POLITECNICO MILANO 1863

DIPLOMA SUPPLEMENT ATTACHMENT

Person code 10452037
Document ID 152576/4
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Numero registro 0916-0389

1	INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION

1.1	Family name(s)

FALCI

1.2	Given name(s)

ANGELO

1.3	Date of birth (day/month/year)

23/08/1994

1.4	Student identification number or code (if available)

808759

2	INFORMATION IDENTIFYING THE QUALIFICATION

2.1	Name of the qualification and (if applicable) title conferred (in original language)

Laurea in INGEGNERIA INFORMATICA
Dottore

2.2	Main field(s) of study for the qualification

L-8 Information Technology

2.3	Name and status of awarding institution (in original language)

Politecnico di Milano (Università statale), Piazza Leonardo da Vinci 32, 20133 Milano

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Description of curriculum

BUSINESS ECONOMICS AND ORGANIZATION

Code:	082741
Credits:	10.00
Grade:	25
Date:	07/02/2014

Subject groups
ING-IND/35 ENGINEERING AND MANAGEMENT

The programme
Firms: objectives, typologies, ownership and control. General accounting: functions, content and classification of financial statements; liquidity and profitability. Long-run decisions (investment analysis): cost of capital, cash flows, Net Present Value, other assessment methods. Analysis of markets: demand, cost structure, perfect competition, other market structures. Cost accounting: cost typologies, cost analysis and allocation, short-run decisions, budgeting. Business organization: definitions, elements of organization design. Examples and applications from the ICT industries.

MATHEMATICAL ANALYSIS 1

Code:	082740
Credits:	10.00
Grade:	24
Date:	12/02/2014

Subject groups
MAT/05 MATHEMATICAL ANALYSIS

The programme
Numerical sets: real numbers, ordering and completeness; complex numbers: algebraic and trigonometric form, De Moivre theorems, n-th roots. Real functions of one real variable: domain, codomain, graph; elementary functions; composition of functions, invertibility and inverse function; monotonic, symmetric, periodic functions; sequences. Limits and continuity: main properties, indeterminate forms, rate of growth, monotone convergence, Weierstrass theorem, intermediate value theorem. Derivative: derivation rules, applications, differential and linear approximation, Fermat, Lagrange, De L'Hospital theorems; higher order derivatives; Taylor's formula, local approximation by polynomials, convex functions, maxima and minima, graph of functions. Integral of one variable functions: definite integral, main properties and applications; primitives, fundamental theorem of calculus, integration rules. Curves in R3. Numerical series; Taylor' series. Complex exponential function.

FUNDAMENTALS OF COMPUTER SCIENCE

Code: 082746
Credits: 10.00
Grade: 27
Date: 14/02/2014

Subject groups

ING-INF/05 DATA PROCESSING SYSTEMS

The programme

Overview of computers and programming: functional description of an elementary computer, algorithms, programming languages, compilers, operating systems and networks. Encoding of the information, boolean operators and fundamental theorems. Programming language concepts using the C or C++ language: data abstraction and the use of types, control structures for the execution of a sequence of statements. Top-down design with functions, parameter passing among functions, local and global variables and the recursive programming. File management using operating system services. Translation of C or C++ programs into assembly language. Introduction to system programming.

BASIC CIRCUIT THEORY

Code: 082742
Credits: 10.00
Grade: 25
Date: 30/06/2014

Subject groups

ING-IND/31 ELECTROTECHNICS

The programme

Introduction to basic electric quantities. Kirchhoff Laws. Resistive one-port components. Voltage-Current descriptive function. Electric Power. Solution of simple circuits. Two-ports. Controlled sources. Special two-ports. Matrix representation. Analysis of resistive circuits: general methods, superposition principle. Thevenin and Norton equivalent one-ports. Dynamic components: capacitors, inductors, coupled inductors. Linear dynamic circuits: first order (RC and RL) and second order (RLC). Sinusoidal steady state: phasor method, immitance and impedance, power, applications (resonance, maximum power transfer, impedance adaptation, power factor correction). Fundamentals of elctromechanic transformations.

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PHYSICS

Code: 082745
Credits: 12.00
Grade: 21
Date: 07/07/2014

Subject groups
FIS/01 EXPERIMENTAL PHYSICS

The programme
Physical quantities and measurements.. Kinematics of a point particle. Newtonian dynamics, forces, study of motion. Work and energy. Dynamics in non-inertial reference frames. Elementary interactions between masses and electrical charges. Dynamics of particle systems and rigid bodies. Elements fluid mechanics Thermodynamical systems. The first end the second principles of thermodynamics. Kinetic theory of gases.

GEOMETRY AND LINEAR ALGEBRA

Code: 082747
Credits: 8.00
Grade: 27
Date: 28/07/2014

Subject groups
MAT/03 GEOMETRY

The programme
Vectors. Analytic geometry in cartesian 2 and 3 dimensions. Matrices; linear maps and systems; eigenvalues and eigenvectors. Euclidean spaces Rn. Conics and quadric surfaces.

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PROBABILITY AND STATISTICS

Code:	085902
Credits:	10.00
Grade:	24
Date:	06/02/2015

Subject groups

MAT/06 PROBABILITY AND MATHEMATICAL STATISTICS

The programme

Introduction The most frequent probability models: validation. Descriptive statistics Quantitative e qualitative variable; graphical descriptions of data; fre-quency distribution; box plot; bivariate case, least squares means. Probability Combinatorics. Sample space event space, sigma algebras. Conditional probabil-ity and independence of events, reliability. Random variables Special random variables; discrete case: Bernoulli, binomial, geometric, hypergeometric, Poisson; continuous case: uniform, exponential, gamma, normal. Moment-generating functions, Tchebysheff inequality. Function of random variables. Random vectors Cumulative distribution function, independent random variables. Multino-mial normal distribution. Conditional distributions. Sampling The Central Limit Theorem, the normal approximation. Weak law of large numbers, the variables chi-square, t-student, Cauchy, Fisher. Short introduction to Monte Carlo meth-ods. Estimation Point estimation and intervals estimation for normal and Bernoulli populations. Hypothesis testing Parametric testing for parameters of normal and Bernoulli distributions. Nonparametric testing: goodness of fit, Kolmogorv-Smirnov, q-q plot, Shapiro-Wilk. Test of independence Linear models and estimation Method of least squares, inferences concerning parameters, predicting a particular value of y using simple linear regression. Multiple linear regression model, fitting the linear model by using matrices, the projection matrix.

COMPUTER ARCHITECTURES AND OPERATING SYSTEMS

Code:	085779
Credits:	10.00
Grade:	28
Date:	13/02/2015

Subject groups

ING-INF/05 DATA PROCESSING SYSTEMS

The programme

Parallel and concurrent programming models: processes and threads. The structure of Operating Systems: process management, virtual memory, file system structure and device drivers. Introduction to digital logic circuits: Boolean algebra and lgic gates, boolean function implementation and basic combinational circuits, basic sequential elements, memory organization. Functional subsystems: buses and interfacing. Processor microarchitecture: data path and control path, microcode. Microarchitecture design and performances: pipelining and cache memory. Instruction Set Architectural level (with a reference processor): instruction formats and addressing modes, assembly process and linking.

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MATHEMATICAL ANALYSIS 2 (FOR STUDENTS IN INFORMATION ENGINEERING)

Code:	085778
Credits:	10.00
Grade:	25
Date:	25/02/2015

Subject groups
MAT/05 MATHEMATICAL ANALYSIS

The programme
Real functions of two or several variables: limits, continuity, level curves and surfaces, gradient, differentiability and linear approximation, higher order derivatives, Taylor's formula; free optimization; constrained optimization, Lagrange multipliers. Linear differential equations: 1st order and 2nd order equations, superposition principle, structure of general solution, existence and uniqueness for the initial value problem, solution techniques. Fourier series: pointwise convergence, amplitude spectrum. Double and triple integrals: properties and applications, formulae of reduction, change of variables (polar, cylindrical, spherical coordinates). Curves in the space: regularity, tangent straight line, normal plane. Line integrals: length of a curve, work of a vector field, conservative vector fields, potential function. One topic between a) Surfaces in R3: area, surface integrals, flow of a vector field through a surface; curl and divergence theorems in the plane and in the space. b) Differential linear systems: structure of general solution, existence and uniqueness for the initial value problem.

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FUNDAMENTALS OF AUTOMATIC CONTROL

Code: 085905
Credits: 10.00
Grade: 27
Date: 02/07/2015

Subject groups

ING-INF/04 AUTOMATICS

The programme

Control problems: an overview (control objectives, basic structures and terminology, primary features, performance evaluation). Mathematical models of physical systems. Oriented systems (dynamic vs. non dynamic systems, time-invariant vs. time-varying systems, linear vs. nonlinear systems; state variables and normal form, equilibrium conditions, linear model tangent to a system at an operating point). Analysis of linear time-invariant systems in the time-domain (state-motion and output-response, superposition of effects, stability of motion, stability of system, stability criteria). Elements of signal analysis: main transforms and their properties. Analysis of linear time-invariant systems in the frequency-domain (state-motion and output-response, superposition of effects, transfer function, cancellations and Kalman canonical decomposition (hint), system stabilizability, realizations of a transfer function, block diagrams, stability analysis of systems described by a block diagram, frequency response, system bandwidth). Performance evaluation of linear feedback control systems: (robust, asymptotic) stability criteria, phase and gain margins, dynamic precision (bandwidth and sensitivity, load and output disturbances, measurement and transmission errors), static (asymptotic) precision, periodic disturbances. Try and error techniques for control system design. Linear (PID) and nonlinear (switching) industrial regulators. Tuning rules. Non elementary control architectures (feedforward vs. feedback, cascade control, decoupling). Digital control (hints).

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INTRODUCTION TO ELECTRONICS

Code:	085746
Credits:	10.00
Grade:	19
Date:	06/07/2015

Subject groups
ING-INF/01 ELECTRONICS

The programme
The course provides the students with a basic understanding both of electronic circuits (analog and digital) and of devices. Topics covered in the subject include: - Signals: acquisition and processing; sources and sensors; time domain and frequency domain analysis. - Circuits: transfer function, amplification and attenuation, input and ouptput impedance, circuit cascading. - Electronic devices: semiconductors, pn-junction diode, MOS transistor. - Digital electronics: CMOS logic, volatile and non-volatile memories. - Analog electronics: MOS single-stage amplifiers, MOS differential stage, operational amplifier, negative feedback, inverting and non-inverting amplifier, input and output impedance, current conveyors, summer, differential amplifiers, integrators, differentiators, frequency response and stability. - Analog to digital conversion: sampling theorem, sample&hold circuits, A/D converters, D/A converters. The focus of the subject is twofold: both understanding the basic concepts that drive the operation of an electronic circuit and understanding the impact of non-idealities of real components on the circuit performances. This course is not intended to develop a specific skill in electronics, but rather to give the student a rather broad view of the overall aspects of electronics. The breadth of topics covered in this course makes it useful both for the students who intend to graduate after the first three years and for the students who want to specialize in the field of electronics.

LOGIC AND ALGEBRA

Code:	085903
Credits:	5.00
Grade:	20
Date:	10/07/2015

Subject groups
MAT/01 MATHEMATICAL LOGIC, MAT/02 ALGEBRA

The programme
Relations and maps: Relations of arity 2, properties and closure of a relation with respect to a given set of properties. Equivalence relations and partitions, quotient set. Order relations. Surjective, injective and bijective maps, existence of the inverse map, kernel, factorization theorem of maps. Cardinality: Cantor`s theorem. Algebraic structures: definitions, examples and elementary properties of main algebraic structures, substructures, congruence relations, quotient structures, homomorphisms. Propositional logic: well formed formulas and semantic, formal systems. Deduction, soundness and completeness theorems. First order logic: the language of first order logic, terms and well formed formulas. Semantic and models. Prenex normal form. Formal systems: soundness and completeness. Examples of first order theories.

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INDUSTRIAL AUTOMATION

Code: 085901
Credits: 5.00
Grade: 23
Date: 20/07/2015

Subject groups

ING-INF/04 AUTOMATICS

The programme

The course provides the methodological and practical foundations for the management of automation and control problems related to industrial machines and plants. Techniques for modeling, analysis and control of discrete event systems are studied in detail. Some real case studies of industrial processes are also discussed, with focus on flexible manufacturing systems.

ALGORITHMS AND PRINCIPLES OF COMPUTER SCIENCE

Code: 086067
Credits: 10.00
Grade: 26
Date: 03/02/2016

Subject groups

ING-INF/05 DATA PROCESSING SYSTEMS

The programme

Computer science models. Automata, grammars, Petri Nets, applications of mathematical logic to system modeling. Theory of computation. Church`s thesis; unsolvable problems. Computational complexity. Computational models and relations between their computational complexities. Linear acceleration. Algorithms and data structures. Order of magnitude of computational complexity; searching and sorting; fundamental data structures: stacks, queues, trees, hash tables. Backtracking, Divide et impera. NP-completeness.

DIGITAL LOGIC DESIGN

Code: 085877
Credits: 5.00
Grade: 21
Date: 05/02/2016

Subject groups

ING-INF/05 DATA PROCESSING SYSTEMS

The programme

This subject has the goal of introducing the student to the logic design of digital circuits and systems, considering basic problems and methods. Logic synthesis and design optimization are treated, starting from combinational networks and then considering sequential systems, even complex ones. Merit figures of the optimization process are defined, valid also for the case of adoption of CAD based methods.Prototyping and/or implementation of digital systems will be examined adopting field programmable logic gate arrays (FPGA).

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THE INTERNET AND COMMUNICATION NETWORKS

Code:	085894
Credits:	10.00
Grade:	23
Date:	08/02/2016

Subject groups

ING-INF/03 TELECOMMUNICATIONS

The programme

The course is devoted to the presentation of the architectures and the technologies of data networks and the Internet. The course program includes first two introductory parts, the first on the basics of communications systems and transmission techniques, and the second on functional models of computer networks and the concept of communication protocol and stack architectures. Then the course focuses on the protocol architecture of the Internet which is illustrated focusing the attention on protocols for transferring information units (frames, packets, segments) into the network according to the layered model. Both local areas and geographical areas will be considered as application contexts. The last part of the program is devoted to a brief overview of some advanced issues of communication technologies for the Internet (MPLS, IPV6, Internet multimedia, security).

DATA BASES 1

Code:	085887
Credits:	5.00
Grade:	28
Date:	10/02/2016

Subject groups

ING-INF/05 DATA PROCESSING SYSTEMS

The programme

This course aims at communicating to students two basic abilities: designing and querying databases. After a brief introduction dedicated to data models and formal languages for databases, the course turns to the description of relational systems. Using SQL both as a query and data manipulation language, we show its use as a means for delivering relational applications. Next, we illustrate the Entity-Relationship model as an instrument for conceptual database design, discussing how the design process takes place and the quality requirements of design results.

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INFORMATION SYSTEMS (FOR STUDENTS IN INFORMATION ENG.)

Code:	085914
Credits:	5.00
Grade:	24
Date:	27/06/2016

Subject groups

ING-INF/05 DATA PROCESSING SYSTEMS

The programme

Introduction to information systems: classification of information systems, evolution of information systems. Operational information systems, transactional information systems. Introduction to ERP, and CRM systems. Cooperative and distributed information systems. Business Processes Modelling (BPM). Support to process execution: technologies based on workflow management systems and on Web services. Life cycle and information system planning. Introduction to security of information systems: principles of cryptography; applications of information systems and electronic signature; data security; security plan.

HYPERMEDIA APPLICATIONS (WEB AND MULTIMEDIA)

Code:	089318
Credits:	5.00
Grade:	26
Date:	01/07/2016

Subject groups

ING-INF/05 DATA PROCESSING SYSTEMS

The programme

This course aims at providing students with the knowledge and skills needed to design and to implement complex, high quality web based hypermedia applications for stationary and mobile devices. The course is organized in two parts.Part I focuses on conceptual design. It proposes the IDM Model as a means to define information architectures, and navigation, interaction, and presentation features of complex multi-channel applications, and emphasizes the need for making the user experience in the different contexts easy and effective. Part II focuses on technology. The addressed topics include: overview of web architectures and protocols, languages for web data representation (XML/XHTML) and layout (CSS), technologies for dynamic web page execution on the client side (Javascript and DOM), technologies for remote services call (Asynchronous Javascript, AJAX, and JSON), technologies for dynamic web page execution on the server side (Java JSP / Servlet), architectural patterns for web applications (MVC and DAO), the cloud computing paradigm and web application development on Google App Engine platform. The course includes a number of sessions devoted to exemplify, through exercises, live demos, and case studies, the methods and concepts presented in the various lectures.

FINAL EXAMINATION

Code: 085923
Credits: 3.00
Grade: 29
Date: 15/07/2016

Subject groups
Unavailable

The programme
The goal is of implementing a Java application, adopting the object-oriented paradigm.

SOFTWARE ENGINEERING

Code: 085885
Credits: 7.00
Grade: 26
Date: 18/07/2016

Subject groups
ING-INF/05 DATA PROCESSING SYSTEMS

The programme
Software Design: Object-Oriented design. Client-server architectures and distributed programming in Java, Event-based component interaction and GUI design. Unified Modeling Language: Description of a software architecture in UML. UML for requirements analysys and specification. Software Testing: Goals, foundations, techniques. Software Life-cicle: Software process and software evolution. Configuration management.

MECHANICS

Code: 088804
Credits: 5.00
Grade: 27
Date: 19/07/2016

Subject groups
ING-IND/13 APPLIED MECHANICS FOR MACHINERY

The programme
The first part of the course is dedicated to the study of the kinematics of the rigid bodies in plane motion with geometry and algebra of vector solutions and complex numbers method. Arguments such the phenomenon of the contact between solids, as friction are introduced. The second part of the course deal with the dynamics of rigid bodies system in plane motion. General equations of dynamics are discussed and is introduced the D`Alambert principle. Work-Energy relations are treated in the study of the energy flow in a machine with the characterization of engine, transmission and utilizator. Concepts of steady and transient rate, direct and retrograde motion are discussed. For all the arguments the development of various numerical applications are provided.

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THERMODYNAMICS AND HEAT TRANSFER

Code: 088805
Credits: 5.00
Grade: 24
Date: 26/07/2016

Subject groups

ING-IND/10 TECHNICAL PHYSICS

The programme

Fundamentals of Thermodynamics: First Law for closed and open systems: internal energy and enthalpy. Second Law for closed and open systems: entropy. External and internal irreversibilities. Applied thermodynamics: turbine, pump, heater and cooler. Analysis of power generation and refrigeration systems. Heat transfer. Conduction: The Fourier law. Unidirectional steady conduction. Extended surfaces (Fins). The lumped capacitance model for unsteady conduction. Convection: basic principles of convection: forced and natural convection. Dimensional analysis and model theory. Correlations in forced and natural convection. Radiation: black body radiation. Heat transfer between black surfaces. Diffuse-gray surfaces. Application: heat exchanger, electronic cooling.