بسم الله الرحمن الرحيم

Courses Description

Civil Engineering Department

Faculty of Applied Engineering & Urban Planning

University of Palestine

2017

Course Name:	**Physics I**		
Course Type:	**College Requirement**		
Course ID.:	**ENGI 3111**	**Course Credit Hours**	**3**
Course Description	The course covers: -Units and Measurement. -Vectors: Coordinate Systems. -Motion in One Dimension, Freely Falling Objects and gravity. -Motion in Two Dimensions Projectile Motion, Uniform Circular Motion, Relative Velocity. -The Laws of Motion: The Concept of Force, Constant Force, Varying Force, -Newton's Laws, work and Forces of Friction. -Energy: Kinetic and potential Energy Theorem, Conservation of Energy. -Collisions: Collisions in One Dimension, Two-Dimensional Collisions. -Static Equilibrium (Torque). -Center of Gravity.		
Course Aims	The aims of this course are to explore the following points: -Understanding and demonstrating the basic principles and concepts of mechanics theories with easy and clear way. -Bridging the gap between school and university physics by providing a more complete and logical framework in key areas of classical physics -Providing fundamental knowledge of physics and its important in engineering professions. -This course will form the base for further engineering courses.		
Course Outcomes	Upon completion of this course, the student should be able to: -Know and correctly use the language of physics (naming, terminology, and symbolic). -Demonstrate an understanding of the basic principles, theories, and laws of physics through the description of physical systems -Understanding the importance of physics and its applications in different fields of engineering -Understand and apply physical concepts, facts, and models, and use them as a foundation to further study.		
Course Name:	**Introduction to Engineering**		
Course Type:	**College Requirement**		
Course ID.:	**ENGI 1107**	**Course Credit Hours**	**1**
Course Description	Introduces students to the engineering profession, including the disciplines of chemical, civil, computer, electrical, environmental, and mechanical engineering; Prepares students for success through the integration of the following important skills: technical problem solving and engineering design, ethical decision-making, teamwork, and communicating to diverse audiences.		
Course Aims	This course aims at encouraging students to explore engineering and urban		

	planning and understand the themes of this science and profession. Furthermore, it aims to help the junior students to understand the following : - The profession's ethics . - History of Engineering and Urban Planning, - How to be a good engineer/planner, - Engineering and planning concepts, - How to study Engineering and Urban Planning, -General knowledge about global engineering and planning landmarks and development.		
Course Outcomes	At the end of this course: 1. Students will become familiar with the University, the College of engineering and the various departments within the college. 2. How to be successful in work and life in general. 3. How to work in a team-based project with report and presentation. 4. The understanding of professional, ethical, legal, security and social issues and responsibilities. 5. How to work in a team-based project with report and presentation. 6. Students will gain an awareness of the connections between engineering and the wider world. Lectures on the history and future of engineering will tie the relevance of engineering to global societal issues.		
Course Name:	**Engineering Drawing**		
Course Type:	**College Requirement**		
Course ID.:	**ENGI 1309**	**Course Credit Hours**	**3**
Course Description	This course is an introduction to the students about the basic and standard for drawing technique. The drawing technique is emphasized in how to draw an object graphically, to study multi-view, pictorial drawings and to sketch, geometric construction, sectioning, lettering, dimensioning and auxiliary projections. The course presents theories and principles of orthographic projection. Studies the analysis and graphic presentation of space relationships of fundamental geometric elements: points, lines, planes and solids.		
Course Aims	The aims of this course are to explore the following points: • An understanding of how graphical methods can be used to communicate information about engineering products. • The importance of course as a step for anyone thinking of taking up a career in engineering • How to produce engineering drawings of different components, assemblies using a variety of sketching and drawing techniques. • Student's visualization skills.		
Course Outcomes	Upon completion of this course, the student should be able to: • Identify and use the basic tools of engineering drawing • Sketch engineering components (lines, arches, polygons, isometries….etc.) using engineering drawing tools. • Interpret engineering drawings that comply with drawing standards		

	• Understand the theory of projection. • Produce engineering drawings • Develop adequate visualization skills. • Be able to prepare a basic layout.		
Course Name:	**Engineering Terminology**		
Course Type:	**College Requirement**		
Course ID.:	**ENGI 1211**	**Course Credit Hours**	**2**
Course Description	This course is particularly designed to enhance students with the required foundation to undertake further engineering courses. It will cover basic terminologies required for Civil and Architecture Engineering. From the Civil engineering prospectus, topics include: structures, fluid & soil mechanics, materials, construction and project management. While, Architecture engineering sessions will handle areas including: urban design, interior design and space planning.		
Course Aims	Equip students with professional Engineering terminologies. - Improve students writing skills with particular attention to technical reports and essays. - Enhance overall communication skills in English.		
Course Outcomes	Upon completion of this course, the student should be able to: - Identify basic technical terminologies related to both Civil and Architecture engineering. - Demonstrate the ability to use engineering terminologies in the right context. - Student will demonstrate the ability to produce a professional report. - Student will demonstrate the ability to produce a presentation in technical English.		
Course Name:	**Physics II**		
Course Type:	**College Requirement**		
Course ID.:	**ENGI 1304**	**Course Credit Hours**	**3**
Course Description	The course deals with the following topics: -Coulomb's law. -The electrostatic field. -Flux and Gauss's Law. -The potential difference. -Capacitance and dielectrics. -Current and Power. -Electromotive force. -Resistance and resistors. -Ohm's law and Kirchhoff's laws. -Direct current circuits. -Magnetic field, Faraday's Law and Maxwell's equations.		

Course Aims	The aims of this course are to explore the following points: -Understanding and demonstration the basic concepts of electrostatic and electromagnetic theories with easy and clear way. -Applying those principles in problem solving. -Providing a good understanding of the way electrical circuits work. -Providing a clear description of the basic concepts of electricity and magnetism physics which will form the base for farther engineering courses		
Course Outcomes	Upon completion of this course, the student should be able to: -Know and correctly use the language of the electrostatic and electricity. -Have a thorough knowledge of the basic fields of physicsII, including electricity and magnetism. -Demonstrate an understanding of the concept of electric charge, so they can describe the types of charge, the attraction and repulsion of charges. -Description of the basic concepts of physics II which will form the base for farther engineering courses.		
Course Name:	**Engineering Economy**		
Course Type:	**College Requirement**		
Course ID.:	**ENGI 4317**	**Course Credit Hours**	**3**
Course Description	• Identify and apply relevant economic and/or financial considerations in decision-making. • Understand and apply theoretical concepts/principles that form the basis of economic decision-making. • Distinguish between and apply alternative evaluation methods that are commonly used in economic decision-making processes. • Identify and incorporate relevant practical considerations (e.g., income taxes, inflation, risk and uncertainty, etc.) in economic analyses. • Understand and apply a few operations research tools for optimization and decision making.		
Course Aims	An engineer is a problem-solver; Engineers design things and implement projects. -Solutions should be both technically (physically) and financially (economically) sound. -Every problem has multiple solutions, so the issue becomes: -How can we rationally select the design with most favorable economic result? -Engineering economy provides a systematic framework for evaluating the economic aspects (merits) of competing design solutions. -Engineering solutions exist within the context of a business opportunity. -Engineers must model the economic impacts of their decisions. -To be economically feasible (affordable), an engineering solution must demonstrate a positive balance of long-term benefits over long-term costs (do its benefits exceed its costs?). -Engineering economy is about making decisions. -Engineering economic analysis is used to evaluate projects with future		

	consequences when the time value of money matters.		
Course Outcomes	Part I: Fundamentals -Introduction to engineering decision making -Engineering economy concepts (cost, interest, equivalence, and time-money relationships) -Cash-flow diagrams -Compound interest formulas Part II: Applications -Comparing alternatives -Present worth analysis -Annual cash flow analysis -Rate of return analysis -Benefit-cost ratio analysis -Depreciation Part III: Special Topics (if time permits) -Inflation, taxation, and price change -Uncertainty and risk analysis -Introduction to linear programming		
Course Name:	**Engineering Ethics**		
Course Type:	**College Requirement**		
Course ID.:	**ENGI 4114**	**Course Cr. Hrs.**	**1**
Course Description	This course is designed to introduce undergraduate engineering students to the concepts, theory and practice of engineering ethics. It will allow students to explore the relationship between ethics and engineering and apply classical moral theory and decision making to engineering issues encountered in academic and professional careers.		
Course Aims	• An understanding of their duties and responsibilities as professionals through gaining knowledge of the philosophies of ethics, professional practice, and world culture. • Basic knowledge to make informed ethical decisions when confronted with problems in the working environment. • Improved awareness of potential ethical issues within an engineering context. • Team skills through working in teams on assignments and in-class assignments. • Subjective analytical skills through investigation and evaluation of ethical problems in engineering settings using accepted tests for moral problem solving. • An understanding of how societal morals varies with culture and how this influences ethical thought and action. • Improved communications skills with regard to ethical and professional issues in engineering. • Know some of the classic cases as well as contemporary issues in engineering ethics.		
Course Outcomes	¬ Students will have the improved ability to function on multidisciplinary teams.		

	¬ Students will have an understanding of professional and ethical responsibility. ¬ Students will have an improved ability to communicate effectively. ¬ Students will have the broad education necessary to better understand the impact of engineering solutions in a global/societal context. ¬ Students will have recognition of the need for and an ability to engage in lifelong learning. ¬ Students will have knowledge of contemporary issues.		
Course Name:	**Engineering Project Management**		
Course Type:	**College Requirement**		
Course ID.:	**ENGI 4216**	**Course Credit Hours**	**2**
Course Description	The course provide an introduction to Engineering Project Management including; project stages, roles and responsibilities of parties involved in a project, different contract types, work breakdown structure, bar charts, Critical Path Method (CPM), resource allocation and cash flow analysis. It also exposes students to the use of computer techniques, Microsoft Project, used in planning and scheduling and of construction projects.		
Course Aims	This course introduces the fundamental principles necessary for successful management of projects. Project planning and management techniques will be discusses and the application of computers in the project management will be studied. This course is intended to equip students with the tools needed to make managerial decisions.		
Course Outcomes	Upon completion of this course, the student should be able to: • Define Project life cycle. • Identify delivery approaches and contract types. • Conduct planning and scheduling using critical path method. • Allocate resources. • Perform cash flow analysis. • Employ MS Project to project scheduling.		
Course Name:	**Numerical Analysis**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 3309**	**Course Credit Hours**	**3**
Course Description	Finding Numerically solutions (Zeros/Roots) of nonlinear equations by both bracketing and open methods: Explain and use numerical methods to solve a polynomial equations. Explore and use numerical methods and techniques to systems of linear equations. Learn and perform numerical differentiation and integration. Approximation and fitting of curves. Integrate MATLAB and/ Excel with all methods mentioned above.		
Course Aims	Understand the words of no algebraic solutions. Be aware and beware of		

	strategies on dealing with the algebraically non-solvable systems. Learn, investigate and apply different methods and approaches for numerical solutions. Apply		
Course Outcomes	Understand and apply different numerical methods, apply them in computer programming languages, understand how computer arithmetics and algorithms work. Beware of error analysis and understanding the word of accepted/non-accepted roundoff, truncations and computational errors, and thus decision making.		
Course Name:	**Structural Analysis 1**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 3311**	**Course Credit Hours**	**3**
Course Description	The course introduces the analysis of statically determinate structures: beams, trusses, frames, cables, and arches, influence lines, moving loads on beams and trusses, deflection of statically determinate structures, moment-area methods, conjugate beam, virtual and real work, and analysis of indeterminate structures using approximate methods, computer-based and manual techniques, verification and interpretation of results, case studies involving local structures.		
Course Aims	The course presents the classical methods of structural analysis needed to analyze statically determinate and indeterminate structures. It aims at providing the necessary analysis foundation for the design courses (reinforced concrete, steel, etc) that typically follow this course in the traditional civil or architectural engineering curriculum. It also aims at preparing the student for more advanced analysis courses. The student will also become familiar with analysis methods for cable and arch structures. To learn the concept of influence lines for determinate structures in order to be prepared for highway bridge structural design.		
Course Outcomes	1. Learn the idealization of structures and loads (including support types in 2D and 3D). 2. Model structural components and systems using free-body diagrams 3. Evaluate the internal forces and moments in beams to develop shear force and bending moment diagrams, 4. Evaluate bending and shear stresses and deflections in beams. 5. Learn the analysis techniques of forces in cables - suspension bridges with three-hinged and two-hinged stiffening girders - three-hinged and two- hinged arches -and understanding the settlement and temperature effects.		
Course Name:	**Fluid Mechanics**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 3313**	**Course Credit Hours**	**3**
Course Description	The course covers properties of fluids, Statics of fluids. Dynamics of fluids: system and control volume; equations of continuity Euler, Bernoulli, energy, linear momentum, and angular momentum with applications. Dimensional		

	analysis and dynamic similitude. Viscous flow: laminar flow through tubes, transport phenomena, boundary layer, drag on immersed bodies hydraulic and energy grade lines, turbulent flow in pressure conduits and in open channels, steady in-compressible flow through simple pipes and open channels.		
Course Aims	The main aims of this course are to: • Obtain a solid understanding of the fundamentals of fluid mechanics. • Study different properties of fluid and fluid flow types. • Explain the conservation of mass, momentum, heat transfer and energy equations.		
Course Outcomes	Upon completion of this course, the student should be able to: • Define different types of fluid flow (laminar, turbulent, and transition) and the appropriate discharge model for each. • Apply the continuity equation for engineering hydraulics problems for including both steady-state and transient systems. • To use the momentum equation for force calculations in both pressurized and free surface flow systems. • Derive the energy equation (Bernoulli equation) and apply into pressurized flow and open channel flow systems. • Solve for losses in energy head due to friction and minor losses. • Solve for the fluid forces acting on submerged bodies in a static fluid system.		
Course Name:	**Fluid Mechanics Lab**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 3115**	**Course Credit Hours**	**1**
Course Description	Extension and application of fluid mechanics principles to hydraulic engineering problems. Pipe flow, pipe flow networks, flow measurement ,open channel flow, pipeline systems, turbo machinery, unsteady flow in pipes, network project with software application of network analysis and design (EPANET, WATERCAD)		
Course Aims	The main objectives of this course is to provide the student with a clear and through the presentation of the theory and application of Hydrualics as it applies to pipes, pumps, water distribution networks and open channels. This course will build on topics covered in Dynamics and mainly in Fluid Mechanics.		
Course Outcomes	• An ability to design, and analyze and interpret data • An ability to design a Hydraulics system, its components, or process to meet required design values. • An ability to function on multi-disciplinary teams • A knowledge of contemporary issues in Hydraulic Engineering. • An ability to use the techniques, skills, and modern engineering tools necessary for hydraulic system practices. • An ability to identify, formulate, and solve Hydraulic problems.		
Course Name:	**Introduction to Construction Mechanics**		
Course Type:	**Specialization Requirement**		

Course ID.:	**CVIL 3217**	**Course Credit Hours**	**2**
Course Description	The course introduces to the student the construction process, characteristics of the construction industry; types of construction companies; contracts; people involved in a project, their responsibilities and interrelationships; evolution of a project; interpreting working drawings; construction bonds; contract documents including general overview of organization, relationships, practices and related terminologies.		
Course Aims	The aim of this course is to know Construction elements starting from foundations up to isolation. Construction technologies. Construction materials. Physical and Chemical Tests		
Course Outcomes	Upon completion of this course, the student should: • Be familiar with construction industry elements and terminologies. • Understand construction industry technologies and materials • Be aware of about quality or safety regulations. • Be acquainted with tests of physical and chemical properties		
Course Name:	**Introduction to Sustainability and Renewable Energy**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 3219**	**Course Credit Hours**	**2**
Course Description	Different systems of traditional and modern energy and its applications. Solar energy and its applications, renewable energy, the design of residential buildings of various kinds, public and other regulations for the harmonization of energy		
Course Aims	• Study the different systems of traditional and modern energy and its applications in architecture • Identify the last what has been reached of research and studies for solar energy systems and renewable energy and its applications in architecture • Rational use of energy and to provide operating expenses for buildings		
Course Outcomes	• Specialized knowledge of the various energy systems and their applications in architecture. • Awareness of contemporary environmental issues and the ability to deal with them and their application in the design and planning. • Applied through skill tests and applications of theories in practical examples. • Produce an applied project.		
Course Name:	**Structural Analysis 2**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 3316**	**Course Credit Hours**	**3**
Course Description	This course teaches the student the Statically indeterminate structures; degree of indeterminacy; analysis of statically indeterminate structures using the constant deformation; slope deflection; moment distribution and introduction to matrix		

	analysis.		
Course Aims	This Course aims at providing the students the concept of analyzing indeterminate structure using classical and up to date methods.		
Course Outcomes	Intended Learning Outcomes: Analyzing the statically indeterminate beams, trusses and frames using the force method Analyzing the statically indeterminate beams and frames using displacement methods: slope-deflection method and moment distribution method. Analyzing of beams, trusses and frames using the stiffness method Understanding the concept of the finite element method Analyzing of real structure problems. This Course is a pre-requisite of many courses specially: Advance Structural Analysis.		
Course Name:	**Soil Mechanics**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 3318**	**Course Credit Hours**	**3**
Course Description	The course is an introductory course in the science of soil mechanics (branch of science that deals with the study of the physical properties of soil and the behavior of soil masses subjected to various types of forces) and the art of Geotechnical Engineering. It deals with all phenomena which affect the response of soils in any way associated with engineering. In this course we will study: origin of soil and grain size, weight-volume relationships, plasticity and structure of soil, soil classification, soil compaction, permeability, seepage, stresses in a soil mass, compressibility of soil, and shear strength of soil.		
Course Aims	The goals of this course are to: • Develop a fundamental understanding of the nature and peculiarities of soils, rocks and other earth materials relative to their performance in soil-structure systems. • Survey the principles of analysis of soil-structure system and to review some design techniques and practices. • Develop a working knowledge of soils and geotechnical engineering to be able to recognize critical situations in practice and to develop a capability for detailed research for solutions to particular problems.		
Course Outcomes	Upon completion of this course, the student should be able to: • Have knowledge of soil origin and mineralogy. • Have knowledge of soil properties and classifications. • Have understanding of water seepage and flow nets. • Have differentiation between effective and total stresses. • Have development of research skills and presentation skills.		
Course Name:	**Design of Concrete Structures 1**		
Course Type:	**Specialization Requirement**		

Course ID.:	**CVIL 3322**	**Course Credit Hours**	**3**
Course Description	The course introduces to the students the reinforced concrete, design approaches and codes, sections under flexure and shear, design and detailing of singly reinforced rectangular beams, doubly reinforced rectangular beams, T-beams. Shear and diagonal tension in beams, bond, anchorage and development length, and one-way slabs, stairs, design of columns under concentric loading, design project with discussion of current building practice.		
Course Aims	• Design of reinforced concrete beams (Rectangular and T section) for shear and moment. • Design of continuous beams and one-way slabs (single span and continuous). • Design short columns under concentric loading. • Proportion footings and design axially loaded footings • Calculate termination of reinforcement and layout reinforcement to satisfy Code requirements. • Evaluate the need to provide shear and torsion reinforcement.		
Course Outcomes	Upon completion of this course, the student should be able to: • Carry out analysis and design of singly reinforced concrete beams. • Carry out analysis and design of doubly reinforced concrete beams • Carry out analysis and design of continuous beams and one-way slabs (single span and continuous). • Design short columns • Proportion footings and design axially loaded footings • Calculate termination of reinforcement and layout reinforcement to satisfy Code requirements. • Evaluate the need to provide shear and torsion reinforcement.		
Course Name:	**Hydraulics**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 3326**	**Course Credit Hours**	**3**
Course Description	Extension and application of fluid mechanics principles to hydraulic engineering problems. Pipe flow, pipe flow networks, flow measurement ,open channel flow, pipeline systems, turbo machinery, unsteady flow in pipes, network project with software application of network analysis and design (EPANET, WATERCAD)		
Course Aims	The main objectives of this course is to provide the student with a clear and through the presentation of the theory and application of Hydrualics as it applies to pipes, pumps, water distribution networks and open channels. This course will build on topics covered in Dynamics and mainly in Fluid Mechanics.		
Course Outcomes	• An ability to design, and analyze and interpret data • An ability to design a Hydraulics system, its components, or process to meet required design values. • An ability to function on multi-disciplinary teams		

	• A knowledge of contemporary issues in Hydraulic Engineering. • An ability to use the techniques, skills, and modern engineering tools necessary for hydraulic system practices. • An ability to identify, formulate, and solve Hydraulic problems.		
Course Name:	**Environmental Engineering**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 4329**	**Course Credit Hours**	**3**
Course Description	This course covers Water quality, treatment and regulations; physical and chemical unit processes including disinfection, coagulation, clarification, filtration, membranes, air stripping, adsorption, softening. It also presents other advanced processes for waste water treatment such as screening; sedimentation; flotation, thickening; aerobic treatment methods; theory of aeration; anaerobic digestion; disposal methods. In addition, this course covers an introduction to the design of different units in the waste water treatment plant.		
Course Aims	The main aims of this course are to: • Introduce basic concepts of physical and chemical parameters used to measure water quality. • Present the fundamentals and microbiology and application to drinking water treatment, distribution, water pollution control and natural systems. • Develop an understanding of wastewater treatment process and management systems.		
Course Outcomes	Upon completion of this course, the student should be able to: • Recommend solutions to major environmental problems such as climate change. • Take up key roles in industry, developing innovations in areas such as renewable energy. • Develop understanding and application skills in Environmental Management systems (WWTP). • Design functional and environmentally compatible facilities and infrastructure.		
Course Name:	**Transportation Engineering 1**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 4321**	**Course Credit Hours**	**3**
Course Description	The course covers the study of vehicular transportation fundamentals including Traffic flow theory, volume, speed, level of service analysis, and delay studies, capacity analysis of signalized and un-signalized Intersections, traffic safety studies, capacity analysis of basic freeway segments, multilane, and two-lane highways, basic principles of roadway design, route location, and economy visibility studies of recommended design alternatives, geometric design involving vertical and horizontal alignment.		
Course Aims	This course aims at providing students with an introduction to transportation engineering. This will be achieved by providing:		

	• A description of the basic characteristics of transportation planning and of the models used by transportation planners. • An explanation of the basic parameters of traffic engineering and the methods to estimate those parameters, promoting operational efficiency and safety through the use of traffic control devices.		
Course Outcomes	Upon completion of this course, the student should be able to: • Describe the four-step transport planning process, data requirements and collection. • Analyse and assess the performance of routes and intersections through an understanding of traffic flow theories. • Appreciate and consider the needs of all road users, their interaction and management of their movement in an efficient and safe way. • Design traffic signal timings for junctions. • Assess different drivers when improving road safety. • Discuss solutions and alternatives to urban congestion.		
Course Name:	**Foundation Engineering**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 4323**	**Course Credit Hours**	**3**
Course Description	The purpose of this course is to provide the students with depth knowledge and understanding of the principles governing the design of foundation systems for structures. This course covers the following subjects: subsurface exploration (borings, sampling, preparation of boring logs, and subsoil exploration report), running field tests (Vane Shear Test, Cone Penetration Test, Pressuremeter T, and Dilatometer Test), ultimate bearing capacity of shallow foundations, lateral earth pressure, retaining walls, and sheet pile walls.		
Course Aims	The goals of this course are to: • To introduce to students the fundamental concepts of foundation analysis and design. • To develop students ability to interpret field and laboratory data to get design parameters for foundation analysis. • To prepare students for the effective use of the commonly used formulas, tables, and figures in the design and analysis of shallow and deep foundations. • To introduce some selected topics in foundation engineering.		
Course Outcomes	Upon completion of this course, the student should be able to: • Identify the essential steps involved in a geotechnical site investigation and specify appropriate laboratory test procedures for the characterization soil materials with respect to strength and compressibility. • Identify the principal types of foundations and describe the factors governing the choice of the most suitable type of foundation for a given situation. • Perform: (a) bearing capacity and, (b) settlement analyses for shallow foundations.		

	• Evaluate (a) end bearing capacity and (b) skin friction for a given type of deep foundations and hence estimate the axial load capacity. • Prepare a geotechnical engineering report documenting procedures used and findings from site investigation.		
Course Name:	**Design of Concrete Structures 2**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 4325**	**Course Credit Hours**	**3**
Course Description	The course covers the properties of structural steel, elastic design and analysis of structural elements: tension members, compression members; beams; beam columns, connections, weld and bolt design, design of trusses and moment resisting frames; introduction to plastic design.		
Course Aims	This course aims to provide students with the knowledge and skills required to analyze indeterminate structures using approximate methods and to design steel structures.		
Course Outcomes	Upon completion of this course, the student should be able to: • Analyze indeterminate frames and trusses using approximate methods of analysis. • Describe the material properties of steel. • Determine the ultimate tensile capacity of steel members. • Determine the ultimate bending moment capacity of steel members. • Describe different welding techniques and classify various types of bolts and their insulations. • Design bolted connections in shear and tension.		
Course Name:	**Transportation Engineering 2**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 4330**	**Course Credit Hours**	**3**
Course Description	The course covers pavement types and definitions, soil classification for highway purposes, bituminous material types and tests, uses of asphalt in highways, design of bituminous mixtures by Marshall Procedure, analysis of rigid and flexible highway pavement stresses (one layer system), Pavement layers, calculations of equivalent single axle load, design of rigid and flexible highway pavement by AASHTO procedure.		
Course Aims	The main goals of this course are to explore the following: • Pavement structure and materials. • Concepts of road pavement design and properties of materials. • Principles of geometric design, both vertical and horizontal. • Examples of how studied principles and application come together in a design.		
Course Outcomes	Upon completion of this course, the student should be able to: • Select the appropriate materials for use in different road layers. • Perform road pavement analysis and design.		

	• Apply the principles of geometric design in the design of intersections. • Apply the code of practice in the design of flexible road pavements. • Design the geometric curves of a road pavement. • Perform full road pavement design.		
Course Name:	**Sanitary Engineering**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 4334**	**Course Credit Hours**	**3**
Course Description	This course will introduce the principles and practices of wastewater and storm-water collection systems. Sewer design issues, the hydraulic design of gravity and pressure sewers, sewer system layout, appurtenances and structural design of sewer lines will be discussed. In addition, an introduction to wastewater and sludge treatment will be provided.		
Course Aims	The main aims of this course are to: • Provide students with a broad understanding of design and operation of wastewater collection systems. • Present the basic design and materials used in storm-water systems. • Give students an overview of various wastewater treatment methods. • Explore various sludge treatment methods.		
Course Outcomes	Upon completion of this course, the student should be able to: • Define different types of sewer systems and sources of sanitary sewage. • Determine quantity of sanitary sewage. • Quantify quantities of storm water using various methods. Explain physical, chemical and biological characteristics of sewage. Design of wastewater collection system. • Discuss types of sewer line rehabilitation and corrosion control.		
Course Name:	**Desgin of steel Structures**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 4336**	**Course Credit Hours**	**3**
Course Description	The course covers the properties of structural steel, elastic design and analysis of structural elements: tension members, compression members; beams; beam columns, connections, weld and bolt design, design of trusses and moment resisting frames; introduction to plastic design.		
Course Aims	This course aims to provide students with the knowledge and skills required to analyze indeterminate structures using approximate methods and to design steel structures.		
Course Outcomes	Upon completion of this course, the student should be able to: • Analyze indeterminate frames and trusses using approximate methods of analysis. • Describe the material properties of steel. • Determine the ultimate tensile capacity of steel members.		

	• Determine the ultimate bending moment capacity of steel members. • Describe different welding techniques and classify various types of bolts and their insulations. • Design bolted connections in shear and tension.		
Course Name:	**GIS**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 4338**	**Course Credit Hours**	**3**
Course Description	This course was designed for a two-week lecturing module on the principles of geographic information systems, to be taught. The course introduces students to GIS terminology, the concept of relational databases, spatial data models, topology, raster data and vector data. Data entry methods, including quality control and metadata are discussed. The student is introduced to spatial analysis applications including terrain analysis, data manipulation and visualization. Students apply knowledge in the laboratory using GIS software.		
Course Aims	By the end of the course we expect students to be able to explore the following : • Spatial data and Geographic information systems. • The use spatial data and maps. • Raster layers. • Vector layers. • Use GIS software to analyze spatial data.		
Course Outcomes	Upon completion of this course, the student should be able to: • Manage the spatial references of different data sources. • Manipulate and interrogate layers in a GIS. • Create basic maps with the necessary elements for users to interpret.		
Course Name:	**Hydrology**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CVIL 4340**	**Course Credit Hours**	**3**
Course Description	This course covers the principles of the physical hydrology and its engineering applications. It covers the the processes involved in generation, and movement of water above and below the ground surface, which compose the natural hydrological cycle. The course also covers the principles of the frequency analysis for the purposes of hydrological design and analysis. The urban hydrology is studied through this course, in order to introduce the design approaches for the stormwater drainage and harvesting systems. This course introduces the principles for analysis of groundwater systems that includes the confined and unconfined aquifers. The concepts of wells analysis and design are covered. The course utilizes a variety of software and computer applications for the hydrological analysis applications.		
Course Aims	This course ultimately aims at introducing the students to the design and analysis approaches of the variety of hydrological facilithies.		

Course Outcomes	- Able to analyze hydrological problems considering the interrelations between relevant physical phenomena; - To follow the appropriate approaches for the design of hydrological facilities according to the available data, and the case conditions. The student is expected to have the sufficient knowledge that qualifies him/her to judge the validity of the models for each case; - To use computerized software appropriately in order to produce engineering reports and designs that satisfy the professional requirements in the field.		
Course Name:	**Construction Safety**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CONS 5301**	**Course Credit Hours**	**3**
Course Description	The course covers the explanation of requirements of the Occupational Safety and Health Act and other related federal and state legislation as applied to the building construction industry		
Course Aims	The aim of this course is to • Raise awareness among students on the importance of Health and Safety issues in construction. • Emphasize the roles of different parties, involved in a construction project, towards enforcing Health and Safety regulations. • Provide an understanding of accident causes and prevention as they related to the construction industry. • Be familiar with regulation and standard for construction, compensation, insurance, and construction safety management control systems. • Develop accompany specific safety compliance program.		
Course Outcomes	Upon completion of this course, the student should be able to: • Explain Health and Safety laws and regulations. • Apply Heath and safety regulations and practices on project sites. • List hazards and risks associated with different construction projects. • Explain Health and safety Duty Holders within a construction project. • Employ Health and Safety Measures.		
Course Name:	**Cost Analysis and Management**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CONS 5306**	**Course Credit Hours**	**3**
Course Description	The course includes the study of cost management procedures applicable to the building process from the conceptual phase through owner operations, including conceptual estimating, project cost analysis and control, and value engineering and life-cycle costing.		
Course Aims	The main aim of this course is to explore various cost estimating methods and their applications, topics include: • Labour • Material		

	• Equipment • Indirect costs • Analysis of historical cost data. • Forecasting		
Course Outcomes	Upon completion of this course, the student should be able to: • Enumerate the components of project cost. • Differentiate between direct and indirect cost. • Conduct cost estimates for different project resources. • Forecast total project cost at a specific point in time with respect to measured progress.		
Course Name:	**Project Planning and Control**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CONS 5208**	**Course Credit Hours**	**2**
Course Description	This course concentrates on discussing advanced methods for planning and controlling construction projects. It will present a wide variety of questions that top management, both consultant and contractor will need to answer prior to making a decision.		
Course Aims	The main goals of the course are: • To help students develop a comprehensive, real world perspective of different decisions need to be taken be top management including; contractor selection, bid/no bid decision, mark-up percentage, resource allocation and leveling. • To present and discuss various multi-criteria decision-making techniques including compensatory and non-compensatory methods. • To introduce students to waste management hierarchy and techniques. • To explore decision under uncertain situations. • To discuss approaches to controlling resources; labour, material and equipments. • To apply learned techniques to actual managerial situations under the guidance of the lecturer.		
Course Outcomes	Upon completion of this course, the student should be able to: • Conduct tender evaluation using the point's method. • Define modeling and simulation with relation to some managerial decisions. • Differentiate and apply multi-criteria decision making techniques. • Identify risk attitudes and utility theory. • Control resources by leveling and smoothing technique. • Discuss different methods of controlling waste according to the waste hierarchy.		
Course Name:	**Mechanics of Material**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CIVL 2308**	**Course Credit Hours**	**4**

Course Description	This course introduces the concept of stress: normal, shearing, bearing stress, factor of safety and design consideration; Stress and strain and deformation under axial loading, stress-strain diagram, hook's law and modulus of elasticity, statically indeterminate problems, temperature changes, poisson's ratio, modulus of rigidity, generalized hook's law; Torsion: stresses and deformation in acircular shaft, angle of twist, statically indeterminate shafts; Pure bending: stress and deformations in a symmetric members in purebending; analysis and design of beams for bending; shear andbending-moment diagrams; Shearing stresses and strain in beamsand thin-walled members; Transformations of stress and strain, mohr's circle; Principal stresses under combined given loading;Columns stability of structure, euler!s formula.		
Course Aims	The aims of this course are to: -Develop a strong understanding of materials behavior and response (deformation, stresses, and failure) due to various loading conditions (axial, torsion, bending, shear) applied individually or in combinations to structural members. -Provide a solid base for further design courses. -Develop the ability to analyze and design simple structural members under various loading conditions and imposed constraints.		
Course Outcomes	Upon completion of this course, the student should be able to: - Calculate deformation, strain, and stress that developed in materials when subjected to various loading conditions (axial, torsion, bending, shear, and combined loading.) -Design (and verify the design of) simple structural members. -Analyze simple indeterminate members by using equilibrium and compatibility equations. -Demonstrate skills in problem solving and analytical thinking.		
Course Name:	**Engineering Statics**		
Course Type:	**College Requirement**		
Course ID.:	**ENGI 2313**	**Course Credit Hours**	**3**
Course Description	This course presents the theory and applications of basic engineering mechanics (Statics and Dynamics), including a review of vectors, the computation of resultant forces, the equations for equilibrium of particles and rigid bodies, the computation and diagramming of internal shear and moment forces, and dry friction. It also covers kinematics of a particle, kinetics of a particle (force& acceleration, work & energy, impulse & momentum), planar kinematics of rigid body, and planar kinetics of rigid body (force and acceleration, work & energy, impulse & momentum).		
Course Aims	Upon completion you would be able to: ′ Analyze forces and fined out the resultant forces in two and three dimension ′ Differentiate between various type of supports and draw free-body-diagram ′ Compute the reaction force, internal forces and bending moment at a specific		

	point on a simple structure (beam, frame, truss) ′ Draw bending moment and shear force diagram to a simple structure. ′ Obtain centre of gravity and centroid for deferent engineering shapes & moment of inertia for deferent sections ′ Manipulate Newton's laws of motion ′ Identify vibration force with & without damping		
Course Outcomes	Upon completion of this course, the student should be able to: ′ Students will be able to draw complete free-body diagrams and write appropriate equilibrium equations from the free-body diagram. ′ Students will be able to apply the concepts of equilibrium to various structures. ′ Students will be able to calculate moments, centers of mass, and forces for particular structures.		
Course Name:	**Computer Programming**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CIVL 2301**	**Course Credit Hours**	**2**
Course Description	The course introduces students to the fundamentals of computer programming, data structures (such as strings, matrices and arrays), logic and control structures (logical and relation expressions, conditional statement: if and switch, repetition: for while statements, vectorization),data manipulation and presentation (flowcharts, basic operating system commands loading data files, computing simple statistics and graphing data), and proper programming techniques, recursive processes,and the use of text file, Solves engineering problems involving programming in languages such as FORTRAN, PASCAL,MATLAB or C++.		
Course Aims	The course aims at discussing the following: • Teaching the basic computer programming concepts and apply them to computer- based problem-solving methods. • Computer programming using MATLAB a powerful high-level programming language for Engineers. • The development of well-structured programs, and stress the importance of good design • Exploring the programming concepts that will assist in learning other languages (like Java, Perl, or python		
Course Outcomes	Upon completion of this course, the student should be able to: • Read, write, and debug basic programs using good programming style • Design, implement and evaluate a computer-based system, process, component, or program to meet desired needs and budget, by applying best practices in software development processes, methods, and tools." • Have a sound understanding of MATLAB as a programming language Knowing the capabilities, strengths, and weaknesses of MATLAB. • Apply knowledge to develop programs using MATLAB related to civil engineering applications and courses.		

Course Name:	**Engineering Geology**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CIVL 2207**	**Course Credit Hours**	**3**
Course Description	This course introduces students to geology and its importance to engineers, history of the Earth and its internal structure, minerals versus rocks, composition and structure of minerals, physical features of the Earth, composition and structure of rock, composing the Earth, Earth's external processes, weathering and soils, geological maps and their engineering applications, ground water, earthquakes and Earth's interior, plate tectonics, volcanoes and volcanic hazard. Analysis of the agents of weathering, erosion, diastrophism and their effects on engineering construction.		
Course Aims	The goals of this course are to: • Present the history of earth and rock formations. • Explain the processes that shape the surface of the Earth. • Evaluate the potential for geologic hazards under specific circumstances. • Construct a personal philosophy integrating scientific knowledge of earth materials and the impact they have on the environment. • Discuss fundamentals of the engineering properties of earth materials.		
Course Outcomes	Upon completion of this course, the student should be able to: • Have development of research skills and presentation skills. • Have an understanding to the importance of geology in civil engineering. • Describe the three rock types and the processes involved in their formation. • Have an understanding of basic plate tectonic theory, the processes involved, and the geologic features produced by plate tectonics. • Understand the fundamental laws of geologic dating as they apply to determining the age of the earth, and the designation of geologic time periods. • Have an appreciation for the processes that shape and sculpt our landscapes.		
Course Name:	**Engineering Dynamics**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CIVL 2204**	**Course Credit Hours**	**3**
Course Description	This course covers the fundamentals of Newtonian mechanics, including kinematics, motion relative to moving reference frames, Kinetics and Newtons laws of motion, work and energy, impulse and momentum, 2D and 3D rigid body dynamics. Helps apply the above principles to practical dynamical problems.		
Course Aims	Introduce the concepts of dynamics. Learn the mathematical formulations of dynamics problems. Develop working skills in the dynamic analysis for both particles and rigid bodies. Master some basics of dynamics, including free body diagrams and kinematics, and broadens those basics through the extensive use of vector math to 3-D		

	problems. Migration from 3D vector math to the math of scalers through the use of work-energy principles to solve many dynamic problems. Introduce definitions and terminologies of thermodynamics. Introduce some properties of thermodynamic systems, some of which are pressure, temperature and its scales, heat and work as path dependent functions, zeroth law of thermodynamics, concept of a thermodynamic equilibrium.		
Course Outcomes	Knowledge of kinematic and kinetic analyses for particles and systems of particles. Knowledge of momentum and energy methods for particles and systems of particles. Knowledge of kinematic and kinetic analyses for rigid bodies. Knowledge of momentum and energy methods for rigid bodies.		
Course Name:	**Advanced Mathematics**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CIVL 2306**	**Course Credit Hours**	**3**
Course Description	This course introduces definitions and concepts of the differential equations. Classifies DE.s according to the types of the derivatives: ordinary or partial. Classifies the DE.s according to the order (degree) and linearity. Introduces the first order differential equations, classifies them by type, and describes methodologies to solve them according to their types. Classifies the second and higher order differential equations according to linearity, homogeneity and coefficients, and explains procedures to solve such higher order differential equations; Changes of a dynamic system within the limits of the infinitesimal differences are related to the mathematical derivatives of functions; Changes in a system are described by equations of differentials: the differential equations (DE.s). Introduces a special kind of non-constant coefficient differential equations, e.g., the Cuachy-Euler type, and introduces ways to solve them. Introduces systems of differential equations and helps learning how to solve the linear ones. Helps model the changes and behavior of dynamic systems by differential equations, and helps finding analytic solutions.		
Course Aims	This Course: Gives engineering students a mathematical background for understanding and solving problems related to changing systems. Helps students understand models and problems' solving methods. Introduces some concepts of the differential equations, their applications in science and engineering, and some skills to analytically solve differential equations.		
Course Outcomes	Upon completion of this course, the student should be able to: Classify differential equations according to orders and the type of derivatives.		

	Find the solution of a linear and non-linear first order differential equations. Find the set of solutions to second or higher order linear homogeneous differential equation. Find particular solutions of non-homogeneous differential equations Find the general solution of homogeneous and non-homogeneous second or higher order linear differential equation. Use Laplace transform and Fourier series to find solutions of differential equations.		
Course Name:	**Concrete and Cement Technology**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CIVL 2310**	**Course Credit Hours**	**3**
Course Description	The course is designed to provide an in depth understanding of Production, types, properties and uses of cementitious materials and aggregate. Fresh and hardened concrete properties, concrete testing, effects of admixtures, and destructive and non-destructive testing of existing concrete structures. Concrete production, transport, casting, compacting, and curing concrete, Design of concrete mixes, durability of concrete, creep and shrinkage of concrete. The laboratory is used for the testing of the aggregates and concrete specimens in accordance with ASTM standards and the ACI code		
Course Aims	The main aims of this course are to: • Furnish the student with basic understanding of the ingredients of concrete and their impact on fresh and hardened properties of concrete. • Teach the student the most appropriate methods to mix, handle, cure, place, compact, and evaluate concrete in its fresh and hardened states. • Provide basic understanding of objectives of different tests performed on different construction materials. • Teach the student the method of testing and ensure that he/she carry out the test him/herself.		
Course Outcomes	Upon completion of this course, the student should be able to: • Understand the process of cement manufacturing and the purpose use of different types of cements. • Select appropriate aggregate and determine its physical properties. • Know the appropriate methods to mix, handle, place, compact, and cure concrete. • Design concrete mixtures to achieve fresh and hardened properties required. • Evaluate fresh and hardened properties in laboratory and field using destructive and non-destructive techniques. • Carry out different tests on cement paste or mortar, mineral aggregate, concrete in its fresh and hardened state, and reinforcing steel.		
Course Name:	**Scientific Research Methods And Applied Stiatistics**		
Course Type:	**Specialization Requirement**		
Course ID.:	**ENGI 3215**	**Course Credit**	**2**

		Hours	
Course Description	Regarding the organization, the book consists of fourteen chapters, well arranged in a coherent manner. Chapter One is an introduction, presenting an overview of the research methodology. Chapter Two explains the technique of defining a research problem. Chapter Three dwells on various research designs, highlighting their main characteristics. Chapter Four presents the details of several sampling designs. Different measurement and scaling techniques, along with multidimensional scaling, have been lucidly described in Chapter Five. Chapter Six presents a comparative study of the different methods of data collection. It also provides in its appendices guidelines for successful interviewing as well as for constructing questionnaire/schedules. Chapter Seven deals with processing and analysis of data. Sampling fundamentals, along with the theory of estimation, constitutes the subject-matter of Chapter Eight. Chapter Nine has been exclusively devoted to several parametric tests of hypotheses, followed by Chapter Ten concerning Chi-square test. In Chapter Eleven important features of ANOVA and ANOCOVA techniques have been explained and illustrated. Important non-parametric tests, generally used by researchers have been described and illustrated in Chapter Twelve. In Chapter Thirteen, an effort has been made to present the conceptual aspects and circumstances under which various multivariate techniques can appropriate be utilized in research studies, specially in behavioural and social sciences. Factor analysis has been dealt with in relatively more detail. Chapter Fourteen has been devoted to the task of interpretation and the art of writing research reports.		
Course Aims	The need, therefore, is for those concerned with research to pay due attention to designing and adhering to the appropriate methodology throughout for improving the quality of research. The methodology may differ from problem to problem, yet the basic approach towards research remains the same.		
Course Outcomes	(i) to enable researchers, irrespective of their discipline, in developing the most appropriate methodology for their research studies; and (ii) to make them familiar with the art of using different research methods and techniques.		
Course Name:	**Construction Methods and Materials**		
Course Type:	**Specialization Requirement**		
Course ID.:	**CONS 5309**	**Course Credit Hours**	**3**
Course Description	The course introduces to the students the basic building materials, with emphasis on techniques for assembly and utilization in residential and light construction, including materials such as concrete, brick, and wood. Introduces students to the vocabulary and knowledge of materials necessary to design and construct buildings.		
Course Aims	The aim of this course is to prepare students for advanced courses in design, estimating, scheduling and project management by providing students with a thorough description of the properties of different materials used in construction		

	and common assembly techniques.		
Course Outcomes	Upon completion of this course, the student should be able to: • List basic construction materials. • Familiar with different materials used in residential buildings. • Explain methods and techniques used in the construction of residential and commercial buildings.		
Course Name:	**Material Science**		
Course Type:	**College Requirement**		
Course ID.:	**CONS 5309**	**Course Credit Hours**	**2**
Course Description	Material science is an informative two credit course. Understanding the bigs, starts by understanding the smalls that build it. Systems are collections of smaller items. When a system is to be studied, it is broken into its smallest parts. Information all lie within the smalls, when we understand the nature of the smalls, we may understand and explain properties of their constellations (big systems). Matter is a collections of atoms as the smallest part. Thus this course describes atoms, their bondings and their aggregates. Systems based on physical and chemical atomic bondings between their builder-atoms, are grouped into physical phases: solid, fluid (liquid or Gas). This course also introduces physical phases, their physical differences, and their possible transformations. Properties of such atomic constellations, i.e., the action-reaction to external physical agents, are specified by the nature of the builder atoms and the external physical agents, e.g., heat and pressure make the phase transformations possible. Solids under normal physical conditions and their related mechanical properties are the main to confront head on within this course. This course introduces the nature of mechanical properties of solids and reasons these properties back to the nature of the constituent atoms, their bondings and their aggregates.		
Course Aims	This two credit course is more into informativeness than into a deep analysis. It will help student learn how to understand big systems by breaking them down to their basis smallest constituents (atoms in general or unit cells in crystallines). It starts from the concept of atoms since matter is built from them (as the smallest part). It then, identifies and differentiates systems based on their builder-atoms, physical phases: solid, fluid (liquid or Gas), and finally study their properties which are the reaction to actions of external physical agents. It explains the mechanism of phase transformation. It focuses on reactions of solid matter to some externally applied physical agents, such as forces, pressure, light and/or temperature and so on. and explains many of the mechanical properties.		
Course Outcomes	By the end of this course students will have gained many of the English terms used in science and Engineering. revise the concept of atoms, and will learn the concept of unit cells, crystal		

	structure and crystal system. connect matter mechanical properties to the smallest constituents and the internal structure (either atoms or crystal structure). differentiate between Crystalline and amorphous solids. understand physical phases and their corresponding transformations. learn about defects in crystals. learn effects of heat and pressure on matter.