De Anza College

21250 Stevens Creek Blvd.
Cupertino, CA 95014
408-864-5678
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Academic Year

2020 - 2021

Computer Information Systems

Programming/Network Programming

Business, Computer Sciences and
Applied Technologies Division
Bldg. L1, Room L14
408-864-8797

Find your counselor at
deanza.edu/our-counselors

Please visit the Counseling and Advising Center to apply for degrees and for academic planning assistance.

Certificate of Achievement Requirements
• Completion of all major courses with a C grade or higher.

Note: A maximum of six quarter units may be transferred from other academic institutions.

Certificate of Achievement-Advanced Requirements
• Completion of all major courses with a C grade or higher.

• Demonstrated proficiency in mathematics and English as evidenced by eligibility for MATH 114 and eligibility for any of the following: EWRT 1A, EWRT 1AH, EWRT 1AS with EWRT 1AT, or ESL 5.

Note: A maximum of 18 quarter units may be transferred from other academic institutions.

A.A./A.S. Degree Requirements
1. Completion of all General Education (GE) requirements (32-43 quarter units) for the A.A./A.S. degree. GE units must be completed with a minimum 2.0 GPA (C average).
2. Completion of all major courses with a C grade or higher. Major courses can also be used to satisfy GE requirements (except for Liberal Arts degrees).

   Note: A maximum of 22 quarter units from other academic institutions may be applied toward the major.
3. Completion of a minimum of 90 degree-applicable quarter units (GE and major units included). All De Anza courses must be completed with a minimum 2.0 GPA (C average). All De Anza courses combined with courses transferred from other academic institutions must be completed with a minimum 2.0 GPA (C average).

Note: A minimum of 24 quarter units must be earned at De Anza College.

Business Programming
Certificate of Achievement-Advanced
A.A. Degree

The Business Programming Certificate of Achievement-Advanced and A.A. degree programs create programming-savvy entrepreneurs who can make decisions about finances and technology, and who understand how to run an enterprise from both the technology and business perspectives. These programs teach skills combined from business and programming that enable a more in-depth view into the technology necessary to run a business in the 21st century.

Program Learning Outcomes - upon completion, students will be able to:
• Analyze business requirements and architect, design and develop distributed business applications that meet these requirements to the level of user interfaces, algorithms, design patterns, security and storage strategies

Certificate of Achievement-Advanced
1. Meet the requirements for this certificate level.
2. Complete the following.

Course	Title	Units
ACCT 1A	Financial Accounting I	5
or ACCT 1AH	Financial Accounting I - HONORS	
BUS 10	Introduction to Business	5
CIS 14A	Visual Basic .NET Programming I	4.5
CIS 22A	Beginning Programming Methodologies in C++	4.5
CIS 22B	Intermediate Programming Methodologies in C++	4.5
or CIS 22BH	Intermediate Programming Methodologies in C++ - HONORS	
CIS 28	Object Orientated Analysis and Design	4.5
CIS 64A	Database Management Systems	4.5

Complete one course:		**3-4.5**
CIS 56	Network Security (4.5)	
CIS 75D	Enterprise Security Policy Management (3)	

Complete one course:		**4.5**
CIS 22C	Data Abstraction and Structures (4.5)	
or CIS 22CH	Data Abstraction and Structures - HONORS (4.5)	
CIS 29	Advanced C++ Programming (4.5)	
CIS 63	Systems Design (4.5)	

Complete one course:		**4-5**
CIS 3	Business Information Systems (4.5)	
CIS 67A	Local Area Networks (4)	
CIS 95A	Project Management - A Practicum (5)	
CIS 95F	Managing Cloud Projects (4)	
	Total Units Required	**44-46.5**

A.A. Degree

Major	Complete the Certificate of Achievement-Advanced requirements	44-46.5
GE	General Education (32-43 units)	
Electives	Elective courses required when major units plus GE units total is less than 90	
	Total Units Required	**90**

Check with the CIS department about the recommended sequence for completing the above courses.

Network Basics
Certificate of Achievement

The Network Basics Certificate of Achievement prepares students for entry-level employment as a computer support or network technician. Students are introduced to programming, networking and Internet protocols. This certificate program also gives students a foundation for further study in either network administration or programming.

Program Learning Outcomes: Upon completion, students will be able to

- Create algorithms to solve introductory-level problems using C programming language through the stages of coding, documenting, debugging, reading and testing with various tools
- Identify networking components and protocols in the context of architectures and technologies for LAN, WAN and Internet networks

1. Meet the requirements for this certificate level.
2. Complete the following.

CIS 22A	Beginning Programming Methodologies in C++	4.5
CIS 66	Introduction to Data Communication and Networking	5
CIS 67A	Local Area Networks	4
CIS 75A	Internet Concepts and TCP/IP Protocols	5
	Total Units Required 18.5	

Network Programming
Certificate of Achievement-Advanced
A.A. Degree

The Certificate of Achievement-Advanced and A.A. degree give students a foundation for either employment or further study in the field of network programming. The curriculum offers students an introduction to computer programming, networking and internet protocols. Advanced topics include data structures, advanced computer programming, Internet programming with TCP/IP and UNIX/LINUX utilities and shell features for file manipulation and communication.

Program Learning Outcomes: Upon completion, students will be able to

- Design solutions for advanced network problems creating distributed programs using Transmission Control Protocol and Internet Protocol
- Create algorithms and code, document, debug and test advanced-level C programs using multiple source and header files
- Use UNIX/LINUX utilities and shell features for file manipulation and communication

Certificate of Achievement-Advanced
1. Meet the requirements for this certificate level.
2. Complete the following.

CIS 18A	Introduction to Unix/Linux	4.5
CIS 22A	Beginning Programming Methodologies in C++	4.5
CIS 22B	Intermediate Programming Methodologies in C++	4.5
or CIS 22BH	Intermediate Programming Methodologies in C++ - HONORS	
CIS 22C	Data Abstraction and Structures	4.5
or CIS 22CH	Data Abstraction and Structures - HONORS	
CIS 26B	Advanced C Programming	4.5
or CIS 26BH	Advanced C Programming - HONORS	
CIS 66	Introduction to Data Communication and Networking	5
CIS 75A	Internet Concepts and TCP/IP Protocols	5

Complete two courses:		**8-9.5**
CIS 18B	Advanced Unix/Linux (4.5)	
CIS 21JA	Introduction to x86 Processor Assembly Language and Computer Architecture (4.5)	
CIS 31	Operating System Concepts (5)	
CIS 33A	Programming in Perl (4.5)	
CIS 67A	Local Area Networks (4)	
CIS 67B	Introduction to Wide Area Networking (4)	
CIS 75B	Internet Programming with TCP/IP (4.5)	
	Total Units Required 40.5-42	

A.A. Degree

Major	*Complete the Certificate of Achievement-Advanced requirements*	*40.5-42*
GE	*General Education (32-43 units)*	
Electives	*Elective courses required when major units plus GE units total is less than 90*	
	Total Units Required .... 90 units	

Check with the CIS department about the recommended sequence for completing the above courses.

Programming in C/C++
Certificate of Achievement

The C/C++ Certificate of Achievement prepares students for entry-level employment in computer programming, software testing and integration, software analysis or algorithm design. The curriculum offers students an introduction to programming in C, intermediate problem solving in C and advanced C/C++ programming and design. The Certificate of Achievement also provides a solid foundation and skill set for those interested in pursuing further study towards a Certificate of Achievement-Advanced or A.A. degree in Systems Programming or Business Programming.

Program Learning Outcomes: Upon completion, students will be able to
- Read, analyze and explain advanced C/C++ programs
- Design solutions for advanced problems using appropriate design methodology incorporating advanced programming constructs
- Create algorithms and code, document, debug and test advanced level C/C++ programs using multiple source and header files

1. Meet the requirements for this certificate level.
2. Complete the following.

CIS 22A	Beginning Programming Methodologies in C++	4.5
CIS 22B	Intermediate Programming Methodologies in C++	4.5
or CIS 22BH	Intermediate Programming Methodologies in C++ - HONORS	
CIS 22C	Data Abstraction and Structures	4.5
or CIS 22CH	Data Abstraction and Structures - HONORS	

Complete one course:		**4.5**
CIS 26B	Advanced C Programming (4.5)	
or CIS 26BH	Advanced C Programming - HONORS (4.5)	
CIS 29	Advanced C++ Programming (4.5)	
	Total Units Required 18	

Programming in Java
Certificate of Achievement

This Certificate of Achievement gives students the knowledge and skills necessary to develop for client/server, web and mobile environments. Organizations running networks on private and public clouds, which pass information among desktop, server and mobile devices, count on Java as a general-purpose, object-oriented solution to fulfill the development requirement of applications. The flexible nature of the language is driving the demand for trained Java programmers.

Program Learning Outcomes: Upon completion, students will be able to
- Read, analyze and debug code using Core Java
- Design solutions using object-oriented programming constructs and advanced concepts in the Java Development Kit
- Design web applications using a three-tier architecture and applying advanced concepts for Java Enterprise Edition
- Design Java programs for the Android platform
- Create, design and debug advanced-level programs with Java language

1. Meet the requirements for this certificate level.
2. Complete the following.

CIS 22A	Beginning Programming Methodologies in C++	4.5
CIS 22B	Intermediate Programming Methodologies in C++	4.5
or CIS 22BH	Intermediate Programming Methodologies in C++ - HONORS	
CIS 35A	Java Programming	4.5
CIS 35B	Advanced Java Programming	4.5
CIS 53	Java for Mobile Development	4.5
	Total Units Required 22.5	

Programming in Perl
Certificate of Achievement

The Programming in Perl Certificate of Achievement certifies that the student can create Perl programs. Perl is a continuously developing language, designed for practical management of important server systems. Perl programming is a key skill used in server processing, web host processing and integrating multiple subsystems. Students develop basic knowledge of Perl, which enables them to match interfaces of web protocol subsystems, the operating system and database subsystems.

Program Learning Outcomes: Upon completion, students will be able to
- Read, analyze and explain intermediate-level C programs
- Design solutions for intermediate-level problems using appropriate design methodology incorporating intermediate programming constructs
- Create algorithms and code, document, debug and test intermediate-level C programs
- Use the UNIX/LINUX Operating System utilities and shell features for basic file manipulation, networking and communication
- Design, code, document, analyze, debug and test advanced-level Perl programs that include object-oriented Perl modules and access to database, TCP/IP and system processes

1. Meet the requirements for this certificate level.
2. Complete the following.

CIS 18A	Introduction to Unix/Linux	4.5
CIS 22A	Beginning Programming Methodologies in C++	4.5
CIS 22B	Intermediate Programming Methodologies in C++	4.5
or CIS 22BH	Intermediate Programming Methodologies in C++ - HONORS	
CIS 33A	Programming in Perl	4.5
CIS 33B	Advanced Perl Programming	4.5
	Total Units Required 22.5	

Programming in Python
Certificate of Achievement

Python is best known for applications in data analytics and big data processing. Python is also popular in many other software application fields, including graphics, database, network programming, game development, embedded systems, and web and internet development. Organizations running networks on private and public clouds count on Python as a general-purpose solution to fulfill the development requirement of applications. The flexible nature of the language is driving the

demand for trained Python programmers and the certificate of achievement will prepare students for jobs that require professional level Python programming skills. In addition, Python is also good building block to jump start to other programming languages such as JavaScript, Perl, Ruby and other key programming languages.

Program Learning Outcomes: Upon completion, students will be able to
- Create algorithms, code, document, debug and test Python programs that include Python modules for database, networking, graphics and extensions
- Read and analyze Python programs

1. Meet the requirements for this certificate level.
2. Complete the following.

CIS 41A	Python Programming	4.5
CIS 41B	Advanced Python Programming	4.5

Complete one course: **4.5**

CIS 22A	Beginning Programming Methodologies in C++ (4.5)
CIS 36A	Introduction to Computer Programming Using Java (4.5)
CIS 40	Introduction to Programming in Python (4.5)

Complete one course: **4.5-5**

CIS 9	Introduction to Data Science (4.5)
CIS 22B	Intermediate Programming Methodologies in C++ (4.5)
or CIS 22BH	Intermediate Programming Methodologies in C++ - HONORS (4.5)
CIS 26A	C as a Second Programming Language (4.5)
CIS 27	Programming in C++ for C/Java Programmers (4.5)
CIS 35A	Java Programming (4.5)
CIS 36B	Intermediate Problem Solving in Java (4.5)
CIS 64B	Introduction to SQL (4.5)
CIS 66	Introduction to Data Communication and Networking (5)
	Total Units Required 18-18.5

Systems Programming
Certificate of Achievement-Advanced
A.A. Degree
Students pursuing the Systems Programming Certificate of Achievement-Advanced or A.A. degree learn computer programming fundamentals of both low-level and high-level languages and gain computing experience on both Windows and Linux platforms.

Program Learning Outcomes: Upon completion, students will be able to
- Create a design, implement and debug solutions for computing systems of different levels of complexity using C and C++
- Create, design, implement and debug solutions for embedded systems such as 8086/ IA32 processor using Assembly Language
- Use UNIX/LINUX utilities and shell features for file manipulation and communication

Certificate of Achievement-Advanced
1. Meet the requirements for this certificate level.
2. Complete the following.

CIS 18A	Introduction to Unix/Linux	4.5
CIS 21JA	Introduction to x86 Processor Assembly Language and Computer Architecture	4.5
CIS 22A	Beginning Programming Methodologies in C++	4.5
CIS 22B	Intermediate Programming Methodologies in C++	4.5
or CIS 22BH	Intermediate Programming Methodologies in C++ - HONORS	
CIS 22C	Data Abstraction and Structures	4.5
or CIS 22CH	Data Abstraction and Structures - HONORS	
CIS 26B	Advanced C Programming	4.5
or CIS 26BH	Advanced C Programming - HONORS	
CIS 29	Advanced C++ Programming	4.5
CIS 31	Operating System Concepts	5

Complete one course: **4-5**

CIS 18B	Advanced Unix/Linux (4.5)
CIS 21JB	Advanced x86 Processor Assembly Programming (4.5)
CIS 28	Object Oriented Analysis and Design (4.5)
CIS 35A	Java Programming (4.5)
CIS 66	Introduction to Data Communication and Networking (5)
CIS 95F	Managing Cloud Projects (4)
	Total Units Required 40.5-41.5

A.A. Degree

Major	*Complete the Certificate of Achievement- Advanced requirements*	*40.5-41.5*
GE	*General Education (32-43 units)*	
Electives	*Elective courses required when major units plus GE units total is less than 90*	
	Total Units Required 90	

Check with the CIS department about the recommended sequence for completing the above courses.

UNIX/LINUX Operating System
Certificate of Achievement

Students pursuing the UNIX/LINUX Operating System Certificate of Achievement learn the fundamentals of the UNIX/LINUX OS, ranging from text file manipulation, job control and communication to implementation of shell scripts to automate tasks.

Program Learning Outcomes: Upon completion, students will be able to
- Use UNIX/LINUX utilities and shell features for file manipulation, job control and communication
- Create algorithms and code, document, debug and test shell scripts that interact with the UNIX/LINUX Operating System

1. Meet the requirements for this certificate level.
2. Complete the following.

CIS 18A	Introduction to Unix/Linux	4.5
CIS 18B	Advanced Unix/Linux	4.5
CIS 18C	Bash Scripting	4.5
CIS 22A	Beginning Programming Methodologies in C++	4.5
CIS 22B	Intermediate Programming Methodologies in C++	4.5
or CIS 22BH	Intermediate Programming Methodologies in C++ - HONORS	
	Total Units Required 22.5	

Visual Basic Programming
Certificate of Achievement

The Visual Basic Certificate of Achievement prepares students for entry-level positions such as Visual Basic developer, .NET developer and web database developer. Additionally, students will enhance their skills in working with spreadsheets and databases. These skills can be applied to degrees in MIS, web development or any associated area.

Program Learning Outcomes: Upon completion, students will be able to
- Develop and present a plan for improving a business using the business decision making model utilizing hardware and software applications such as word processing, spreadsheets or databases
- Design, create and debug an application incorporating class modules, bas modules, multiple forms and database updating
- Design, create and debug a Web application using ASP.NET 3.5

1. Meet the requirements for this certificate level.
2. Complete the following.

CIS 3	Business Information Systems	4.5
CIS 14A	Visual Basic .NET Programming I	4.5
CIS 14B	Visual Basic .NET Programming II	4.5
CIS 64A	Database Management Systems	4.5
	Total Units Required 18	

Web Development
Certificate of Achievement

The Certificate of Achievement in Web Development certifies that the student can create web pages and client side programming for web pages.

Program Learning Outcomes: Upon completion, students will be able to
- Create algorithms and code, document, debug and test introductory-level programs in a high-level programming language
- Create web pages using Extensible Hypertext Markup Language (XHTML), Cascading Style Sheets (CSS), JavaScript and the Document Object Model (DOM), and demonstrate how they interact together within a web document

1. Meet the requirements for this certificate level.
2. Complete the following.

Complete one course:		**4.5**
CIS 5	Swift Programming (4.5)	
CIS 14A	Visual Basic .NET Programming I (4.5)	
CIS 22A	Beginning Programming Methodologies in C++ (4.5)	
CIS 40	Introduction to Programming in Python (4.5)	

Complete four courses:		**16.5-18**
CIS 18A	Introduction to Unix/Linux (4.5)	
CIS 55	iOS Development (4.5)	
CIS 57	Web Site Administration (4.5)	
CIS 89A	Web Page Development (4.5)	
CIS 89C	Client-Side Programming with JavaScript (4.5)	
CIS 89D	Rich Internet Application Development (4.5)	
CIS 97	FLASH Animation (3)	
CIS 98	Digital Image Editing Software (Photoshop) (4.5)	
	Total Units Required 21-22.5	