Informatics

Emphasis

NAME OF THE SUBJECT: **Informatics** ● Obligatory (X): Basic (X) Complementary ( ) ● Elective (): Intrinsic ( ) Extrinsic ( )
NUMBER OF ACADEMIC CREDITS: Four (4).
COURSE TYPE: THEORETICAL: ___ PRACTICAL: ___ THEORETICAL-PRACTICAL: _X_ Methodological alternatives: Master Class (X), Seminar ( ), Seminar - Workshop (X), Workshop ( ), Practice (X), Tutored projects (X), Other: ______________________

Justification

SYNOPSIS OF THE SUBJECT:

In this academic space, theoretical-conceptual aspects are presented that approach the concept of Informatics from a scientific, engineering and social practice approach, useful for organizations to efficiently manage their information assets by supporting the processes of their value chain.

The space contributes to the development of the skills required by the student to critically address the problem contexts in which the information sciences can contribute to the generation of systems whose processes are aligned with missionary objectives and with the support of decision making in dynamic, complex and uncertain environments.

JUSTIFICATION:

It is difficult to find a human activity that does not consume, transform or produce information. It is the information assets, properly managed, that allow balanced decision-making, aligned with the mission of organizations (De Haes and Van Grembergen, 2019). Information

Management is a fundamental piece for the constant re-creation of the organizational ethos, necessary for the adaptation of business to market dynamics, technological evolution and social uncertainties.

Information is the resource that companies need to enter the so-called knowledge and learning society, it is the input that is required to maximize delivery of value to users and to keep a positive return on investment . Nowadays, the information is a valid object of study (ontological context), whose aspects need to be approached from an investigative perspective. The processes by which it is generated and managed (epistemological context) must be characterized and validated; the technical resources, technologies and human talent that constitute the systems that support its management (engineering context) must be rationally articulated; and the processes that guarantee its integrity, availability and confidentiality (practical context) require to be optimized and quantitative - qualitatively managed.

This Subject offers a broad, updated and critical overview of computing not as a concrete and static concept but as a field of study that is constantly enriched, as a result of related research, the emergence of new approaches and technologies, the evolution of tools and a growing community of "knowledge and learning engineers".

PREREQUISITES:

Basic programming
Basic skills on Operating System Administration
Fundamental statistics

Content

GENERAL OBJECTIVE
Bring on the corpus of knowledge related to computing science from a critical contextual, ontological, epistemological, engineering and practical approach.

SPECIFIC OBJECTIVES
- Understand informatics as a science, engineering, and practical field.
- Explore the role of informatics in the process of value development within organizations.
- Conceive the historical development of computing science from the modern structuralist and mechanistic view to cybernetics and information systems and contemporary perceptions based on adaptive systems, complexity theory and artificial intelligence.
- Establish the differences between data, information and knowledge, taking into account the management strategies of each of them.
- Conceptualize information systems, their categories and the role they play in today's computing science.
- Analyze the role of software engineering in computing.
- Define differentiation criteria for the best known software development process models and their possible application according to the context.
- Detail the disciplines of requirements, architecture, development, testing, deployment and risk management as fundamental elements in the construction of software solutions that support computing.
- Contextualize the student in the evolution of Software Engineering approaches and in the predominant process models in the development of computing projects.

SYNTHETIC PROGRAM:
1. Introduction
    a. Philosophy and nature of computing
    b. Symbol, sign, data, information and knowledge
    c. Information and knowledge models
    d. Fundamental aspects of Software Engineering
    e. Programming languages
    f. Software Engineering
2. Programming Paradigms
    a. Concept of Paradigm
    b. Historical development of programming paradigms.
    c. Relevant programming paradigms
3. Software Architecture

   a. Architecture Description
   b. Points of View and views
   c. Architecture styles and models
   d. Software Design Specification
4. Software development
   a. Software Development Processes
   b. Source Code Management
   c. Introduction to Software Patterns
   d. Interoperability Mechanisms
5. Software Systems Modeling
6. Inofrmation security
7. Quality in Software Systems
8. Application Cases
   a. Analytical Intelligence Systems
   b. Business Process Management
   c. Internet of things
   d. Geographic information systems
   e. Machine Learning
   f. Cloud Computing

Strategies

METHODOLOGY:
This subject, as an academic space, is developed in multiple interaction scenarios that fosters the construction of knowledge within a socio-cultural approach. In this way, the interaction between participants in the educational act is of vital importance and is intended to manifest itself in a dialogical, intentional, social, conscious and systematic style of relationship, aimed at generating learning experiences that allow the student, through their interaction with others, build their own knowledge related to the proposed competences (Escobar, 2011).

At a procedural level, seven (7) didactic units are proposed, each one using a mixture of the following approach:

- Project-based learning
- Collaborative learning
- Master classes

- Multiple execution environments
- Significant learning
- Socio-cultural immersion learning

The proposed projects - related to uses cases, are developed in group-based activities that recreate team practices in DevOps environments.

	Hours			Teacher hours / week	Student hours / week	Total Hours Student / semester	Academic credits
Type of course	DW	CW	AW	(DW + CW)	(DW + CW +AW)	X 18 weeks	
	3	1	8	4	12	192	4

Direct Presential Work (DW): classroom work in plenary session with all students.
Mediated-Cooperative Work (CW): Teacher tutoring work to small groups or individually to students.
Autonomous Work (AW): Student work without the presence of the teacher, which can be done in different instances: in work groups or individually, at home or in a library, laboratory, etc.)

Resources

PHYSICAL RESOURCES REQUIRED:

- Classroom
- Video Beam
- Personal Computer
- Internet Access
- IoT Devices

BIBLIOGRAPHY:

- Rumbaugh, J., Jacobson, I. y Booch, G. The Unified Modeling Language Reference Manual. Segunda Edición, Addison-Wesley.
- Wiegers, K. (2013). Software Requirements. Tercera Edición. Microsoft Press.
- Clements, P., Bachman, F. y Otros (2011). Documenting Software Architectures: Views and Beyond. Segunda Edición. Addison- Wesley.
- Epf.eclipse.org. (2017). OpenUP. [en línea] Disponible en: http://epf.eclipse.org/wikis/openup/ [Accedido 31 de julio de 2017].

- Bell, M. (2016). Incremental Software Architecture: A Method for Saving Failing IT Implementations. Wesley.
- Agile Software Development. Alistair Cockburn
- The Clean architecture. Robert C. Martin
- The Clean Code. Robert C. Martin
- The Software architecture patterns. Mark. Richards.
- Elegant Software Design Principles. Narayanan Jayaratchagan
- Software Metrics and Software Metrology. Alain Abran
- Requirements Writing for System-Engineering. George Koelsch
- ISO/IEC 25000, ISO/IEC 42000, ISO/IEC 27000, ISO/IEC 25000 family of Standards.
- IEEE 1016. Standard for Information Technology — Systems Design — Software Design Descriptions
- ISO/IEC 19501. Information technology — Open Distributed Processing — Unified Modeling Language (UML) Version 1.4.2
- ISO/IEC 15504. Information technology – Software Process Improvement and Capability Determination (SPICE)
- ISO/IEC/IEEE 15939. Systems and software engineering — Measurement process

BIBLIOGRAPHIC RESOURCES:

- IEEE Database
- SPRINGER Database
- ELSEVIER Database

Course Schedule

Week /Unid	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Nature and Philosophy of Computing	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Programming Paradigms	x	x	x	x												
Software Architecture	x	X	x	x	x	x	x									
Software development			x	x	x	x	x	x	x	x	x	x	x	x		
Software Systems Modeling					x	x	x	x	x	x	x	x	x	x		
Information Security										x	x	X	x	x		
Quality in Software Systems					x	x	x	x	x	x	x	x	x	X		
Application Cases			x			x			x			x			x	x

Evaluation

ASPECTS TO EVALUATE

Conceptual Competence in the field of Information Sciences : Ability to trace computing in the information science framework, arguing its differences and equivalences from different points of views.

Comprehensive Competency in Computer Science: Ability to understand computing as a field of study in a multidimensional scientific, engineering and practical approach.

Comprehensive competence in Information Management Systems: Ability to understand the governance, objectives, structure, and operation of information management systems and their role in preserving the integrity, confidentiality, and availability of information.

Conceptual Competence in the field of computer and information security: Ability to know the structure of a computer system determining its components and the characteristics related to security in each of them and their interactions (including technologies, processes, risks, software, hardware, etc.).

Procedural competence in Software Engineering: Ability to functionally characterize, analyze, architecturally design, implement, test, track and improve information management systems to ensure the integrity, availability and integrity of data and information throughout the collection, production, appropriation, analysis chain, treatment and distribution.

TEACHER INFORMATION:

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