

Ingeniería en Sistemas Computacionales (Computing Systems Engineering)
Course description (Study plan #5)

Administration (SCE-0401)

Credits: 6

Introduction (Definitions, Corporations and classifications, Organization areas, resources administration, Management development)
Management and corporations environments (Open system model, external environment, internal environment, corporate culture, globalization)
Decision making (Levels of decision making, conditions, processes)
Management process mechanics (Planning, strategies, qualitative and quantitative planning techniques, strategic, tactic and operative planning, organization types)
Management process dynamics (Management, decision making, human factor, control, cost analysis)
Project management (Environment, fundamentals, stages, methodology)

Bibliography:

Economía y administración / Eugene F. Brigham, James L. Pappas -- México : Interamericana, 1978
Domingo Ajenjo, A. Dirección y Gestión de Proyectos, Ed. Ra-MA, 2005.

Computer Architecture (SCC-0402)

Credits: 10

Computer Architectures (models (classic, segmented, multiprocessing), component analysis (CPU architectures, types, features, ALU, Main memory, cache, IO, interruptions, DMA, bus))
CPU structure and function (processor structure, registers, control and status registers, instruction cycle, Fetch-Decode-Execute cycle, instruction sets)
Computer components assembly (chipset, applications)
Parallel processing (types, taxonomy, Flynn taxonomy, memory addresses management, shared memory systems, multiprocessors, cache coherence, distributed memory systems, clusters, study cases)

Bibliography:

Hwang, Kai Arquitectura de computadoras y procesamiento paralelo / Kai Hwang, Faye A. Briggs -- México : McGraw-Hill, 1990
Barry, B. brey. Microprocesadores intel. Pearson 7ª Edición 2006

Electric and Electronic Circuits (SCC-0403)

Credits: 10

Analogue electronics (direct and alternating current, passive devices, active devices, semiconductors, diodes, transistors, thyristors, applications, amplifications)
Digital electronics (logic gates, combinational circuits design, sequential logic, logic families)
Converters (analogue/digital, types, applications)
Hardware Description Language (programmable devices, combinational and sequential devices programming)

Bibliography:

BOYLESTAD, ROBERT L. NASHESKY, LOUIS. Electrónica: teoría de circuitos y dispositivos electrónicos. Ed. Pearson. 8ª Edición

Finance Accounting (SCM-0404)

Credits: 8

General concepts

Financial Statements (definition, elements, assets, liabilities, capital, balance)

Operations registration (double-entry, accounts)

Double-entry bookkeeping (Account, elements, charge and deposit)

Registration systems (Merchandise, Stock, stock valuation, accounts catalog)

Analysis and interpretation (classification, percent method, financial ratios method, trends method)

Bibliography:

Charles T. Horngren, Gary L. Sudem, John A. Elliott. "Introducción a la Contabilidad Financiera". 7ª Ed. Prentice Hall. México. 2000.

Corporate Culture (SCE-0405)

Credits: 6

Business models and organization levels (model, plan, entrepreneurship, evaluation)

Corporate quality culture (fundamentals, functions)

Change strategies (planned change, organizational development, innovations)

Strategic planning (Introduction, mission, vision, values)

Informatic legislation (Mexican law, copyright, privacy and data protection, consumer protection, Internet regulations)

Quality auditing (ISO standard, Mexican Official Norms for Software development)

Bibliography:

Albizu Gallastegi, EWneka y Olazaran, Mikel. "Reingeniería y cambio organizativo: teoría y práctica". Prentice Hall. México. 2003.

Software Project Development (SCM-0406)

Credits: 8

Introduction (Project handling, stages, planning, proposal, staff selection, project review, PMI fundamentals)

Software quality (Quality framework, standards and metrics for software quality, PSP and TSP, CMM, MOPROSOFT, impact of quality in time to deliver, cost and scope)

Project planning (Goal, estimates (time, cost, staff), risks, viability)

Information presentation (Proposal, justification, schedule, staff, policies, follow ups, tools, contract)

Staff selection (Roles, workload, task assignment, productivity evaluation tools)

Project review (resource and time management, adjustments)

Bibliography:

Pressman, R. (2008). Ingeniería del software: un enfoque práctico. México: McGraw-Hill.

Sustainable Development (ACM-0401)

Credits: 8

Introduction (sustainable concept, principles, economic, social and natural scenario)

Natural scenario (ecosystem, energy flow, biodiversity, natural resources, environment services, natural phenomena)

Social scenario (Organization, culture and diversity, population, human development, urban and rural development, communities)

Economic scenario (supply and demand, global vs local economy, GDP)

Modified scenario (population growth, industry, energy use, human activities impact on nature, social and economic aspect)

Sustainable strategies (Social, agreements, responsibility, growth and development plans, economics, management, education, norms)

Bibliography:

Díaz Coutiño, R. Desarrollo sustentable: Una oportunidad para la vida (2a ed.^a ed.). México: McGraw-Hill.

Drawing (SCV-0407)

Credits: 3

Hand and CAD drawing workshop.

Views (top, front, side)

Projections (isometric, perspective)

Bibliography:

AutoCAD documentation online.

Data Structure (SCC-0408)

Credits: 10

Introduction to data structures (abstract data types, modularity, use, static and dynamic memory handling)

Recursion (Definition, procedures, cases)

Linear structures (Lists (types, operations, singly linked, doubly linked, circular, applications), Stacks (static and dynamic memory representation, operations, applications, notation, recursion using stacks), Queues (static and dynamic memory, operations, simple, circular, deque, priority queues)

Non-linear structures (Trees (binary, AVL), Graphs)

Sorting methods (Internal (bubblesort, quicksort, shellsort, radixsort), External)

Search methods (sequential, binary search, hash based)

Algorithm analysis (time and space complexity, efficiency)

Bibliography:

Joyanes Aguilar, L. (1992). Fundamentos de programación: Algoritmos y estructura de datos. México: McGraw-Hill.

Physics I (SCM-0409)

Credits: 8

Static (forces, resultant, Newton's First Law, momentum, Varignon Theorem)

Dynamic (kinematic, uniform straight movement, speed, acceleration, kinetics, Newton's Second Law,

friction)

Optics (light, reflection, refraction, optic fiber, mirrors, lenses, telescope, laser)

Thermodynamics (temperature scales, thermal capacity, Thermodynamics laws)

Bibliography:

Fishbane, P.M., Física para Ciencias e Ingeniería, Volumen II, Editorial Ed.
Prentice-Hall Hispanoamericana, México, 1994.

Physics II (SCM-0410)

Credits: 8

Electrostatics (units, charge, electric field, electric potential, dielectric capacitor, capacitor)

Electrodynamics (current, resistance, conductivity, Ohm law, power, Kirchhoff laws)

Electromagnetism (Magnetic field, trajectory of charges, magnetic forces between currents, electromagnetism laws, Ampere law, magnetic inductance, energy, density, applications)

Bibliography:

Fishbane, P.M., Física para Ciencias e Ingeniería, Volumen II, Editorial Ed.
Prentice-Hall Hispanoamericana, México, 1994.

Investment Project Planning and Evaluation (SCE-0411)

Credits: 6

Introduction (project, investors, stakeholders, investment, resources, risk, results, success and failure)

Project definition (problem, goals, competition, costs, assets, depreciation)

Project presentation (investors and stakeholders, investment, budget plan)

Risks (identification, mitigation, response)

Results (relevant data, presentation, success and failure degrees)

Bibliography:

Hernández Hernández, A. (1999). Formulación y evaluación de proyectos de inversión. México: ECAFSA.

Database Fundamentals (SCM-0412)

Credits: 8

Database Management systems (purpose, application field, data models, architecture, abstraction levels, user types)

Entity-relationship model and DB design (design process, E-R model, restrictions, diagrams, E-R with UML)

Relational model (basic structure, DB schemes, keys, query languages)

Relational database design (features, atomic domains, normalisation, dependencies, Boyce-Codd normalisation, decomposition algorithms, DB integrity)

Relational algebra (operations, null values, DB modification operations)

SQL (introduction, data types, query structure, set operations, nested queries, complex queries, views)

Object oriented DB (data types, inheritance)

Bibliography:

De Miguel, Santa Maria Adoración y Piattini, Mario. Fundamentos y modelos de Base de datos. 2ª. Ed. Alfaomega & Ra-ma.

Research Fundamentals (ACU-0402)

Credits: 4

Major development and status (History and development, Social context, Local, National and International practices, Industry related with major)

Research as a Social process (Basic research concepts, Theory elements (problem, hypothesis, abstractions, reflections, explanations, methods, law), Method types (inductive, deductive, analytic, synthetic), Research process (Problem statement, Theoretical Background, Methods, Results)

Oral and Written communication tools in research (Rules, Semantics, Scientific language, essay, thesis, protocol, report)

Information management in research (Structure, sources)

Bibliography:

Tamayo y Tamayo, Mario. (1993). El Proceso de la Investigación Científica. México. Limusa.

System Development Fundamentals (SCM-0413)

Credits: 8

Software Engineering Fundamentals (software evolution, software development stages, CASE tools)

Requirements engineering (tasks, techniques, modeling, CASE tools)

Analysis model (class architecture, stereotypes, sequence diagrams, CASE tools)

Design model (strategies, object design, system design, design review, CASE tools)

Implementation model (component diagrams, tests)

Bibliography:

Pressman, R. (1988). Ingeniería del software: un enfoque práctico (2ª ed.). México: McGraw-Hill.

Graphing (SCM-0415)

Credits: 8

Graphics environments (HW and SW for graphics rendering, formats, fractal geometry)

2D Graphics (line, polygons, bidimensional transformations, matrix representation, window and viewpoint)

3D Graphics (representation, transformations, lines and curve surfaces)

Lighting and shadowing (polygon filling, shadowing techniques, lighting models)

Related areas (image processing, computer vision, computer animation)

Bibliography:

HEARN, Donald & M. Pauline Baker, Gráficas por computadora 2ª edición, Ed. Prentice Hall Hispanoamericana. México 1995.

Artificial Intelligence (SCB-0416)

Credits: 8

Fundamentals (history, concepts and techniques, actual developments, Natural Language Processing, pattern recognition, robotics, expert systems, fuzzy logic, heuristics)

Search techniques (deterministic and non-deterministic states, BFS and DFS, game theory)

Knowledge and reasoning representation (knowledge systems, semantic networks, predicate logic, uncertainty reasoning, fuzzy logic, proofs and methods)

Reasoning systems (rules, facts, knowledge base, control mechanisms, production system lifecycle)

AI applications (robotics, neural networks, NLP)

Bibliography:

WINSTON, Patrick Henry, Inteligencia Artificial, Ed. Addison Wesley

Iberoamericana, 1992

Interfaces (SCF-0417)

Credits: 8

Device programming (concepts)
Video buffer in text mode
Disk access in assembly language
Serial port programming
Parallel port programming
Hybrid programming
USB port programming
Microcontrollers (LED, LCD displays)
Sensors (optical, temperature, pressure, proximity)
Actuators (electric, mechanic)

Bibliography:

Nichols, J. (1984). Microprocesador Z-80, programación e interfaces. México: Marcombo.
Brey, Barry B. (2006). Microprocesadores intel : arquitectura, programación e interfaz : 8086 (7a edición). : pearson educación

Operation Research (SCB-0419)

Credits: 8

Linear programming (models, graphical method, simplex method, applications)
Network analysis (transport problem, distribution problem, shortest route problem)
Non-linear programming (inflection point, maximums and minimums)
Stock theory (management and control, deficit)
Waiting lines (notation, Poisson method (one supplier, multiple suppliers), cost analysis)

Bibliography:

Hillier, F. (1982). Introducción a la investigación de operaciones (5ª ed.). México: McGraw-Hill.

Assembly Language (SCM-0420)

Credits: 8

Introduction (importance, processor and its registries, RAM, interruptions, system calls, assembly and linkage process)
Basic programming (loops, strings, conditions and tests, jumps, increment and decrement, arithmetic instructions, stack manipulation, file operations)
Modularisation (procedures, macros)

Bibliography:

PETER Abel, Lenguaje Ensamblador y programación para PC IBM y Compatibles, 3ª. Edición, Pearson Prentice Hall, 1966.

Mathematics II (ACM-0404)

Credits: 8

Integral Calculus course

Calculus fundamental theorem (Sums, Definite integral, primitive function, improper integrals)
Indefinite integral and Integration methods (definition, properties, calculus (straight, variable swap, trigonometric, split, substitution)
Integral applications (Area, curve length, solid of revolution volume)
Series (finite, indefinite, convergence, powers, convergence radius, Taylor series)

Bibliography:

Ayres, F. (1990). Cálculo diferencial e integral (3ª ed.). México: McGraw-Hill.

Mathematics III (ACM-0405)

Credits: 8

Multivariable Calculus course.

Vector algebra (definition, R^2 , R^3 , geometric interpretation, scalar and vectorial fields, operations and properties, decomposition, line and plane equations, applications)
 R^2 curves (Line parametric equation, flat curves, derivatives, polar coordinates, graphing)
Vectorial functions with one variable (definition, graphing, derivatives, integration, arc length, tangent vector, curve)
Vectorial functions with many variables (definition, graphing, curves and level surfaces, partial derivatives, directional derivative, higher order partial derivative, increments, differentials and chain rule, gradient, vectorial fields, rotation)
Integration (Line integration, double and triple iterative integrations, polar coordinates integration, cylindrical and spherical coordinates, applications)

Bibliography:

Stewart J. (1999). Cálculo multivariable. México, Thomson.

Mathematics IV (ACM-0406)

Credits: 8

Linear algebra course.

Complex numbers (definition, operations, powers, modulus or absolute value, polar and exponential form, De Moivre theorem, powers and root extraction, polynomial equations)
Matrixes (matrix, order, operations, classifications, transformations, inverse, determinant, applications)
Linear equation systems (geometric interpretations, Gauss, Gauss-Jordan, inverse and Cramer solution methods, applications)
Vectorial space (linear combination, linear independence, base and dimension, Gram-Schmidt orthonormalization process)
Linear transformations

Bibliography:

Grossman, S. (1988). Algebra lineal (2ª ed.). México: Iberoamérica.

Mathematics V (ACM-0407)

Credits: 8

Differential equations course.

First order equations (definitions, solutions, initial value, order, grade, separable variables, reducibles, exact and integrating factor, linear, Bernoulli, applications)
Superior order linear equations (homogeneous, linear dependency and independency, general solution, order reduction, constant coefficient solution, non-homogeneous solutions, applications)
Laplace transform (conditions, direct and indirect transform, properties, equations solutions)
Linear differential equations systems (solutions, applications)

Bibliography:

Ayres, Frank Jr.(1996). Ecuaciones Diferenciales. Primera edición. McGrawHill.
Serie Schaum.

Numeric Methods (SCM-0422)

Credits: 8

Introduction to numerical methods (importance, concepts, errors, software, iterative methods)
Equation solution methods (Interval, bisection, successive approximations, interpolation, applications)
Equation systems solution methods (iterative, non-linear equation systems, iteration and convergence, applications)
Numerical Integration and Differentiation (single, multiple, applications)
Interpolation (Newton interpolation polynomial, Lagrange interpolation polynomial, segmented interpolation, applications)
Differential equations solutions (Single-pass methods, multiple passes methods, ordinary differential equation systems, applications)

Bibliography:

Burden, R. L, Faires, J. D., Análisis Numérico, 5ª edición, Thomson Learning Inc. 2002.

Planning and Modeling (SCM-0423)

Credits: 8

Business modeling (evolution, components, direction)
Development methodologies (waterfall, incremental, evolutive, spiral, prototype, component based development, other methodologies)
Software architectures (modular decomposition, design patterns, domain specific architecture, multiprocessor architecture design, client-server architecture design, distributed architecture design, real time architecture design)
Security in Software Engineering (Software security, Security in development cycles, software reliability, security engineering)

Bibliography:

Pressman, R. (1988). Ingeniería del software: un enfoque práctico (2ª ed.). México: McGraw-Hill.

Probability and Statistic (SCC-0424)

Credits: 10

Counting theory (additive, multiplicative principle, factorial, permutations, combinations, tree diagram, binomial theorem)
Probability theory fundamentals (event, sample, set theory, axioms, theorems, dependent and independent events, Bayes rule, random variable, discrete and continuous random phenomenon)
Descriptive statistics (decision, sample, random parameters, groups, frequencies, mean, median, mode, standard deviation, range, frequency distribution, data grouping techniques, histograms)

Sample distribution (probability function, binomial, hypergeometric and Poisson distributions, normal, T-student and chi-squared distributions)

Applied statistics (inference, estimations by confidence intervals, regression and correlation)

Bibliography:

Montgomery, D; Runger, G. "Probabilidad y Estadística aplicadas a la ingeniería".

2ª. Edición. Limusa. México. 2002

System Programming (SCC-0425)

Credits: 10

Lexical analysis (patterns, token table, lexical errors, applications)

Syntax analysis (derivation trees, Chomsky normalisation, ambiguity elimination, error handling)

Semantic analysis (expression trees, type check, semantic stack, translation scheme, symbol table generation, error handling)

Intermediate code generation (notations, prefix, infix, postfix, representations, polish representation, generation scheme, variables and constants, expressions, assignments, control, functions, structs)

Optimisation (types, locals, loops, globals, costs, execution cost (memory, registries, stack))

Object code generation (Registries, assembly language, machine language, memory management)

Bibliography:

Aho, A. Compiladores: principios, técnicas y herramientas (2a ed.ª ed.). México: Pearson Educación, Addison Wesley.

Object Oriented Programming (SCM-0426)

Credits: 8

Introduction to OOP paradigm (classes, objects, abstraction, inheritance, polymorphism, encapsulation, UML class diagram)

Classes and objects (Instantiation, reference, methods (parameters, return values), constructors and destructors, method overload, operator overload)

Inheritance (Base and child classes, single and multiple, reusing code, base class object, constructors and destructors)

Polymorphism (abstract classes, interfaces, templates)

Exceptions (types, propagation, handling, user defined exceptions)

Streams and Files (text and binary access, persistent storage handling)

Bibliography:

Deitel, H. (2004). Cómo programar en Java (5ª ed.). México: Prentice-Hall.

Web Programming (SCF-0427)

Credits: 8

Architecture (evolution, technologies, planning)

Markup language (document layout, data types, global structure, test, links, lists, tables, objects, images, apps, forms)

Presentation language (syntax, selectors, media types, application)

Client side programming (elements, object manipulation)

Server side programming (elements and applications)

Bibliography:

Lerdorf, R. (2006). Programming PHP (2ª ed.). México: O'reilly.
W3 Schools

Computer Networks (SCM-0429)

Credits: 8

Networking course with CISCO CCNA material, labs and tests.

Networking fundamentals (evolution, topology, classification)
Norms and standards (OSI model, TCP/IP, IEEE 802, protocol stacks and data flow)
Network devices (active and passive, physical, link, network, upper layers)
Network addressing (netmasks, network segmentation)
Routing (routing protocols (IGRP, EIGRP, RIP, BGP), data retransmission)
Access Control Lists (definition, creating ACE/ACL)

Bibliography:

CISCO (2008). Routing protocols and concepts CCNA Exploration Labs and Study Guide. U.S.A.: Cisco Press.
Stallings, William. Comunicaciones y redes de computadores, Séptima edición. México D.F.: Prentice Hall. 2004.

Simulation (SCM-0430)

Credits: 8

Introduction (definitions and importance, methodology, models and control, structure and stages, discrete events simulator elements)
Pseudorandom numbers (generation, statistic tests (uniformity, randomness, independence), MonteCarlo method)
Random variable generation (concepts, random continuous and discrete variables, inverse transform, special procedures, statistic tests)
Simulation languages (use of a simulator, practical uses, wait line problems, stock problems, validation, hypothesis tests, estimation tests)
Integration project

Bibliography:

Coss Bu, R. (1982). Simulación: un enfoque práctico. México: Limusa.

Operating Systems (SCC-0431)

Credits: 10

Introduction (concept, functions, features, evolution, classification, levels, kernel)
Process management and the processor (process concept, state transitions, threads, concurrency, sequentiality, levels, scheduler)
Memory management (Real memory, virtual memory)
IO management (device drivers, data structures)
Filesystems (Real and virtual file, components, organization, access, secondary storage, hierarchy, recovery)
Security and protection (access matrix, language based protection, cryptography)

Bibliography:

Abraham Silberschatz, Peter Baer Galvin, Greg Gagne. 2006, Fundamentos de sistemas operativos. Séptima edición.. McGraw-Hill.

Database Workshop (SCS-0432)

Credits: 6

Install and setup (requirements, install, setup)
Data definition language (DB scheme, update, modification and removal)
Data manipulation language (insert, delete, update, queries)
Security (user types and management, roles, views)
Transactions (properties, consistency degrees, isolation levels, commit and rollback)
Procedural SQL (stored procedures, triggers)
DB connectivity (ODBC, .NET, JDBC, guest language connectivity)

Bibliography:

ORACLE Database PL/SQL Language Reference
David Kroenke. "Procesamiento de Bases de Datos". Editorial Prentice Hall

Research Workshop I (ACG-0409)

Credits: 2

Research types (pure and applied, qualitative and quantitative, experimental and non-experimental, field research, data gathering techniques)
Research protocol (background, problem statement, general and specific goals, hypothesis, justification, theoretical framework, method, timeline, budget, sources)
Verbal and Written presentation (Structure, evaluation, registration)

Bibliography:

García De Alba, Pompeya. (2000). Metodología de la Investigación. México: Porrúa.

Research Workshop II (ACG-0410)

Credits: 2

Research protocol analysis (structure, sources)
Research protocol refactor (Theoretical framework, methodology draft, variables and operations definition, report structure)
Research project contest (Verbal and written presentation)

Bibliography:

García De Alba, Pompeya. (2000). Metodología de la Investigación. México: Porrúa.

Computer Theory (SCM-0433)

Credits: 8

Formal languages theory introduction (alphabet, strings, languages, translator, compiler phases)
Regular expressions (operations, applications)
Finite automata (classification, conversion from nondeterministic to deterministic finite automata, regex with automatas, applications)
Turing Machines (construction, accepted languages)

Bibliography:

Hopcroft, J. (2002). Introducción a la teoría de autómatas, lenguajes y computación (2ª ed.). Madrid: Addison Wesley.

Telecommunication Theory (SCY-0434)

Credits: 7

Communication systems (impact, sender, receiver, mean, codes, protocols, signals (analogue, digital, electric, optic), Fourier analysis)
Transmission (twisted pair, coaxial, optic fiber, RF, microwaves, satellite, IR, error detection and recovery, flow control)
Modulation (analogue modulation, digital modulation, conversion analogue/digital, line codes, modems, standards and protocols)
Commutation techniques (circuits, packets, messages, cells)
Multiplexing (time split, frequency split, length split, code split)
Communication devices (interfaces, protocols and standards, error detection and recovery)

Bibliography:

Academia de Networking de Cisco Systems (2004). CCNA 1 y 2 Prácticas de laboratorio, vol. 1, Guía del primer año vol. 2 (3ª ed.). España: Pearson.
Andrew Tanenbaum., Redes de Computadoras, Cuarta Edición. Ed. Pearson/Prentice-Hall, México. 2003.

Programming Selected Topics (SCM-0435)

Credits: 8

Events (types, propagation, control)
Graphical User Interface
Components and libraries (definition, language provided, user defined components and libraries)
Concurrent programming (threads, multiple flows, creation and control, thread synchronisation)

Bibliography:

Deitel, H. (2004). Cómo programar en Java (5ª ed.). México: Prentice-Hall.

Database Management (SCM-07E1)

Credits: 8

Database management perspective (DBA functions and relationship with other areas, DBMS analysis)
Manager architecture (features, memory and processes, physical structure, install requirements, environment variables and install files, procedure, setup, general commands)
Storage space setup and management (Logical storage structures, definition and creation, logs, partitions, private spaces, object spaces, segments, shared memory, multiple instances)
Maintaining and operations (logs, rollback and commit, operation modes, indexes)
Security (backup and recovery, mirroring, replication, migration, monitoring and auditing, automated monitoring tools)

Bibliography:

Loney, K. Oracle Database 11g: The complete reference.. Mc Graw Hill: Estados Unidos de América.

Data Mining (SCF-07E2)

Credits: 8

Introduction (background, data, information and knowledge, analysis and representation, applications)
Knowledge management and modeling (methods, diagrams, relational models, reasoning)
Ontology engineering (definition, methodologies, OWL, applications)
Knowledge acquisition (data mining introduction, data preprocessing (filter, reduction and normalisation), rules and relationships, selection)
Business intelligence (data warehousing, query and analysis tools, reports)

Bibliography:

Hand David, Mannila Heikki and Smyth Padhraic. Principles of Data Mining.
A Bradford Book. The MIT Press, Cambridge Massachusetts, London,
England. 2001.

Computer Networks II (SCC-07E3)

Credits: 10

Networking course with CISCO CCNA material, labs and tests.

WAN technologies (configuration, applications)
Wireless networks (standards, protocols, security)
Switching fundamentals (uses, interaction with other devices)
VLAN (concept, trunk and tagging)
Switch configuration (lab practices with real switching scenarios using VLANs configured on the switch)
Layer 3 switches (features, applications)

Bibliography:

CISCO (2008). LAN Switching and Wireless CCNA Exploration Companion Guide. U.S.A.: Cisco Press.

Security (SCM-07E4)

Credits: 8

Introduction (value of data, types, goals, risks, safeguarding techniques)
Classic cryptography (cipher machines)
Digital signatures and certificates (key distribution, certification, management, HTTPS, SSL, SSH)
Network security (communications security, TCP/IP weaknesses, standards, wireless vulnerabilities)
Firewalls (software and hardware firewalls, lower layers firewall, application layer firewall, personal firewall, limitations, policies)
Information systems monitoring (attacks, scanning, vulnerabilities, infiltration, consolidation, defense)

Bibliography:

Oppliger, R. (1998). Sistemas de autenticación para seguridad en redes. Colombia: Computec Ra-Ma.
Seberry Jennifer (1993). Advances in Cryptology -AUS CRYPT'92. Berlin: Springer-Verlag.

Distributed Systems (SCF-07E5)

Credits: 8

Features (challenges, transparency, scalability, security, failure handling)
Architecture (client-server, layers and levels, Model-View-Controller, Service Oriented Architectures)
Communication (message passing, distributed objects, synchronous and asynchronous, security considerations)
Design (Formal specification, Petri nets, failure tolerant model, time synchronisation, coordination (mutual

exclusion, selection algorithms), shared distributed memory, real time systems)
Application types (web, internet, client, services, business logic)
Trends (multiprocessor architecture, media applications, RAID)

Bibliography:

Tanenbaum, A. Sistemas distribuidos, principios y paradigmas (2a ed.^a ed.). México: Pearson Educación.

Professional Internship

Credits: 20

This is a 480-hour internship program where the student needs to work in a company while developing a project, which will be then presented to the evaluation committee.

My project (it is specific to the student/company) was the development of a financial application for credit unions in Mexico by using the MOPROSOFT (Mexican standard for software development quality) and PSP (Personal Software Process) to keep the defect rate at a minimum.

Ethics Seminar (ACH-0408)

Credits: 4

Ethics course focused on professional and engineering ethics.

The reason to study ethics (personal, social, academic, citizen environments, judgement, values (truth, responsibility, justice, freedom), Human Rights)
Ethics in science and technology (ethics in scientific research, motivations, ethics in scientific development)
Ethics in institutions and organizations (ethics code, social responsibility/commitment, Working rights)
Ethics in professional work (leadership, conflicts)

Bibliography:

Mathematics I (ACM-0403)

Credits: 8

Differential Calculus course.

Real numbers (properties, intervals, inequalities)
Functions (variable, domain, graphs, polynomial, rational, irrational, trigonometric, logarithmic)
Limits and continuity (infinite limits and limits to the infinite, asymptote, discontinuity)
Derivatives (geometric interpretation, chain rule, formulas for functions, L'Hopital rule)
Derivatives applications (Tangent line, Lagrange theorem, maximums, minimums, inflection point, optimisation and rates)

Bibliography:

Ayres, F. (1990). Cálculo diferencial e integral (3^a ed.). México: McGraw-Hill.

Computer Mathematics (SCB-0421)

Credits: 8

Discrete mathematics course.

Numerical systems (binary, octal, decimal, hexadecimal, conversions, arithmetic, applications of different bases)

Set theory (empty set, universe, number sets (integer, rational, irrational, imaginary), operations (union, intersection, complement, difference, symmetric difference))

Mathematical Logic (Proposition, compounded (negation, conditional), truth table, contradiction, logic equivalences, inference rules, proofs (by induction, by contradiction), quantifiers)

Boolean algebra (Theorems, expression optimisation, logic gates)

Graph theory (elements and types, representation (mathematical and computational), shortest path, DFS, BFS, trees (components, properties), networks (max flow, min flow), applications)

Bibliography:

Johnsonbaugh, R. (1990). Matemáticas discretas. México: Iberoamericana.

Chemistry (SCC-0428)

Credits: 10

Quantum theory and atomic structure (atom and subatomic particles, cathodic and anodic rays, radiation, light wave theory, photoelectric effect, Bohr theory, Quantum theory, De Broglie duality, Heisenberg uncertainty principle, quantum and atomic orbitals, Electron distribution, Aufbau principle, Pauli exclusion principle, Hund's rule, periodic table)

Chemical elements and classification (periodic elements classification, nuclear charge, radius, ionisation, electron affinity, oxidation value, electronegativity, application, contaminants)

Chemical bonds (Octet rule, covalent bond, ionic bond)

Chemical reactions (Combination, decomposition, substitution, neutralisation, redox, applications)

Bibliography:

Chang, R. Química. Mc Graw Hill, 1991.

Introduction to Computer Systems Engineering (SCE-0418)

Credits: 6

Computing devices (digital and analogue machines, numeric systems, computer hardware, storage devices, processing devices, IO devices, software (OS, programming languages, tools, apps), computer types)

Use of Information and Communication technologies (Telecommunications and distributed and collaborative work, Internet services and applications)

Last generation technologies (Society in information technology, technology for the industry and government, ethical aspects, proprietary and open source software)

Computer models (digital circuit models, Boole algebra, Numerical algorithms)

Bibliography:

Luis A. Ureña, Antonio M. Sánchez, María T. Martín, José M. Mantas.

Fundamentos de informática.

Ed. Alfaomega-rama, México, 1999.

Programming Fundamentals (SCM-0414)

Credits: 8

Programming Fundamentals.

Basic Concepts (Algorithm, Programming, Programming Paradigms (OOP), Compilers)

Algorithms (Problem analysis, flowchart and pseudocode)



Introduction to Programming (Programming languages features, basic program structure, compilation -> linkage -> execution, compiler errors, program execution and runtime errors)
Flow control (Sequential statements, Choice statements, Loops)
Arrays (1-D and multidimensional arrays)

Bibliography:

Joyanes Aguilar, L. (1992). Fundamentos de programación: Algoritmos y estructura de datos. México: McGraw-Hill.

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