COMPUTER SCIENCE (CSC)

CSC 100. Introduccion a la Informatica, en espanol. 3 Credit Hours.
An introduction to the fundamental notions of computing, from the hardware through to the applications used in society today. Taught in Spanish.
Prerequisite: SPA 301 or SPA 302 or SPA 303 or SPA 307.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 115. Social and Ethical Issues in Computing. 3 Credit Hours.
History, social context and methods and tools of analysis. Professional and ethical responsibilities. Intellectual property. Privacy and civil liberties.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

CSC 116. Cybersecurity: An Introduction to Security in Cyberspace. 3 Credit Hours.
Components: LEC.
Grading: GRD.

CSC 118. Information Technology and Society. 3 Credit Hours.
A variety of topics on information technology and society through various course activities including research papers, experiments, and by reading articles. The topics covered include but are not limited to: history of computing, hardware mechanisms, algorithms design, software development principles, software tools, security, and artificial intelligence.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Summer.

CSC 119. Computers and Society. 3 Credit Hours.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 120. Computer Programming I. 4 Credit Hours.
Prerequisite: MTH 108. or Corequisite: MTH 140 or Higher or MAS 110.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 198. Freshman Topics in Computer Science. 1-3 Credit Hours.
Content varies by semester.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 210. Computing for Scientists. 3 Credit Hours.
Prerequisite: MTH 141 or MTH 151 or MTH 161 or MTH 171.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 215. Introduction to Python for Arts & Humanities. 3 Credit Hours.
The Python programming language for students without prior programming experience, coming from a background of Arts and Humanities.
Prerequisite: MTH 108 or Higher.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
CSC 220. Computer Programming II. 4 Credit Hours.
Common APIs including list, priority queue, set, and map, and their efficient implementations in an object-oriented language using fundamental data structures. Sorting and other applications of recursion. Combining asymptotic analysis and experiments to extrapolate running times. Using APIs in a software project.
Prerequisites: CSC 120 or BTE 324 or ECE 218 and MTH 108 or MTH 140 or MTH 141 or MTH 161 or MTH 162 or MTH 171 or MTH 172 or MAS 110.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 298. Sophomore Topics in Computer Science. 1-3 Credit Hours.
Sophomore Topics in Computer Science - Content varies by semester.
Requisite: At Least 6 credits of CSC courses.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 314. Computer Organization and Architecture. 3 Credit Hours.
Digital logic and digital systems. Machine level representation of data. Assembly level machine organization. Memory system organization and architecture. Interfacing and communication. Functional organization. Multiprocessing and alternative architectures
Prerequisite: CSC 220 or BTE 324 or ECE 218. Corequisite: MTH 309.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 310. Introduction to Python for Scientists. 3 Credit Hours.
Python Programming for students with science majors. Python programming basics. Python packages for scientific applications, especially data science and machine learning applications.
Prerequisite: MTH 161 and MTH 224.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 317. Data Structures and Algorithm Analysis. 3 Credit Hours.
Prerequisite: CSC 220 or ECE 318 and MTH 309.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 322. System Programming. 3 Credit Hours.
Prerequisite: CSC 220 or ECE 318.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

CSC 329. Introduction to Game Programming. 3 Credit Hours.
Fundamental programming issues in game design: Software design; Version control; Basic graphics; GUI programming. Large-scale game project: Team development of a functional game; Graphics and GUI component; Networking component; Core game engine.
Prerequisite: CSC 220 or ECE 318.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

CSC 330. Android Programming. 3 Credit Hours.
Prerequisite: CSC 220.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
CSC 398. Junior Topics in Computer Science. 1-3 Credit Hours.
Junior Topics in Computer Science - Content varies by semester.
Requisite: At Least 9 credits of CSC courses.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 401. Computer Science Practicum I. 1 Credit Hour.
Implementation of techniques, algorithms, and data structures being taught in a co-requisite computer science course.
Components: PRA.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 402. Computer Science Practicum II. 1 Credit Hour.
Implementation of techniques, algorithms, and data structures being taught in a co-requisite computer science course.
Components: PRA.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 403. Computer Science Practicum III. 1-3 Credit Hours.
Implementation of techniques, algorithms, and data structures being taught in a co-requisite computer science course.
Components: PRA.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 405. Computer Science Seminars. 1 Credit Hour.
A range of topics in Computer Science, as embodied in the seminars hosted by the Department.
Requisite: At least 12 credits of CSC courses.
Components: SEM.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 410. Computer Science Project Planning. 1-3 Credit Hours.
Planning for the implementation of a Computer Science project, including: Problem analysis, System architecture design, Algorithm and data structure selection, User interface design, Verification and validation plan, and Prototyping.
Components: PRA.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 411. Computer Science Project Implementation. 1-3 Credit Hours.
Implementation of a Computer Science project, including: Hardware preparation, Component implementation, System integration, Verification and validation, and Documentation.
Components: PRA.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 412. Computer Science Internship. 1-3 Credit Hours.
A commercial computing environment. Normally 50 internship hours are required per credit earned (the host company must supply documentary evidence of hours worked).
Components: PRA.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 419. Programming Languages. 3 Credit Hours.
Prerequisite: CSC 317 or CSC 517.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
CSC 421. Principles of Computer Operating Systems. 3 Credit Hours.
Process management. Scheduling and dispatch. Interprocess communication. Memory management. File systems. Device management. Security and
protection. System programming for UNIX.
Prerequisite: CSC 314 and CSC 322.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 423. Database Systems. 3 Credit Hours.
Information models and systems. Database systems. Data modeling. Relational databases. Relational database design. Database query languages,
Data mining concepts, Web database programming.
Prerequisite: CSC 322 or ECE 322.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 424. Computer Networks. 3 Credit Hours.
Introduction to computer networks and network applications. The protocol stack. Routing, switching and bridging technologies. Models of network
computing. Internet standards and protocols.
Prerequisite: CSC 314 and CSC 322.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 427. Theory of Computing. 3 Credit Hours.
Sets, relations, and languages. Automata theory. Basic computability theory. Turing machines. The complexity classes P and NP.
Prerequisite: CSC 228 or ECE 318 and MTH 309.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

CSC 431. Introduction to Software Engineering. 3 Credit Hours.
Software processes, requirements and specifications, design, validation, evolution. Project management, tools and environments. Foundations of
Prerequisite: CSC 317 or CSC 322 or CSC 517.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

CSC 481. Teaching Assistant Training in Computer Science. 1-3 Credit Hours.
Training and teaching assistant for a specific course, in computer laboratories. May be taken multiple times, assisting maximally twice for a given
course.
Components: PRA.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 498. Senior Topics in Computer Science. 1-3 Credit Hours.
Senior Topics in Computer Science - content varies by semester.
Requisite: At least 12 credits of CSC courses.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 506. Logic. 3 Credit Hours.
Propositional and first order logic: completeness. Computational logic: Robinson's resolution. Formalized theories: arithmetic, Godel's incompleteness
theorem, Tarski's theorem on undefinability of truth.
Prerequisite: MTH 230 or PHI 210 or PHI 510.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
CSC 507. Data Security and Cryptography. 3 Credit Hours.
Prerequisite: CSC 317 or CSC 427.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

CSC 518. Interpreters and Compiler Theory. 3 Credit Hours.
Prerequisite: CSC 419.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 528. Introduction to Parallel Computing. 3 Credit Hours.
Parallel computing systems shared-memory parallel programming, with OpenMP, distributed-memory parallel programming, software with open MPI software package. Applications: vector and matrix operations, sorting, image processing.
Prerequisite: CSC 317.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 529. Introduction to Computer Graphics. 3 Credit Hours.
Prerequisite: CSC 220 or ECE 318 and MTH 210.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 540. Algorithm Design and Analysis. 3 Credit Hours.
Design techniques include divide-and-conquer, greedy method, dynamic programming, backtracking. Time and space complexity. Sorting, searching, combinatorial and graph algorithms.
Prerequisite: CSC 317.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 545. Introduction to Artificial Intelligence. 3 Credit Hours.
Prerequisite: CSC 317 or ECE 318 and MTH 224 or ECE 310 or IEN 310.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 547. Computational Geometry. 3 Credit Hours.
Algorithms for solving geometric problems arising from application domains including graphics, robotics, and GIS.
Prerequisite: CSC 317.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 548. Bioinformatics Algorithms. 3 Credit Hours.
Prerequisite: CSC 120 or CSC 210 and BIL 150 or BIL 104 or BIL 352 or BIL 552 or CSC 552.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.
CSC 549. Biomedical Data Science. 3 Credit Hours.
The computational skills needed for analysis of genomic and biomedical data sets, including: The basics of a command line interface; programming in (bio-)python; running programs on Pegasus2; writing scripts for downloading, manipulating, and analyzing data; file sharing and version control using github; analyzing a Next Generation Sequencing data set, and interpreting the results; and responsible conduct of Research.
Prerequisite: CSC 120 and BIL 150.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 550. Computational Neuroscience. 3 Credit Hours.
Prerequisite: MTH 162 and MTH 224.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 552. Bioinformatics Tools. 3 Credit Hours.
Databases and tools of bioinformatics, as relevant to research in genomics and molecular biology. Bioinformatics applications. Information retrieval, analytical tools, BLAST searches, promoter analysis, and protein structure-function analysis, and various applications.
Prerequisite: BIL 250 or BIL 150.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 555. Multimedia Systems. 3 Credit Hours.
Prerequisite: CSC 317.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 595. Topics in Computer Science. 1-3 Credit Hours.
Topics in Computer Science - content varies by semester.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 596. Topics in Computer Science. 1-3 Credit Hours.
Topics in Computer Science - content varies by semester.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 597. Topics in Computer Science. 1-3 Credit Hours.
Topics in Computer Science - content varies by semester.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 598. Topics in Computer Science. 1-3 Credit Hours.
Topics in Computer Science - content varies by semester.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 599. Topics in Computer Science. 1-3 Credit Hours.
Topics in Computer Science - content varies by semester.
Components: THI.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
CSC 607. Logic. 3 Credit Hours.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 609. Data Security and Cryptography. 3 Credit Hours.
Prerequisite: CSC 317 or CSC 427.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 618. Interpreters and Compiler Theory. 3 Credit Hours.
Prerequisite: CSC 419.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 623. Theory of Relational Databases. 3 Credit Hours.
Prerequisite: CSC 423.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 629. Introduction to Computer Graphics. 3 Credit Hours.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 632. Introduction to Parallel Computing. 3 Credit Hours.
Parallel computing systems shared-memory parallel programming, with open MP, distributed-memory parallel programming, software with open MPI software package. Applications: vector and matrix operations, sorting, image processing.
Prerequisite: CSC 317.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 640. Algorithm Design and Analysis. 3 Credit Hours.
Design techniques include divide-and-conquer, greedy method, dynamic programming, backtracking. Time and space complexity. Sorting, searching, combinatorial and graph algorithms.
Prerequisite: CSC 317.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 645. Introduction to Artificial Intelligence. 3 Credit Hours.
Prerequisite: CSC 545.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
CSC 647. Computational Geometry. 3 Credit Hours.
Algorithms for solving geometric problems arising from application domains including graphics, robotics, and GIS.
Prerequisite: CSC 317.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 649. Bioinformatics Algorithms. 3 Credit Hours.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

CSC 650. Computational Neuroscience. 3 Credit Hours.
Prerequisite: MTH 162 and MTH 224.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 656. Multimedia Systems. 3 Credit Hours.
Prerequisite: CSC 317.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 670. Directed Reading. 2-4 Credit Hours.
Directed reading in Computer Science - content varies by semester.
Components: THI.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 685. Topics in Computer Science. 1-3 Credit Hours.
Topics in Computer Science - content varies by semester.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 686. Topics in Computer Science. 1-3 Credit Hours.
Topics in Computer Science - content varies by semester.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 687. Topics in Computer Science. 1-3 Credit Hours.
Topics in Computer Science - content varies by semester.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 688. Topics in Computer Science. 1-3 Credit Hours.
Topics in Computer Science - content varies by semester.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 689. Topics in Computer Science. 1-3 Credit Hours.
Topics in Computer Science - content varies by semester.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
CSC 690. Seminar for Graduate Students I. 1-3 Credit Hours.
Flexible topics of interest to graduate students.
Components: THI.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 692. Seminar for Graduate Students II. 1-3 Credit Hours.
Flexible topics of interest to graduate students.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 707. Logic Programming. 3 Credit Hours.
Programming in Prolog, Fix-point semantics, Declarative semantics, Completeness of SLD-resolution, Negation, Implementation of logic programming languages. Deductive databases.
Prerequisite: MTH 506 and CSC 317.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 711. Theory of Computation. 3 Credit Hours.
Recursive functions, Markov algorithms, Turing machines. Unsolvability.
Prerequisite: CSC 317 or CSC 517.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 712. Complexity Theory. 3 Credit Hours.
Models of computations, Blum's axioms, intractability, NP-completeness.
Prerequisite: CSC 427.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 724. Mobile Wireless Systems. 3 Credit Hours.
Cellular Systems, multiple access techniques, wireless networking, mobile IP, power management, user location information management, TDMA, CDMA, and GSM systems, data broadcasting.
Prerequisite: CSC 424.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 732. Parallel Algorithms. 3 Credit Hours.
Parallel computation models; sorting networks; parallel algorithms for sorting, searching, graph problems, prefix computation, pattern matching, and fast Fourier transforms; theory of P-completeness, the class NC.
Prerequisite: CSC 317.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

CSC 746. Neural Networks and Deep Learning. 3 Credit Hours.
Prerequisite: CSC 317.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 749. Automated Reasoning. 3 Credit Hours.
Prerequisite: CSC 317 or CSC 645.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
CSC 751. Semantic Web. 3 Credit Hours.
An overview of the underlying semantic web technologies. Ontology construction and implementation using tools and APIs (logic, XML, RDF, RDFS). Theoretical and practical aspects of knowledge representation (description logic, RDF, RDFS, SPARQL, SROIQ(D)). Designing and debugging ontologies (ontology engineering, entailment tools, project).
Prerequisite: CSC 317 and MTH 309.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 752. Autonomous Robotic Systems. 3 Credit Hours.
Prerequisite: CSC 317 and MTH 210.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 756. Advanced Multimedia Systems. 3 Credit Hours.
Prerequisite: CSC 656.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 785. Advanced Topics in Computer Science. 1-3 Credit Hours.
Advanced Topics in Computer Science
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 786. Advanced Topics in Computer Science. 1-3 Credit Hours.
Advanced Topics in Computer Science
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 787. Advanced Topics in Computer Science. 1-3 Credit Hours.
Advanced Topics in Computer Science
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 788. Advanced Topics in Computer Science. 1-3 Credit Hours.
Advanced Topics in Computer Science
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 789. Advanced Topics in Computer Science. 1-3 Credit Hours.
Advanced Topics in Computer Science
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CSC 793. Research Project. 1-6 Credit Hours.
Supervised research project preceding dissertation research for the Ph.D.
Components: IND.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 794. Research Project. 1-6 Credit Hours.
Supervised research project preceding dissertation research for the Ph.D.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.
CSC 810. Master's Thesis. 1-6 Credit Hours.
The student working on his/her master's thesis enrolls for the number of credits as determined by his/her advisor. Credit is not awarded until the thesis has been accepted.
Components: THI.
Grading: SUS.
Typically Offered: Fall & Spring.

CSC 825. Continuous Registration--Master's Study. 1 Credit Hour.
To establish residence for non-thesis master's students who are preparing for major examinations. Credit not granted. Regarded as full time residence.
Components: THI.
Grading: GRD.
Typically Offered: Fall & Spring.

CSC 830. Pre-Candidacy DOCTORAL DISSERTATION. 1-12 Credit Hours.
Required of all candidates for the Ph.D. The student will enroll for credit as determined by his/her advisor, but for not less than a total of 12 hours. Up to 12 hours may be taken in a regular semester, but not more than six in a summer session.
Components: THI.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.

CSC 840. Post-Candidacy Doctoral Dissertation. 1-12 Credit Hours.
Required of all candidates for the Ph.D. who have advanced to candidacy. The student will enroll for credit as determined by his/her advisor, but not for less than a total of 12. Not more than 12 hours of CSC 740 may be taken in a regular semester, nor more than six in a summer session.
Components: THI.
Grading: SUS.
Typically Offered: Spring.

CSC 850. Research in Residence. 1 Credit Hour.
Used to establish research in residence for Ph.D. students after the student has enrolled for permissible cumulative total in appropriate doctoral research. Regarded as full-time residence.
Components: THI.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.