

Assessment Plan for CS and CIS Degree Programs  
Computer Science Dept.  
Texas A&M University - Commerce

Program Objective #1 (PO1): Students will be able to demonstrate a broad knowledge of Computer Science which includes data structures, operating systems, computer programming skills, computer organization, algorithm design, and automata theory.

Program Objective #2 (PO2): Students will gain a substantial knowledge of one of the following Computer Science specialties: Database, Networking, Artificial Intelligence, Information Security, Computer Engineering.

Program Objective #3 (PO3): Students will demonstrate the ability to recognize, design and implement efficient software solutions to problems.

Program Objective #4 (PO4): Students will demonstrate knowledge and understanding of Professional ethics and responsible behavior.

Program Objective #5 (PO5): Students will demonstrate the ability to communicate effectively and to work as a team.

Program Objective #6 (PO6): Students will become successful professionals able to gain Employment and/or to be accepted into a Computer Science Ph.D. program.

**Program Objective#1: Students will be able to demonstrate a broad knowledge of Computer Science which includes data structures, operating systems, computer programming skills, computer organization, algorithm design, and automata theory.**

Assessment will be measured through testing the following course objectives:

CSCI 515 Fundamental of Programming

(CO515.1): To understand the internal representation of the various data types.

(CO515.2): To examine the internal representation of two and three dimension arrays in C/C++.

(CO515.3): To understand dynamic memory allocation, parameter passing, the use of pointers.

CSCI 516 Fundamental Concepts of Computer and Machine Organization

(CO516.1) Numbering systems and conversions, Boolean functions.

(CO516.2) Intro to Computer Organization: design logic; digital diagrams, and basic circuits and gates, and the link between Boolean functions, circuits, processor and Micro code..

(CO516.3) Concepts of Machine Instructions, Assembly and linking, common interrupts.

(CO516.4): Concepts of Jumps, flags, subroutines, procedures, stacks, stack parameters and frames..

(CO516.5): Arrays, addressing modes and Floating Point memory management, indirect addressing.

(CO516.6): Advanced procedures, local variables, stack parameters, strings.

CSCI 520 Information Structure and Algorithm Analysis.

(CO520.1): To understand the concept of sparse matrices, stack and queues.

(CO520.2): To examine the differences between linear and linked representation of stacks, queues, and ordered data.

(CO520.3): To understand and implement tree structures and to compare various sorting algorithms.

## CSCI528 Object Oriented Methods

(CO528.1): Software Engineering Basics.

## CSCI 530 Operating Systems <not taught this semester>

(CO530.1) Understand the concepts, structures, and mechanisms of operating systems.

(CO530.2) Understand memory management, virtual memory, swapping, paging algorithms, segmentation, and clock paging policies.

(CO530.5) Understand concurrent processes and associated deadlock prevention, avoidance, detection, recovery methods, and the use of semaphores.

## CSCI 532 Algorithm Design

(CO532.1): To teach students how to analyze algorithms in order to determine their calculation complexity in the terms of Big Oh, Big theta and Omega. Recursions.

(CO532.2): To teach sorting algorithms and their application: Insertion, Merge, Quick, and Shell Sort algorithms.

(CO532.3): Probabilistic Analysis and Randomized algorithms and their applications to CS- Hiring Algorithm, Bins and Balls problems; Birthday paradox, Longest Streaks; 89%

(CO532.4): Binary search trees and optimal binary search trees, and their applications to large code development.

(CO532.5): Dynamic programming problem- line scheduling, matrix chain multiplication, longest common subsequence and their practical applications.

(CO532.6): Introduction to greedy algorithms – an activity selection problem and its application to resources planning.

## CSCI 540 Computer Architecture

(CO540.1): General purpose machines from different views. Instruction sets and classification of computers.

(CO540.2): Cost and performance of a computer: evaluation metrics, Amdahl's law, principle of locality, and benchmarks.

(CO540.3): Cache and memory organization: cache mapping and replace strategies, virtual memory and cache coherence.

(CO540.4): Pipelining: performance issues, and pipelining hazards.

(CO540.5): I/O system: hard drive, RAID technology, I/O performance and benchmarks.

## CSCI 549 Automata Theory

(CO549.1): Understand the concept of languages and recursive definitions

(CO549.8): Construct a context free grammar to define a context free language

(CO549.11): Construct a push down automata for a language

(CO549.12): Design and construct a Turing machine for any language

(CO549.13): Design and construct a LR(1) parser for SmallG language

## **Program Objective#2: Students will gain a substantial knowledge of one of the following Computer Science specialties: Database, Networking, Artificial Intelligence, Information Security, Computer Engineering.**

Assessment will be measured through testing the following course objectives:

## CSCI 525 Introduction to Local Area Networking

(CO525.1): To define and understand basic Data Communications, networking topologies, the OSI Model and the IEEE 802 standards.

#### CSCI 526 Databases Systems

(CO526.1): Obtain current status of the state-of-the-art database design methodology in industry and academics.

(CO526.5): Write SQL programs for effective data definition and manipulation.

(CO526.6): Develop ER diagrams for logical design of database systems.

(CO526.7): Implement a small scale database development project using commercially available DBMS tools.

#### CSCI 534 Networking II Routers and Switches

(CO534.1): Using subnets and routing protocols, design and configure a router network.

(CO534.2): Design and configure a switched network and VLANs.

(CO534.3): Understand the concepts of an Access Control List and learn how to configure a router for ACLs.

#### CSCI 538 Artificial Intelligence

(CO538.1): To learn about general concepts in the field of artificial intelligence

(CO538.2): To learn about the current fields of research in artificial intelligence

(CO538.3): To work on an on-going class project to create a computer program that learns from its users

#### CSCI 539 Expert Systems

(CO539.1): To learn about the general concepts and deployment of expert systems.

(CO539.2): To create an expert systems project using a pre-developed software tool (environment) or in any language of your choice.

#### CSCI 553 Networking III – Unix Based Networks

(CO553.5): Become familiar with sockets, including programming both connection-oriented TCP and connectionless UDP sockets.

(CO553.6): Be able to create simple TCP Client/Server applications using sockets in a High-level language/toolbox such as Java, Perl, Python or C++.

#### CSCI 563 Fundamentals of Information Security & Assurance

(CO 563.1): State the basic concepts in information security, including security policies, security models, and various security mechanisms.

(CO563.2): Understand the issues of network communications such as service, confidentiality, authentication, reliability, access control, and availability.

(CO563.3): State threats and sources of attacks in network security.

(CO563.4): Explain how to use cryptography to protect information and how to choose an appropriate encryption method.

(CO563.5): State main strategies to secure Windows and Linux computers.

(CO563.6): Understand limitation of the current security technology and able to choose proper security mechanisms.

### CSCI 581 Computer and Network Security

(CO581.1): Students will be able to describe and discuss information security and network security basics.

(CO581.2): Students will be able to describe and discuss cryptography basics.

(CO581.3): Students will be able to describe and discuss authentication in network applications.

(CO581.4): Students will be able to describe and discuss electronic mail security.

(CO581.5): Students will be able to describe and discuss IP security.

(CO581.6): Students will be able to describe and discuss network security applications that implement the above capabilities.

### **Objective#3: Students will demonstrate the ability to recognize, design and implement efficient software solutions to problems.**

#### CSCI 520 Information Structure and Algorithm Analysis.

(CO520.1): To understand the concept of sparse matrices, stack and queues.

(CO520.2): To examine the differences between linear and linked representation of stacks, queues, and ordered data.

(CO520.3): To understand and implement tree structures and to compare various sorting algorithms.

#### CSCI527 Advanced Databases and Data Mining

(CO527.1): Understand current status of the state-of-the-art data mining methodology in industry and academics.

(CO527.3): Learn and use effective tools for web navigation and program integration management.

(CO527.5): Construct programs for capturing association rules.

(CO527.6): Write programs for trend analysis using statistical data mining techniques.

#### CSCI 528 Object Oriented Methods

(CO528.2): Classes basics/advanced.

(CO528.3): Overloading.

(CO528.4): Polymorphism/Virtual function.

(CO528.5): Template, Exception.

(CO528.6): UML.

#### CSCI 532 Algorithm Design

(CO532.1): To teach students how to analyze algorithms in order to determine their calculation complexity in the terms of Big Oh, Big theta and Omega. Recursions.

(CO532.2): To teach sorting algorithms and their application: Insertion, Merge, Quick, and Shell Sort algorithms.

(CO532.3): Probabilistic Analysis and Randomized algorithms and their applications to CS- Hiring Algorithm, Bins and Balls problems; Birthday paradox, Longest Streaks.

(CO532.4): Binary search trees and optimal binary search trees, and their applications to large code development.

(CO532.5): Dynamic programming problem- line scheduling, matrix chain multiplication, longest common subsequence and their practical applications.

(CO532.6): Introduction to greedy algorithms – an activity selection problem and its application to resources planning.

CSCI 581 Computer and Network Security

(CO581.2): Students will be able to describe and discuss cryptography basics.

**Objective #4: Students will demonstrate knowledge and understanding of Professional ethics and responsible behavior.**

CSCI 563 Fundamentals of Information Security & Assurance

(CO 563.1): State the basic concepts in information security, including security policies, security models, and various security mechanisms.

(CO563.2): Understand the issues of network communications such as service, confidentiality, authentication, reliability, access control, and availability.

(CO563.3): State threats and sources of attacks in network security.

CSCI 581 Computer and Network Security

(CO581.1): Students will be able to describe and discuss information security and network security basics.

**Objective #5: Students will demonstrate the ability to communicate effectively and to work as a team.**

CSCI 526 Database Systems

(CO526.2): Master the technique for team play and teamwork for small scale database projects through brain storming and joint requirement planning.

(CO526.10): Be able to demo and present the initial, intermediate, and final delivery of the database design project.

CSCI 527 Intelligent Database Systems

(CO527.2): Obtain the technique for team play and teamwork for large intelligent database projects through brain storming and joint requirement planning.

CSCI 528 Object Oriented Methods

(CO528.7): Integration Project.

**Objective #6: Students will become successful professionals able to gain Employment and/or to be accepted into a Computer Science Ph.D. program.**

Assessed by on-going follow-up surveys.