Book of short descriptions by course

Ciencia de la Computación

– 2024-II–

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1.1 CS100. Introduction to Computer Science

This course serves as the foundation for understanding the fundamental concepts of computational thinking applicable across various professions.

The course provides, starting from ground zero, a panoramic view of: introductory computational thinking, data storage, computer architecture, operating systems, networks and the Internet, algorithms, sorting methods, software engineering, databases, data structures, software engineering, computer graphics, artificial intelligence among others.

Designed as an introductory course to Computer Science, the concepts are presented in a playful manner and using an Active Learning methodology. Throughout the course, active audience participation is encouraged, akin to a theatrical performance.

The related knowledge areas covered are directly aligned with the Computing Curricula ACM/IEEE-CS.

The course **does not require** any prior knowledge in computer handling topics and can be taken by student from any field.

1.2 CS111. Introduction to Programming

This is the first course in the sequence of introductory courses to Computer Science.This course is intended to cover the concepts outlined by the Computing Curricula ACM/IEEE-CS 2013. Programming is one of the pillars of Computer Science; any professional of the area, will need to program to materialize their models and proposals. This course introduces participants to the fundamental concepts of this art. Topics include data types, control structures, functions, lists, recursion, and the mechanics of execution, testing, and debugging.

1.3 MA101FCCS. Linear Algebra

Linear algebra is fundamental to computer science, providing essential tools for algorithm analysis, computer graphics, machine learning, and many other areas. This course provides a solid foundation in the concepts and techniques of linear algebra, with a focus on its application in computing.

1.4 MA102FCCS. Integral Calculus

Differential calculus is a fundamental tool in computer science for understanding and modeling change. This course introduces the main concepts of differential calculus, including limits, derivatives, applications of the derivative, and optimization.

1.5 FI101FCCS. Physics I

Physics is essential for understanding the world around us, and its principles are fundamental in many areas of computer science, such as computer graphics, physical simulations, and robotics. This course introduces the basic concepts of classical mechanics, including kinematics, dynamics, work, and energy.

1.6 CH101FCCS. Chemistry I

Chemistry provides a foundation for understanding the composition, structure, and properties of matter. While not directly related to many aspects of programming, chemistry is relevant to computer science in areas such as materials science (developing new materials for computer components), nanotechnology, and bioinformatics. This course introduces the basic principles of general chemistry.

1.7 ID101. Technical and professional English I

A fundamental part of the integral formation of a professional is the ability to communicate in a foreign language in addition to the native language itself. It not only broadens its cultural horizon but also allows a more humane and comprehensive view of people's lives. In the case of foreign languages, English is undoubtedly the most pratical because it is spoken around the world. There is no country where it is not spoken. In careers related to tourist services English is perhaps the most important practical tool that the student must master from the outset as part of his comprehensive education.

2.1 CS112. Computer Science I

This is the second course in the sequence of introductory courses in computer science. The course will introduce students in the various topics of the area of computing such as: Algorithms, Data Structures, Software Engineering, etc.

2.2 CS1D1. Discrete Structures I

Discrete structures provide the theoretical foundations necessary for computation. These fundamentals are not only useful to develop computation from a theoretical point of view as it happens in the course of computational theory, but also is useful for the practice of computing; In particular in applications such as verification, cryptography, formal methods, etc.

2.3 MA103FCCS. Differential Calculus

Integral calculus is essential in computer science for modeling and solving problems involving accumulation, change, and areas under curves. This course provides the foundations of integral calculus, including integration techniques, applications, and its relationship with differential calculus.

2.4 FI201FCCS. Computational Physics

This course applies the principles of physics to computational problems, with an emphasis on light, wave propagation, collisions, and energy transfer. These concepts are essential in areas such as computer graphics, physical simulations, and video game development.

2.5 BI101FCCS. Biology I

Biology is the science of life, and while it may not seem immediately relevant to computer science, it provides a foundation for interdisciplinary fields such as bioinformatics, computational biology, and biologically inspired artificial intelligence. This course introduces the fundamental concepts of biology, from the cell to evolution.

2.6 ID102. Technical and professional English II

A fundamental part of the integral formation of a professional is the ability to communicate in a foreign language in addition to the native language itself. It not only broadens its cultural horizon but also allows a more humane and comprehensive view of people's lives. In the case of foreign languages, English is undoubtedly the most practical because it is spoken around the world. There is no country where it is not spoken. In careers related to tourist services english is perhaps the most important practical tool that the student must master from the outset as part of his comprehensive education.

3.1 CS113. Computer Science II

This is the third course in the sequence of introductory courses in computer science. This course is intended to cover Concepts indicated by the Computing Curriculum IEEE (c) -ACM 2001, under the functional-first approach. The object-oriented paradigm allows us to combat complexity by making models from abstractions of the problem elements and using techniques such as encapsulation, modularity, polymorphism and inheritance. The Dominion of these topics will enable participants to provide computational solutions to design problems simple of the real world.

3.2 CS1D2. Discrete Structures II

In order to understand the advanced computational techniques, the students must have a strong knowledge of the Various discrete structures, structures that will be implemented and used in the laboratory in the programming language..

3.3 CS2B1. Platform Based Development

The world has changed due to the use of fabric and related technologies, rapid, timely and personalized access to the information, through web technology, ubiquitous and pervasive; they have changed the way we do things, how do we think? and how does the industry develop? Web technologies, ubiquitous and pervasive are based on the development of web services, web applications and mobile applications, which are necessary to understand the architecture, design, and implementation of web services, web applications and mobile applications.

3.4 MA104FCCS. Advanced Differential and Integral Calculus

This course extends the concepts of differential and integral calculus to functions of several variables. Topics covered include partial derivatives, multiple integrals, and their applications in computing.

3.5 EC101FCCS. General Economy

Economics is the study of how societies allocate scarce resources. For computer science students, understanding economic principles is valuable for decision-making in business contexts, evaluating technology projects, and understanding the economic impact of innovations. This course provides an introduction to microeconomic and macroeconomic principles.

3.6 ID103. Technical and professional English III

A fundamental part of the integral formation of a professional is the ability to communicate in a foreign language in addition to the native language itself. It not only broadens its cultural horizon but also allows a more humane and comprehensive view of life. In the case of foreign languages, undoubtedly English is the most practical because it is spoken around the world. There is no country where it is not spoken. In careers related to tourist services, English is perhaps the most important practical tool that the student must master from the outset as part of his / her integral education

4.1 CS210. Algorithms and Data Structures

The theoretical foundation of all branches of computing rests on algorithms and data structures, this course will provide participants with an introduction to these topics, thus forming a basis that will serve for the following courses in the career.

4.2 CS211. Theory of Computation

This course emphasizes formal languages, computer models and computability, as well as the fundamentals of computational complexity and complete NP problems.

4.3 CS221. Computer Systems Architecture

A computer scientist must have a solid knowledge of the organization and design principles of diverse computer systems, by understanding the limitations of modern systems they could propose next-gen paradigms. This course teaches the basics and principles of Computer Architecture. This class addreses digital logic design, basics of Computer Architecture and processor design (Instruction

Set architecture, microarchitecture, out-of-order execution, branch prediction), execution paradigms (superscalar, dataflow, VLIW, SIMD, GPUs, systolic, multithreading) and memory system organization.

4.4 CS271. Data Management

Information management (IM) plays a major role in almost all areas where computers are used. This area includes the capture, digitization, representation, organization, transformation and presentation of information; Algorithms to improve the efficiency and effectiveness of accessing and updating stored information, data modeling and abstraction, and physical file storage techniques.It also covers information security, privacy, integrity and protection in a shared environment. Students need to be able to develop conceptual and physical data models, determine which (IM) methods and techniques are appropriate for a given problem, and be able to select and implement an appropriate IM solution that reflects all applicable restrictions, including Scalability and usability.

4.5 MA106FCCS. Numerical Methods

Numerical methods are essential in computer science for approximating solutions to mathematical problems that cannot be solved analytically. This course provides an introduction to the most common numerical methods, including equation solving, interpolation, numerical integration, and the solution of differential equations.

4.6 ST251FCCS. Probability Calculation

Probability calculus is fundamental in computer science for algorithm analysis, system modeling, and decision-making under uncertainty. This course introduces the basic concepts of probability, including random variables, probability distributions, and important theorems like Bayes' theorem.

4.7 ID104. Technical and professional English IV

A fundamental part of the integral formation of a professional is the ability to communicate in a foreign language in addition to the native language itself. It not only broadens its cultural horizon but also allows a more humane and comprehensive view of life. In the case of foreign languages, English is undoubtedly the most practical because it is spoken around all the world. There is no country where it is not spoken. In addition to being vital to your professional career

5.1 CS212. Analysis and Design of Algorithms

An algorithm is, essentially, a well-defined set of rules or instructions that allow solving a computational problem. The theoretical study of the performance of the algorithms and the resources used by them, usually time and space, allows us to evaluate if an algorithm is suitable for solving a specific problem, comparing

it with other algorithms for the same problem or even delimiting the boundary between Viable and impossible. This matter is so important that even Donald E. Knuth defined Computer Science as the study of algorithms. This course will present the most common techniques used in the analysis and design of efficient algorithms, with the purpose of learning the fundamental principles of the design, implementation and analysis of algorithms for the solution of computational problems

5.2 CS272. Databases II

Information Management (IM) plays a leading role in almost every area where computers are used. This area includes the capture, digitization, representation, organization, transformation and presentation of information; Algorithms to improve the efficiency and effectiveness of access and update of stored information, data modeling and abstraction, and physical file storage techniques.

It also covers information security, privacy, integrity and protection in a shared environment. Students need to be able to develop conceptual and physical data models, determine which IM methods and techniques are appropriate for a given problem, and be able to select and implement an appropriate IM solution that reflects all applicable constraints, including scalability and Usability.

5.3 CS291. Software Engineering I

The aim of developing software, except for extremely simple applications, requires the execution of a well-defined development process. Professionals in this area require a high degree of knowledge of the different models and development process, so that they are able to choose the most suitable for each development project. On the other hand, the development of medium and large-scale systems requires the use of pattern and component libraries and the mastery of techniques related to component-based design

5.4 CS2S1. Operating systems

An Operating System (OS) manages the computing resources to complete the execution of multiple applications and their associated processes. This course teaches the design of modern operating systems; and introduces their fundamental concepts covering multiple-program execution, scheduling, memory management, file systems, and security. Also, the course includes programming activities on a minimal operating system to solve problems and extend its functionality. Notice that these activities require much time to complete. However, working on them provides valuable insight into operating systems.

5.5 CS342. Compilers

That the student knows and understands the concepts and fundamental principles of the theory of compilation to realize the construction of a compiler

5.6 ID105. Technical and professional English V

A fundamental part of the integral formation of a professional is the ability to communicate in a foreign language in addition to the native language itself. It not only broadens its cultural horizon but also allows a more humane and comprehensive view of life. In the case of foreign languages, undoubtedly English is the most practical because it is spoken around the world. There is no country where it is not spoken. In careers related to tourist services, English is perhaps the most important practical tool that the student must master from the outset as part of his / her integral education

6.1 CS231. Networking and Communication

The ever-growing development of communication and information technologies means that there is a marked tendency to establish more computer networks that allow better information management..

In this second course, participants will be introduced to the problems of communication between computers, through the study and implementation of communication protocols such as TCP / IP and the implementation of software on these protocols

6.2 CS261. Artificial Intelligence

Research in Artificial Intelligence has led to the development of numerous relevant tonic, aimed at the automation of human intelligence, giving a panoramic view of different algorithms that simulate the different aspects of the behavior and the intelligence of the human being.

6.3 CS2H1. User Experience (UX)

Language has been one of the most significant creations of humanity. From body language and gesture, through verbal and written communication, to iconic symbolic codes and others, it has made possible complex interactions Among humans and facilitated considerably the communication of information. With the invention of automatic and semi-automatic devices, including computers, The need for languages or interfaces to be able to interact with them, has gained great importance. The utility of the software, coupled with user satisfaction and increased productivity, depends on the effectiveness of the User-Computer Interface. So much so, that often the interface is the most important factor in the success and failure of any computer system. The design and implementation of appropriate Human-Computer Interfaces, which in addition to complying with the technical requirements and the transactional logic of the application, consider the subtle psychological implications, sciences and user facilities, It consumes a good part of the life cycle of a software project, and requires specialized skills, both for the construction of the same, and for the performance of usability tests.

6.4 CS311. Competitive Programming

Competitive Programming combines problem-solving challenges with the fun of competing with others. It teaches participants to think faster and develop problem-solving skills that are in high demand in the industry. This course will teach you to solve algorithmic problems quickly by combining theory of algorithms and data structures with practice solving problems.

6.5 CS312. Advanced Data Structures

Los algoritmos y estructuras de datos son una parte fundamental de la ciencia de la computación que nos permiten organizar la información de una manera más eficiente, por lo que es importante para todo profesional del área tener una sólida formación en este aspecto.

En el curso de estructuras de datos avanzadas nuestro objetivo es que el alumno conozca y analize estructuras complejas, como los Métodos de Acceso Multidimensional, Métodos de Acceso Espacio-Temporal y Métodos de Acceso Métrico, etc.

6.6 MA307. Mathematics applied to computing

Este curso es importante porque desarrolla tópicos del Álgebra Lineal y de Ecuaciones Diferenciales Ordinarias útiles en todas aquellas áreas de la ciencia de la computación donde se trabaja con sistemas lineales y sistemas dinámicos.

7.1 CS251. Computer graphics

It offers an introduction to the area of Computer Graphics, which is an important part of Computer Science. The purpose of this course is to investigate the fundamental principles, techniques and tools for this area.

7.2 CS292. Software Engineering II

The topics of this course extend the ideas of software design and development from the introduction sequence to programming to encompass the problems encountered in large-scale projects. It is a broader and more complete view of Software Engineering appreciated from a Project point of view.

7.3 CS393. Information systems

Analyze techniques for the correct implementation of scalable, robust, reliable and efficient information systems in organizations.

7.4 CS3I1. Computer Security

Nowadays, information is one of the most valuable assets in any organization. This course is oriented to be able to provide the student with the security

elements oriented to protect the Information of the organization and mainly to be able to foresee the possible problems related to this heading. This subject involves the development of a preventive attitude on the part of the student in all areas related to software development.

7.5 FG211-ACM. Professional Ethics

This course introduces the ethical principles and professional responsibilities in computing, based on the ACM Code of Ethics and international standards. Students will analyze real-world cases, evaluate ethical dilemmas, and apply decision-making frameworks in technological contexts, considering social impact, privacy, security, and sustainability.

7.6 CS262. Machine learning

Write justification for this course here ...

8.1 CS281. Computing in Society

Ofrece una visión amplia de los aspectos éticos y profesionales relacionados con la computación. Los tópicos que se incluyen abarcan los aspectos éticos, sociales y políticos. Las dimensiones morales de la computación. Los métodos y herramientas de análisis. Administración de los recursos computacionales. Seguridad y control de los sistemas computacionales. Responsabilidades profesionales y éticas. Propiedad intelectual.

8.2 CS391. Software Engineering III

Software development requires the use of best development practices, IT project management, equipment management And efficient and rational use of quality assurance frameworks, these elements are key and transversal during the whole productive process. The construction of software contemplates the implementation and use of processes, methods, models and tools that allow to achieve the realization of the quality attributes of a product.

8.3 CS3P1. Parallel and Distributed Computing

The last decade has brought explosive growth in computing with multiprocessors, including Multi-core processors and distributed data centers. As a result, computing parallel and distributed has become a widely elective subject to be one of the main components in the mesh studies in computer science undergraduate. Both parallel and distributed computing the simultaneous execution of multiple processes, whose operations have the potential to intercalar in a complex way. Parallel and distributed computing builds on foundations in many areas, including understanding the fundamental concepts of systems, such as: concurrency and parallel execution, consistency in state / memory manipulation, and latency. The communication and coordination between processes has

its foundations in the passage of messages and models of shared memory of computing and algorithmic concepts like atomicity, consensus and conditional waiting.Achieving acceleration in practice requires an understanding of parallel algorithms, strategies for decomposition problem, systems architecture, implementation strategies and analysis of performance. Distributed systems highlight the problems of security and tolerance to Failures, emphasize the maintenance of the replicated state and introduce additional problems in the field of computer networks.

8.4 CS401. Capstone Project I

Este curso tiene por objetivo que el alumno aprenda a realizar una investigación de carácter científico en el área de computación. Los docentes del curso determinarán un área de estudio para cada alumno, y se le hará entrega de bibliografía para analizar y a partir de la misma, y de fuentes bibliográficas adicionales (investigadas por el alumno), el alumno deberá ser capaz de construir un artículo del tipo survey del tema asignado.

8.5 FG120FCCS. General Economy

Understanding Peruvian reality is essential for future professionals, including those in computer science, so they can contribute to the country's development in an informed and responsible manner. This course analyzes the historical, social, economic, and political aspects of Peru, with an emphasis on current challenges and opportunities.

8.6 EX301FCCS. Extracurricular Activities

This course records the student's participation in activities that complement their academic training, such as workshops, conferences, social outreach, volunteering, or technical skills. Its objective is to promote comprehensive development, soft skills, and social commitment.

8.7 CS361. Computational Vision

This course covers fundamental techniques for automated analysis of digital images, essential for applications like medical diagnosis, autonomous vehicles, and surveillance systems. Aligns with ACM/IEEE-CS standards for computer vision.

9.1 CS370. Big Data

Nowadays, knowing scalable approaches to processing and storing large volumes of information (terabytes, petabytes and even exabytes) is fundamental in computer science courses. Every day, every hour, every minute generates a large amount of information which needs to be processed, stored, analyzed.

9.2 CS400FCCS. Pre-professional internships

This course enables students to apply knowledge acquired during their academic training in a real work environment, under the supervision of a company and the university. Professional internships are essential to develop technical, ethical, and teamwork competencies, ensuring students gain hands-on experience in projects related to Computing.

9.3 CS402. Capstone Project II

This course aims to allow the student to carry out a study of the state of the art of a topic chosen by the student for his thesis.

9.4 CB309. Bioinformatics

The use of computational methods in the biological sciences has become one of the key tools for the field of molecular biology, being a fundamental part of research in this area.
In Molecular Biology, there are several applications that involve both DNA, protein analysis or sequencing of the human genome, which depend on computational methods. Many of these problems are really complex and deal with large data sets.
This course can be used to see concrete use cases of several areas of knowledge of Computer Science such as Programming Languages (PL), Algorithms and Complexity (AL), Probabilities and Statistics, Information Management (IM), Intelligent Systems (IS).

9.5 CS369. Topics in Artificial Intelligence

Provides a set of tools to solve problems that are difficult to address using traditional algorithmic methods. Includes heuristics, planning, knowledge representation and reasoning formalisms, machine learning techniques, methods for action-reaction problems (e.g., reinforcement learning), as well as applications in natural language processing, computer vision, and robotics.

9.6 CS351. Topics in Computer Graphics

Advanced course covering real-time rendering techniques, 3D modeling, and physical simulation, with applications in entertainment industries and scientific visualization. Aligns with ACM/IEEE Computing Curricula guidelines.

9.7 CS392. Tópicos en Ingeniería de Software

El desarrollo de software requiere del uso de mejores prácticas de desarrollo, gestión de proyectos de TI, manejo de equipos y uso eficiente y racional de frameworks de aseguramiento de la calidad y de Gobierno de Portfolios, estos elemento son pieza clave y transversal para el éxito del proceso productivo.

Este curso explora el diseño, selección, implementación y gestión de soluciones TI en las Organizaciones. El foco está en las aplicaciones y la infraestructura y su aplicación en el negocio.

10.1 CS353. Quantum Computing

This course introduces fundamental principles of quantum computing including qubits, superposition, entanglement and quantum algorithms. Students will learn to contrast classical and quantum models while exploring applications in cryptography, optimization and physical system simulation using frameworks like Qiskit or Cirq.

10.2 CS365. Evolutionary Computing

This course introduces biologically-inspired algorithms for solving complex optimization and design problems. It covers genetic algorithms, evolutionary strategies, and genetic programming, with applications in engineering, logistics, and machine learning. Students will implement solutions using modern frameworks like DEAP.

10.3 CS3P2. Cloud Computing

To understand advanced computational techniques, students must have a strong knowledge of various discrete structures, structures that will be implemented and used in the laboratory with the programming language.

10.4 CS3P3. Internet of Things

The last decade has an explosive growth in multiprocessor computing, including multi-core processors and distributed data centers. As a result, parallel and distributed computing has evolved from a broadly elective subject to be one of the major components in mesh studies in undergraduate computer science. Both parallel computing and distribution involve the simultaneous execution of multiple processes on different devices that change position.

10.5 CS403. Research Workshop

This course aims at the student to conclude his thesis project.

10.6 FG211. Professional Ethics

La ética es una parte constitutiva inherente al ser humano, y como tal debe plasmarse en el actuar cotidiano y profesional de la persona humana. Es indispensable que la persona asuma su rol activo en la sociedad pues los sistemas económico-industrial, político y social no siempre están en función de valores y

principios, siendo éstos en realidad los pilares sobre los que debería basarse todo el actuar de los profesionales.