# Luna Community College
## STEM Department

### 2012-2015
### Computer Science Curriculum Profile

#### Mission:

**To Promote a STEM Culture that Inspires Completion**

#### Vision:

**To Become the Premier STEM Program in Northeastern New Mexico**

## Program Goals

**Computer Science–** the program is designed for students who wish to enter the multifaceted field of computers. The program provides students with general computer hardware, software, networking and security skills using Microsoft and LINUX operating systems. The purpose of the degree is to provide students with a broad base of computer skills for employment opportunities or as a preparatory program for students who plan to pursue a bachelor's degree in computer science or a related field. If the primary goal is to transfer, the student must learn in advance the particular requirements of the intended school or university. With proper advising students may choose one of the three tracks in computer science: information systems, web technology, or video game design and development.

**Program Educational Objectives** are statements that describe what our graduates are expected to attain within a few years of graduation. Program educational objectives for Computer Science are as follows.

1. Our graduates will continue their education by obtaining a four-year degree at a university or enter the workforce with the skills and knowledge gained.
2. Our graduates will demonstrate a commitment to teamwork, communicate effectively, and demonstrate leadership qualities.
3. Our graduates will become productive citizens who are responsible and professional, while promoting the value of diversity.

**Program Student Outcomes for Computer Science**: Graduates of the Associates of Applied Science degree in Computer Science program will demonstrate:

1. an ability to summarize and interpret the history and evolution of computer systems as well as social issues involving computers.
2. an ability to analyze and interpret data when developing programs using C++ and Java
3. an ability to maintain and differentiate between different operating systems
4. an ability to communicate effectively, engage in life-long learning  and function on teams
5. an ability to distinguish between the hardware and software of a computer system
6. an ability Identify various applications as well as their functions
7. an ability to maintain and implement small home and office networks
8. an ability to use the techniques and skills for professional practice
9. an understanding of professional and ethical responsibility
10. a knowledge of contemporary issues

Within the Computer Science Program, the department also offers a Computer Application Specialist Certificate. The purpose of the Computer Application Specialist Certificate is to develop technical expertise in computer technology and its applications. The curriculum is focused on knowledge and understanding of common office application software, computer hardware and software components, introduction to operating systems, and introduction to computer networks.

## Educational Goals and Students Outcome Mapping

| Course | Program Student Outcomes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| CS105 | X | X | X | X | X | X | | | X | X |
| CS112 | X | | X | | X | X | | | X | |
| CS121 | | X | | X | | X | | X | X | |
| CS130 | X | | | | X | | X | X | X | |
| CS140 | | X | | X | | | | | | |
| CS215 | | X | | X | | | | | | |
| CS220 | X | | X | X | X | X | X | X | X | |
| CS231 | X | | X | | X | X | | X | | |
| CS245 | | | | X | X | X | X | X | X | X |
| CS248 | X | | | X | | X | | X | X | |
| CS261 | | | | X | X | | X | X | X | |
| CS267 | | | | X | X | | X | X | X | |
| VGD106 | | | | X | | | | X | X | |
| VGD130 | | | | X | | | | X | X | X |
| VGD147 | | | | X | | | | X | X | X |
| VGD260 | | | | X | | | | X | X | X |
| SMET101 | | | | X | | | | | | X |
| SMET105 | X | X | | X | X | X | | X | X | X |

| Course | Program Educational Goals | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| CS105 | X | X | |
| CS112 | X | | X |
| CS121 | X | X | |
| CS130 | X | | |
| CS140 | X | X | X |
| CS215 | X | X | |
| CS220 | X | X | X |
| CS231 | X | | X |
| CS245 | X | X | X |
| CS248 | X | X | |
| CS261 | X | X | X |
| CS267 | X | X | X |
| VGD106 | X | X | |
| VGD130 | X | X | |
| VGD147 | X | X | |
| VGD260 | X | X | |
| SMET101 | X | X | |
| SMET105 | X | X | |

# COMPUTER SCIENCE
## Associate of Applied Science Degree
Minimum of 66 Credit Hours

Computer Science is designed for students who wish to enter the multifaceted field of computers. The program provides students with general computer hardware, software, networking and security skills using Microsoft and LINUX operating systems. The purpose of the degree is to provide students with computer skills for employment opportunities or as a preparatory program for students who plan to pursue a bachelor's degree in computer science or a related field. If the primary goal is to transfer, the student must learn in advance the particular requirements of the intended school or university. With proper advising students may choose one of the three tracks in computer science: information systems, web technology, or video game programming.

_____

## Degree Requirements Credit Hours: 66

**General Education Core** ........................................................... **(36 hours)**

Area I. Communications ............................................................ (9 hours)

| | |
|---|---|
| ENG111 Freshman Composition I | 3 |
| ENG115 Freshman Composition II | 3 |
| SPCH111 Public Speaking -or- | 3 |
| SPCH112 Interpersonal Communication | 3 |

Area II. Mathematics ................................................................ (4 hours)
| | |
|---|---|
| MATH180 College Algebra | 4 |

Area III. Laboratory Science ...................................................... (8 hours)

Area IV. Social and Behavioral Sciences ................................... (9 hours)

Area V. Humanities and Fine Arts .............................................. (6 hours)

**Program Requirements** ........................................................... **(24hours)**
| | |
|---|---|
| CS105 Introduction to Computer Science | 3 |
| CS112 Introduction to Operating Systems | 3 |
| CS121 Introduction to Programming | 4 |
| CS130 Introduction to Networking | 4 |
| CS140 Computer Science I | 4 |
| SMET101 Introduction to Science, Math and Engineering Technology | 3 |
| SMET105 Computer Use for Technology 3 | |

**Approved Electives** ................................................................ **(6 hours)**
| | |
|---|---|
| CS215 Java Programming | 4 |
| CS220 A+ Essentials with Practical Applications | 4 |
| CS231 LINUX+ | 3 |

CS245 Security+                                      3
CS248 Web Design and Programming                     3
CS261 Network Concepts I                             3
CS267 Network Concepts II                            3
VGD106 Script Writing and Storyboarding              3
VGD130 Art and Computer Animation                    3
VGD147 Game Analysis and Critique 3
VGD260 Video Game Project 4

# COMPUTER APPLICATION SPECIALIST
## Certificate
Minimum of 32 Credit Hours

Computer training is essential for any career in today's world. The purpose of the Computer Application Specialist Certificate is to develop technical expertise in computer technology and its applications. The curriculum is focused on knowledge and understanding of common office application software, computer hardware and software components, introduction to operating systems, and introduction to computer networks. Under approved electives, students will have the opportunity to choose from a variety of computer courses. Coursework in the Computer Application Specialist Certificate can be applied toward the Associate of Applied Science Degree in Computer Science. Students are strongly encouraged to consult with their LCC advisor for proper advisement and course selection.

## Institutional Proficiency Requirements
In addition to the courses listed below for this program of study, students must also complete institutional proficiencies of ENG095, MATH075 and READ095 that are outlined on page XX to meet all graduation requirements.

## Certificate Requirements Credit Hours: 32

**Program Requirements** ........................................................................ **(17 hours)**

| | |
|---|---|
| CS105 Introduction to Computer Science | 3 |
| CS112 Introduction to Operating Systems | 3 |
| CS121 Introduction to Programming | 4 |
| CS130 Introduction to Networking | 4 |
| CSA150 Computer Fundamentals -or- | 3 |
| SMET105 Computer Use for Technology | 3 |

**Approved Electives** ............................................................................. **(15 hours)**

| | |
|---|---|
| CS140 Computer Science I | 4 |
| CS215 Java Programming | 4 |
| CS220 A+ Essentials with Practical Applications | 4 |
| CS231 LINUX+ | 3 |
| CS245 Security+ | 3 |
| CS248 Web Design and Programming | 3 |
| CS261 Network Concepts I | 3 |
| CS267 Network Concepts II | 3 |
| CSA208 Microsoft Access | 3 |
| CSA217 Microsoft Excel | 3 |
| CSA233 Desktop Publishing | 4 |
| CSA242 Web Design | 3 |

## Course Descriptions and Learning Outcomes for Computer Science

**CS105**             **Introduction to Computer Science**             3:(2,2)

This course is an introduction to computer science and computer information systems. The intent of this course is to prepare students and provide them with the terminology and a brief understanding of concepts within the computing field. Topics will include computer history, algorithms, computer architecture, programming languages, applications, social issues and ethics. Students should have an understanding of how to use a computer and basic software such as MS Word and the internet prior to taking this course.

**Course Objectives**: to introduce the student to the broad field of computer science and computer information systems.

**Learning Outcomes**: Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Summarize and interpret the history and evolution of computer systems.
- Demonstrate  a knowledge of the algorithmic foundation of computer science
- Distinguish between the hardware and software of a computer system
- Identify various application as well as social issues involving computers
- Apply a basic understanding of networking, Internet, and Webpage  design

_____

**CS112**             **Introduction to Operating Systems**             3:(2,2)

This course offers a brief introduction to operating systems where students will gain an understanding of the terms process, scheduling, memory, file management, processes and threads. Students will learn to use editors, compilers, linkers, assemblers, debuggers, and program assembly using libraries. Students will master concepts of process, threads, forks, and dinner's problem done with Linux. *Prerequisite: CS105*

**Course Objectives**: The course is designed to introduce students to the various types of operating systems and their functions.

**Learning Outcomes:** Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Describe the purpose and theory of operating systems
- Differentiate between various operating systems
- Demonstrate standard operating and maintenance procedures
- Configure storage devices, I/O devices, remote communication devices and network connectivity

_____

**CS121**             **Introduction to Programming**             4: (3,2)

This course presents computer programming language along with a model of how a

computer works as a problem-solving machine. Basic programming concepts such as variables, flow control, and functions will be explored. Introduction to programming with C++, Java, and HTML using variables, loops, functions, and objects. *Prerequisite: CS105*

**Course Objectives**: The course is designed to give students an introduction to programming languages as a foundation for continuation in the CS program.

**Learning Outcomes:** Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Prepare an algorithm prior to constructing a functional program
- Describe the function and purpose of a compiler
- Compare the multiple data types and create class definitions
- Analyze and provide a  program based solution for a given problem
- Identify and define various I/O, operators and expressions
- Compare and utilize different types of programming languages

_____

**CS130**            **Introduction to Networking**                    **4: (3,2)**

This course introduces the student to local- and wide-area networks, OSI 7 layer model switches routers, and TCP/IP. Topics covered may lead a student to pass the Network+ test. Topics include: network protocols, connections and topologies. Network security will be addressed as part of the curriculum. *Prerequisite: CS105*

**Course Objectives**: familiarize the student with network protocols and associated hardware.

**Learning Outcomes:** Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Define and summarize the purpose and history  of networks
- Identify network hardware , standards,  topologies,  technologies and protocols
- Analyze network  reference models
- Identify and solve network problems
- Define network security and its importance
- Design, maintain and support small business networks

_____

**CS140**            **Computer Science I**                         **4: (3,2)**

Introduction to programming types, control structures, functions, objects, recursion, linked lists and templates are introduced with C++. Software Engineering with UML will focus on functional and object oriented approaches. *Prerequisite: CS 121.*

**Course Objectives**: The purpose of the course is to give an in-depth investigation of topics introduced in earlier courses and for the student to become proficient in programming.

**Learning Outcomes**: Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Prepare an algorithm prior to constructing a functional program
- Describe the function and purpose of a compiler
- Compare the multiple data types and create class definitions
- Analyze and provide a  program based solution for a given problem
- Identify and define  various I/O, operators  and expressions

_____

**CS215**              **Java Programming**                              **4: (3,2)**

This course provides the Java approach to object oriented programming and a continuation of the exploration of classes, methods, encapsulation and inheritance that are introduced in Computer Science I.  Event driven programming will also be covered.  *Prerequisites:  CS105*

**Course Objectives**: introduce the student to object oriented programming using JAVA.

**Learning Outcomes**: Upon Completion of this course with a grade of a 'C' or better the student will be able to:

- Prepare an algorithm prior to constructing a functional program
- Create fully functional programs using java script
- Perform event driven programming
- Identify and define  various I/O, operators  and expressions

_____

**CS220**              **A+ Essentials with Practical Applications**        **4: (3,2)**

A+ Essentials with Practical Applications prepares students for CompTIA's Exam 220-701 and 220-702. The lecture focuses on operating system and hardware concepts; the practical lab applications focus on installing, configuring and troubleshooting hardware. *Prerequisite: CS105.*

**Course Objectives:** to enable the student to pass the CompTIA exam

**Learning Outcomes**:  Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Set up a new computer and identify system requirements when purchasing a new computer.
- Understand the technology and specifications used to describe computer components, and make informed choices about which device characteristics are required for your situation.
- Install or upgrade the operating system.
- Manage external devices.
- Install and upgrade internal computer and laptop components.
- Troubleshoot computer components.

- Install, partition, and format hard disk storage.
- Configure a small office/home office (SOHO) network.
- Configure system security settings.
- Troubleshoot system startup.
- Back up and recover a computer and user data.

_____


**CS231**                                    **LINUX+**                                    **3; (2,2)**

Linux+ prepares students for CompTIA's Linux+ Exams, LX0-101 and LX0- 102. The course focuses on running GNU and Unix commands from the command line, installing and configuring Linux, maintaining and securing the Linux system. *Prerequisite: CS220.*

**Course Objectives**: to prepare students to pass the CompTIA exams.

**Learning Objectives**: Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Define and summarize the history of Linux
- Install and configure Linux systems
- Manage a system using command line interface
- Demonstrate maintenance skills including adding users, backing up systems, software installation, and disk and file system management
- Maintain user interfaces, desktops, and groups
- Configure network and hardware connections

_____

**CS245**                                    **Security+**                                    **3: (2,2)**

Security+ prepares students for CompTIA's Security+ Certification Exam; SY0-301. The curriculum emphasizes control of security, system access, and network infrastructure. *Prerequisite: CS220.*

**Course Objectives**: to prepare students for the CompTIA security exam.

**Learning Outcomes**: Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Define and utilize technical security terms
- Examine  and analyze network infrastructure and devices
- Interpret encryption concepts
- Identify security risks and vulnerabilities
- Demonstrate skills in employing security controls , application security
- Demonstrate the ability to respond to security attacks
- Analyze security assessments and audits

_____

**CS248** **Web Design and Programming** **3: (2,2)**

Web Design and programming covers the fundamentals of web languages and the impact on business to social networking. Students will design and publish web pages using current web programming languages. Topics include aesthetics, navigation, and incorporation of Java applications. *Prerequisite: CS140*

**Course Objectives**: to present the student with advanced topics and processes in Web Design.

**Learning Outcomes**: Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Construct a functional web-page using HTML
- Plan a wed-page using a site map
- Construct uniform style applications
- Employ java script application within their web-page
- Demonstrate a working knowledge of the latest technologies used in creating web-pages

_____

**CS261** **Network Concepts I** **3: (2,2)**

This course is a continuation to CS130 Introduction to Networking and will prepare students for the Cisco Certified Network Associate (CCNA) certification exam 640-802. The topics covered are implementation, management, protection, and troubleshooting small to medium size enterprise branch networks. Other topics covered in-depth will be subnetting, VLANs, data encapsulation, Ethernet architecture, WAN, Frame Relay, and advanced TCP/IP configuration. *Prerequisite: CS130*.

**Course Objectives**: to prepare the student for the CCNA exam

**Learning Outcomes**: Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Apply network terminology
- Define network architecture ,
- Apply router security with the use of passwords and banners
- Configure and maintain  routers
- Demonstrate subnetting
- Implements  and troubleshoot Wide Area Networks, Wireless networks
- Illustrate network security, protocols and infrastructure

_____

**CS267** **Network Concepts II** **3: (2,2)**

This course is a continuation of Network Concepts II and will prepare students for the Cisco Certified Network Associate (CCNA) certification exam 640-802. The topics covered are implementation, management, protection, and troubleshooting small to medium size enterprise branch networks. Other topics covered in-depth will be subnetting, VLANs, data encapsulation, Ethernet architecture, WAN, Frame Relay, and advanced TCP/IP configuration. *Prerequisite: CS261*.

**Course Objectives**: continued exam preparation

**Learning Outcomes**: Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Configure routing information protocols
- Apply advanced switching concepts and use of access lists
- Demonstrate  network troubleshooting skills
- Configure frame relay, subinterfaces and address mapping
- Demonstrate skill in advanced TCP/IP configuration

_____

**VGD106**          **Script Writing and Storyboarding**                    **3;(2,2)**

In this course the students will learn the techniques of storytelling as they relate to the particulars of writing game script. The class will complete exercises in analyzing video game storytelling, creative writing, and the process of turning good ideas into a script. Students will have opportunities to produce supporting visual materials; including character sketches, environments, and storyboards.

**Course Objective:** introduce the student to the concepts of writing a story line for a video game.

**Learning Outcomes:** Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Define and interpret basic game design art
- Develop and game design layouts, sketches, environments, character art, etc..
- Apply art skills in creating visual components of storyboard development
- Develop a well though and planned script
- Plan and present a game from idea to finished story board

_____

**VGD130**               **Art and Computer Animation**                **3;(2,2)**

This course will introduce the students to basic art and computer animation. It will teach students the physics of movement in animation based on real life objects and people along with drawing 2D and 3D characters and objects. Students will use motion systems along with industry imaging software.

**Course Objectives:** have the student develop artistic skills using computer software.

**Learning Outcomes**: Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Distinguish between different art techniques and technologies
- Apply art skills and develop animations using different computer animation software
- Develop well thought and designed art and animation.

_____

**VGD147**         **Game Analysis and Critique**                    **3;(2,2)**

The class will integrate lecture, presentations, argument and debates, play, thought, and critique. This course will mostly concentrate on theory of game design, dissecting the structure of games, and research into deeper understanding of the structure and process of game design. Lecture, play sessions and critiques will be designed to go hand in hand with explorations of the topics discussed in class; the class will be divided into groups and will play specific games reflecting on the topics discussed in the lecture. In addition to lectures and play, the students will be asked to research a specific game and present arguments or perspectives.

**Course Objectives:** to critically analyze and critique all aspects of video game design and development.

**Learning Outcomes**: Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Discuss the history of game testing.
- Define the role of the game tester and how it fits into the game development team.
- Explore misconceptions, roles, environment, and tester characteristics.
- Illustrate game testing techniques and disciplines.
- Investigate game bug categories, tracking tools, management roles, and documentation associated with game QA and testing.
- Evaluate games for bugs and recommend fixes.
- Analyze issues related to the future of game testing.

_____

**VGD260**          **Video Game Project**                       **4;(3,2)**

This capstone course is an overview of the Video Game Design and Development program. Based on coursework completed in the Video Game core curriculum, the student will design a full functional video game and present it to a committee of peers and instructors for evaluation. The student will also make a final public (oral) presentation of the video game and present a final portfolio. *Prerequisite: Instructor approval.*

**Course Objectives**: the purpose of the course is for the student to build on previously learned theory and technique to produce an operable video game.

**Learning Outcomes**: Upon Completion of this course with a grade of a 'C' or better the student will be able to:
- Discuss the history of electronic game development.

- Distinguish between the different game platforms and genres.
- Define elements related to game strategy, theory and gameplay.
- Identify the distinct roles and responsibilities game development team members.
- Analyze and develop game concepts and proposals.
- Apply story and character development to games.
- Evaluate the game industry and market.

_____

Course Descriptions for CSA courses in the Computer Application Specialist Certificate can be found in the curriculum profiles for the Department of Business and Professional Studies.

CSA208 Microsoft Access
CSA217 Microsoft Excel
CSA233 Desktop Publishing
CSA242 Web Design

**Assessment**

Luna Community College defines assessment as a process that will lead to the improvement of student learning. The process must follow four steps as illustrated below.

**LCC Assessment Plan**

All course offerings, including degree and certificate programs, at Luna Community College are required to follow the four-step assessment process. They include:

1. A list of expected learning outcomes
2. Assessment tools that directly measure those learning outcomes
3. The results of the data, and
4. How the data will be used to improve student learning

Academic Departments at Luna Community College are required to participate in semester "Improving Student Learning" assessment reporting and Student Learning Outcomes Assessment (SLOA) Committee presentations. Every semester, academic departments focus on specific learning outcomes with a targeted student population.

Faculty are selected to participate in SLOA; selected faculty participate in developing assessment methods and procedures for their particular course or courses. The faculty give oral presentations at the end of the semester and information gathered is disseminated among SLOA members, faculty and staff. The purpose is to provide a baseline for future improvements.

Visit our web site at www.luna.edu to review LCC's Improving Student Learning (ISL) reports. LCC also abides by the New Mexico state competencies for general education.

# Appendix "A"



**LUNA COMMUNITY COLLEGE**
**Standard "Minimal" Requirements for Course Syllabus**

| | |
|---|---|
| **Course** | course title and other course information including meeting times, dates, room number, credits, semester, prerequisites and/or co-requisites |
| **Faculty** | information about the instructor and his or her contact information (e.g., phone number and email). List time and day of office hours for full time faculty |
| **Course Description** | use catalog description, 2012-2015 |
| **Expectations of Students** | What do you expect from your students? For example, description of students' responsibilities in the learning process; how you hope the students will approach the course subject/content; take responsibility for their learning; the amount of study time expected in the course, and suggestions on how to succeed in the course. |
| **Course Learning Outcomes (Competencies)** | this section will include a list of skills or techniques students will develop from the course. This list will consists of a <u>minimum of four to six quantifiable statements</u> about what students will be able to do after completing the course. |
| **New Mexico CORE Competencies** | If teaching a CORE course, the State HED competencies must be stated (e.g., Communications, Mathematics, Laboratory Science, Social & Behavioral Sciences, Humanities & Fine Arts). |
| **Methods of Measuring Learning Outcomes (Competencies)** | What tools are used to measure student success based on the learning outcomes? |

| | |
|---|---|
| **Evaluation** | Indicate how the student will earn a particular grade, such as information about assignments including types of assignments, nature of exams (e.g., take home, open book, in-class) due dates, grading criteria and so forth. |
| **Course Schedule** | Add a tentative schedule indicating the course content that will be covered throughout the course (e.g., eight week or sixteen week schedule). |
| **Policies** | Include policies such as attendance, academic responsibilities, late assignments, missed exams, cell phones, etc.<br><br>Add a statement that indicates: for additional student information, refer to the 2012-2015 Student Handbook |
| **Grading Standard** | Refer to the LCC 2012-2015 Catalog |
| **Textbook(s)** | Name of required textbooks(s) and any recommended materials. Include ISBN number(s) |
| **Important Dates** | List important dates such as last day to withdraw from the course, holidays, add/drop, midterm, final exam week, spring break and other important dates. |
| **ADA Statement** | Add a statement regarding accommodations for students with disabilities. See Academic Policies & Procedures Manual 2014 for additional information. |
| **Academic Integrity** | See Academic Policies and Procedures Manual 2014 for additional information. |
| **Syllabus Revisions or Changes** | Add a statement that indicates the syllabus is subject to change |
| **Internet Courses** | See Academic Policies & Procedures Manual 2014 for additional information. |