students with the principles that treats the Statics of particles and rigid bodies, trusses, frames, machines; centroids, centers of gravity; and friction. Prerequisites: ENGL051. Co-requisites: MATH210.
MATH310	Probability & Statistics for Scientists & Engineers	3	The concept of probability and its properties, descriptive statistics, discrete and continuous random variables, expected value, distribution functions, the central limit theorem, random sampling and sampling distributions, Hypothesis testing. Prerequisite: MATH 170
ENGG300	Engineering Economics	3	This course covers the fundamentals of Engineering Economics for engineering professionals to match engineering practice today. It recognizes the role of the engineer as a decision maker who has to make and defend sensible decisions. It emphasizes on the analytical consideration of money and its impact on decision making as well as on other factors such as environmental and social factors and tasks. By the end of the course students will be equipped with basic analytical skills for solving problems of an economic nature real-world example.
SURV251	Introduction to Surveying Engineering	3	This course is an attempt to break the ice between fresh surveying students and surveying instruments. Therefore, it tries to develop an understanding between different types of surveying measurements and the related various types of surveying instruments: tapes, electronic distance meters, levels, theodolites, total stations, Global Positioning Systems □etc.
SURV251L	Introduction to Surveying Engineering Lab	1	This course aims to develop students an understanding of the basic concepts relating to the measurement of land and the use of maps and site plans A practical application of the study, theory and field methods of route and topographic surveying, Introduction to using chaining, stadia, leveling, transit. The objective of this lab is to orient the student to linear measurements, become familiar with measurement techniques and their applications, compare the relative accuracy of different techniques, and learn the principles of keeping notes. Utilization of computers and software for data collection, reduction, analysis, and presentation.

Major Requirements

Code	Title	Credits	Description
------	-------	---------	-------------

SURV305	Surveying I	3	This course treats the basics of surveying and basis for topographical problems encountered in surveying engineering. As the course deals the earth (earth and universe, earth size measurements, spheroid, spherical triangles), methods of surveying and mapping (introduction, classical ground surveys, aerial surveys, and global position system), mathematical review (function, derivative, differential of a function), and theory of error (statistics and probabilities, types of error accidental errors and calculations, accidental error for indirect measurements, measurements of different reliability. Angular measurements and instruments (definitions, instruments errors of angular measurements).Distance measurements (definitions and types, direct measurements. behavior of systematic error in direct measurements methods and equipments for indirect measurements reduction of distances to projection plan), leveling and instruments (definitions, methods of leveling), execution of surveying works (basic net work, calculation principles), areas calculations (regular and irregular figures).
SURV305L	Surveying Practice I Lab	1	This course aims to develop students an understanding of the basic concepts relating to the measurement of land and the use of maps and site plans A practical application of the study, theory and field methods of route and topographic surveying, Introduction to using chaining, stadia, leveling, transit. The objective of this lab is to orient the student to linear measurements, become familiar with measurement techniques and their applications, compare the relative accuracy of different techniques, and learn the principles of keeping notes. Utilization of computers and software for data collection, reduction, analysis, and presentation.
SURV315	Geology	3	This course is designed for the Survey engineering students (non-science students) to understand the Earth processes and phenomena. This course is designed in eight parts and twenty five chapters. The first part starts with defining geology and its principal branches. It deals with cosmology; the origin of earth and planets. Students will make a journey to the earth core and will be introduced to the Plate tectonic theory. In the second part students will learn about different types of Rocks (metamorphic, igneous and sedimentary). Part three will deal more about earth dynamics (volcanism, earthquakes, and mountains building). The fourth part would be dedicated for studying the biography of the Earth and the ways and methods for dating the rock age. While part five is about earth resources (Energy & Mineral). Part six will handle the Processes and Problems at the Earth's Surface, students would be exposed to the notion and processes of mass movements, the geology of running water, oceans and coast, groundwater, atmosphere, climate, deserts, and glaciers. Part seven, on the other hand, deal with the art of making and reading geological maps in addition to performing the stratigraphical column and cross sections. Last and not least Part eight will have an over view on the Geology of Lebanon and its related processes.
SURV325	Cartography	3	Basic concepts of cartography, geographical maps, types and proprieties, cartographical expression and representation, map realization, earth surface, earth representation.
SURV335	Surveying Drawing & CAD	3	Procedure and methods of topographical planes drawing. Topographical symbols (sign convention), axing and briefing on planes survey, drawing scales, traverses surveys, plotting. Surveys of existing buildings. Contouring, leveling, location of contours by cross- section method, elevations, area and volumes.

SURV355	Surveying II	3	Introduction, branches of surveying, earth surface determinations. Introduction about geodesy. Ellipsoid and Geoids. Mapping of earth surface. Properties of plane representation, properties of conform representation. Mapping procedures used in topography. Surveying instruments. Determination of surveying points net work (azimuth, surveying intersection, three points problem, traverse). Leveling instruments. Surveying of details (side shots- abscissa and ordinates, lateral oblique). Representation of relief (Methods used, construction of contour lines). Longitudinal profile- cross sections- earth world).
SURV355L	Surveying Practice II Lab	1	An intermediate lab course covering the equipment (theodolite, electronic distance measurement, total station), techniques and hardware of the profession necessary to measure horizontal and vertical angles and distances used in traversing, according to prevailing and applicable professional standards. Study of the measurement and determination of boundaries, areas, shapes, and location through traversing techniques. Instruction in a variety of adjustment methods using programmed and non-programmed hand-held calculators and computers.
SURV365	Geodesy I	3	Basic concepts of geodesy. The gravity field of the system of natural coordinates. Approximating the natural system. The geoids, the ellipsoid, basic surface geometry.
SURV375	Topometric Calculus I	3	General concepts on topometrical calculus- resolution of triangles, point coordinates rabatment. Radiation.
SURV385	Computer Aided Drafting for Surveyors	3	Softdesk introduction, DTM settings, surface, site, contour, section, DTM tools and profile.
SURV405	Photogrammetry	3	Introduction to photogrammetry, introduction the photographic negative and its optical and chemical elements, the relief constitution, aerial photography, analogical stereophotogrammetry. The modern stereophotogrammetry. Digital photogrammetry, aerial triangulation, mapping from space, multi-sensor aerial triangulation, integration aerial and satellite imagery, the rope of features in photogrammetric operations.
SURV414	Cadastral Surveying and Construction LAW	3	Cadastral surveying refers to those surveys involving the definition of land boundaries and requires a thorough knowledge of the current system for the registration of land. The majority of survey graduates will have some involvement with cadastral surveying during their career, if not for the whole of their careers, and must be introduced to the underlying principles as early as possible.
SURV425	Topometric Calculus II	3	Polygonal development, Straight line and curve problems, acreage, surface division. Implantation.
SURV435	Theory of Measurement Errors	3	Generality, measurements in surveying, random errors, characteristics, notions of probability, precision and accuracy, relative precision, accuracy ratio, least square method, weighted measurement, and weights by repeated measurements, adjustment of net work and level net work. Concepts of measurement and error, error propagation and error linearization, reanalysis of survey in measurements, applications in plane coordinate surveys, adjustment of several geodetic net works.
SURV445	Geodesy II	3	Computation of distance on earth surface, rigidity of geodesy net works, engineering and location conditions in net works. Geodesy cal triangles, triangles scales. The geometry of spheroid, geodesic lines. First and second fundamental problems spheroid, normal sections. Datum problems.

ENGG450	Engineering Ethics and Professional Practice	3	Engineering Profession and Ethics is a complete study course on the role of ethics in engineering in their historical, philosophical and professional contexts. The course examines the impact of ethical theories and their application to issues encountered in the engineering profession, such as employee rights, whistleblowing, safety, risk and liability, professional responsibility to consumers and employers, conflicts of interest, codes of ethics, legal obligations, environmental and social responsibility. Through the use of real and hypothetical case studies, the course focuses on developing analysis techniques and applying them to ethical problems through independent critical thinking and moral sensitivity.
SURV455	Geographic Information Systems I	3	Introduction, origin, field of applications, methods of capturing and storing data, coordinate system, and data analyses. Coordinate projection, geo-referencing.
SURV465	Spatial Geodesy (GPS I)	3	Introduction, overview of GPS, reference systems satellites orbits, observables, the DOP factors, errors in GPS, the direct and reverse problems, satellite signal structure.
SURV580	Geomatics for Civil Works	3	Specific applications of the principles and techniques introduced in earlier surveying courses are applied to a range of engineering projects in this course. The main emphasis, however, will be on the practical application of this knowledge in practical projects. Linear measurements- field work practice. Leveling, Angular measurement , building setting out, building surveys, roads works- curve calculation, roads works- setting out, drain and pipelines, height tension electricity. Hydrographic survey.
SURV420	Surveying application I	3	Summer training for field surveying application. Determination of surveying points net work (azimuth, surveying intersection, three points problem, and traverse). Leveling instruments. Surveying of details (side shots- abscissa and ordinates, lateral oblique). Representation of relief (Methods used, construction of contour lines). Longitudinal profile- cross sections- earth world).
SURV500	Geographic Information Systems II	3	Design and operation of GIS, concepts of GIS, spatial data management systems, geoprocessing, data base management systems, 3D methods.
SURV510	Remote Sensing	3	Remote sensing principle, infrared and microwave radiation, collectors, geometry of image, Radiometric corrections, remote sensing applications.
SURV620	Engineering Transportation and Roads Design	3	Urban transportation planning, public transportation planning, traffic engineering, traffic characteristics, pedestrians, parking. Traffic accident and safety, road classification, traffic management, transport and environment. Traffic noise, traffic pollution, environment oriented transportation planning. This course introduces students to the concept of road location with particular emphasis on the design of the geometric elements of the road including horizontal and vertical curves. The course is comprised of two components; theory of road design and design by CAD. It is expected that students understand the interpretation of a surveyor's field book for plan production and correct standards of plan presentation. The CAD component is an introduction for the student to the flexibility and capability of a civil engineering/surveying design software packages. Traffic volume. Cross section. Highway alignment.
SURV530	GPS II	3	Coordinate system in GPS, differential GPS positioning, future of GPS. Geodetic and surveying applications of GPS.
SURV550	Image Processing	3	Introduction to image processing, multi-scale analysis, inverse problem in remote sensing, lower resolution systems, introduction to numerical photogrammetry.

SURV560	Advanced Digital Photogrammetry	3	Camera calibration ,Scan correct , digital image enhancement ,Aerial triangulation, correlation and automatic point matching Automatic, block adjustment , analytical stereomodel, 3D stereo data collection, Digital elevation model, Automatic DTM generation, Automatic production of contour lines, rectification, Orthophotography, Automatic production of orthophoto, mosaicking ,photogrammetric map production process.
SURV560L	Advanced Digital Photogrammetry Lab	1	Using a digital photogrammetric work station , data handling , Aerial block generation , camera calibration , measuring tie points, measuring ground control points, block adjustment, stereo data collecting, automatic DTM generation, rectifying , orthorectifying, mosaicking and generation of orthophoto maps, map compilation.
SURV670	Technology Of Construction	3	The main goal of this course is to give an idea about the connection between the surveying engineer and the civil engineer, on the site in the following fields: the soil mechanics, he building components, the construction materials of the buildings and the roads (such as the floors, the panels, the roofing, the frame works, the bituminous materials,□.), the steel, and the piles. The objective of this course to train the students in various techniques in the construction of buildings, especially cost efficient techniques to develop Competencies in assisting supervisors, engineer□s and Contractors and prepare them self for self employment
SURV590	Map Projection	3	Theory and classification of map projection, proprieties of different types of projection, distortion in map projection, arc to chord connection, and convergence of the meridians.
SURV595	Capstone Project	6	This project is a requirement for graduation with the B.S. in Engineering degree. Proposed by the supervising faculty, projects are geared towards integrating several topics covered in the curriculum. Students will have the opportunity to exercise research, experimentation, implementation and technical writing skills. Students typically work in teams; each team agrees on a project with the supervisor. The project scope must be adjusted to match at least a 3 credit load per team member. The project concludes with a demonstration, a presentation and a technical report all of which are appraised by a committee of faculty members.
SURV530L	GPS II Lab	1	This laboratory course introduce the students to the field of GPS, its applications, equipment, and operation. It also covers the types of GPS field observing techniques (static, semi-kinemaitc RTK, ect..), planning of GPS campaigns, practical utilization of GPS units for data collection and post-processing, methods for adjusting networks, and accuracy evaluation of GPS observations and final points coordinates.