

Subject	:	ICC 559 TALLER DE GESTION DE PROYECTOS 2 PROJECTS MANAGEMENT WORKSHOP 2
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	160 Obligatory Credits
OBJECTIVE:		
<ul style="list-style-type: none"> • To develop the investigation or study project, that was approved in the Projects Management Workshop 1. • To achieve a significant advance. • To establish for the project: the institutional environment, the technological contribution, the economic-social profit value and the investment risk. 		
PROGRAM:		
During the semester, activities will develop aiming to:		
<ul style="list-style-type: none"> - To establish the investigation or study final plan. - To determinate the institutional environment in which it will be applied. - The technological contribution that intends. - The project or investigation formulation in academic, social, and economic terms. - To make a risk analysis. - Generation of behavior laws or creation of project solutions, on a optimality base. Analysis of results. Presentation of conclusions and recommendations. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	EII 518 ADMINISTRACION DE EMPRESAS BUSSINES ADMINISTRATION
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	130 Obligatory Credits
OBJECTIVE:		
<ul style="list-style-type: none"> • To analyze the organizations, considering the human, structural, internal, and external factors affecting them. 		
PROGRAM:		
<ul style="list-style-type: none"> - Evolution of the organizational theory. The bureaucratic model. The administrative focus. The human relationships focus. The open systems focus. - The external environment and the organization. Components and characteristics of the external environment. External environment and structure: theory of contingency. Technology and structure. The technological imperative. Planning. Types, characteristic, phases. - Organizational design. Division criteria. Structure and information flow. - Motivation. General concepts. Hierarchy needs. Dual factor of motivation. Expectation theory. - Leadership. Human conduct focus. Situational focus. - Charges evaluation. Charges description. Evaluation methods. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	COM 312 FINANZAS FINANCES
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	130 Obligatory Credits
OBJECTIVE:		
<ul style="list-style-type: none"> • To give to students, basic principles of accounting and finances, permitting them understand the accounting operation as a information and control system. • To form a criterion with regard to the bases of financial decisions. 		
PROGRAM:		
<ul style="list-style-type: none"> - Accounting. Information need in the business. The accounting as a information system. Principles and accounting conventions. Commercial company. Double charge. Currency as valuation base. Historic cost, execution, accumulation, etc. Effects of transactions performed by companies in their financial structure. Assets, passive, incomes and expenses concepts. Basic accounting reports. General balance. State of results. Valuation stocks. Periodic inventory. Stock inventory, valuation stocks system. Associated costs. Characteristic, fixed assets, depreciations. Decreasing and linear methods. Repairs- punishments-improves. Expenses and incomes, classification. Expenses and incomes differed. - Financial Theory. Object of study and action field of finances. Profit value and rotation. Risk and uncertainty. Capital cost. The money in time value. - The assets administration. Prominent elements to consider in the investments of fixed assets. Investments evaluation method. Elements to consider in the investments of current assets. - Financial Analysis. Uses and sources. Analysis of ratios and vertical. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 549 TALLER DE GESTION DE PROYECTOS 1 WORKSHOP OF PROJECTS MANAGEMENT 1
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	140 Obligatory Credits
OBJECTIVE:		
<ul style="list-style-type: none"> • To identify, understand and apply the elements and operational instruments, which facilitate the design and development of investigation works and project study. • To acquire experience in the investigation techniques management. • To design, present and defend the investigation plan or project study for the thesis. 		
PROGRAM:		
<ul style="list-style-type: none"> - The technological factor in business operation. Formulation and investment projects evaluation and technological projects. Investigation and experimental development. Formulation of the subject–problem of the investigation or thesis. Objectives and interests discussion. Hypothesis presentation. Methodologies definition. Project presentation and defense of the investigation or study. - Erudition work in the theme. - The information management. Collection, classification and analysis of consistency. - Use of statistical methods and data processing engineering. - Field or laboratory work. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 546 OBRAS MARITIMAS Y FLUVIALES SEA AND RIVER WORKS
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	ICC 355 HIDRAULICA 2 HYDRAULIC 2
OBJECTIVE:		
<ul style="list-style-type: none"> • To prepare the student for subsequent performance in maritime and river works planning, construction and inspection. 		
PROGRAM:		
<ul style="list-style-type: none"> - Harbor Planning. The port general plan. The port users. The harbor operation. Harbor planning. Determining factors of planning. Oceanographical and coastal engineering. The sea movements. The waves modifications. The sea level variations. Sea current. Casts defense. Marine contamination. - Maritime Works. The maritime zone project. Dikes structure resistance. Slope dikes. Dikes of vertical walls. The dike optimum design. Dredged. Paves design for harbor areas. - River defense works. "Gabion" masonry for protection of river banks. Hydrologic correction works. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 545 OBRAS HIDROELECTRICAS Y DE RIEGO. HYDROELECTRIC AND IRRIGATION WORKS
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	ICC 355 HIDRAULICA 2 HYDRAULIC 2
OBJECTIVE:		
<ul style="list-style-type: none"> • To enable and encourage subsequent professional performance in the study and construction of large, medium and small irrigation and hydroelectric works, giving him the necessary practical and theoretical knowledge. 		
PROGRAM:		
<ul style="list-style-type: none"> - General energy panorama. Hydroelectric power plant and works enclose classification. Forced pipes, surge tanks, turbines and generators design. Dams, spillways and inlets design and construction elements. - The irrigation water institutionally. Relations water-soil-plant. Modern and traditional irrigation methods. Drainage. Design and construction. Conduction and control of hydraulics structures. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject :	ICC 544 CAMINOS 2 ROADS 2
Lecturing weekly hours for semester:	
	Theoretical : 4
	Shop : 4
	Total : 8
Prerequisites :	ICC 454 CAMINOS 1 ROADS 1
OBJECTIVE:	
<ul style="list-style-type: none"> • To provide at students the diverse empirical and theoretical elements to design several highways solution alternatives. • To describe different flexible, semi-stiff paves construction methods. • Application of highways geometrical design concepts to a draft that should be done individually. 	
PROGRAM:	
<ul style="list-style-type: none"> - Pave design methods; stiff, semi-stiff and flexible. - Simplified design methods of stiff and flexible paves. - Paves construction. - Sub-Bases, stabilized bases, roll folders ; superficial processing, priming, Fog, Seal, Slurry Seal, - Hydraulic cement concrete pave, industrial paves, compacted concrete paves. - Road workshop. - Industrial execution of a highway draft. - Previous antecedents of draft. - Plant, longitudinal profile, cross profiles. - Cubic measurement computational program. - Type of drainage works, technical specifications, geometric design memory, structural memory design pave for flexible and stiff alternative; collecting work design memory and draining water. - Official budget. 	

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 543 TALLER DE HORMIGON ARMADO REINFORCED CONCRET WORKSHOP
Lecturing weekly hours for semester:		
		Shop : 4
		Total : 4
Prerequisites	:	ICC 453 HORMIGON ARMADO REINFORCED CONCRET
OBJECTIVE:		
<ul style="list-style-type: none"> • Giving the necessary knowledge to be able to make calculation planes from the calculation memory data and to make steel quantity calculation. 		
PROGRAM:		
<ul style="list-style-type: none"> - Slabs plane - Beams plane. - Walls and pillars plane - Foundations plane - Stairs plane. - Details plane - Wall of holding plane. - Reservoirs plane. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 542 PUNTES Y TUNELES BRIDGES AND TUNNELS
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	ICC 452 ESTRUCTURAS METALICAS Y DE MADERA METALLIC AND WOOD STRUCTURES
		ICC 453 HORMIGON ARMADO REINFORCED CONCRET
OBJECTIVE:		
<ul style="list-style-type: none"> • To apply the knowledge acquired to the highway and railroads bridges construction. • To give the knowledge on explosives and systems of exploding, in cut rocks in banks, trenches and tunnels. • To determinate costs and produce excavation budgets. 		
PROGRAM:		
<ul style="list-style-type: none"> - Bridges. Classification, main parts, evolution. Simple beam bridges. Foundations, requests, construction. Universal, mobile, and fixed supports design. Construction system of bridges in arch, hanging, of hurled beam, others. - Tunnels. Excavations in rock. Drilling system, explosive, exploding in banks, in trenches. Tunnels construction. Drilling, exploding, loading of wasted material, transportation and covering. Illumination, air conditioned and communications installations. Ventilation systems. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	EII 503	EVALUACION DE PROYECTOS PROJECT EVALUACION
Lecturing weekly hours for semester:			
		Theoretical	: 4
		Total	: 4
Prerequisites	:	120 Obligatory Credits	
OBJECTIVE:			
<ul style="list-style-type: none"> • To analyze concepts and to work with basic decisions methods in the economic area. Emphasis in the evaluations relating to capital investments. Regarding to methods utilized, the course is oriented to critical analysis of them, emphasizing its qualities and limitations. 			
PROGRAM:			
<ul style="list-style-type: none"> - Basic Concepts. The estimations in the economic analysis. Cost concepts, the engineer role in the economic decisions. - Mathematical financial. The money value in time. Updating factors. - Methods for the alternatives analysis. Net present value. Annual value or cost. Internal rate of return. Capital recovery period. Methods comparison and discussion. Extensions. - Depreciations. Concept. Methods: lineal, accelerated. Comparison of different methods. The depreciation in Chile. - Taxes. The taxes effects in the economic analysis. Financing. The capital cost. Financing sources. Repayment. The financing effect in taxes. The financing effect in the alternatives evaluation. - Equipment withdrawal and replace. Importance. Replace causes. Executable value. Profits and capital loss. Economic useful life. Model. 			

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 458	PROGRAMACION PROYECTOS PROGRAMMING PROJECTS	Y	CONTROL AND CONTROL	DE OF
Lecturing weekly hours for semester:						
Theoretical : 4						
Shop : 4						
Total : 8						
Prerequisites	:	ICC 356	OBRAS SANITARIAS SANITARY WORKS			
		ICC 443	EQUIPAMIENTO DE EDIFICIOS BUILDINGS EQUIPMENT			
OBJECTIVE:						
<ul style="list-style-type: none"> • To know, understand and apply the planning, programming and control techniques in civil works construction projects. Resources to optimize the times and costs of a civil work project construction. • To develop abilities and dexterities in nettings techniques application, as instruments of construction company management. 						
PROGRAM:						
<ul style="list-style-type: none"> - Construction works programming. Construction business administration. The operating process. Plan, program and control projects. Cubic measure projects systems. Productivity techniques in construction. Projects planning systems. Segregation of the project in project activities. Segregation of the project in basic activities. Precedence matrix. The plan computational processing. Singular works programming. Resources assignment. Flexibility analysis. Resources load curve. Resources leveling. The plan representation. Repetitive works programming. The rhythmic programming and its equations. The factor K and the construction velocity. The rhythmic programming phases. Programming representation in the advance letter. Direct and indirect cost analysis. The work budget. Contracts types, regulations and bids. The payment states, re-adjustability and retentions. - Workshop. Basic programming of a constituted construction project by 50 houses. Making all the technical documentation formed by 20 sub-programs. 						

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 457 INVESTIGACION DE OPERACIONES OPERATIONAL RESEARCH
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	110 Obligatory Credits
OBJECTIVE:		
<ul style="list-style-type: none"> • Acquire the capability of modeling the technological construction reality, utilizing technological, economic, and mathematical descriptions in problems of decision and control of complex and uncertain situations. • Qualify to analyze the results obtained with diverse techniques of Operational research. 		
PROGRAM:		
<ul style="list-style-type: none"> - Introduction to the operational research. Origins, nature and impact of the operational research. - Model and stock systems. General approach. Stock models. Administration systems. Stock planning in a construction company. - Linear programming. The Simplex method. The algebra of method. The duality theory. Assignment, distribution and transportation problems. The simplified Simplex method. - Sensibility analysis. Applications to construction. The operational research in perspective. Approach to the problem. A model construction. Solution. Tests. Controls. Put in practice. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 454 CAMINOS 1 ROADS 1
Lecturing weekly hours for semester:		
		Shop : 4
		Total : 4
Prerequisites	:	ICC 440 MECANICA DE SUELOS 2 SOIL MACHANIC 2
OBJECTIVE:		
<ul style="list-style-type: none"> • Offer at the student a theory that allows them to handle highways geometric design elements. • To give practical, theoretical knowledge and criteria to apply them with soil mechanics concepts and construction machines in earthy works. • The student will have a formation that allows select the most adequate method and calculate the earthy works. 		
PROGRAM:		
EARTH MOVEMENT.		
<ul style="list-style-type: none"> - Soil mechanic on highway applications. - Highway infrastructures and superstructures. - Cuts types designs and embankment in roads. - Soil improvement methods to road foundation. - Bruckner's graphic. - Embankment compacting theory. - Machineries hourly cost. Works cost decision. - Earthy works execution methods. - Machineries purchase. The purchases market alternatives. - Calculation and construction. 		
DESIGN THEORY AND ELEMENTS.		
<ul style="list-style-type: none"> - Fundamentals objectives that highways should comply. - Preliminary design project and final project. - Design elements. Highway capacity, service level; Design and critical velocity. Blankets, links and circulate curves. - Vertical, bank. Highway intersection. Subterranean and superficial drainage calculation. Investment costs and exploitation study. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 453 HORMIGON ARMADO REINFORCED CONCRET
Lecturing weekly hours for semester:		
		Theoretical : 4
		Assistantship : 2
		Total : 6
Prerequisites	:	ICC 441 ESTRUCTURAS 4 STRUCTURES 4
OBJECTIVE:		
<ul style="list-style-type: none"> • To give the necessary basic theoretical knowledge for the structural calculation of reinforced concrete elements in order to achieve, in the future professional, an adequate structural criterion for this type of works execution. 		
PROGRAM:		
<ul style="list-style-type: none"> - Relationships of concrete and steel. Compression - Pillars. Elastic and rupture theory. Simple and ringed stirrups. Flexion. With and without armor measurement. - Rectangular beam in T and L. Tensions diagonals. Torsion. Composed flexion. - Crossed and simple slabs. - Foundations. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 452	ESTRUCTURAS METALICAS Y DE MADERA METALLIC AND WOOD STRUCTURES
Lecturing weekly hours for semester:			
		Theoretical	: 4
		Total	: 4
Prerequisites	:	ICC 441	ESTRUCTURAS 4 STRUCTURES 4
OBJECTIVE:			
<ul style="list-style-type: none"> • Give to the future professional the basic knowledge that permits planning, construction and control of metallic and wood structures. 			
PROGRAM:			
<ul style="list-style-type: none"> - Metallic. General principles in traction, compression, flexion and torsion design. Laminated and bend profiles type. Bolted, repeated and soldiers unions. Beam with partner slab. - Wood. Properties. Types of structural woods. Compression, traction and flexion elements design. Union design: Nailed, bolted and connectors. Laminated wood: measurement. 			

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	DER 173 LEGISLACION SOCIAL SOCIAL LAW
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	100 Obligatory Credits
OBJECTIVE:		
<ul style="list-style-type: none"> • To provide general law notions. • To instruct in the work history and the social-economic doctrines. • To give capability on management of Chilean legislation. 		
PROGRAM:		
<ul style="list-style-type: none"> - Concept of rights. Sources. Classifications. The field of right and its projections. Material fact. Legal fact, legal act, convention, contract. Notions on contractual responsibility. Location of the right of the work. Purposes and characteristic. - The work in different epochs of history. The work facing social -economic doctrines. The birth of social legislation. Social Legislation. Historic antecedents. - Definitions of the work contract parts. The individual work contract. Celebration, modifications and termination. Special and general rules. The work journey. The rests. The remunerations and its protection. The prescription. The unions. The union liberty. The collective negotiation. The collective work contract. The social security. Its objectives. Main Chilean laws. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 447	GESTION ECONOMICA EN LA CONSTRUCCION	ECONOMICA EN LA
			ECONOMIC MANAGEMENT	IN
			CONSTRUCTION	
Lecturing weekly hours for semester:				
			Theoretical	: 4
			Total	: 4
Prerequisites	:	100 Obligatory Credits		
OBJECTIVE:				
<ul style="list-style-type: none"> To develop the capability to analyze the construction problems under a microeconomic focus, by the study of economic theory, group participation and cases of study. 				
PROGRAM:				
<p>- The consumer theory from the construction point of view. The materials, the labor and financial resources as economic goods. The utility. Indifference and budget curves. The income. The elasticity. The business construction company.</p> <p>Production and productivity functions. Product elasticity. Isoquants, isocosts conceptual model. Applications. The equilibrium point. Real restrictions.</p> <p>The production states. The minimum cost and maximum profit analysis. Short and long time functions. The scale economies impact on public works and building costs, segregated analysis. The market. Perfect competence supposed. The house and o the public works market. The builder demand. Offering functions. Dynamic equilibrium. Analysis in monopoly.</p>				

JUAN PALMA
SECRETARIO ACADEMICO

Subject	:	ICC 443 EQUIPAMIENTO DE EDIFICIOS BUILDINGS EQUIPMENT
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	ICC 353 EDIFICACION 2 EDIFICACION 2
OBJECTIVE:		
<ul style="list-style-type: none"> • To know, understand and apply the bases of design, calculation and construction of building installations. • To identify, understand and apply the existing regulation in electric force and gas, in heating, ventilation and air conditioned installations; solid waste management; mechanized transportation and fire protection. 		
PROGRAM:		
<ul style="list-style-type: none"> - Electric Installations. Fundamental concepts. Electric machines. - Gas installations. Current gas, liquid and natural. Norms, materials and projects. - Heating. Thermal permeability. Thermal protection. Heat loss. Isolating materials. - Ventilation and air condition. - Solid waste procedures. Environment protection. - Lifts and mechanical stairs. - Fire protection. - Traction, hydraulic and hydro cable elevators. - Illumination techniques. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 441 ESTRUCTURAS 4 STRUCTURES 4
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	FIS 326 FISICA GENERAL ONDAS MECANICAS MECHANICAL WAVES GENERAL PHYSICS
		ICC 351 ESTRUCTURAS 3 STRUCTURES 3
OBJECTIVE:		
<ul style="list-style-type: none"> • To provide the concepts of structures behavior against seismic action. • To provide the elementary seismology concepts. 		
PROGRAM:		
<ul style="list-style-type: none"> - Structures dynamic. - Seismology. - Velocity and acceleration spectra. - Seismically. - Tectonic plates. - Tsunamis. - Static buildings calculation method. - Stiffness center. - Torsion of plant and height. - Dynamic behavior of structural systems. - Failure in structures by seismic effect. - Repairs. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 440	MECANICA DE SUELOS 2 SOIL MECHANIC 2
Lecturing weekly hours for semester:			
		Theoretical	: 4
		Assistantship	: 4
		Total	: 8
Prerequisites	:	ICC 350	MECANICA DE SUELOS 1 SOIL MECHANICS 1
OBJECTIVE:			
<ul style="list-style-type: none"> • To apply the basic soil mechanics theories to soil engineering problems and foundations. • To relate the soil problems with civil works design. 			
PROGRAM:			
<ul style="list-style-type: none"> - Soil compacting. - Soil stabilization. - Stability of slopes. - Water behavior in soil; soil drainage. - Superficial foundations. - Deep foundations. - Special foundation problems: expansive soil, collapsible, backfill and other. - Elemental principles of dynamic in soil and rocks mechanic. - Soil mechanics case analysis. 			

JUAN PALMA
SECRETARIO ACADEMICO

Subject	:	ICC 356 OBRAS SANITARIAS SANITARY WORKS
Lecturing weekly hours for semester:		
		Theoretical : 4
		Shop : 4
		Total : 8
Prerequisites	:	ICC 345 HIDRAULICA 1 HYDRAULIC 1
OBJECTIVE:		
<ul style="list-style-type: none"> • To qualify the students in the application of theoretical and practical matters to sanitary works in communities and buildings (dwellings, commercial, public buildings, industries, etc.) • To give knowledge of design techniques, hydraulics laws application to using materials and calculations. Methods of exploitation and production of sanitary works. 		
PROGRAM:		
<ul style="list-style-type: none"> - Drinkable Water. Collecting and conduction. Processing for make it potable. Regulation works. Networks and nettings. Pump stations. Home water systems. Basic formulae. Systems of hydro pneumatic pressure. - Home sewer system. Design. Exploitation and conservation. Public sewer system. Networks calculation. INN norms. Tests. Conservation equipment. Risks. Waist water processing. Final disposition. Design and construction. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 355	HIDRAULICA 2
			HYDRAULIC 2
Lecturing weekly hours for semester:			
		Theoretical	: 4
		Assistantship	: 2
		Total	: 6
Prerequisites	:	EST 200	ESTADISTICA DESCRIPTIVA DESCRIPTIVE STATISTIC
		ICC 345	HIDRAULICA 1 HYDRAULIC 1
OBJECTIVE:			
<ul style="list-style-type: none"> To provide the basic knowledge of water behavior in the nature, as well as the empirical and theoretical methods related with the occurrence, distribution and quantification, since they concur to the design and construction of hydraulic civil works for simple or multiple purposes. 			
PROGRAM:			
<ul style="list-style-type: none"> - The water as a resource. The hydrologic cycle. Balance general equation. Hydrometeorology aspects. Rainfall, genesis and characteristic, spatial variation. Intensity, duration, frequency relations. - Statistical hydrology. Design magnitudes calculation. Data consistency analysis. Frequency density usual functions. Period of return. Analytic and graphic frequency analysis. - Physiographic factors. Use of land, soil, effects on the flow. Shape. Hypsometry. Slope. Orientation. Drainage net. Flow measurement. Measurements limninetrical and limigraphical. Discharge measurements methods: Volumetric, slope-area; critical depth; chemical, using salt, rotating meter. Cumulate curves of flow. Reservoirs capacity, safe flow curves. - Hydrogram analysis. The runoff phenomenon. Elementary and unit hydrogram. "S" hydrogram. Synthetic hydrogram. Flood determination, calculation with real and unit hydrogram. The fundamental equation of the hydrology application. Water balance. Reservoirs regulation. Reservoirs operation and safe production. Flow transit. - Groundwater movement: types of aquifers; Darcy's law; coefficient of permeability; Basic flow equations Analytic solutions; well hydraulics; steady and unsteady radial flow in confined and unconfined aquifers; well behavior near a boundary and multiple boundaries. 			

JUAN PALMA
SECRETARIO ACADEMICO

Subject	:	ICC 353 EDIFICACION 2 EDIFICACION 2
Lecturing weekly hours for semester:		
		Theoretical : 4
		Assistantship : 2
		Total : 6
Prerequisites	:	ICC 343 EDIFICACION 1 EDIFICACION 1
OBJECTIVE:		
<ul style="list-style-type: none"> • To give theoretical-practical knowledge on methods, techniques and constructive processes for the execution of the gross work and finishing execution for the different building activities. 		
PROGRAM:		
<ul style="list-style-type: none"> - Form work: traditional, Donath, metallic, Shami, climbing up and slicing. - Technological Innovation. - Closing walls. Retaining walls. - Wood partition construction. - Construction made of masonry of compressed cement blocks. - Construction made of masonry of bricks. - Construction made of masonry of rocks. - Construction made of Adobe and "adobillo". - Construction made of reinforced concrete. High buildings. Scaffolds. - Roofs. Covert. Plumb. - Mezzanine. False ceiling. - Stairs. - Chimneys. - Pave covering. - Doors and windows. - Paintings. Glasses. Mural role. Stuccoes. - Pools. - Workshop: Visits to construction site once a week - Works: Constructive details planes. - Project: Height building. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 351 ESTRUCTURAS 3 STRUCTURES 3
Lecturing weekly hours for semester:		
		Theoretical : 4
		Assistantship : 2
		Total : 6
Prerequisites	:	MAT 323 ECUACIONES DIFERENCIALES DIFFERENTIAL EQUATIONS
		ICC 341 ESTRUCTURAS 2 STRUCTURES 2
OBJECTIVE:		
<ul style="list-style-type: none"> • To provide the basic elemental knowledge on the laws governing the structural elements deformation, as well as those relating to different structural elements when the systems are hyperstatics. 		
PROGRAM:		
<ul style="list-style-type: none"> - Angular and transfer deformations. - Arrows. - Buckling. - Angular rigidity and deformations by shear stress. - Hyperstatics systems. - Clapeyron and Cross methods. - Influence lines. - Stiff frameworks with nodes displacements. - Castigliano's theorem. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 350 MECANICA DE SUELOS 1 SOIL MECHANIC 1
Lecturing weekly hours for semester:		
		Theoretical : 4
		Laboratory : 4
		Total : 8
Prerequisites	:	ICC 341 ESTRUCTURAS 2 STRUCTURES 2
OBJECTIVE:		
<ul style="list-style-type: none"> • To qualify a student for: to identify and classify the different soil types. To recognize different techniques for trials and soil exploitation. To understand the basic behavior of soil-air-water system facing diverse demands. To know the main basic techniques of soil mechanics, as elasticity, consolidation, and shear resistance. 		
PROGRAM:		
<ul style="list-style-type: none"> – Geology basic concepts. Introduction to geotechnical subject. – Soil formation. – Soil properties, indices and classification. – Stress in a soil mass. – The elasticity theory. – The consolidation theory. – The soil shear stress resistance. – Lands push. – Contention structures. – Recognition and research methods. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 345	HIDRAULICA 1 HYDRAULIC 1
Lecturing weekly hours for semester:			
		Theoretical	: 4
		Assistantship	: 2
		Total	: 6
Prerequisites	:	FIS 231	FISICA GENERAL MECANICA 2 MECHANIC GENERAL PHYSICS 2
		MAT 323	ECUACIONES DIFERENCIALES DIFFERENTIAL EQUATIONS
OBJECTIVE:			
<ul style="list-style-type: none"> To understand the fundamental knowledge in static and dynamic behavior of water making possible its physical management, in pressure pipes as well as in free surface conduits. Assimilation of conceptual bases for design, simulation and inspection of hydraulic systems is expected. 			
PROGRAM:			
<ul style="list-style-type: none"> - Fluid properties. Hydrostatic pressure and buoyant, stability of floating bodies. - Basic concepts of fluids motion: Types of flow; stream lines; continuity equations, energy and momentum; flow nets; boundary layer; dimensional considerations. Applications of Bernoulli and momentum equation; flow in a curved path; spillways; orifices; measurement of flows and water head. - Analysis of pipe flow: Laminar and turbulent flow; similarity parameters; energy losses by friction; semi-empirical theory of pipes resistance; transition formula; empirical formulae; minor losses in pipes. - Pipelines and pipe systems: hydraulic and energy gradients; power transmission; discharge under varying head; transient behavior; multiple pipes systems in open, closed and hybrid nets. Numerical resolutions (Cross, Newton-Raphson). - Uniform flow in channels: Laminar flow; empirical and fundamental relationships; best hydraulics section; scouring and silting. - Non uniform flow channels: specific and critical energy; critical and normal depth; general equation of gradually varied flow; classification of surface profiles; control points; outlining of surface profiles; Profile evaluation; hydraulic jump; applications and hydraulic games (software). 			

JUAN PALMA
SECRETARIO ACADEMICO

Subject	:	ICC 347 CONTROL DE PERDIDAS LOST CONTROL
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	EST 200 ESTADISTICA DESCRIPTIVA DESCRIPTIVE STATISTIC
OBJECTIVE:		
<ul style="list-style-type: none"> • To know, understand and apply the present regulation in risks prevention of labor. • To identify, analyze and evaluate the losses factors originated by work accidents and professional illnesses. • To identify and apply the procedures to detect and eliminate losses causes by risk of work. • To create conscience about prevention and loss control. 		
PROGRAM:		
<ul style="list-style-type: none"> - Concept. Historical antecedents. The industrial revolution and the social legislation. The industrial security origins. Law 16744 and its regulations. The work risks consequences. Heinrich's theory. Economic and social impact. Risks and productivity. The accidents main factors: agent, source, type, causes. - Loss control basic principles. Procedures: engineering, instruction and imposition. Statistical control. Investigation, analysis and report. Security inspections, observations and contacts. Security in the work analysis. Motivation and participation. - Risk administration. Work analysis. Control of losses principles. Factors of the accidents. Etiology. The control of losses administration. Accident investigation and analysis, measurement, evaluation and task correction. Ergonomic design and correction. - Industrial hygiene notions. The biological, chemical, and physical risks. Professional illnesses risks control methods. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 344	MAQUINAS DE CONSTRUCCION CONSTRUCCION MACHINES
Lecturing weekly hours for semester:			
		Theoretical	: 4
		Total	: 4
Prerequisites	:	ICC 152	DIBUJO 1 DRAWING 1
		ICC 153	QUIMICA DE LOS MATERIALES CHEMISTRY OF MATERIALS
OBJECTIVE:			
<ul style="list-style-type: none"> • To give a general knowledge of machines elements: motor plant, transmission, rolling train, hydraulic systems, efficiency and performances. • To give a specific mechanical knowledge of the most employed machines in construction works. • To qualify for the administration of a machineries park. 			
PROGRAM:			
<ul style="list-style-type: none"> - Metallurgy. Fixing elements. Pumps. Welding. - Reduction boxes. Mixing concrete machinery and elevators velocities calculation. - Gasoline and diesel motor. Chassis. Clutches. Gear box. - Mechanical and hydraulic brakes. Suspension. Differential system. - Cooling system. - Tractors, excavators, motoleveler. - Cement mixers. Vertical transportation equipment. 			

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 343 EDIFICACION 1 EDIFICATION 1
Lecturing weekly hours for semester:		
		Theoretical : 4
		Assistantship : 2
		Total : 6
Prerequisites	:	ICC 253 TECNOLOGIA DEL HORMIGON TECHNOLOGY OF CONCRETE
OBJECTIVE:		
<ul style="list-style-type: none"> To give a theoretical-practical knowledge on General Ordinance of Construction, project gestation, building techniques and constructive processes for starting and constructing the foundations of building work 		
PROGRAM:		
<ul style="list-style-type: none"> - General Ordinance of Construction. - Productivity, quality, competitiveness and technology in the construction field. - Labor productivity. - Technological Innovation. - Industrialization and pre manufacturing. - ISO 9000. Quality management. - Project gestation. Budget. Proposals. Contracts. - Work installation. - Making the lay out. - Excavations: in trench, in lands saturated. - Ground improvement. - Soil holding works. Cofferdams. - Continous foundations: stone, blocks c.c., simple concrete, H.A. - Concrete platforms: simple concrete, slab of foundation. - Isolate foundations. - Foundation beams. - Foundation on steer. - Floating foundations. - "Moldajes" for foundations. - Paves. Paves covering. - Workshop: Visits to construction site once a week. - Works: Constructive details planes. - Project: House one-family room. "New Work" folder. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 342 TOPOGRAFIA 2 TOPOGRAPHY 2
Lecturing weekly hours for semester:		
		Theoretical : 2
		Shop : 4
		Total : 6
Prerequisites	:	ICC 252 TOPOGRAFIA 1 TOPOGRAPHY 1
OBJECTIVE:		
<ul style="list-style-type: none"> • To know, understand and apply the basic principles of geo-measurements, related to the exact determination of the ground surface • To develop abilities and dexterity in the management of topographical instruments, data calculation, drawing and lay out. 		
PROGRAM:		
<ul style="list-style-type: none"> - Geoides. - Absolute height. - Terrestrial curvature effects. - Levelings. - Simple level of fixed lens. - Corrections. - Sights types. - Errors in the geometric leveling. - Profiles and layout. - Trigonometrical leveling. - Barometric leveling. - Polygonation. - Compensation. - Link with trigonometric point. - Instrumentation. - Method of "estadimétrico". - "Teodolito taquimétricos". - Topographical ground work - Roads works. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 341	ESTRUCTURAS 2 STRUCTURES 2
Lecturing weekly hours for semester:			
		Theoretical	: 4
		Assistantship	: 2
		Total	: 6
Prerequisites	:	FIS 231	FISICA GENERAL MECANICA 2 MECHANIC GENERAL PHYSICS 2
		ICC 241	ESTRUCTURAS 1 STRUCTURES 1
OBJECTIVE:			
<ul style="list-style-type: none"> • To give the basic knowledge of relations on internal tension, where structural elements and composing materials respond to action of external loads. 			
PROGRAM:			
<ul style="list-style-type: none"> - Resistance of materials. - Normal efforts: elasticity, ductility. - Hooke's law. - Cross deformations: Poisson. - Flat sections properties: flexion and shear. - Measurement by flexion and shear. - Composed fatigues: Circle of Mohr. 			

JUAN PALMA
SECRETARIO ACADEMICO

Subject	:	MAT 323 ECUACIONES DIFERENCIALES DIFFERENTIAL EQUATIONS
Lecturing weekly hours for semester:		
		Theoretical : 4
		Assistantship : 4
		Total : 8
Prerequisites	:	MAT 213 ALGEBRA LINEAL LINEAR ALGEBRA MAT 204 CALCULO 2-B CALCULUS 2-B
OBJECTIVE:		
<ul style="list-style-type: none"> • To qualify students for the study of linear systems analysis and to solve differential equations presented in different situations. • To develop the capability of presenting and solving differential equations associated to diverse physical systems, and interpreting results. • To present the theory of linear operators. 		
PROGRAM:		
<ul style="list-style-type: none"> - Ordinary differential equations. Non linear differential equations of first order; separable variables method. Exact differentials. Homogeneous and integral factor. Linear equation of first order. Existence and unity of solutions theorem. The Wronskiano, Abel's formula. Non homogeneous and homogeneous equations of order n. The indeterminate coefficients method. Constant coefficients differentials solution of order "n" by means of state variable. The Euler's equation. Order reduction. Differential equations solutions by mean of powers series: Bessel, Lagrange, Laguerre, Hermite equations. Laplace's transformed. - Sectional continuous and exponential order functions; definitions; properties: conversion in s and t; scale change; transformed of derivative and integral of a function; multiplication and division by t; transformed of a periodic function; theorems of final and initial value; inverse and its properties; convolution theorem; differential equations application of constant coefficients with initial conditions; solutions and elements of stability analysis for differential equations. - Linear differential equations system; matrix methods, Cramer and replacement; Laplace's transformed application; numerical solution, truncation, routines comp. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 253	TECNOLOGIA DEL HORMIGON TECHNOLOGY OF CONCRETE
Lecturing weekly hours for semester:			
		Theoretical	: 4
		Laboratory	: 4
		Total	: 8
Prerequisites	:	ICC 243	MATERIALES DE CONSTRUCCION CONSTRUCTION MATERIALS
OBJECTIVE:			
<ul style="list-style-type: none"> • To explain the necessary knowledge to manufacture and place concretes in work. • To explain techniques of resistances statistical evaluation for the control of the pre-mixed concrete. • To give knowledge on basic concepts of special concretes. • To internalize knowledge and interpretation of laboratory sample analysis. 			
PROGRAM:			
<ul style="list-style-type: none"> - Stone materials - Dosing (theoretical classes and workshops) - Additives - Transportation and placement - Concrete joint. - Quality control. Taking samples of fresh concrete, non destructive and destructive trials, mature concrete testing, characteristic resistance, statistical evaluation. - Special concretes. High resistance, cold weather, warm weather, pumped, dry compacting, self compacting pre-mixed. - Visits to field and special lectures, given by related entrepreneurs, are considered . 			

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 252 TOPOGRAFIA 1 TOPOGRAPHY 1
Lecturing weekly hours for semester:		
		Theoretical : 2
		Shop : 4
		Total : 6
Prerequisites	:	ICC 242 DIBUJO 2 DRAWING 2
OBJECTIVE:		
<ul style="list-style-type: none"> • To know, understand and apply the basic principles of geo-measurement, related to the exact determination of ground surface. • To develop abilities and dexterity in management of topographical instruments, data analysis and calculation, planes drawing and lay out. 		
PROGRAM:		
<ul style="list-style-type: none"> - Definitions and fundamental concepts. Vertical and horizontal measurements. Linear measures and surface unit. Scales. Location signs and of points. Alignment without use of instruments. Direct linear measurement. Tolerances and errors. - Instrumentation. Planes definitions. Problems of obstacles. Surfaces calculation and graphic procedure. - Instrumental errors influence. Rural and urban measurements. - Topographical triangulation. Electronic instruments. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	FIS 326	FISICA GENERAL ONDAS MECANICAS MECHANICAL WAVES GENERAL PHYSICS
Lecturing weekly hours for semester:			
		Theoretical	: 4
		Assistantship	: 2
		Total	: 6
Prerequisites	:	FIS 231	FISICA GENERAL MECANICA 2 MECHANIC GENERAL PHYSICS 2
OBJECTIVE:			
<ul style="list-style-type: none"> • To explain the fundamental principles of classical mechanics with special emphasis in application of elastic theory on undeformig bodies. • To recognize the mechanical variables intervening in natural phenomena of waiving type and in usual technological applications of rational mechanics. 			
PROGRAM:			
<ul style="list-style-type: none"> - Periodic movements. - Superimposition of movements. - Free vibrations of physical systems. - Forced vibrations. - Resonance. - Couple oscillators. Normal modes. - Progressive waves. - Effects due to limits: interference. 			

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	EST 200 ESTADISTICA DESCRIPTIVA DESCRIPTIVE STATISTIC
Lecturing weekly hours for semester:		
		Theoretical : 4
		Assistantship : 2
		Total : 6
Prerequisites	:	MAT 203 CALCULO 2-A CALCULUS 2-A
OBJECTIVE:		
<ul style="list-style-type: none"> • To qualify students in knowledge and handling basic concepts of probabilities; the random variable concept; the hope and variance concepts. • To let them know how to solve probabilities calculation problems; to apply the properties of the hope and variance. • To know and identify some distributions of random variables with special treatment of the normal one. 		
PROGRAM:		
<ul style="list-style-type: none"> - Probabilities. Combinations, permutations and set review. Definitions (random experiment, sampling space, events, probability). Probability theorem. Conditional probability and independence. Total probability theorem. Bayes's theorem. - Random variable. Definition. Quantity function, density function, distribution function. Hope and variance of a random variable. - Binomial distribution. Poisson Distribution. Normal distribution. Descriptive statistics. - The scientific investigation and the role of the statistics. Population and sample. Types of sampling. Tables and graphics. - Measures of central tendency: mean; median; mode; deciles, quartiles, percentiles. - Dispersion mesures: maximum deviation, medium deviation, variance; standard deviation, deviation quartile. - Regression: minimums square method; variance of points around the line; prediction. - Correlation: Correlation Pearson's coefficient; Correlation Spearman's coefficient. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	MAT 204	CALCULO 2-B	
			CALCULUS 2-B	
Lecturing weekly hours for semester:				
			Theoretical	: 4
			Assistantship	: 4
			Total	: 8
Prerequisites	:	MAT 203	CALCULO 2-A	
			CALCULUS 2-A	
OBJECTIVE:				
<ul style="list-style-type: none"> To explain the fundamental tools of calculation in two or more variable in a logical sequence form, qualifying students to present and solve problems by using it. 				
PROGRAM:				
<ul style="list-style-type: none"> - Differential calculation in several variables. Neighborhoods: open set, region, accumulation points. Functions whit two or more variable independent: curves and surfaces level. - Limits: definition, necessary condition, limits algebra. Continuity: definition based on neighborhoods concept, characteristic based on limits. Continuous functions algebra, examples. - Partial derived: definition, geometric interpretation, necessary condition for relative extremes. Partial derived of upper order: mixed derived equality, corollary. - Differentiability: definition, characterization based on existence and continuity of partial derivatives, differential functions algebra and examples, derivative of composed differential functions (chain rule), exact differential and application to approximate calculation of increments, gradient and geometric interpretation in three dimensions, derivative directional, Taylor 's theorem in several variables. - Implicit functions: sufficient conditions, implicit partial derivative, application to tangent planes calculation given in implicit form. - Inverse functions: Jacobiano, inverse transformation differential, partial derivative of inverse functions. - Maximum and minimum: relative, critical points, Lagrange's multiplying. Integration. 				

JUAN PALMA
SECRETARIO ACADEMICO

Subject	:	ICC 243	MATERIALES DE CONSTRUCCION CONSTRUCCION MATERIALS	(continuation)
Lecturing weekly hours for semester:				
			Theoretical	: 4
			Laboratory	: 4
			Total	: 8
Prerequisites	:	ICC 153	QUIMICA DE LOS MATERIALES CHEMISTRY OF MATERIALS	
<p>II Technological description of the construction materials.</p> <ul style="list-style-type: none"> - Sand, gravel, rocks, gluing elements (Cement, asphalt, plaster, lime), mortars and concretes, woods, ceramics, metals, polymers, composed materials. - Laboratories: stone materials, cement, lime, plaster, asphalt, mortars, bricks, pipes and blocks, woods 				

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 243	MATERIALES DE CONSTRUCCION CONSTRUCCION MATERIALS
Lecturing weekly hours for semester:			
		Theoretical	: 4
		Laboratory	: 4
		Total	: 8
Prerequisites	:	ICC 153	QUIMICA DE LOS MATERIALES CHEMISTRY OF MATERIALS
OBJECTIVE:			
<ul style="list-style-type: none"> • To study the behavior of diverse composition or structure materials against exterior agents. • To know the main materials properties of construction. 			
PROGRAM:			
I Materials science bases			
<ul style="list-style-type: none"> - Matter structure. Atomic structure, the atom electronic structure, atomic links, atomic arrangement, crystalline structure, the crystalline structure defects. - Matter states. Matter physical states, dispersed systems, phase diagrams. - Materials properties Matter essential properties, properties evaluation, organoleptical properties, physical properties - Mechanical properties of materials. Resistance to failure, diagram of tension - deformation, elastic deformation, plastic deformation, flowing strength, elasticity module, cut resistance, admissible tension, sagging, thermal loads, flexion, deformability, hardness, tenacity, fracture tenacity, fatigue. - Deterioration of materials. Oxidation, corrosion. Wear and erosion, material submitted to efforts, origin and detection of failures, not destructive test methods. - Materials selection. 			

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 242	DIBUJO 2	
			DRAWING 2	
Lecturing weekly hours for semester:				
			Shop	: 4
			Total	: 4
Prerequisites	:	ICC 152	DIBUJO 1	
			DRAWING 1	
OBJECTIVE:				
<ul style="list-style-type: none"> • To give knowledge and develop abilities to make, read and interpret the planes composing the technical antecedents of a civil work. 				
PROGRAM:				
<ul style="list-style-type: none"> - Architecture project: house (1 Project). - Architecture project: height building (1 Project). - Incorporated furniture plane. - Perspective. - Planimetric work - Eaves constructive details. - Doors and windows constructive details. - Pavés constructive details. - Stairs constructive details. - Structure calculation plane (2 sheets). - Artistic drawing (1 picture). - Civil Works modeling (1 work). 				

JUAN PALMA
SECRETARIO ACADEMICO

Subject	:	ICC 241 ESTRUCTURAS 1 STRUCTURES 1
Lecturing weekly hours for semester:		
		Theoretical : 4
		Assistantship : 2
		Total : 6
Prerequisites	:	FIS 131 FISICA GENERAL MECANICA 1 MECHANIC GENERAL PHYSICS 1 MAT 203 CALCULO 2-A CALCULUS 2-A
OBJECTIVE:		
<ul style="list-style-type: none"> To give students the basic knowledge of laws which govern the systems of loads (forces) acting on structures and the global response that some simple structural elements have. 		
PROGRAM:		
<ul style="list-style-type: none"> - Analytic and graphic static: loads systems, equilibrium composition and decomposition. - Supports systems. Structural elements types. - Reticulates systems: Cremona - Ritter. Reactions determination. - Simple flexion. Flexor moment – Cut effort. - Isostatic beam whit various sections: Gerber. - Arches and frameworks three-articulated. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	FIS 231	FISICA GENERAL MECANICA 2 MECHANIC GENERAL PHYSICS 2
Lecturing weekly hours for semester:			
		Theoretical	: 4
		Assistantship	: 2
		Total	: 6
Prerequisites	:	FIS 131	FISICA GENERAL MECANICA 1 MECHANIC GENERAL PHYSICS 1
OBJECTIVE:			
<ul style="list-style-type: none"> • To explain the fundamental principles of classical mechanics with special emphasis in conservation energy principle application. • To recognize the mechanical variables intervening in natural phenomena and in the usual technological applications. • To apply the principles in technological problems resolution. 			
PROGRAM:			
<ul style="list-style-type: none"> - Stiff body dynamic. - Relativist dynamic. - Oscillatory movement. - Gravitation. - Introduction to theoretical mechanics: Lagrange's and Hamilton's equations. 			

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	INF 315 PROGRAMACION Y METODOS NUMERICOS PROGRAMMING AND NUMERICAL METHODS
Lecturing weekly hours for semester:		
		Theoretical : 4
		Assistantship : 2
		Total : 6
Prerequisites	:	MAT 113 ALGEBRA ALGEBRA MAT 123 CALCULO 1 CALCULUS 1
OBJECTIVE:		
<ul style="list-style-type: none"> • Qualify the student to utilize the computer in resolution of common engineering problems, especially through numerical methods. 		
PROGRAM:		
<ul style="list-style-type: none"> - Introduction to the computer. Data processing generalities. The computer general description. Internal representation of information (numerical systems, codes). Information storage. Information processing. Software. (Application and general concepts of operating system). - Programming. Programming languages. (General concept, instructions types, machine language). Design and representation of algorithms. Language Fortran: instructions, subprograms (modulating concepts, construction and subprograms use), complexes arithmetic, file management. - Numerical problems resolution. Error. Taylor's series. Equations numerical solution. Polynomial approximation. Integration. Differentiation. Ordinary differential equations. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	MAT 213 ALGEBRA LINEAL LINEAR ALGEBRA
Lecturing weekly hours for semester:		
		Theoretical : 4
		Assistantship : 4
		Total : 8
Prerequisites	:	MAT 113 ALGEBRA ALGEBRA
OBJECTIVE:		
<ul style="list-style-type: none"> To allow students the achievement of an efficient language for the study of linear systems, qualifying the students to operate skillfully with the tools of linear algebra, posing and solving problems by means of its use. 		
PROGRAM:		
<ul style="list-style-type: none"> - Algebra of matrix: definitions, matrix set, types, scalar products, sum and product of matrix; null matrix, identity, inverse, transposed, symmetrical, decomposed in block. Reversion of matrix: elemental operations, elemental matrix, matrix equivalence, inverse, a matrix determinant, the determinant properties and calculation, inverse matrix calculation by means of the adjunct matrix. Equations and matrix system : enlarged matrix of coefficients and reduction of the stair form, Gauss elimination method, consistency of a equations system, solution set of a m equations and n unknown system, equations system with $n * n$ matrix (not singular), Cramer's rule. Vectorial real spaces: basic language of algebraic structures, matrix vectorial space, vectorial subspace, intersection and sum of subspace, linear combinations, subspace generated, dependence and linear independence, bases, coordinates regarding a base, dimension (theorems). - Linear transformations: properties; algebra of linear transformations; nucleus, image and rank; isomorphism of vectorial spaces (theorems); linear transformations and matrix, matrix rank; base change matrix; equations and linear transformations system. Proper vectors and diagonalization: polynomial character 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	MAT 203 CALCULO 2-A CALCULUS 2-A
Lecturing weekly hours for semester:		
		Theoretical : 4
		Assistantship : 4
		Total : 8
Prerequisites	:	MAT 123 CALCULO 1 CALCULUS 1
OBJECTIVE:		
<ul style="list-style-type: none"> To present in logical sequential form the integral calculation and the series study. The student should know to operate skillfully with the tools given by the integral calculation and the series study, to present and to resolve situations by means of its use. 		
PROGRAM:		
<ul style="list-style-type: none"> Limited functions integration. Riemann's integral. Calculation fundamental theorem. Properties of the integral for continuous functions. Indefinite integral. Definition. Explicit calculation. The logarithm function. Integration methods. Change of variable. Integration by parts. Formulae of reduction for real powers of trigonometric "polinociones". Integration of real polinomy powers; rational, inverse, and rational trigonometric functions. Areas, volumes, inertia momentum, curves length, revolution surfaces area calculation. Improper integral. Convergence theorem of improper integral of 1^a and 2^a species. Cauchy's value. Numerical series. Successions. Convergence. Numerical series and algebraic properties. Harmonic, geometric, alternated, growing series. Convergence criteria. Comparison among terms. The root, the quotient, the integral tests. Comparison at limit. Functions series. Uniform and punctual convergence. Powers series. Radius and interval of convergence. Taylor and of Mc. Laurin series. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 153 QUIMICA DE LOS MATERIALES CHEMISTRY OF MATERIALS
Lecturing weekly hours for semester:		
		Theoretical : 4
		Total : 4
Prerequisites	:	MAT 123 CALCULO 1 CALCULUS 1
OBJECTIVE:		
<ul style="list-style-type: none"> • The student will achieve capability in the main chemical processes affecting the basic construction materials as metals, cements, plaster, lime, water, etc. 		
PROGRAM:		
<ul style="list-style-type: none"> - Chemical elements. Composed. - Atoms. Molecules. - Atomic Theory. Periodic table. - Metals. Not metals. - Solid states. Liquid states. Gaseous states. - Relative humidity. - Combustion. Inflammation. - Latent heat. - Liquid sub-cooled: asphalts, glasses. - Metallic alloy. - Oxidation. Reduction. Corrosion. - Acids. Bases. - Cements. Lime. Plaster. - Paintings and coverings. - Galvanic Protection. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 152 DIBUJO 1 DRAWING 1
Lecturing weekly hours for semester:		
		Theoretical : 2
		Shop : 2
		Total : 4
Prerequisites	:	ICC 141 INTRODUCCION A LA INGENIERIA EN CONSTRUCCION INTRODUCTION TO CONSTRUCTION ENGINEERING
OBJECTIVE:		
<ul style="list-style-type: none"> To give knowledge and develop abilities to make, read and interpret technical drawings of civil works. To provide the necessary concepts to relate elements in space with coplanar representation. 		
PROGRAM:		
<ul style="list-style-type: none"> - Representation systems. Quadrants or dihedrals. - Point, line and purified planes representation. - True magnitude of depurate line. - Bending planes. - Linear drawing. Straight lines (2 sheets). - Linear drawing. Curves lines (2 sheets). - Technical drawing. (4 sheets). - Plane representation (1 sheet). - Architecture plane (2 projects). - Doors and windows plane (2 sheets). - Roof solutions (1 sheet). - Enlargement and reduction of planes. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	FIS 131	FISICA GENERAL MECANICA 1
			MECHANIC GENERAL PHYSICS 1
Lecturing weekly hours for semester:			
		Theoretical	: 4
		Assistantship	: 2
		Total	: 6
Prerequisites	:	MAT 123	CALCULO 1
			CALCULUS 1
OBJECTIVE:			
<ul style="list-style-type: none"> • To explain the fundamental principles of the classical mechanics with special emphasis in the application of the energy conservation principle. • To recognize the mechanical variables intervening in natural phenomena and usual technological applications. • To apply the principles in resolution of technological problems. 			
PROGRAM:			
<ul style="list-style-type: none"> - Vectors. Definition of scalars, vectors, vectorial algebra, vector components. Force. Torque. Mass center. Static. Cinematic. Rectilinear movement: velocity and acceleration. Vectorial representation. Movement with constant acceleration. - Tangency and normal acceleration components. Circular movement, angular velocity. Relative movement. Relative velocity. Relative uniform movement, rotational movement. Relative movement with regard to the Earth. Lorentz's transformations. Transformation of velocities. Consequences of the Lorentz's transformations. - Dynamics of a particle. Law of inertia. The linear momentum conservation. Mass definition. Second and third Newton's law. Force concept. Units. Share stress. Share stress in fluids. Systems of variable mass. Curvilinear dynamic movements. Angular momentum. Central force. Equilibrium. - Work and energy. Definition of work. Power. Units. Kinetic Energy. Potential energy. Energy conservation. Conservative forces. Potential energy curves. Not consecutive forces. Theorem applied to a particle. Dynamics of a particles system. Mass center movement of a particles system. 			

JUAN PALMA
SECRETARIO ACADEMICO

Subject	:	MAT 123 CALCULO 1 CALCULUS 1
Lecturing weekly hours for semester:		
		Theoretical : 6
		Assistantship : 4
		Total : 10
Prerequisites	:	----
OBJECTIVE:		
<ul style="list-style-type: none"> To present in logical sequence manner the matters of the differential calculation to 1er. Semester students. The student, at the end of the course, will be able to operate skillfully the studied tools, presenting and resolving situations by means of its use. 		
PROGRAM:		
<ul style="list-style-type: none"> - Real Numbers. Numerical line. The real numbers body axioms. Factorizing. Rational powers. Irrational equations. Axiom . Absolute value. The Supreme one axiom. Cartesian product. The general equation straight line in a plan. Slope. Parallels and perpendiculars straight line equation. Circumference, ellipse, parabolic, hyperbola. - Real functions as subset. Domain, co-domain, path, restrictions, types. Special functions. Algebra of functions. Exponential and logarithmic functions, graphic and properties. Graphic of hyperbolic sin. Properties. - Limits and continuity. Algebra of functions limits. Lateral limits. Algebra of continuous functions. Adds, product, quotient. Special continuous functions. Basic theorems. - Derivative concept. Geometric and physical interpretation. Derivative algebra. Derivative from upper order. Implicit functions derivative. Function rate calculation. - Inverse of functions trigonometry. Inverse derivative function and exponential function, logarithmic, hyperbolic. Graphic. Curves, parameterization. Derivative of curve. Graphic. Polar coordinates. Derivatives. Graphic. Differential. Maximum and minimum theorem. Rolle and medium value theorem Applications to number of roots of an equation Rule of L'Hopital. Monotonous sectors of derivable functions. 		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	MAT 113 ALGEBRA ALGEBRA
Lecturing weekly hours for semester:		
	Theoretical	: 6
	Assistantship	: 4
	Total	: 10
Prerequisites	:	-----
OBJECTIVE:		
<ul style="list-style-type: none"> To present, in a logical sequence way, some fundamental algebra topics, necessary to continue Mathematics studies in the University. To achieve dexterity by students in management of concepts and the capability of presenting and solving situations, making use of them. 		
PROGRAM:		
<p>Logical and set. Current and formal language. Proposals and connective. Implication. Equivalencies and tautology. Set and the Boolean algebra. Definition by recurrence. Geometric and arithmetic progressions. Description of natural powers of real numbers. Combinations, permutations and arrangements. "Sumatorias" and "productorias". Theorem of binomial. Measure of angles. Trigonometric functions with dominium in angles and real. Trigonometric identities. Calculation of values. trigonometric equations. Graphics. Theorem of sines, cosines and tangents. Resolution of triangles. Definition of complex numbers. Conjugation. Module of a complex. Operations. Properties. Formula of Moivre and root of a complex, properties, graphic. Logarithm of a complex. Polynomials in one variable. Null polynomial; equality, degree. Summation and product. Division. Roots. Theorem of roots. Theorem of conjugated complex roots. Non reducing polynomials in R. Polynomials functions. Vectors, summation, subtraction, scalar product. Arrows, equality, summation, subtraction, scale product. Norm of vectors, unit vector, interior product. Inequality of Schwartz. Angle. Director cosines of a vector. Distance. Product. Property.</p>		

**JUAN PALMA
SECRETARIO ACADEMICO**

Subject	:	ICC 141 INTRODUCCION A LA INGENIERIA EN CONSTRUCCION INTRODUCTION TO CONSTRUCTION ENGINEERING
Lecturing weekly hours for semester:		
		Theoretical : 6
		Total : 6
Prerequisites	:	-----
OBJECTIVE:		
<ul style="list-style-type: none"> • To give to students an integral knowledge of the University and the Construction Engineering discipline; of relations with other professionals, of professional field of action according to the different subjects conforming the academic plan. • To apply the pre-university education to basic and general engineering most common problems. 		
PROGRAM:		
<ul style="list-style-type: none"> - Measurements and units. Theory of errors. Graphic methods. Coordinates system. Scales. Parametric equations, adjustment curves and minimum square. Polynomial functions. Problems. - General formulae of flat trigonometry. A matrix determinants. Vectorial analysis. Field to scale. Vectorial field. Product to vectorial scale. Vectorial differentiation. Elements optimization. Objective function and problem. Flow diagram. Numerical methods. Numerical calculation of algebraic expressions. - Culture development. Energy and resources uses. The cultural revolutions. The satisfaction of needs. The civil works as cultural appliances. Evolution of civil works. The need and the population. The satisfaction and the available resources. Cultural and natural resources. - The economy and the satisfaction of needs. Qualitative and quantitative deficit. Calculation of quantitative deficit. The qualitative deficit concept. Productivity. Characteristics of construction business environment. Perspectives and tendencies. Cycle of civil work. Type of civil works. Phases of constructive process. 		

JUAN PALMA
SECRETARIO ACADEMICO