

Major	Bachelor of Engineering in Surveying Engineering		
Major Requirements			
Code	Title	Credits	Description
SURV305L	Surveying Practice I Lab	1	An intermediate lab course concentrating on survey principals and equipment and basic surveying tasks. The course covers the analysis of the following surveying equipment: Level, digital level, square prism, surveying chain, surveying rods, and compass. It also covers the techniques of using these equipment, calibration and care off. Practice in the establishment of monuments, corners, lines and witness points in accordance with available data. Practice in the preparation of filed notes. Practice in leveling and chaining and contouring.
SURV355L	Surveying Practice II Lab	1	An intermediate lab course concentrating on survey principals and equipment and basic surveying tasks. The course covers the analysis of the following surveying equipment: Total Station, digital level, and Planimeter. It also covers the techniques of using these equipment, calibration and care off. Practice in the establishment of monuments, corners, lines, buildings, roads and witness points in accordance with available data. Practice in the preparation of filed notes and generating digital and hardcopy maps. Practice in traversing, triangulation, Resection, coordinates geometry and profiling.
SURV560L	Advanced Digital Photogrammetry Lab	1	Advanced lab course concentrating on map production using digital photogrammetric workstations. The course covers the procedure of map production from aerial photographs using digital photogrammetric techniques. The student will be introduced and will gain skills in the following topics: Camera calibration , aerial block construction (strips and stereo-pairs),interior orientation , exterior orientation , tie point measurement , control point measurement, photo triangulation adjustment (LS Adjustment , bundle adjustment), data collection in stereo mod, building Digital terrain modes, Ortho-rectification, mosaicking and map production.
SURV530L	GPS II Lab	1	An advanced lab course concentrating on general and detailed survey principals and equipment concerning GPS. The course covers the analysis of the GNSS surveying equipment, the techniques of setup and manage calibrates these receivers and their accessories, and care off. Practice in different modes and methods is essential
SURV305	Surveying I	3	This course treats the basics of surveying and topographical problems encountered in surveying engineering. It deals with 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. Distance measurements (definitions and types, direct measurements. behavior of systematic error in direct measurements methods and equipment for indirect measurements reduction of distances to projection plan), leveling and instruments (definitions, methods of leveling), are also covered.
SURV315	Geology	3	This course is designed to provide an understanding of Earth processes and phenomena. Students will learn about different types of rocks (metamorphic, igneous and sedimentary), earth dynamics (volcanism, earthquakes and mountains building), earth resources (Energy & Mineral), earth processes and problems (mass movements, erosion, glaciers, deserts, oceans, running water, atmosphere). The course will introduce the making and reading of geological maps in addition to performing the stratigraphical columns and cross sections. Students will be exposed to the geology of Lebanon and its related processes.

SURV325	Cartography	3	The course focuses on the history of cartography and elements of maps, which are often used as a source for research. It gives students a good knowledge on cartographic conception and representation, map projections, base elements of thematic maps, cartographic symbology, positioning, scaling, referencing and different coordinate systems. Students will be introduced to the notion of colors, global position system, and the art of making professional maps. It integrates with computer technology mapmaking to present new challenges and opportunities.
SURV335	Surveying Drawing & CAD	3	This course covers procedure and methods to produce topographical drawing using CAD. Topographical symbols (sign convention), axing and briefing on planes survey, drawing scales, traverse surveys, plotting are also introduced . Surveys of existing buildings, and creating contours, leveling, location of contours by cross- section method, elevations, area and volumes. it will be present introduction to Civil 3D including creating and modifying styles and points
SURV355	Surveying II	3	This course treats the basics of surveying and topographical problems encountered in surveying engineering. It deals with the earth surface measurements, methods of surveying and mapping. Geodetic surveys and methods, triangulation, trilateration and traversing. Horizontal and vertical angles measurements. The methods of horizontal, vertical and slope distances in addition, the buildings survey and layout are also included
SURV365	Geodesy I	3	This course attempts to develop an appreciation of the scope of geodesy and to generate some understanding of the problems encountered in the science. The basic principles are presented through discussions of various geodetic topics such as: Ellipsoids, geoids, horizontal surveying, leveling, geodetic datum s, and gravity.
SURV375	Topometric Calculus I	3	A study of the principles and methods of surveying computations as they relate to Cartesian coordinate systems, coordinate geometry including a four parameter similarity transformation and an introduction to coordinate systems and the use of mathematical trigonometry and geometry features
SURV385	Computer Aided Drafting for Surveyors	3	Autodesk Civil 3D is used worldwide by most civil engineers and land surveyors for all kinds of Land Development Projects. Civil 3D allows engineers and surveyors to precisely model land topography and show existing and proposed structures and utilities. It is a great design and analysis tool used for land grading, quantities surveying, highway designs, hydraulics and hydrology analysis, and for underground utilities designs. Concept of Design drawings, shop-drawings and as-built drawing for Roads and infra-structures. Quantity survey: Manual and CAD procedures used for quantifying construction material quantities for building and civil infrastructure projects
SURV405	Photogrammetry	3	This is an introductory course in analog photogrammetry covering, in part, the history of photogrammetry, aerial cameras and camera calibration, geometry of the aerial photograph, stereoscopy and stereoscopes, parallax and the theory and techniques of plotter orientation. Students will perform basic mapping tasks on the stereo plotter.
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. An introduction of construction Law is also present

SURV425	Topometric Calculus II	3	This course is a study of the principles and methods of surveying computations as they relate to the use of mathematical trigonometry and geometry features. It covers Computation of areas along regular and irregular boundaries, Polygonal development, straight line and curve problems, acreage, surface division; implantation, azimuth and volume
SURV435	Theory of Measurement Errors	3	This course deals with the measurements, classification of measurements and errors of measurements. It explains the methods used to get the best estimation of measured values, compensation of random errors and elimination of systematic and blunders. It also includes several applications in topography mainly adjustment of leveling and horizontal networks. The course is designed to give basic theory and techniques of item analyses, including reliability and validity analyses, and item response theory analysis
SURV445	Geodesy II	3	The aim of this course is to explain the student some knowledge about the gravity of the Earth and its influence on the topometric works especially leveling. It also covers analyzing the choice of the leveling datum to study the gravity field and all the dependent approximations that are accomplished to reduce the difficulties in the formula of the gravity field.
ENGG450	Engineering Ethics and Professional Practice	3	Engineering Ethics and Professional Practice 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	The GIS course allows handling of spatial information and its powerful mapping tools, it helps investigating problems, producing variable solutions, supporting therefore decisions and planning. This can be done using thematic mapping, algorithms and queries, producing network analysis, buffer zones, or simply interpretation of cartographic presentations depending on computer aided GIS software. This course provides a basic introduction to geographical information systems. GIS data types, editing GIS data and spatial data analysis, GPS collection, with emphasis on applications to natural resources. Students will be introduced to basic concepts and techniques of map analysis and the way these are used in geographical information systems in general and desktop GIS in particular. The major areas of practical application of GIS will be discussed. The use of data and principles of sampling and modeling will be presented. The basic computer skills necessary to use a desktop GIS will be taught

SURV465	Spatial Geodesy (GPS I)	3	The Global Positioning System (GPS) and the wider Global Navigation Satellite System (GNSS) include constellations of earth-orbiting satellites that broadcast their locations in space and time, a network of ground control stations, and military and civilian receivers that calculate ground positions by trilateration. Geospatial professionals need to possess a working knowledge of current and future GPS and GNSS capabilities because satellite positioning is so prevalent in geographic information systems (GIS) applications in government, industry, and academia. GPS has always been a dual use system, military and civilian. From the beginning, GPS signals have been available with no direct user fees. GNSS has built on those concepts and added some new ones. GPS and GNSS are used now in all of transportation—aviation, maritime, railroad, highway and mass transit. Satellite positioning also plays critical roles in telecommunications, land surveying, law enforcement, emergency response, precision agriculture, mining, finance, and scientific research. It controls computer networks, air traffic, power grids, and so on. As the scope of satellite positioning has expanded, the systems continue to evolve
SURV580	Geomatics for Civil Works	3	This course describes the relations between the civil works and their necessary surveying works and how to construct these relations. These geomatic works describe the linear measurements, the practical leveling, the building survey, the building setting out, the calculation and setting out of roads and the survey for pipe lines.
SURV420	Surveying application I	3	This Course is an introduction to proper field surveying theory, techniques and terminology. Topics covered in this course include taping, tape corrections, leveling, angle measurements, traversing, traverse adjustments, contouring and fundamentals of mapping, and proper use and care of surveying instruments. In addition, the relationship between engineering studies and field works will be covered too. Note keeping formats will be covered throughout the course for all the procedures that are introduced. The proper care and handling of the equipment and safe work procedures will be emphasized throughout the term. This course involves the development and application of good professional practices.
SURV500	Geographic Information Systems II	3	This course allows students to identify the different procedures of spatial data acquisition and the diverse treatments that can be applied on vector data (extraction, local interpolation (spline), krigging, erase, clip, identity, intersect, union, etc...). It introduces the concept of three-dimensional space in GIS (creating and managing 3D data, computing hillshade, creating a line sight and analyzing visibility, mapping distance and density, zonal statistics, etc...). It educates participants on how geodatabase operates and it aims to leverage the RDBMS to scale GIS datasets. Participants in this course will be introduced to new notions that are used to extend simple tables, features, and raster to add rich behavior, data integrity, and data management capabilities
SURV510	Remote Sensing	3	This course presents the necessary bases for the comprehension of techniques and applications of remote sensing. It details the different sensors of great interest for land, climate and marine observation, through describing the electromagnetic spectrum, general rules of orbitology (geostationary and revolving orbits), systems receiving the solar radiation (whiskbroom and pushbroom), image characteristics (spatial, spectral and radiometric resolutions, scene dimensions), and panchromatic, multi-bands and radar-microwaves applications.

SURV620	Engineering Transportation and Roads Design	3	This course introduces of the concept of roads design, with particular emphasis on the design of geometric elements of the road, including, the typical cross section, the horizontal and the vertical alignment. It covers traffic engineering, highway capacity and road classification. It also treats the intersections problems and their design, the signs and road marking. In addition the profession of transportation engineering, the modes of transportation, and the transportation planning, the collection of data, the road life studies and traffic volume studies. The course is complement an application component; the student prepare and submit a project of a road that includes the design of typical cross section and the horizontal and vertical alignments using AutoCAD software.
SURV530	GPS II	3	Global Positioning Systems for mapping is designed to teach the knowledge and skills necessary to use the GPS to collect, process, and use geographic data. Students will learn and apply GPS theory and techniques through field survey experiences. The goal of this course is to provide the fundamental knowledge and skills to effectively use the GPS to collect and integrate spatial and non-spatial data. This course discusses the different types of GPS measurements, the design of static network in preparation for a GPS field survey, least square adjustment of GPS networks and RINEX data format
SURV550	Image Processing	3	This course focuses on hands on applications of Remote Sensing data collection, data preparation and processing, satellite image distortion, radiometric and geometric corrections, satellite image enhancement, image mosaicking and masking, space triangulation, filtering, methods of supervised and unsupervised classifications. It apprehends knowledge practically through its application on computers holding software of image treatments
SURV560	Advanced Digital Photogrammetry	3	This course relates the principles of precise measurement and proper data reduction through measurements of photographs followed by calculations to determine spatial information. The focus of the course is on hands-on experience with digital photogrammetric modeling, both for airborne imagery and terrestrial close-range applications. It also contains lectures about digital imagery and emerging trends and applications in digital photogrammetry and computer vision After completing this course, the student should be familiar with methods commonly used in digital photogrammetric practice as well as their theoretical bases.
SURV670	Technology Of Construction	3	This course deals with the relationship between the Surveying and the civil engineering on site achieves in the following fields: The soil mechanics, foundations, piles, retaining walls, the building components (column, framework, slab), the building and road construction materials (such as concrete, steel, base course, asphalt,...). The course provides a basic knowledge to the students in order to state, analyze, interpret and recommend the convenient propositions in construction fields.
SURV590	Map Projection	3	This course treats the transformation of the curve surface of the Earth into a plane surface called a map. This representation includes descriptions of the systems used, the accuracy on the representation the deformation of distances, angles and areas. This course treats also the applications of the projection systems that is depending on its criteria.
ENGG499	Practical Experience	4	Eligible students should register this practical experience in order to complete requirements for graduation. The training facility may be a firm or a research lab external to the university. Registering for this course requires pre-approval of the training facility of choice by the department chair. At the end of the training, the student should submit a report describing the training activities completed for evaluation and credits. Note that the minimum time to be spent at the facility should not be less than 9 weeks with at least 180 working hours.

SURV595	Capstone Project	6	This course requires the student to apply the design, development, testing and writing skills acquired during the B.E, program. A capstone project is typically carried out by teams of two or three students each. Under the supervision of a faculty member, the student works through the stages of completing an engineering project from idea through to implementation and testing. Students will have to exercise problem identification, solution design, experimentation, implementation, technical writing and teamwork skills. Students typically work in teams of two. The main deliverables of a capstone project are a demonstration of the developed solution, a report describing the entire development life cycle of the solution, and a technical presentation before a committee composed of multiple faculty members to explain the student's work.
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Core Requirements			
Code	Title	Credits	Description
SURV251L	Introduction to Surveying Engineering Lab	1	An intermediate lab course concentrating on general survey principals and equipment and basic surveying tasks. The course covers the analysis of the following surveying equipment: tapes, laser meter, tilts, plumb bob, tripods, tribach, surveying rods, and staff. It also covers the techniques of setup and calibrates these equipment, and care off. Practice in reading maps and legends, drawing sketches and producing filed notes and simple maps.
MATH210	Calculus II	3	This is the second course in the Calculus sequence. The course material includes logarithmic, exponential, and trigonometric functions, their inverses and their derivatives, integration techniques, improper integrals, sequences, infinite series, tests of convergence, alternating series, power series, polar coordinates and its application.
MATH225	Linear Algebra with Applications	3	This course provides an introduction to linear algebra topics. Emphasis is placed on the development of abstract concepts and applications for vectors, systems of equations, matrices, determinants, vector spaces, multi-dimensional linear transformations, eigenvectors, eigenvalues, diagonalization and orthogonality. The concepts of linear algebra are extremely useful in physics, economics and social sciences, natural sciences, and engineering.
MENG225	Engineering Drawing & CAD	3	This course consists of 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 or a tool, or they may represent the first step of design (Design of tools and machines).
PHYS220	Physics for Engineers	3	This course is designed to provide an overview of calculus based introductory physics, which is a requirement for all undergraduate engineering students. It offers an introduction to mechanical oscillations and mechanical waves, exploring different wave phenomena such as interference of mechanical waves, reflection and refraction of light, in addition to image formation.
MATH220	Calculus III	3	The course consists of two parts: Multivariable calculus and vector calculus. The multivariable calculus is the extension of calculus in one variable to calculus in more than one variable: (quadric surfaces, partial differentiation, multiple integration). Vector calculus applies calculus to the concept of vector fields.
EENG250	Electric Circuits I	3	The course provides an introduction to Electrical and Electronics Engineering. The course has been designed to introduce fundamental principles of circuit theory commonly used in engineering research and science applications, the Concepts of voltage, current, power, resistance capacitance and inductance. Circuit analysis techniques such as Kirchhoff's Laws, node voltages, and mesh currents. Thevenin's and Norton's equivalent circuits, in addition to special circuits with op-amp and the response of 1st order RL and RC circuits.

MATH270	Ordinary Differential Equations	3	This course provides an introduction to ordinary differential equations and their applications. The contents of this course include first order equations, separable, exact, and linear equations, second and higher order differential equations, systems of differential equations, series solutions, and Laplace transformation.
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, or electrical devices encountered in engineering. As the course name suggests, this course deals with the equilibrium of bodies that are either at rest or 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.
MATH310	Probability & Statistics for Scientists & Engineers	3	The course is intended to provide you with the basic probabilistic and statistical concepts with related computational and analytic skills for three main purposes: 1) To become an integrated part of the student scientific education. 2) To give the student an adequate ability for comprehending and interpreting many non-deterministic situations. 3) To appreciate the wide range of applications of such concepts to real-life situations.
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 a general introduction that explains the geomatics concepts and the domains of life where geomatics are needed. It creates a consistent knowledge about surveying applications and tasks, the deliverables and products of surveying projects and the duties of a surveyor or surveying engineer are also included. New technologies and tools and soft programs are indicated.

General Education Requirements

Code	Title	Credits	Description
ENGL201	Composition and Research Skills	3	This course builds upon the skills acquired in pre-requisite courses mainly ENGL 151 to further develop students' critical thinking and academic writing competencies. Students will read and respond to a variety of texts from different disciplines and produce a research paper using analytical and critical skills in response to texts.
ENGL251	Communication Skills	3	Workplace Occupational Writing is an advanced interdisciplinary writing course emphasizing workplace and technical communication and editing appropriate to diverse professions. It incorporates practice and study of selected types of discourse employed in professional writing situations, preparing students for different systems of writing in their professional lives. Examples from the writing of workplace professionals are analyzed and used as models to demonstrate the transition from academic to professional writing.
ARAB200	Arabic Language and Literature	3	هذا المقرر يهدف إلى تزويد الطالب بالمعارف والمهارات اللازمة لفهم اللغة العربية وآدابها، وذلك من خلال دراسة النصوص الأدبية واللغوية، وتحليلها، وتفسيرها، وتطبيقها في الحياة العملية. ويتضمن المقرر دراسة النصوص الأدبية واللغوية، وتحليلها، وتفسيرها، وتطبيقها في الحياة العملية. ويتضمن المقرر دراسة النصوص الأدبية واللغوية، وتحليلها، وتفسيرها، وتطبيقها في الحياة العملية.

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