



Book of short descriptions by course

Ciberseguridad

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Task Force

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1.1 CS111. 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 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.

1.3 MA100. Mathematics I

The course aims to develop in students the skills to deal with models in science and engineering related to single variable differential calculus skills. In the course it is studied and applied concepts related to calculation limits, derivatives and integrals of real and vector functions of single real variables to be used as base and support for the study of new contents and subjects. Also seeks to achieve reasoning capabilities and applicability to interact with real-world problems by providing a mathematical basis for further professional development activities.

1.4 FG101. Communication

Para lograr una eficaz comunicación en el ámbito personal y profesional, es prioritario el manejo adecuado de la Lengua en forma oral y escrita. Se justifica, por lo tanto, que los alumnos de la Universidad Católica San Pablo conozcan, comprendan y apliquen los aspectos conceptuales y operativos de su idioma, para el desarrollo de sus habilidades comunicativas fundamentales: Escuchar, hablar, leer y escribir. En consecuencia el ejercicio permanente y el aporte de los fundamentos contribuyen grandemente en la formación académica y, en el futuro, en el desempeño de su profesión

In order to achieve effective communication in the personal and professional field, the proper handling of the Language in oral and written form is a priority.

It is therefore justified that the students of UTEC University know, understand and apply the conceptual and operational aspects of their language, for the development of their fundamental communicative skills: Listening, speaking, reading and writing. Consequently the permanent exercise and the contribution of the fundamentals contribute greatly in the academic formation and, in the future, in the performance of his profession.

1.5 FG102. Study Methodology

Los alumnos en formación profesional necesitan mejorar su actitud frente al trabajo y exigencia académicos. Además conviene que entiendan el proceso mental que se da en el ejercicio del estudio para lograr el aprendizaje; así sabrán dónde y cómo hacer los ajustes más convenientes a sus necesidades. Asimismo, requieren dominar variadas formas de estudiar, para que puedan seleccionar las estrategias más convenientes a su personal estilo de aprender y a la naturaleza de cada asignatura. De igual modo conocer y usar maneras de buscar información académica y realizar trabajos creativos de tipo académico formal, así podrán aplicarlos a su trabajo universitario, haciendo exitoso su esfuerzo.

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 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..

2.3 MA101. Math II

The course develops in students the skills to deal with models of science and engineering skills. In the first part of the course a study of the functions of several variables, partial derivatives, multiple integrals and an introduction to vector fields is performed. Then the student will use the basic concepts of calculus to model and solve ordinary differential equations using techniques such as Laplace transforms and Fourier series.

2.4 FG106. Theater

Favorece al estudiante a identificarse a la “Comunidad Académica” de la Universidad, en la medida en que le brinda canales naturales de integración a su grupo y a su Centro de Estudios y le permite, desde una visión alternativa, visualizar la valía interior de las personas a su alrededor, a la vez que puede conocer mejor la suya propia. Relaciona al universitario, a través de la experimentación, con

un nuevo lenguaje, un medio de comunicación y expresión que va más allá de la expresión verbal conceptualizada. Coadyuva al estudiante en su formación integral, desarrollando en él capacidades corporales. Estimula en él, actitudes anímicas positivas, aptitudes cognitivas y afectivas. Enriquece su sensibilidad y despierta su solidaridad. Desinhibe y socializa, relaja y alegra, abriendo un camino de apertura de conocimiento del propio ser y el ser de los demás.

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 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 addresses 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.

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 FG203. Oratory

En la sociedad competitiva como la nuestra, se exige que la persona sea un comunicador eficaz y sepa utilizar sus potencialidades a fin de resolver problemas y enfrentar los desafíos del mundo moderno dentro de la actividad laboral, intelectual y social. Tener el conocimiento no basta, lo importante es saber comunicarlo y en la medida que la persona sepa emplear sus facultades comunicativas, derivará en éxito o fracaso aquello que tenga que realizar en su

desarrollo personal y profesional. Por ello es necesario para lograr un buen decir, recurrir a conocimientos, estrategias y recursos, que debe tener todo orador, para llegar con claridad, precisión y convicción al interlocutor

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 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.

4.4 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.

4.5 MA203. Statistics and Probabilities

It provides an introduction to probability theory and statistical inference with applications, needs in data analysis, design of random models and decision making.

4.6 FG350. Leadership and Performance

En la actualidad las diferentes organizaciones en el mundo exigen a sus integrantes el ejercicio de liderazgo, esto significa asumir los retos asignados con eficacia y afán de servicio, siendo estas exigencias necesarias para la búsqueda de una sociedad más justa y reconciliada. Este desafío, pasa por la necesidad de formar a nuestros alumnos con un recto conocimiento de sí mismos, con capacidad de juzgar objetivamente la realidad y de proponer orientaciones que busquen modificar positivamente el entorno.

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 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

5.5 CB111. Computational Physics

Física I es un curso que le permitirá al estudiante entender las leyes de física de macropartículas y micropartículas considerado desde un punto material hasta un sistemas de partículas; debiéndose tener en cuenta que los fenómenos aquí estudiados se relacionan a la física clásica: Cinemática, Dinámica, Trabajo y Energía; además se debe asociar que éstos problemas deben ser resueltos con algoritmos computacionales.

Poseer capacidad y habilidad en la interpretación de problemas clásicos con condiciones de frontera reales que contribuyen en la elaboración de soluciones eficientes y factibles en diferentes áreas de la Ciencia de la Computación.

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. Intelligent Systems

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 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.

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 analice estructuras complejas, como los Métodos de Acceso Multidimensional, Métodos de Acceso Espacio-Temporal y Métodos de Acceso Métrico, etc.

6.6 CS393. Information systems

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

6.7 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 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.

7.2 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.

7.3 CY251. System Security

This course addresses the security of computer systems as a whole, considering the interaction between components, connections, and software. Concepts of system thinking, system management, access control, and security testing are explored to train students in analyzing and mitigating risks in complex systems.

7.4 CY401. Methodology of Computation Research

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.

7.5 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.

7.6 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 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 intercalate 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.

8.3 CY211. Data Security

This course introduces the fundamentals of data security, crucial for cybersecurity. It covers cryptography, access control, digital forensics, secure storage, and privacy, preparing students to analyze threats and protect sensitive information.

8.4 CY221. Software Security

This course addresses the principles and practices for secure software development, enabling students to build applications resistant to vulnerabilities. Design, implementation, and testing techniques are explored, considering ethical and legal responsibilities.

8.5 CY241. Connection Security

This course focuses on the security of connections in computer systems, addressing both physical and logical connections. Protocols, architectures, vulnerabilities, and best practices are examined to secure communication between components and systems, enabling students to design and implement robust connection security solutions.

8.6 CY261. Human Security

This course explores the human dimension of cybersecurity, analyzing human behavior in relation to the security of information and systems. Topics covered include social engineering, identity management, risk awareness, privacy, and

human factors in secure system design, enabling students to understand and mitigate human-related risks.

8.7 CS361. Computational Vision

Provee una serie de herramientas para resolver problemas que son difíciles de solucionar con los métodos algorítmicos tradicionales. Incluyendo heurísticas, planeamiento, formalismos en la representación del conocimiento y del razonamiento, técnicas de aprendizaje en máquinas, técnicas aplicables a los problemas de acción y reacción: así como el aprendizaje de lenguaje natural, visión artificial y robótica entre otros.

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 CY231. Component Security

This course focuses on the security of software and hardware components, addressing their design, procurement, testing, and analysis. Students will learn to identify and mitigate vulnerabilities, strengthen component security, and understand their impact on overall system security.

9.3 CY271. Organizational Security

This course focuses on information and system security from an organizational perspective. It covers risk management, security governance and policies, cybersecurity planning, business continuity, disaster recovery, systems administration, and personnel security, preparing students to implement comprehensive security programs in organizations.

9.4 CS369. Topics in Artificial Intelligence

La Computación Evolutiva comprende un conjunto de metodologías de búsqueda y optimización cuya base primordial es el Paradigma Neodarwiniano que agrupa la Herencia Genética (Mendel), el Seleccionismo (Weismann) y la Evolución de las Especies (Darwin) que, cuando llevadas a implementaciones computacionales, ofrecen una herramienta poderosa de optimización global para una determinada función objetivo. Son bastante robustos cuando se supone la existencia de muchos óptimos locales. De esta forma, estos algoritmos pueden aplicarse en diversos problemas de optimización.

9.5 CS351. Topics in Computer Graphics

In this course you can delve into any of the topics Mentioned in the area of Graphics Computing (Graphics and Visual Computing - GV).

This course is designed to perform some advanced course suggested by the ACM / IEEE curriculum. [?, ?]

10.1 CS365. Evolutionary Computing

Write justification for this course here ...

10.2 CS3P2. Cloud Computing

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.

10.3 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.

10.4 CY281. Societal Security

This course examines the intersection of cybersecurity and society, analyzing the impact of cybercrime, legislation, ethics, public policy, and privacy on society. The ethical and legal responsibilities of cybersecurity professionals are explored, as well as the social implications of emerging technologies.

10.5 CY311. Advanced Cryptography

This course delves into cryptography, covering advanced concepts and their application in information security. Symmetric and asymmetric encryption algorithms, cryptanalysis, digital signatures, and security protocols are analyzed, enabling students to design and implement robust cryptographic solutions.

10.6 CY351. Advanced System Security

This advanced course expands on system security knowledge, delving deeper into risk analysis, vulnerability mitigation, and the design of robust security solutions for complex systems. Topics covered include cloud security, industrial control systems, advanced forensic analysis, and formal verification methods.

10.7 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.