

## **I/ Technologic programs (Bachelor Programs)**

### **1- Faculty of Socioeconomic & Managerial Sciences**

#### **1-1 Business management**

##### **1-1-1 Presentation**

The participation of the labor sector and the academy, have to focus with projects that include science, technology and innovation in order to attain a positive and sustainable impact in the different stages in which our students and graduates are involved. The challenges for the managerial education in the program of Business Management are multiple. In addition to a regional perspective, business management requires of components based fundamentally in the development of processes that contribute to the competitiveness of the Small & Medium Sized Companies, with the purpose to face the changes that are generated by the development of the new local businesses with an international vision. Our commitment is the following: "The community and the integral development of our country".

##### **1-1-2 Professional profile**

The Technologist in Business Management of the Technological Units of Santander is able to:

- Manage problems of different areas to generate solutions and help the small and medium sized companies to take decision, developing the different administrative processes in descriptive shape.
- Organize teams of work that generate effectiveness in the financial, technological and human talent resources, to optimize the fabrication's processes or services provision of the small and medium sized companies.
- Manage the integration's processes of human talent setting up the different functions that are developing and forming an intellectual capital in the small and medium sized companies.
- Use applications oriented to maximize the use of economic resources in agreement with the organization's possibilities using tools of financial analysis.

- Set up the Marketing's Strategic Plan of the organization in agreement with the established politic.
- Identify opportunities and set up new businesses plans applying the current administrative tendencies in order to expand the niches of market.
- Manage new styles of virtual businesses in agreement with the application established by the organization.
- Besides, the technologist graduated in Business Management will have the necessary skills to continue his professional training in Companies Administration program of the Technological Units of Santander.

### **1-1-3 Fields of action**

The Technologist in Business Management of the Technological Units of Santander will be able to work in the following fields:

- Operative management of small and medium sized companies and other organizations.
- Manager of departments or administrative units in the administrative activities of an organization.
- Manager in the setup of businesses plans and in the preparation of investment's projects.
- Manager in communication's processes and information's system of the organization.
- Creator and manager of his own small and medium sized company.

### 1-1-4 Plan of studies

SEMESTER	SUBJECT
I	Basic Mathematics
I	Introduction to administration
I	Lecture & Writing Workshop
I	General Accounting
I	Economy & Company
I	UTS functioning
I	Physical Culture
II	Basic Differential calculation
II	General administration
II	Basic Marketing
II	Costs
II	General Administration
II	Companies Legislation
II	Economical politic
III	Basic Integral Calculation
III	Context elective subject I
III	Basic Budget
III	Commercial & Services Administration
III	Planning & Control
III	Financial estates
IV	Financial mathematics
IV	Organization & Management
IV	Deepening elective subject I
IV	Financial management
IV	Companies Workshop
IV	Complement elective subject I
V	Statistics
V	Human Talent Organization
V	Deepening elective subject II
V	Production Administration
V	International Businesses
V	Thesis Project I
V	Context elective subject II
VI	Management of Administration
VI	Deepening elective subject III
VI	Project's formulation & evaluation

VI	Complement elective subject II
VI	Ethical
VI	Thesis Project II
VI	Companies' simulation

### 1-1-5 Elective subject list:

#### Complement elective subject

- Art, culture & society
- Communication
- Radiophone processes
- Cinema & Literature
- Emotional intelligence

#### Context elective subject

- Thought and politic systems
- Development social & regional
- Sustainable Development
- Contemporary social problems
- Science, Technology & Society
- Personal social and business leadership

#### Deepening elective subject

- American administrative tendencies
- Japanese administrative tendencies
- Europeans administrative tendencies
- Negotiation's strategies
- Labor Right
- Commercial Right
- Public Finances
- Markets evaluation

## **1-2 Marketing & Commercial Management**

### **1-2-1 Presentation**

The marketing & Commercial Management Technology of the Technological Units of Santander forms technologists competent in the setup, development and approach of marketing strategies, that allows them to set up processes of markets investigation; possessors of commercial and negotiations skills; with a wide knowledge of the social, economic, cultural and technological environment with a vision local, regional, national and international.

### **1-2-2 Professional profile**

The Technologist in Marketing of the Technological Units of Santander is able to:

- Identify the distinct variables of the environment using the market segmentation
- Set up the marketing's plan, like strategy of positioning and competitiveness.
- Realize markets investigation in order to define guidelines of the consumer's behavior.
- Develop marketing mix as a strategy for the positioning of national and international products.
- Participate in the process of design and development of new products and services.
- Boost the undertaking as company's creator in order to improve the quality of life and generate employment.
- Be an ethical professional as graduates of the Technological Units of Santander.
- Recognize and respect the social ethical and citizen norms.

### 1-2-3 Fields of action

- Supervisor of Marketing and Sales
- Executive of Accounts in Advertising Companies.
- Assistant in business consulting, corporate image and events in the commercial area.
- Assistant of Markets Research
- Commercial adviser.
- Collaborator in Marks Consulting and Commercial Franchises.
- Entrepreneur and generator of employment through the creation of companies.

### 1-2-4 Plan of studies

SEMESTER	SUBJECT
I	Basic Mathematics
I	General Administration
I	Economy & Companies
I	Basic Marketing
I	UTS functioning
I	Lecture & Writing Workshop
I	Physical Culture
II	Basic Differential calculation
II	Administrative processes
II	Consumer's Behavior
II	Creativity & Design
II	Companies Right
II	Context elective subject
II	Complement elective subject
III	Statistics
III	General Accounting
III	Logistic & Distribution Management
III	Qualitative Markets Research

III	Basic advertising
III	Context elective subject
III	Complement elective subject
IV	Financial mathematics
IV	Exhibition & Merchandising
IV	Sales Management
IV	Advertising Design Laboratory
IV	Introduction to International Business
IV	Sales Management
IV	Planning & Control
IV	Deepening elective subject
V	Costs & Budget
V	Plan de Marketing
V	Commercial capacities
V	Prices strategy
V	Product & Innovation development
V	Deepening elective subject
V	Thesis project I
VI	Administration of Human Talent
VI	Basic Microeconomics
VI	Basic International Business
VI	Green Marketing
VI	Deepening elective subject
VI	Ethical
VI	Thesis project II

### 1-2-5 Elective subject list:

#### Complement elective subject

- Organization & Methods
- Production's Control

**Context elective subject:** Personal social and business leadership

### **Deepening elective subject**

- Financial Marketing
- Touristic & Sportive Marketing
- Participative Marketing
- Franchises
  
- E-Commerce
- Advertising semiotic

### **1-3 Financial accounting**

#### **1-3-1 Professional profile**

The Financial Accounting Technologist of the Technological Units of Santander is a professional able to:

In the Countable:

- Implement systems of financial accounting.
- Classify information to prepare financial states.
- Analyze economic and financial information of the organizations applying financial tools.
- Manage plans of treasury and portfolio's management.

In Costs:

- Manage inventories, pay and control the goods and supplies thanks to recognized methods and techniques.
- Compile and organize information for the budgets and financial projections preparation.



**In Taxes:**

- Process countable information related with taxes and tributary responsibilities.
- Elaborate tributaries statements for natural people, micro companies and small companies, applying the valid norms.
- Participate to planning processes, management and tributary execution in the organizations.

**In Audit and control:**

- Execute plans of internal control
- Participate to plans of audit and control thanks to processes of compilation, organization and processing of financial information.

**1-3-2 Fields of actions**

- Assistant of countable systems and costs
- Assistant of internal control and fiscal revision
- Assistant of financial audit
- Auxiliary of portfolio and treasury departments
- Auxiliary of production's department
- Auxiliary of human resource and payment department
- Director of cellar and inventories manager
- Auxiliary of taxes
- Commercial manager

### 1-3-3 Plan of studies

SEMESTER	SUBJECT
I	Basic Mathematics
I	Economy & Companies
I	General accounting
I	Introduction to accounting
I	General administration
I	Lecture & Writing Workshop
I	UTS functioning
II	Basis of Differentials calculation
II	Micro economy
II	Financial accounting I
II	Commercial legislation
II	Information's systems
II	Complement elective subject I
II	Context elective subject I
III	Basis of Integral Calculation
III	Financial accounting II
III	Occupational legislation
III	Deepening elective subject I
III	Complement elective subject II
III	Context elective subject II
IV	Financial accounting III
IV	Financial mathematics
IV	Costs I
IV	Tributary I
IV	Markets management
IV	Deepening elective subject II
V	Statistics
V	Financial analysis
V	Costs II
V	Tributary II
V	Internal control
V	Deepening elective subject III
V	Thesis project I
VI	Inferential statistics
VI	Countable theory

VI	Production's management
VI	Deepening elective subject IV
VI	Thesis Project II

## 1-4 Agro industrial management

### 1-4-1 Presentation

Agro industrial management, is the alternative of development in front of the free trade agreements requirements signing by the country; it allows to the agricultural producers to be actors of the productive chain in order to achieve high places levels of productivity and competitiveness with added value and criteria of sustainability zero emission.

### 1-4-2 Professional profile

The technologist in agro industrial management is able to:

- Formulate and evaluate agro industrial projects that satisfy the needs of the consumer expiring with quality parameters.
- Integrate human talent, natural, physical and economic necessary resources to stimulate the agro industrial development in ideal form.
- Manage the agro industrial development using efficiently the information systems.
- Lead processes of technological development between the rural communities in order to promote changes with quality in life conditions.
- Develop systemic approaches from the sectorial visions of the agroindustry optimizing the productive chains.
- Integrate the research for the technological development framed inside the sustainability of environment.
- Propose initiatives for the entrepreneurship of the organizations
- Understand the composition and behavior of the biological raw materials in the processes conditions, in order to to preserve and to improve organic and sensory characteristics of the products.

### **1-4-3 Fields of action**

The technologist in agro industrial management is able to:

#### **AGRICULTURE**

- Apply technologies for the improvement of the productivity and the products quality of the rural sector.
- Apply sustainable and sustainable practices of the agricultural activity.
- Organize information to produce reports and to elaborate budgets.
- Register information for the control of the production.
- Analyze and interpret economic, environmental and social indicators.
- Manage credit analysis.
- Formulate agricultural projects.
- Plan credits for agricultural promotion.
- Plan units of agricultural production.

#### **AGROINDUSTRY**

- Apply technologies in transformation processes of biological raw materials.
- Apply technologies in the conservation of agricultural products.
- Register information for the control of the production.
- Apply controls of the quality.
- Register and calculate unitary costs of production.
- Register and control inventories.

- Plan agro industrial production.
- Organize information to produce technical reports and to elaborate budgets.
- Monitor the quality of raw materials.
- Formulate agro industrial projects.

## MARKETING

- Classify product according to normativity and standards.
- Plan the purchase of agricultural and agro industrial products.
- Plan the sale of agricultural and agro industrial products.
- Register and control inventories.
- Register information, process statistically and elaborate technical reports
- Apply market research instruments
- Apply storage technologies of agricultural and agro industrial products

### 1-4-4 Plan of studies

SEMESTER	SUBJECT
I	General administration
I	Economy & Companies
I	Superior algebra
I	Introduction to agroindustry
I	Agriculture typology
I	UTS functioning
I	Lecture & Writing Workshop
II	General accounting
II	Administrative processes
II	Differentials calculation
II	Agronomy I
II	Microbiology

II	Livestock systems
II	Context elective subject
III	Statistics
III	Financial mathematic
III	Agronomy II
III	Biotechnology in Agroindustry
III	Companies Right
III	Research methodology
III	Context elective subject
IV	Administration of Human Talent
IV	Production management
IV	Deepening elective subject
IV	Post-harvest management
IV	Deepening elective subject
IV	Geographic Information System & Regional agriculture development
V	Basic Marketing
V	Costs & Budget
V	Quality system
V	Agro industrial processes
V	Deepening elective subject
V	Complement elective subject
VI	Formulation & Evaluation of project
VI	Basis of tributary
VI	Deepening elective subject
VI	Inferential statistics
VI	Sustainable production
VI	Deepening elective subject
VI	Ethics

## **1-5 Sports**

### **1-5-1 Presentation**

The Sports technology offers basic training in technology and didactics of times and marks, combat and games sports that contribute with the integral formation of human being and the creation of sports talents groups. Endowing the student of concrete tools that allow him to penetrate with the major efficiency into the context of body development and human mind, in levels of sports formation, competition and physical activity. The sciences applied to the sport is turned as a fundamental sustenance for knowledge and experience of teachers.

### **1-5-2 Professional profile**

The Sports Technologist is a professional able to:

- Recognize and apply different strategies and methodologies focused on the education of the movement and the sports training from the school and the sports initiation.
- Plan, manage and control programs of formation sports training of and biological adjustment.
- Create and organize sporting entities as schools of training and sports clubs legally constituted.
- Lead sports processes between the community in order to promote social changes and integral development of the human being.
- Create and apply programs for children and teens implementing an integral model that is taking into account food habits, practice of the physical - sports activity and the promotion of a physical prophylactic culture.
- Recognize and apply different strategies and methodologies focused on the education of the movement.
- Formulate and develop projects stimulating physical-sports activity in the educational entities or institutions for different types of population. Orientate the learning of a specific sport in sports schools as a point of beginning for the physical and functional development for children and young persons.

- Apply principles of sports training in the orientation of programs for sports initiation.
- Plan strategies focused on the physical and mental development of the persons taking as a base the practice of physical and sports activity.
- Participate to the construction of a physical prophylactic culture for the suitable use of the free time advising on the risk of use of alcohol and drugs

### **1-5-3 Fields of action**

- Manager proposing didactic and formative programs directed specially the sports initiation.
- Creator running programs of physical activity and sports for children, taking into account the development of sensitive phases, in sports educational institutions
- Assessor of schools and sports clubs in specific sports.
- Technical director and trainer of children training groups.
- Sports Instructor in entities or educational organizations, training persons or integral sportsmen and sportswomen.
- Guidance counselor of companies and organizations in relation with the prevention in health across programs of sport focused for the improvement of the community life's quality.

In addition, the technologist can hold a position of technical and pedagogical guidance counselor in sports entities of the public and private sector, in educational communities, associations, schools, gymnasia, centers of sport and recreation.



### 1-5-4 Plan of studies

SEMESTER	SUBJECT
I	Biology
I	Basic mathematics
I	Mobility
I	Swimming
I	Gymnasia
I	UTS functioning
I	Lecture & Writing Workshop
I	Complement elective subject
II	Morphology
II	Mechanics
II	Time & Mark Sports
II	Athletics I
II	Sports pedagogy
II	Introduction to psychology
II	Complement elective subject
III	Statistics
III	Physiology of morphology
III	Agronomy II
III	Biomechanics
III	Teams sports
III	Athletics II
III	Sports psychology
III	Complement elective subject
IV	Chemistry
IV	Exercises physiology
IV	Fighting sports
IV	Sports rights
IV	Theory & Methodology of practice
IV	Games pedagogy
IV	Context elective subject
V	Medicine of sport
V	Sports for disabled persons
V	Anthropometry & Nutrition
V	Deepening elective subject
V	Strength

V	Pedagogical practice
V	Thesis project I
VI	Physical activities & chronicle illnesses
VI	Deepening elective subject
VI	Deepening elective subject
VI	Practice of performance
VI	Thesis project II

## 1-6 Finances & banking

### 1-6-1 Presentation

The Technology in Banking and Finance, is conscious that the country and its economy, demand qualified and motivated technologists, that contribute to the development of money managing in the different topics, persons, clients, operations, transactions and everything what happens about the bank estates; capital market (stock markets, stockbrokers, tables of money, financial intermediaries) and in general the institutions that compose the financial system of the country. The program projects its educational action, across the critical and reflexive analysis and the configuration of solutions in social, labor and community environments. The value of the research, as an area orientated to create, develop, apply, construct and spread knowledge in scientific and technological levels, in order to promote the urban and regional developments its area of influence.

### 1-6-2 Professional profile

The Technologist in Banking and Financial Institutions will be able to:

- Interpret financial statements, riders and financial indicators in order to help the management in decisions making, maximizing the economic value of the organizations.  
Put into effect planning processes in an intermediate level, looking for the improvement of business operational results.
- Apply financial tools to operative, administrative and commercial level in the financial institutions, in order to provide a better service to the client.  
Evaluate alternatives of investment for SME, by means of financial malingerers in order to facilitate a correct decision making.

- Use instruments, tools and technologies that are in use in the processes of decision making in relation with investment, financing and the distributions of usefulness.  
Analyze microcredits in commercial banking and entities of financial intermediation.  
Manage operative sub processes in organizations, based on managerial procedures.
- Realize market researches in public and private entities investment projects.  
Advise the commercialization of banking & financial intermediation entities.
- Run the financial planning of SME, which allows to analyze the existing interrelationship between the decisions of investment and financing.
- Assistant of Stock exchange - Trader.

### **1-6-3 Fields of action**

- Commercial assistant.
- Commercial adviser.
- Chief of portfolio.
- Assistant of audit.
- Business and bank services assistant.
- Principal cashier.
- Credit chief.
- Fiduciary Chief
- Financial assistant of public or private entities.
- Controller assistant in entities of the public sector.
- Assistant of budgets in public or private entities.

- Credit analyst to intermediate level in organizations.
- Analyst of planning to intermediate level in organizations.
- Auxiliary bank employee in financial institutions.
- Commercial assistant in financial institutions.
- Assistant of treasury
- Stock exchange operator
- Stock exchange assistant - Trader.

#### 1-6-4 Plan of studies

SEMESTER	SUBJECT
I	Basic Mathematics
I	UTS functioning
I	Lecture & Writing Workshop
I	General accounting
I	Economy & Companies
I	Introduction to banking
I	Physical culture
II	Basis of Differentials calculation
II	General administration
II	Commercial legislation
II	Banking accounting
II	Banking portfolio
II	Monetary theory & politic
III	Basis of Integral Calculation
III	Statistics
III	Financial mathematics
III	Neurolinguistic Programming
III	Complement elective subject
III	Finances I
IV	Ethics
IV	Basic marketing
IV	Work legislation

IV	Deepening elective subject
IV	Costs & Budgets
IV	Finances II
V	Administrative processes
V	Formulation & Evaluation of Projects
V	Analysis of credits
V	Market of capitals
V	Thesis project I
VI	Context elective subject
VI	Management of human talent
VI	Basis of Tributary
VI	Banking & Financial Management
VI	Deepening elective subject III
VI	Financial simulation workshop
VI	Thesis Project II

## 1-7 Sustainable tourism

### 1-7-1 Presentation

The program of Sustainable tourism technology has been designed by the intention of training bilingual technologists in sustainable tourism with generic and specific competences that allows them to contribute to the sustainable development of this important sector of the economy; which, in agreement to the plans of the national and regional order, is called to be one of the principal engines of economic and social development for the country and its regions.

### 1-7-2 Professional profile

The technologist in sustainable tourism understands the basic aspects of the sustainable development of the tourism; in such a way answers as well to the current requirements derived from professional activities as to the new scenes produced by social changes, globalization and development of the knowledge in the tourist industry.

In consequence, the Technologist in Sustainable Tourism is a professional able to:

- Promote the development of the sustainable tourism in the zone of development of his professional activity, in agreement with the policies and plans of local development.

- Elaborate, help and control systems of management for the sustainability, in agreement with the normativity.
- Take part in the implementation of policies, plans and programs in the organizations for the sustainable development of tourism.
- Instruct the group of tourists over particularities of each one of the attractions, routes, circuits and tourist establishments visited, in agreement with the information recorded in leaflets and other promotional documents.
- Orientate the tourist or traveler about normativity and good environmental practices, in such a way that his stay contributes to the sustainable development of the sector.
- Develop programs of tourist and environmental sensitization for the community, in order to develop the tourist and environmental culture necessary for the sustainable development of the sector.
- Communicate correctly in his mother language and in a second one with the group of tourists and with the support personnel of the different tourist entities.

### **1-7-3 Fields of action**

The Technologist in Sustainable Tourism, will be able to give his professional services in entities of housing, urban and rural accommodations, camping, clubs of vacations, desks of compensation, gastronomic and hotel entities, tour operators, travel agencies, museums, theme parks, nature reserves, eco tourist, companies of well-being companies of tourist transport and in public institutions as secretaries of development and tourism and decentralized institutes:

#### **Agent / Promoter of Tourist Sustainable Development:**

- Ability to elaborate, develop and evaluate specific development projects of sustainable tourism for private entities.
- Ability to help to the secretariats of development and tourism and other public entities, in the implementation of policies, programs, plans and governmental projects in relation with the planning and development of the tourism, in a zone or a locality.

**Tourist informer:** ability to supply services of information about attractions and tourist services, routes and circuits in his zone of influence, in fixed or Itinerant Positions of Tourist Information and in public and private entities.

**Administrative assistant:** ability to supply services as adviser or administrative assistant of organizations that need the implementation of a management system for sustainability; or marketing assistant for the promotion of destinations, programs, products and tourist attractions.

**Responsible of sensitization programs:** ability to elaborate and run seminars-workshop, conferences and/or programs of sensitization for the Community, on topics related to the sustainable development of the tourism

### 1-7-4 Plan of studies

SEMESTER	SUBJECT
I	Basic Mathematics
I	General administration
I	Introduction to sustainable tourism
I	Physic geography
I	Basic English A1
I	UTS functioning
I	Lecture & Writing Workshop
II	General Accounting
II	Services management processes
II	Fauna & Flora
II	Touristic geography
II	Basic English A2
II	Physic culture
II	Context elective subject
III	Costs & Budgets
III	Touristic & Environmental Legislation
III	Management system for sustainability
III	Touristic inventories
III	Intermediate English B1
III	Basic Informatics
IV	Financial mathematics
IV	Quality management in sustainable tourism
IV	Group management technics

IV	Intermediate English B1.2
IV	Deepening elective subject
IV	Information systems based on Internet
IV	Complement elective subject
V	Companies Workshop
V	Statistics
V	Basic touristic marketing
V	Planning of sustainable tourism
V	Patrimony interpretation
V	Advanced English B2.1
V	Deepening elective subject
V	Thesis Project I
VI	Touristic market research
VI	Project's formulation & evaluation
VI	Touristic guiding
VI	Advanced English B2.2
VI	Deepening elective subject
VI	Complement elective subject



## **2- Faculty of Natural Sciences & Engineering**

### **2-1 Electronic**

#### **2-1-1 Presentation**

The program of Technology in Electronics works around the development and welfare that generates the science at the service of the man in coherence with the rational use of resources, its implementation through optimum electronic design and the own innovation of qualities processes that reflect the excellence and creativity of those that propose initiatives with vision of future. The principles that orient the program are based on the critical analysis, the respect of difference and individuality in relation with the national and international politics of science and technology.

#### **2-1-2 Professional Profile**

The Technologist in Electronics of the Units of Technological of Santander is a professional able to:

- Execute activities in relation with the handle of the electronic components presents in the Telecommunications systems with base in the norms of the systems operation.
- Implement systems of electronic control in the organization production's processes using tools of the basic, digital and industrial electronics.
- Develop in low and high level software's applications that allow the implementation of actions and control based in the use of microcontrollers and microprocessors.
- Apply the instrumentation in the diverse electronic systems or part of integrated systems in teams of another technological nature (electrical, magnetic, biological, thermal, optical, etc.) in concordance with the subject variables to measurement.
- Develop activities of preventive and corrective basic maintenance in electronic equipments s in accordance with technical specifications.

### 2-1-3 Fields of action

- Electronic Engineering (applications, software's development, hardware's adaptation)
- Engineering in electronic control and instrumentation (Preparation and realization of designs and elementary controls applications of domestic and industrial applications)
- Electrical Engineering (adaptations of industrial type for power's engineering in the area of software and hardware for simulation and design)
- Engineering of production (Adaptation of technology as well as maintenance of systems and industrial processes)
- Engineering in Telecommunications (Applications in analogous and digital communications, to adapt and keep basic systems in communications and telecommunications)
- Interdisciplinary between systems and environment (Adaptations and designs of basic applications to contribute with the environmental impact of the processes)

### 2-1-4 Plan of studies

SEMESTER	SUBJECT
I	UTS functioning
I	Upper Algebra
I	Lecture & Writing Workshop
I	Basic Mathematics
I	Complement elective subject I
I	Logic & Algorithm
I	Trigonometry & Analytic Geometry
I	Physical Culture
I	Context elective subject I
II	Differentials calculation
II	Context elective subject II
II	Complement elective subject II
II	Mechanic
II	Analysis of Electronic Circuits I

II	Laboratory of Measures & Electronic Circuits
II	Programming
III	Deepening elective subject I
III	Integral Calculation
III	Electromagnetism
III	Analysis of Electronic Circuits II
III	Electronic I
III	Laboratory of Electronic I
IV	Laboratory of Physic
IV	Multivariable calculation
IV	Signals & Systems
IV	Electronic II
IV	Laboratory of Electronic II
IV	Digital Electronic I
IV	Laboratory of Digital Electronic I
IV	Deepening elective subject II
V	Analogous Communications
V	Microprocessors I
V	Digital Electronic II
V	Laboratory of Digital Electronic II
V	Electronic III
V	Deepening elective subject III
V	Thesis Project I
V	Laboratory of Electronic III
VI	Digital Communications
VI	Electronic Devices
VI	Laboratory of Analogous Communications
VI	Deepening elective subject IV
VI	Microprocessors II
VI	Thesis Project II
VI	Systems of Analog Control

## **2-1-5 Elective subject list:**

### **Deepening elective subject**

- Basic Instrumentation
- Reds
- VHDL
- Techniques of Maintenance
- Audios & Videos Systems
- PLC

### **Complement elective subject**

- MATLAB
- Industrial Security
- Advanced Programming

### **Context elective subject**

- Entrepreneurship
- Science, Technology & Society
- Contemporary social problems

## **2-2 Informatics System Development**

### **2-2-1 Presentation**

The program of Technology in Informatics System Development is framed in the Software's Engineering. The technologist of this program will be able to implement software in efficient way and realize its respective maintenance. This activity is necessary due to the fact that big and costly software's often play a vital role in applications of critical security. These technologists have to combine the experience in sciences of computation, engineering and mathematics to design, define and organize diverse appearances of complex software.

### **2-2-2 Professional Profile**

The Technologist in Informatics System Development of the Technological Units of Santander will be able to:

- Implement computer applications using developments methodologies of software and technologies of emergent information, to support the solution of the problematic in productive context.
- Operate and maintain computer systems of an organization, taking into account the specifications and international standards regarding the development and new technologies of software and hardware.
- Configure, manage and apply strategies of security in diverse types of servers.
- Design and manage models of Relational Databases taking into account rules of normalization that guarantee the flexibility in the handle and data's integrity.
- Advise the organizations for the acquisition of technological resources that give support to the different processes with the objective to improve levels of innovation and competitiveness.

### **2-2-3 Fields of action**

- Software's developer: implement computer applications, having as reference the elements of programming and administration of databases for its correct construction.
- Operator of Computer Systems: manage and maintain the applications of software in the organization.
- Servers Administrator: manage hardware and installs software on the servers of the organizations.
- Administrator of Databases: manipulate databases systems of the computer applications, having a basic knowledge of SQL and programming languages.
- Adviser of Technologies: orient the acquisition and implantation of new technologies for the business surroundings.

## 2-2-4 Plan of studies

SEMESTER	SUBJECT
I	Basic Mathematics
I	Trigonometry & Analytic Geometry
I	Algorithmic Thought
I	Basic Informatics
I	Lecture & Writing Workshop
I	UTS functioning
I	Context elective subject I
II	Differentials calculation
II	Mechanic
II	Analysis & Design oriented to object
II	Databases Design
II	Computers Structure
II	Informatics systems planning
III	Integral Calculation
III	Programming oriented to object
III	Databases motors
III	Operative's Systems
III	Selection & Evaluation of Technologies
IV	Electromagnetism
IV	Basic Programming
IV	Web Programming
IV	Servers Administration
IV	Deepening elective subject I
IV	Context elective subject II
IV	Complement elective subject I
V	Physics Laboratory
V	Java's Programming
V	Data's Structure
V	Security of Information's Technologies
V	Deepening elective subject II
V	Thesis Project I
VI	Multivariable calculation
VI	Development of Companies Applications
VI	Introduction to Engineering
VI	Deepening elective subject III
VI	Complement elective subject II
VI	Thesis Project II

## **2-3 Operation and Electromechanical Maintenance**

### **2-3-1 Presentation**

The Technology in Operation and Electromechanical Maintenance is a relatively new profession that has taken strength by the contribution to the development and constant update of the technology involved in industrial processes, especially when it wraps the systems that integrate electrical and mechanics elements without forgetting the electronic, control and automation's components. The industry always will have equipments that need maintenance, adaptations or remodeling: the program generates some very big expectations in the labor's field, especially with the graduates of the institution, because of the high quality showed in the development of the gained competences.

### **2-3-2 Professional profile**

The technologist in Operation and Electromechanical Maintenance is able to:

- Install, control, transform, keep and operate electromechanical systems such as: systems of transmission, systems of electrical energy distribution, systems of electrical team's protection and control, processes of automation and control.
- Control and supervise electrical, industrial, hydraulic and thermal machines and industrial installations of mid and low tension.
- Select, control, supervise and implant processes of mechanical components manufacture.
- Select, install, control, operate and keep equipments of refrigeration and air conditioned.
- Select, install and operate measurement's instruments in the electromechanical area.
- Execute and supervise systems and technicians of maintenance.
- Analyze and interpret norms, specifications, codes, manual, planes and diagrams of electrical and mechanical equipment

- Apply the norms and regulations of security and hygiene in all the activities that is developed.
- Participate in programs of total quality.
- Participate in the generation and development of investigations projects in the electromechanical area, for the benefit of the society.

### **2-3-3 Fields of action**

The technologist in Operation and Electromechanical Maintenance is able to:

- Development and innovation of processes and electromechanical systems in small and medium sized industries.
- Application of mechanized processes for preparation and recovery of machines elements.
- Design of basic control systems that take part in processes of manufacture and assemble of mechanical pieces.
- Implementation of automation's systems for the control of all equipments type.
- Control and report of the information for the automation and control of electromechanical systems.
- Systems Administration and establishment of machines maintenance in the industry.
- Selection and development of refrigeration's systems and air conditioned.
- Appropriation of the technology for the transformation and adaptation of the machines and electromechanical systems.



## 2-3-4 Plan of studies

SEMESTER	SUBJECT
I	Basic Mathematics
I	Trigonometry & Analytic Geometry
I	Chemistry of processes
I	Logic & Algorithms
I	Descriptive Geometry
I	Lecture & Writing Workshop
I	UTS functioning
I	Context elective subject I
I	Context elective subject II
II	Differentials calculation
II	Mechanic
II	Electric circuits Analysis I
II	Materials
II	Design with Computer
II	Introduction to Engineering
II	Complement elective subject I
III	Integral Calculation
III	Electromagnetism
III	Electric circuits Analysis II
III	Static
III	Selection & Evaluation of Technologies
III	Mechanicals processes
III	Mechanical measures laboratory
II	Complement elective subject II
IV	Multivariable's calculation
IV	Physics Laboratory
IV	Electrical Machines I
IV	Electrical Machines Laboratory
IV	Servers Administration
IV	Materials Resistance
IV	Thermodynamic
IV	Deepening elective subject I
V	Electronics I
V	Mechanisms
V	Machine Elements Design
V	Internal Combustion Motors

V	Industrial Maintenance
V	Deepening elective subject II
V	Deepening elective subject III
V	Thesis Project I
VI	Electronics Laboratory I
VI	Electro mechanics operation & Assembly
VI	Electrical Machines II
VI	Electrical Machines Laboratory II
VI	Electrical Actions
VI	Electrical Actions Laboratory
VI	Refrigeration & Air Conditioned
VI	Deepening elective subject IV
VI	Thesis Project II

### 2-3-5 Elective Subjects List

#### Deepening elective subject

- Basics Pneumatic
- Basics hydraulic
- Industrial Instrumentation
- Electrical Industrial System
- Sub Electric Stations
- Micro Controllers

#### Complement elective subject

- MATLAB
- Industrial Security
- Norms ISO 9002 & Security

#### Context elective subject

- Environment & Durable Development
- Science, Technology & Society

## **2-4 Environmental Resources**

### **2-4-1 Professional Profile**

The Technologist in Environmental Resources of the Technological Units of Santander is able to:

- Identify environmental impacts in the natural resources, recognizing the causes and consequences generated by different alterations, with the objective to support the process of environmental licenses management.
- Use equipment of specialized laboratories for physical, chemist and biological analysis that allow the characterization of the resources and the control of environmental conditions.
- Determine the pollution levels of waters, ground and air thanks to its physical and chemical characterization and implement the necessary actions for its recovery.
- Develop campaigns of environmental education in communities and organizations, in order to promote changes in behaviors and processes and ameliorate environmental conditions.

### **2-4-2 Fields of actions**

- Environmental lab technician: handling and processing of resources samples with the objective to identify contaminants and determine possible processes of environmental recovery.
- Field Technician: sampling, monitory and control of waters, air or ground pollution.
- Treatment Plants Auxiliary: operations of drinking water treatment and treatment of domestic agricultural and industrial residual waters.
- Inspector of Emission sources: qualitative and quantitative characterization of atmospheric contaminants.
- Environmental trainer: projects plans setting for organizations in order to improve the environmental behaviors and the development of its members.

- Projects manager: participation in protection and conservation's projects of the natural and cultural biodiversity.
- Solid wastes manager: use of organic reusable and recyclable waste and companies' training in recycling activities.

### 2-4-3 Plan of studies

SEMESTER	SUBJECT
I	Basic Mathematics
I	Trigonometry & Analytic Geometry
I	Biology
I	Laboratory of biology
I	Drawing
I	Lecture & Writing Workshop
I	UTS functioning
II	Differentials calculation
II	Mechanic
II	Inorganic chemistry
II	Laboratory of Inorganic chemistry
II	Natural resources
II	Physical culture
II	Context elective subject I
III	Integral Calculation
III	Electromagnetism
III	Organic chemistry
III	Laboratory of organic chemistry
III	Fauna & Flora
III	Fauna & flora fields practice
III	Context elective subject II
IV	Physics Laboratory
IV	Water resource
IV	Laboratory of Water resource
IV	Environmental ecology
IV	Environmental microbiology
IV	Environmental rights
IV	Topography & Cartography
IV	Deepening elective subject I
V	Air resource

V	Laboratory of air resource
V	Ground resource
V	Laboratory of ground resource
V	Environmental geology
V	Occupational health
V	Deepening elective subject II
V	Complement elective subject I
V	Thesis Project I
VI	Statistics for Engineers
VI	Solid wastes
VI	Environmental education
VI	Evaluation of environmental effects
VI	Introduction to Engineering
VI	Deepening elective subject III
VI	Complement elective subject II
VI	Thesis Project I

## 2-5 Electricity

### 2-5-1 Professional profile

The technologist in Electricity of the Technological Units of Santander is able to:

- Take part in projects of electrical energy distribution networks, which involve activities of setting, supervision management and administration.
- Install, operate and support electrical equipment presents in the industry.
- Take part in projects of control and identification of losses, in electrical energy companies
- Realize works of electrical maintenance in companies' of energy production.
- Operate and inspect electrical and instrumental equipment's present in the substations.

### 2-5-2 Fields of actions

The Technologist in Electricity of the UTS will work in the following fields:

- Companies of the electrical sector, in the areas of generation, transmission, distribution and commercialization of electrical energy, as personnel of teams and machinery's operation and maintenance.
- Trading companies of supplies, devices and machinery related with the activities of the electrical sector as personnel of installation, support and tuned of teams and supplies.
- Companies of the industrial sector and of services provisions, as personnel of electrical systems support and maintenance.
- Companies devoted to the execution and administration of installation, modification and maintenance's agreements, networks of electrical distribution, as work's supervisor.
- Companies of the mining sector and exploitation of natural resources, as personnel of machineries and electrical devices maintenance

### 2-5-3 Plan of studies

SEMESTER	SUBJECT
I	Analytic Trigonometry & Geometry
I	Basic mathematics
I	Lecture & Writing Workshop
I	UTS functioning
I	Laboratory of biology
I	Context elective subject I
I	Complement elective subject I
I	Logic & Algorithm
I	Physical culture
II	Differential calculation
II	Mechanic
II	Commercial legislation
II	Analysis of electrical circuit I
II	Drawing assisted by computer

II	Context elective subject II
II	Complement elective subject II
II	Programming
III	Integral calculation
III	Laboratory of general electronics
III	Electrical & lighting systems I
III	Laboratory of Electrical & lighting systems I
III	General electronics
III	Laboratory of electrical measures
III	Analysis of electrical circuit II
IV	Electrical & lighting systems II
IV	Laboratory of Electrical & lighting systems II
IV	Electrical lines & reds I
IV	Electrical machines I
IV	Low tension practice
IV	Laboratory of physics
IV	Electromagnetism
V	Electrical machines II
V	Electrical lines & reds II
V	Deepening elective subject I
V	Thesis project I
V	Laboratory of machines
V	Electric substations
VI	Technical seminary: rational use of energy
VI	Mid tension practice
VI	Electrical operations
VI	Deepening elective subject II
VI	Laboratory of electrical operations
VI	Deepening elective subject III
VI	Thesis project II

## **2-6 Geotechnical studies**

### **2-6-1 Professional profile**

The technologist in geotechnical studies is able to:

- Develop physical cartography for the development of projects orientated to the development of routes, tracings lines for aqueducts, sewers, axes for buildings, references to accessions in buildings; urban and rural lines of electrification.
- Gather Geographical information to implement databases in SIG.
- Realize geotechnical studies for the development of the different architectural and civil construction site.
- Realize labors of control and follow-up in processes of construction.
- Develop labors of construction site management

### **2-6-2 Fields of action**

- Study, plan, manage, control and inspect material works that are ruled by geotechnical science.
- Grant geotechnical information that allows to advise interdisciplinary teams corresponding to the works inspection which nature needs the presence of a professional entrusted in geotechnical studies.
- Overseer in civil works that need the use of geotechnical studies.
- Specialist in laboratory of geotechnical processes.
- Technician of team operations in situ.
- Technical recognition and characterization of the area



## 2-6-3 Plan of studies

SEMESTER	SUBJECT
I	Physical culture
I	Algebra
I	Graphical expression
I	Topography
I	Introduction to geology
I	Laboratory of biology
I	UTS functioning
I	Lecture & Writing Workshop
II	Calculation
II	Physics
II	Physics laboratory
II	Construction materials
II	Mineralogy & Petrology I
II	Stratigraphy & tectonic principles
II	Context elective subject
III	Numeric methods
III	Statistics
III	Mechanics for engineers
III	Rock mechanics
III	Basic ground mechanics
III	Rock & Ground mechanics laboratory
III	Hydrogeology
IV	Deepening elective subject
IV	Materials resistance
IV	Tele detection & IGS
IV	Geotechnical prospection
IV	Geomorphology
IV	Hydraulics
IV	Deepening elective subject
V	Deepening elective subject
V	Geophysics prospection
V	Geologic cartography
V	Geotechnical works
V	Geologic risks
V	Ethics & Legislation

V	Complement elective subject
VI	Deepening elective subject
VI	Difficult ground geotechnical
VI	Construction processes laboratory
VI	Construction processes in geotechnical construction
VI	Environmental impact
VI	Thesis project I

## 2-7 Oil and gas in surface managing

### 2-7-1 Presentation

The Technology in managing oil and as in surface is the first technological national program which object of study is " Hydrocarbons in Surface " from the intervention in different processes as transport, distribution, treatment and use of gas and oil in industrial and residential context, this, besides the systems of coverage with its possible affectations and reasonable alternatives of consumption in the national economy, which allow to obtain a vision of this industry that affects the own projects of investment in every region of our Country and social growth from the creation of alternatives and projects in relation with gas and oil industry in Colombia.

### 2-7-2 Professional profile

The graduated one from the Technology in managing oil and gas in surface must answer so much to the current requirements derived from the exercise of the professional activities such as the new scenes that are resulting from social changes, globalization and technological development adapting to the new tools, concepts and applications that arise from the development of the energetic knowledge. For all those reasons, this technologist is able to:

- Advise and execute actions for the environmental management in the sector of hydrocarbons in surface, taking into account criteria of preservation, protection and conservation.
- Use technologies and methods for the analysis and treatment of oil and gas in relation with normativity and quality standards.

- Realize measurement of natural gas system installations for domestic and industrial use, according to the requirements, technical specifications and security procedure.
- Control operations related with the transport and distribution of oil and natural gas in surface according to a plan of supply and procedure of environmental security.
- Take part in research projects in the area of hydrocarbons in surface thanks to capture and processing of information in tests laboratory in order to take decisions.

### 2-7-3 Fields of action

- Installer of internal and external distribution networks of natural gas for residential, industrial and commercial level.
- Gauge of equipment for gas analysis.
- Promoter of environmental security in the project execution of Oil and Gas.
- Supervisor of hydrocarbons treatment and storage by means of instruments and automated control.
- Supervisor of transport and distribution of oil according to given specifications.

### 2-7-4 Plan of studies

SEMESTER	SUBJECT
I	Basic mathematics
I	Analytic trigonometry & geometry
I	Inorganic chemistry
I	Basic informatics
I	Basic hydrocarbons exploration y exploitation
I	UTS functioning
I	Lecture & Writing Workshop
II	Differential Calculation
II	Mechanics
II	Inorganic chemistry laboratory

II	Chemistry of hydrocarbons
II	Mineralogy & Petrology I
II	Logic & algorithms
II	Oil Colombian industry
II	Physic culture
II	Context elective subject
III	Integral calculation
III	Physic mechanics laboratory
III	Mass & energy assessment
III	Integral management systems
III	Hydrocarbons legislation
III	Deepening elective subject
IV	Statistics
IV	Fluid & hydraulic mechanics
IV	Principles of instrumentation
IV	Thermodynamic of hydrocarbons
IV	Environmental use & control
IV	Deepening elective subject
V	Untreated measurement laboratory
V	Hydrocarbons production
V	Electronic instrumentation
V	Surfaces facilities
V	Deepening elective subject
V	Complement elective subject
V	Thesis project I
VI	Gas measurement laboratory
VI	Simulation of processes
VI	Data's acquisition laboratory
VI	Transport & distribution of hydrocarbons
VI	Natural gas
VI	Deepening elective subject
VI	Complement elective subject
VI	Thesis project II

## **2-8 Topography**

### **2-8-1 Presentation**

The program of technology in topography is one of the programs with major tradition of our Institution. 48 years constructing the future of our country with our graduated, guarantee and quality for employers who today invite our technologists to take part of the multiple projects that they need from the direct intervention of this great profession in the diverse areas of the engineering: development of geographical and property information of territory, participation in the development of civil construction, help for the geometric and volumetric control of architectural and landscape works, for the exploitation of miner and energetic resources, with the objective to guarantee the construction of a territory constructed for sustainable development.

### **2-8-2 Professional profile**

The Technologist in Topography is a professional compromised with the development of his company, with firm ethical and moral values, high critical capacity that propose suitable and innovative solutions looking for the general well-being of populations

For such a reason the Technologist in topography is able to:

- Build infrastructure to satisfy needs of the community.
- Look for basic information for the design, studies and approach of physical infrastructure works.
- Calculate and draw topographic raisings in demarcations of areas, determination of surfaces and elaboration of planimetric and altimetric ensemble.
- Check structures geometric characteristics and engineering works in the territory, according to the proper quality conditions of every infrastructure work.
- Interact inside teams of study that plan and arrange the use of the territory in urban and rural areas, according to the legal national frame.
- Propose topographic alternatives in location, calculation and forms of territory utilization permitting the constant improvement of the population life quality.

- Restate infrastructure in the territory answering to the needs and specific circumstances of the territorial classification.
- Identify determinants for the accomplishment of civil works in frame of sustainable development.

### **2-8-3 Fields of action**

The Technologist in Topography will be able to:

- Study, project, plan, direct, control, inspect, execute and evaluate material works that are ruled by the science of the topography.
- Advise official organizations of inspection which needs a professional in topography
- Take part in search and management of the information necessary for the elaboration of classification plans. Be useful and organize digital land registry, specific databases for race, sex, economic and vulnerability level, threat zones which allow the needs analysis of a specific region, granting the basic information to manage the respective plans of municipal and national classification.

As well he can work as:

- Field technician: realization of the respective topographic raisings according to the needs of every project.
- Project resident: participation in discharge construction projects of high, median and low importance, preserving the sustainability.

## 2-8-4 Plan of studies

SEMESTER	SUBJECT
I	Analytic trigonometry & geometry
I	Basic mathematics
I	Topographic drawing
I	Basic topography
I	Physical culture
I	UTS functioning
I	Lecture & Writing Workshop
II	Differential calculation
II	Mechanics
II	Theoretic surveying
II	Surveying practice
II	Descriptive
II	Deepening elective subject
III	Integral calculation
III	Electromagnetism
III	Ground mechanics
III	Theoretic altimetry
III	Altimetry practice
III	Systematized drawing I
III	Positioning astronomy
IV	Physic laboratory
IV	Deepening elective subject
IV	Systematized drawing II
IV	Special topographies
IV	Photogrammetry & Photointerpretation
IV	Geodesy
IV	Context elective subject
V	Deepening elective subject
V	Hydraulic works
V	Theory of ways I
V	Ways practice I
V	Digital cartography
V	Complement elective subject
V	Thesis project I
VI	Deepening elective subject

VI	Land registry & planning
VI	Control of civil works
VI	Theory of ways II
VI	Ways practice II
VI	Complement elective subject
VI	Thesis project II

## 2-9 Telecommunications system

### 2-9-1 Presentation

Communication across electromagnetic signal use electrical and telematics systems of communications. Electrical communication systems involve the functioning, treatment, digitalization, transmission and transport of the signals by means of networks and backbone systems, using the own infrastructure of digital and analogical methods. Telematics takes charge of design, implementation, administration, and configuration, development of applications, principles and security policies of informatics networks.

### 2-9-2 Professional profile

The Technologist in Telecommunications is able to:

- Realize maintenance of broadcasting equipment's to guarantee its functioning.
- Verify that the frequencies and powers of transmission agree with the procedure defined by the Department of Communications.
- Adapt technology in broadcasting systems compatible with national and international standards.
- Integrate antennas to transmission systems and signal receipt for an ideal functioning according to the procedure established by the department of communications.
- Realize maintenance of cable TV's networks with an ideal quality of the signal for the user.
- Implement LAN and WAN networks that are using guiding or wireless means fulfilling with procedure and current standards.



- Manage different network protocols and architectures that guarantee the use of added value services in networks.
- Set up communications devices to optimize efficiency and security of informatics networks.
- Realize networks checks using different means for the transmission of voice, information or images that guarantees quality to the user.
- Develop basic applications for telematics systems and mobile communications.
- Apply principles and essentials bases of fixed-line and mobile telephony in activities of implementation and support for this type of networks.
- Set up equipment's for the implementation and the administration of voice networks fulfilling the conditions of functioning for the provision of quality services.
- Execute preventive and corrective maintenance to telephonic switchboards that guarantee its correct functioning.

### **2-9-3 Fields of action**

The Technologist of telecommunications can work in different sectors of communications as:

- Public fixed-line telephony
- Internet service companies
- Service of cable television
- Management and administration of voice or information networks
- Cellular telephony
- Communications in satellite sector
- Broadcasting

- Any sector that possess wired up structured systems
- Telecommunications services companies
- Financial sector (transmission of information)

#### 2-9-4 Plan of studies

SEMESTER	SUBJECT
I	UTS functioning
I	Lecture & Writing Workshop
I	Basic Mathematics
I	Complement elective subject I
I	Logic & Algorithm
I	Trigonometry & Analytic Geometry
I	Physical Culture
I	Means of transmission
II	Differentials calculation
II	Mechanics
II	Analysis of Electronic Circuits I
II	Laboratory of Measures & Electronic Circuits
II	Deepening elective subject
II	Deepening elective subject
II	Programming
III	Integral Calculation
III	Analysis of Electronic Circuits II
III	Electromagnetism
III	Electronic I
III	Complement elective subject
III	Telematics I
IV	Laboratory of Electronic I
IV	Laboratory of physic
IV	Electronic II
IV	Analog communications
IV	Laboratory of analog communications
IV	Complement elective subject
IV	Telematics II
IV	Visual programming
V	Digital communications I

V	Introduction to engineering
V	Laboratory of digital communications I
V	Deepening elective subject
V	Digital electronic
V	Laboratory of digital electronic
V	Telematics III
V	Thesis Project I
VI	Digital Communications II
VI	Multivariable calculation
VI	Laboratory of digital communications II
VI	Digital Communications III
VI	Laboratory of digital communications III
VI	Deepening elective subject
VI	Thesis Project II

## II/ Professional Programs

### 1- Faculty of Socioeconomic & Managerial Sciences

#### 1-1 Companies administration

##### 1-1-1 Presentation

This year is particularly special for Colombia. The advances derived of the signature of the Treaty of Free Trade with United States, the multilateral agreements with specific countries, the possibility of a TLC with Korea, the strong increase of the foreign investment in the country, the arrival of different business actors in the Colombian economy, and the felt need that the companies see an opportunity in the external trade, is constituting a challenge for the management. In such sense, the challenges for the managerial education in the program of Administration of Companies are multiple. In addition to a global perspective, a strong component of prospective innovation is requiring and is based fundamentally in the investigation, that allow to have international standards that contribute to improve the quality in the training and development of the graduates of our Institution.

### **1-1-2 Professional Profile**

The Professional in Companies Administration of the Technological Units of Santander is able to:

- Manage problems of different nature in order to generate alternatives of solution in the taking of decisions in an organization, developing analytical and predictive shapes for the different administrative processes.
- Lead teams of work that generates effectiveness in the resources, optimizing the processes of manufacture or provision of services for an organization.
- Manage integration processes of human talent thanks to innovation strategies for the development of the functions that form an intellectual capital in the organization.
- Realize a financial planning that maximizes the use of economic thanks to financial analysis.
- Design the integral strategic plan of marketing for the organization with assertive strategies to obtain a better positioning.
- Generate opportunities and design plan of new businesses in situations of globalization or of global markets to create or expand niches of market.
- Create new styles of virtual businesses according to the application that wish the organization.

### **1-1-3 Fields of action**

The Professional in Companies administration of the Technological Units of Santander will be able to work in the following fields:

- Administrative Director of any administrative unit of a company.
- Adviser and business consulter.
- Manager and director of his own company.
- Manager and director of projects.

- With some years of experience the graduate can be director, manager or administrator of any private or public organization.

### 1-1-4 Plan of Studies

SEMESTER	SUBJECT
<b>I</b>	Matrix Algebra
	Administration
	Theory & Components of the Organization
	Strategic Marketing
	Complement elective subject I
	Organizational Communication
	Formative sport
<b>II</b>	Inferential statistics
	Lineal Programming
	Deepening elective subject I
	Colombian Economy
	Context elective subject I
<b>III</b>	Investigation of Operations
	Managerial tools of control
	Environmental Administration
	Quality Administration
	Financial planning
	Creative thought
	Context elective subject II
	Thesis Project III
<b>IV</b>	Managerial tools of Management
	Deepening elective subject II
	Organizational Development
	International Marketing
	Administrative and Managerial simulation
	Complement elective subject II
	Thesis Project IV

## **1-1-5 Elective subject list:**

### **Deepening elective subject**

- Services Management
- Logistic & Transport
- Relational Marketing
- Financial Management
- Public Finances
- Markets Evaluation

### **Complement elective subject**

- Citizenship
- Social & Regional Development
- Art, Culture & Society
- Communication
- Science History
- Cinema & Literature
- Emotional Intelligence

## **1-2 Marketing & international business**

### **1-2-1 Presentation**

The Professional Marketing & international business program of the Technological Units of Santander has a lot of objectives: diagnose, investigate, project, design, formulate, set up, transform, evaluate projects, offer solutions, strategies and tactical of marketing, thanks to models applied to quantitative and qualitative variables, with the support of information's systems in order to optimize the taking of decisions that offer competitiveness to local regional, national and international companies.

### **1-2-2 Professional Profiles**

- Commercial and skills negotiation for the taking of national and international business decisions.
- Formulation and set up of markets investigation, answering to the interests of the organization.

- Capacity to lead processes oriented to the market applying new technologies.
- Design new products and services that contribute to improve and increase the offer for the consumer in the market.
- Consultant in the commercial and marketing area as part of the company's development.
- Manage and optimize the chain of value as strategies for the strengthening of the market.
- Design CRM models in order to cover needs of the company and costumers.
- Contribute to the sustainable development designing packaging that respond to environment necessities
- Design and set up advertising campaigns as marketing strategies in a business context.
- Management of the social and economic development for the region and the country.
- Recognize and respect the social ethical and citizen norms.

### **1-2-3 Fields of actions**

- Director of Marketing and Sales
- Executive of Accounts in Advertising Companies.
- Manager in business consultancy, corporate image and events in the commercial area.
- Director of Markets Investigations
- Commercial adviser.
- Manager in Marks Consultancy and Commercial Franchises.
- Entrepreneur and generator of employment through the creation of companies.

### 1-2-4 Plan of studies

SEMESTER	SUBJECT
I	Inferential Statistics
I	Financial states analysis
I	Basic macro economy
I	Tendencies of Marketing
I	Metrics of marketing
I	Deepening elective subject
I	Formative sport
II	Investigation of Operations
II	Projects Evaluation
II	Quantitative market research
II	Relational marketing
II	Plan strategic of medias
II	Service management
II	International legislation
III	International finances
III	International economic integration
III	Management & building of mark
III	Deepening elective subject
III	Complement elective subject
III	Thesis project III
IV	Management of quality
IV	Simulation of international business
IV	International Marketing
IV	Strategic management
IV	Deepening elective subject
IV	Complement elective subject
IV	Thesis project IV



## 1-2-5 Elective subject list

### Deepening elective subject

- Europe & Asia area study
- South & North America area study
- Advertising strategy
- Events & Fairs Marketing

### Complement elective subject: emotional intelligence

### Context elective subject

- Thought and political system
- Social & Regional Development
- Science, Technology & Society

## 1-3 Public accounting

### 1-3-1 Professional profile

The Public accountant of the Technological Units of Santander is a professional able to:

In the Countable:

- Design and manage accounting systems.
- Manage financial resources.
- Supply economic and financial information.
- Evaluate economic and financial information
- Certify financial states

In Costs:

- Design and implement systems of costs
- Realize strategic and management planning.
- Formulate and evaluate economic and financial projects
- Realize diagnostics and prognoses for investments projects.
- Elaborate and execute budgets.
- Value companies.

**In Taxes:**

- Realize tributary planning
- Advice and orient in the fiscal and tributary field.
- Elaborate tributaries statements

**In Audit and control:**

- Elaborate and develop plans of audit.
- Plan and execute programs of Control Fiscal
- Rule financial states

**1-3-2 Fields of action**

- Public accountant
- General treasury inspector
- Auditor
- Fiscal Auditor
- Business adviser and consultant
- Financial and costs Manager
- Director of Internal Control
- Director of Imposed
- Administrative Director
- Director of budget
- Justice Auxiliary Expert
- Director of his own company or office.

### 1-3-3 Plan of studies

SEMESTER	SUBJECT
I	Matrix Algebra
I	Deepening elective subject I
I	Superior accounting
I	Budgets
I	Macro economy
I	Public administration
II	Complement elective subject I
II	Context elective subject I
II	Colombian economy
II	Deepening elective subject II
II	Governmental accounting
II	Managements costs
II	Financial audit
III	Thesis project III
III	International accounting
III	Laboratory of budgets
III	Basis of international business
III	Information systems audit
III	Tributaries processes
IV	Complement elective subject II
IV	Thesis project IV
IV	Investigation of accounting
IV	Projects evaluation
IV	Fiscal control
IV	Seminary of tributary

### 1-4 Physical activities & sport

#### 1-4-1 Presentation

The professional program in physical activity and sport proposes to form professionals with solid ethical, socially awkward, culturally opened principles, with a suitable vocational and humanistic training, social conscience, human virtues and quality that allows them to join the labour world, with aptitude to satisfy the needs that needs the region and the country

### **1-4-2 Professional profile**

The Professional in Physical Activity and Sport is a professional able to:

- Design and apply programs in favour of the infantile and teen population helping an integral model that is taking into account food habits, practice of the physical - sports activity and promotion of a physical prophylactic culture.
- Propose strategies that promote ways of healthy life by means of the systematic and planned physical activity to reduce risk factors of chronic not transmissible diseases.
- Recognize and apply different strategies and methodologies focused on the education of the movement and sports training from school and sports initiation.
- Formulate and develop projects stimulating the physical - sports activity in the educational institutions.
- Orientate the learning of a specific sport in sports training schools or sports initiation as an objective for the physical and functional development organized for children and young persons.
- Manage and contribute with projects that permit the construction of citizenship propitiating environments of learning that permit the psychosocial development of the persons.
- Apply the bases of sports training in programs orientation for sports initiation and performance

### 1-4-3 Fields of action

The professional in physical activity and sport can work in the different sectors of the society developing the following activities:

#### As Teacher

- Direct and propose didactic and formative programs directed specially to sports initiation.
- Apply programs of physical and sports activity designed for children, adults and major adults using the evaluation of the motive capacities

#### As Instructor of Physical Activity

- Propose, organize and direct physical - sports activities for different population groups, taking into account the set of factors that determine the maximum possible quality.
- Plan, organize and execute sports activities achieving the efficient utilization of materials and resources that determine the quality of these ones.
- Develop programs of physical activity for special or vulnerable populations.

### 1-4-4 Plan of studies

SEMESTER	SUBJECT
I	Biomechanics applied to physical activity
I	Theory & Methodology of training
I	Strength training
I	Functional & physical valuation
I	Complement elective subject
I	Public administration
I	Context elective subject
II	Sportive traumatology
II	Physical activity & chronicle diseases
II	Deepening elective subject
II	Deepening elective subject
II	Practice of performance I

II	Thesis project II
III	Laboratory of cine-anthropometry
III	International accounting
III	Practice of resistance
III	Practice of physical activity for chronicle diseases
III	Deepening elective subject
III	Practice of flexibility
III	Psychology of sportive performance
III	Thesis project III
IV	Practice of physical activity for special population
IV	Practice of performance II
IV	Thesis project III
IV	Practice of velocity
IV	Inferential statistics

## 2- Faculty of Natural Sciences & Engineering

### 2-1 Electronics Engineering

#### 2-1-1 Presentation

The program of Electronics Engineering works around the development of the electronic science in general to national and international level, as well as its application in the productive processes of the industrial, commercial and services sectors. Besides, its curricular structure is flexible and allows the technological and industrial conversion, as well as the optimization of the existent human talent, by means of the formation of technologists that answer to the needs of the country, of the knowledge's diffusion and of the participation in investigation like factors of the local, regional and national development, framed inside the mission of the Technological Units of Santander.

### **2-1-2 Professional profile**

The Electronic Engineer of the Units of Technological of Santander is a professional able to:

- Design systems of electronic control in the processes of production using tools of the electronics advanced and electronic instrumentation.
- Design applications of software in low and high level that allow the implementation of control's actions based in the use of the microcontrollers and processors of signal.
- Schedule activities of preventive and corrective basic maintenance in electronic teams according to technical specifications.
- Execute activities related with the handle of the electronic components presents in the systems of Telecommunications.
- Manage projects in the field of the industrial automation's processes with base in the parameters of each system's design and requests.

### **2-1-3 Fields of action**

- Economic: like auditor, marketing support's engineer of electronic products.
- Industrial: designing and adapting technology, keeping systems and industrial processes of control and instrumentation, adapting and keeping systems of communications and telecommunications.
- Social: like Designer and administrator of social projects in relation with the area of electronic engineering, communications and /or control.
- Health: like department's director of electro-medico maintenance, adapting, managing and developing teams in relation with biomedical sciences.

## 2-1-4 Plan of studies

SEMESTER	SUBJECT
I	Lineal Algebra
I	Statistics
I	Waves & particles
I	Differential Equations
I	Engineering Introduction
II	Modern Physic
II	Numeric Methods
II	Electrical Machines
II	Antennas & Microwaves
II	Digital process of Signals
III	Electronics Instrumentation
III	Digital Systems of Control
III	Electronics of Power
III	Deepening elective subject
III	Context elective subject
IV	Network & Data Communications
IV	Industrial Automation
IV	Electro medicine
IV	Deepening elective subject
IV	Context elective subject
IV	Complement elective subject
V	Environmental impact
V	Projects Evaluation
V	Deepening elective subject
V	Complement elective subject
V	Context elective subject

## 2-1-5 Elective subject list:

### Deepening elective subject

- VHDL & TADD
- Mobiles Communications
- Artificial Intelligence
- Digital Images Process



### **Complement elective subject**

- Art, culture & Society
- Cinema & Literature

### **Context elective subject**

- Thought and political system
- Social Thought & Contemporary Culture

## **2-2 Systems Engineering**

### **2-2-1 Presentation**

To international level, the tendencies of the area of Systems professions and Sciences of the Computation are oriented to the five disciplines by the Association for Computing Machinery (ACM). The program of Systems Engineering is immersed in Software Engineering. Therefore, the professional of this program has to know and cover commonplaces related with the life's cycle of a product, including its efficiency and reliability, adjusted to the budgets of the customer, with suitable proofs and maintenance. This activity is necessary due to the fact that big and costly software's often play a vital role in applications of critical security. These professionals have to combine the experience in sciences of computation, engineering and mathematical to design, define and organize diverse appearances of complex software.

### **2-2-2 Professional profile**

The Systems Engineer of the Technological Units of Santander will be able to:

- Develop software's applying the technicians and methodologies of the Software's Engineering in all the stages of life's cycle, generating solutions to the needs of the customer.
- Shape and simulate different types of systems applying scientific knowledge's in order to support processes of decisions and technological development.
- Manage, propose and implement integrators projects between the academic and productive sector in the field of Systems Engineering, in order to develop processes of investigation and technological innovation.

- Audit the functionality, usability and quality of the computer.
- Create and implement software's architectures using the patterns and reuse of components, taking into account the requirements of quality and the integration with the technological platform.
- Analyze and value the social and environmental impact of the technical solutions posed to promote the respect for biodiversity and sustainable development.

### **2-2-3 Fields of actions**

- **Manager of Projects:** coordinate the implementation of projects that integrate the information's technologies.
- **Engineer of Software:** apply the principles of computational sciences and mathematics to build effective solutions to the problems in the process of software's development.
- **Architect of Software:** design and implement software's architectures to give answer to complex systems solutions.
- **Engineer of Development:** implement computer applications, with the elements of databases programming and administration for his correct construction.
- **Auditor of Systems:** review and evaluate elements of information's system: hardware, software and human resource.
- **Investigator:** integrate new technologies in the fields of Systems Engineering. Hemanages and develops projects of investigation in relation with his area.

## 2-2-4 Plan of studies

SEMESTER	SUBJECT
I	Lineal Algebra
I	Differential Equations
I	Statistics for Engineers
I	Software's Engineering
I	Complement elective subject I
I	Context elective subject I
II	Automats & Formal Languages
II	Digital Simulation
II	Operations Investigations
II	Artificial Intelligence
II	Deepening elective subject I
II	Context elective subject II
III	Network & Communications
III	Compilers
III	Structural Modeling
III	Software's architecture
III	Deepening elective subject II
III	Thesis Project III
IV	Informatics Legislation
IV	Software's quality
IV	Software's patrons
IV	Deepening elective subject III
IV	Complement elective subject II
IV	Context elective subject III
IV	Complement elective subject III
IV	Thesis Project IV

## 2-3 Electromechanical engineering

### 2-3-1 Presentation

The program of Electromechanical Engineering is focused in the design, characterization, operation and maintenance of the systems, processes and electrical electronic & mechanics elements. Its field of action is very large and varied, allowing a development in different areas of the knowledge for the technological development of the country.

### **2-3-2 Professional profile**

The electromechanical engineer is able to:

- Design, identify, operate, transform and keep the systems and electromechanical processes.
- Manage planning processes of control, assembly and maintenance of the electromechanical systems.
- Develop and evaluate design's projects for elements of equipment and mechanisms that take part in the processes of the electromechanical systems.
- Propose and develop investigation & extension projects for the development and updating of advanced technology in industrial or residential processes that involve electromechanical systems.
- Design, select and install automation and control systems of processes and equipment's in specific industrial applications.
- Design, install, operate and keep thermal and hydraulic systems in industrial processes.
- Design, select and install systems of refrigeration and air conditioned for the optimization of the industrial, commercial and residential processes, using advanced technology.
- Manage processes in relation with quality, generation and distribution of energy in industrial systems.

### **2-3-3 Fields of action**

The electromechanical engineer is able to:

- Participate in the area of design, maintenance and control of the electromechanical systems.
- Adapt technologically the small, medium-sized companies and the industry, with the objective to define lines of production.

- Await the processes of production, diminishing the indirect costs and therefore increase in the quality of products and /or services.
- Propose and establish technical politics and technological strategies for the energy saving.
- Participate actively with public services companies, in the design of its social strategies.
- Design systems of refrigeration and air conditioned, using advanced technology in order to satisfy the needs of the company and the community.
- Participate in the design, installation, operation and maintenance of thermal and hydraulic systems in industrial processes.
- Participate in the design, selection and installation of automations systems and control in industrial applications.
- Participate in the design, installation, operation and maintenance of thermal and hydraulic systems in industrial processes.

### 2-3-4 Plan of studies

SEMESTER	SUBJECT
I	Lineal Algebra
I	Differential Equations
I	Dynamic
I	Materials resistance II
I	Materials resistance Laboratory
I	Context elective subject I
II	Numeric analysis
II	Fluids Mechanic
II	Applied Thermodynamic
II	Electrical Protection
II	Context elective subject II
III	Statistics for Engineers
III	Heat Transfer
III	Systems of control
III	Deepening elective subject I

III	Thesis Project III
III	Complement elective subject
IV	Hydraulic Machines
IV	Industrial electronics
IV	Industrial Automation
IV	Maintenance Management
IV	Complement elective subject I
IV	Management of Industrial Projects
IV	Complement elective subject II
IV	Deepening Elective Subject II
IV	Thesis Project IV

### 2-3-5 Elective Subject List

#### Deepening elective subject

- Electromechanical Engineering
- Electrical Machines Maintenance

#### Complement elective subject

- Economy for Engineers
- Engineering Law

**Context elective subject:** Thought and political system

## 2-4 Environmental Engineering

### 2-4-1 Presentation

This program is based on the following three areas of knowledge: natural Sciences, in order to understand the behavior of the living beings in its life's surroundings and how these providemeans to live; social sciences, to understand the human behavior, its needs and strategies tocoexist; mathematics, to quantify and explain processes and phenomena, that allow him to build his ways of life and improve them constantly.

### 2-4-2 Professional profile

The environmental engineer is able to:

- Measure impacts and manage environmental licenses in the realization of projects including natural resources in order to promote its conservation, the respect for biodiversity and the sustainable development.
- Design processes of intervention and bio intervention that allowsustainable use ofwater, ground and air, in order to ameliorate life's quality.
- Design and implement water and solid wasteplants treatment in agreement with the physic and chemical resources analysis, in order to improve and optimize the environmental conditions.
- Design integral projects of environmental education and citizen training that generate proactiveattitudes for the construction of healthy andharmonic relations with the environment.
- Design and coordinate the implementation of Environmental Management Systems that generatescare and conservation of the natural resources involved in theorganization processes.
- Create processes of natural resources exploitation in order to incorporate criteria of sustainability that allow natural mechanisms of auto recuperation and quality of human and social life. Manage processes of territorial development that allow the sustainable exploitation of the natural and environmental.
- Manage consulting and advising environmental companies around projects of social development.

### 2-4-3 Fields of actions

- Director of Environmental Projects. Coordination ofenvironmental development projects in order to consolidate development strategies.
- Environmental engineer. Development of field's activities in order to identify and control different forms of environmental effects inconstruction processes.

- Director of environmental studies. Organize and coordinate work's teams for the identification, intervention and contingency of environmental damages.
- Adviser and environmental consulter. External professional that applies his knowledge's to support the development of the public and private entities main functions.
- Civil servant of Public Entities: formulation, socialization and implementation of environmental public politics for states entities.
- Director of Processes. Manage and control processes and plants for the environmental recovery on different resources affected by the human activities.
- Investigator. Manage and develop projects of investigation related with environmental problematic.

#### 2-4-4 Plan of studies

SEMESTER	SUBJECT
I	Lineal Algebra
I	Multivariable calculation
I	Environmental economy
I	Basic & Environmental Sanitation
I	Environmental chemistry
I	Context elective subject I
I	Formative Sport
II	Differential Equations
II	Hydrology & Climatology
II	Air Resource Pollution Control
II	Environmental ground recovery
II	Mass & Energy Evaluation
II	Water purification
II	Deepening elective subject I
II	Context elective subject II
III	Numeric methods
III	Planning & Regional Development
III	Sustainable Development
III	Solid waste treatment
III	Residual water treatment



III	Deepening elective subject II
III	Complement elective subject I
III	Thesis Project I
IV	Territorial Legislation
IV	Hydraulic Machines
IV	Planning & Regional Development
IV	Projects' Formulation & Evaluation
IV	Maintenance Management
IV	Integral management of risks
IV	Management of Industrial Projects
IV	Modeling & Environmental simulation
IV	Deepening Elective Subject III
IV	Complement Elective Subject II
IV	Thesis Project II

## 2-5 Telecommunication engineering

### 2-5-1 Professional profile

The Engineer of Telecommunications is able to:

- Plan maintenance and/or technological adjustment tasks of broadcasting equipment's according to to the procedure defined by the Department of Communications.
- Introduce technology in systems of broadcasting compatible with the national and international standards.
- Plan voice, information and video networks with an ideal quality of service for the user.
- Design LAN and WAN networks that are using guiding or wireless means fulfilling with procedure and current standards.
- Integrate the systems of communications and the software in the management and administration of networks, in order to guarantee the secure transmission of the information.
- To implement applications that integrate technological platforms, databases and safety protocols in telematics systems and mobile communications.

- Apply principles and basis of cellular and satellites systems.
- Manage voice networks fulfilling conditions of functioning for the provision of quality services.
- Realize management tasks of network in telephonic switchboards to guarantee its correct functioning.
- Create new models or systems of communications that needs the productive sector of the country.
- To take part in processes of research, management and technological appropriation in electronics, telecommunications and computer science.
- Implement technological projects orientated to solving needs of the least favored sectors and to the integral development of the country.
- Apply the legislation and the normativity in the different sectors of telecommunications and computer science.
- Evaluate projects of technological development applying the economic and financial basis.

### 2-5-2 Plan of studies

SEMESTER	SUBJECT
I	Lineal algebra
I	Wave & particles
I	Differential equations
I	Databases
I	Introduction to enginery
I	Context elective subject
II	Modern physic
II	Numeric methods
II	Programmable dispositive
II	Programming orientated to object
II	Signals & systems
III	Statistics
III	Wireless communications



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III	Laboratory of wireless communications
III	Broadband reds
III	Digital processing of signals
III	Context elective subject
IV	Optical communications
IV	Deepening elective subject
IV	Deepening elective subject
IV	Deepening elective subject
IV	Research seminary