

# Program SLOs

## Computer Information Science

A.S. Degrees in CIS – Computer Science, Information Systems Security, Server Administrator, Web Developer, Information Technology

A.S. Degree in MIS – Management Information Systems

Certificates of Achievement in CIS – Computer Programmer (SQL), Relational Database Administration, Web Programming, Server Administrator, Programming C/C++, Information Systems Security, Desktop Publishing

Certificates of Achievement in MIS – Application Expert, Application Master

Certificates of Proficiency in CIS – Business Information Worker, Database Analyst (SQL), Database Design, Web Publishing, Network Helpdesk Technician, Linux System Administrator, Object Oriented Software Development

Certificates of Proficiency in MIS – Application Specialist

### Computer Information Science: Applications and Web Program Student Learning Outcomes From the 2015 PrOF (Program Review) Update

1	Program Student Learning Outcome (P-SLO)	<b>Communication Skills</b>	<ul style="list-style-type: none"> <li>• Share information effectively using state-of-the-art technology.</li> <li>• Receive and process written and oral information and prepare the appropriate response.</li> <li>• Ask effective questions.</li> <li>• Work effectively, individually, and as a member of a group.</li> </ul>
2	Program Student Learning Outcome (P-SLO)	<b>Critical Thinking Skills</b>	<ul style="list-style-type: none"> <li>• Demonstrate the ability to think critically and analyze problems.</li> <li>• Find effective solutions to achieve desired objective using multiple sources.</li> <li>• Be comfortable with, and be able to deal with, ambiguous situations.</li> </ul>
3	Program Student Learning Outcome (P-SLO)	<b>Ethics</b>	<ul style="list-style-type: none"> <li>• Respond ethically to given situations.</li> <li>• Make ethical decisions regarding privacy of data and use of both equipment and data.</li> <li>• Ethical use of data, information, hardware and software resources.</li> </ul>
4	Program Student Learning Outcome (P-SLO)	<b>Technology Skill Sets</b>	<ul style="list-style-type: none"> <li>• Demonstrate knowledge of technology applicable to the field, and a proficiency in appropriate software on multiple devices, including tablets and smartphones.</li> <li>• Be competent evaluators and users of hardware.</li> <li>• Adapt to technological changes and select a current solution for a given problem.</li> </ul>

5	Program Student Learning Outcome (P-SLO)	<b>Diversity</b>	<ul style="list-style-type: none"> <li>• Demonstrate the ability to relate and interact effectively in teams consisting of individuals with differing interests, genders, backgrounds and professions.</li> </ul>
6	Program Student Learning Outcome (P-SLO)	<b>Information Competency</b>	<ul style="list-style-type: none"> <li>• Acquire and validate resources to solve technical problems.</li> <li>• Use information resources to gather discipline specific information or materials.</li> </ul>

<b>Computer Information Science: Database and Programming Program Student Learning Outcomes From the 2015 PrOF (Program Review) Update</b>			
1	Program Student Learning Outcome (P-SLO)	<b>Communication Skills</b>	<ul style="list-style-type: none"> <li>• Share information effectively using state-of-the-art technology.</li> <li>• Receive and process written and oral information and prepare the appropriate response.</li> <li>• Ask effective questions.</li> <li>• Work effectively, individually, and as a member of a group.</li> </ul>
2	Program Student Learning Outcome (P-SLO)	<b>Critical Thinking Skills</b>	<ul style="list-style-type: none"> <li>• Demonstrate the ability to think critically and analyze problems.</li> <li>• Find effective solutions to achieve desired objective using multiple sources.</li> <li>• Be comfortable with, and be able to deal with, ambiguous situations.</li> </ul>
3	Program Student Learning Outcome (P-SLO)	<b>Ethics</b>	<ul style="list-style-type: none"> <li>• Respond ethically to given situations.</li> <li>• Make ethical decisions regarding privacy of data and use of both equipment and data.</li> <li>• Ethical use of data, information, hardware and software resources.</li> </ul>
4	Program Student Learning Outcome (P-SLO)	<b>Technology Skill Sets</b>	<ul style="list-style-type: none"> <li>• Demonstrate knowledge of technology applicable to the field, and proficiency in appropriate software.</li> <li>• Be competent evaluators and users of hardware.</li> <li>• Adapt to technological changes and select a current solution for a given problem.</li> <li>• Understand how to deal with interoperability between Microsoft and non-Microsoft products and systems.</li> <li>• Find effective solutions to supporting resources to support effective table and query design from web sites and other research avenues.</li> <li>• Find effective solutions to supporting stated business and user requirements.</li> <li>• Evaluate the impact of cloud-based, multiple server</li> </ul>

			applications, such as, ASP.net and ADO.net
5	Program Student Learning Outcome (P-SLO)	<b>Diversity</b>	<ul style="list-style-type: none"> <li>• Demonstrate the ability to relate and interact effectively in teams consisting of individuals with differing interests, genders, backgrounds and professions.</li> </ul>
6	Program Student Learning Outcome (P-SLO)	<b>Information Competency</b>	<ul style="list-style-type: none"> <li>• Acquire and validate resources to solve technical problems.</li> <li>• Use information resources to gather discipline specific information or materials.</li> </ul>
7	Program Student Learning Outcome (P-SLO)	<b>Security Skill Sets</b>	<ul style="list-style-type: none"> <li>• Demonstrate the ability to control access to resources; audit access to resources; and authentication..</li> </ul>
8	Program Student Learning Outcome (P-SLO)	<b>System Architecture and Data Models</b>	<ul style="list-style-type: none"> <li>• Demonstrate the ability to extract information from large database user installations.</li> <li>• Find effective solutions to support advanced query and table design – optimize table relationship to utilize database resources more efficiently.</li> </ul>
9	Program Student Learning Outcome (P-SLO)	<b>Programming Skill Sets</b>	<ul style="list-style-type: none"> <li>• Select the appropriate programming language with which to implement a given programming logic. The selection should be based on the strengths of the language, including: <ol style="list-style-type: none"> <li>a. Type of user interface that can be created (GUI, simple text console window, web page)</li> <li>b. Ability to get data into program from the keyboard, a text file, or a database file</li> <li>c. Ability to save output to a text file or a database file if necessary</li> <li>d. Ability to execute cross-platform, including mobile</li> <li>e. Ability to create multiple server applications using technologies such as, ASP.net and ADO.net</li> <li>f. Ease of development and maintenance of the program</li> <li>g. Existence of predefined data structures</li> </ol> </li> </ul>

**Computer Information Science: Networking and Security**  
**Program Student Learning Outcomes**  
**From the 2015 PrOF (Program Review) Update**

1	Program Student Learning Outcome (P-SLO)	<b>Computing Environment</b>	<ul style="list-style-type: none"> <li>Manage, implement, and maintain a typical computing environment</li> </ul>
2	Program Student Learning Outcome (P-SLO)	<b>Security</b>	<ul style="list-style-type: none"> <li>Analyze risks to a network and be able to implement a workable security policy that protects information assets from potential intrusion, damage or theft</li> </ul>
3	Program Student Learning Outcome (P-SLO)	<b>Complex Issue Analysis</b>	<ul style="list-style-type: none"> <li>Develop the critical verbal, written, and quantitative skills needed to analyze complex issues</li> </ul>
4	Program Student Learning Outcome (P-SLO)	<b>Modes of Inquiry</b>	<ul style="list-style-type: none"> <li>Develop an understanding of the basic concepts and major modes of inquiry used in a variety of disciplines</li> </ul>
5	Program Student Learning Outcome (P-SLO)	<b>Skill Development</b>	<ul style="list-style-type: none"> <li>Develop a depth of understanding, including critical cognitive, psychomotor and affective skills, in this discipline</li> </ul>
6	Program Student Learning Outcome (P-SLO)	<b>Self-reliant learning</b>	<ul style="list-style-type: none"> <li>Make progress toward becoming engaged and self-reliant learners demonstrating habits of intellectual inquiry and striving toward their maximum potential</li> </ul>
7	Program Student Learning Outcome (P-SLO)	<b>Ethics and Citizenship</b>	<ul style="list-style-type: none"> <li>Become more prepared to contribute to a diverse democratic society with a pluralistic perspective and with an understanding of ethical issues related to information and communication technologies</li> </ul>

**A.S. - Computer Science Student Learning Outcomes\***

**SLO 1** Redefine a complex problem into a sequential set of parts that can be translated into the language of programming logic.

**SLO 2** Design, write, test, and debug computer programs in a structured language, a low-level language, and an object-oriented language.

**SLO 3** Incorporate foundational data management concepts such as data structures within computer programs.

**A.S. - Information Systems Security Student Learning Outcomes\***

**SLO 1** Evaluate the different types of access control methods used to secure a network, in particular authentication, authorization and audit.

**SLO 2** Construct a Business Continuity and a Disaster Recovery Plan. These plans are used by an organization to resume partially or completely interrupted critical function(s) within a predetermined time after a disaster or temporary

disruption.
<b>SLO 3</b> Analyze the different types of cryptography used in computer and network security in such area as access control and information confidentiality.
<b>SLO 4</b> Recognize some of the methods used to properly conduct a computer forensics investigation. This discussion should begin with a discussion on ethics.
<b>SLO 5</b> Evaluate a firewall to prevent unauthorized access to a network or computer. Students will also learn how to allow access to key services while maintaining an organization's security.
<b>SLO 6</b> Evaluate, implement and manage secure remote-access technologies, such as Internet Detection Systems (IDS), which are powerful tools used for identifying and responding to network- and host-based intrusions.
<b>SLO 7</b> Distinguish the different ways to secure an operating system. Students will know how to maintain the integrity, authenticity, availability, and privacy of data.
<b>SLO 8</b> Analyze risks to a network and be able to implement a workable security policy that protects information assets from potential intrusion, damage or theft.

### **A.S. - Server Administrator Student Learning Outcomes\***

<b>SLO 1</b> Manage, implement, and maintain the typically complex computing environment of medium- to large-sized companies
<b>SLO 2</b> Manage and maintain a Windows server environment
<b>SLO 3</b> Manage, implement, and maintain a Windows server network infrastructure
<b>SLO 4</b> Develop the critical verbal, written, and quantitative skills needed to analyze complex issues
<b>SLO 5</b> Develop an understanding of the basic concepts and major modes of inquiry used in a variety of disciplines
<b>SLO 6</b> Develop a depth of understanding, including critical cognitive, psychomotor and affective skills, in this discipline
<b>SLO 7</b> Make progress toward becoming engaged and self-reliant learners demonstrating habits of intellectual inquiry and striving toward their maximum potential
<b>SLO 8</b> Become more prepared to contribute to a diverse democratic society with a pluralistic perspective

### **A.S. – Information Technology Student Learning Outcomes\***

<b>SLO 1</b> Apply fundamental knowledge of computing and the current use of technology techniques, skills, and tools necessary for the computing practice.
<b>SLO 2</b> Apply fundamental knowledge of computing and the current use of technology techniques, skills, and tools necessary for the computing practice.
<b>SLO 3</b> Assess user needs in the selection, creation, evaluation and administration of computer-based information systems.
<b>SLO 4</b> Demonstrate appreciation of the Information Technology career field and the need to be lifelong learners.

### **A.S. – Management Information Systems Student Learning Outcomes\***

<b>SLO 1</b> Apply information and communication technology concepts to business problems.
<b>SLO 2</b> Demonstrate in-depth knowledge of common office computerized application software and operating systems.
<b>SLO 3</b> Create business documents such as letters, spreadsheets, presentations, publications and reports using appropriate business writing style, document appearance, grammar usage, and writing mechanics.
<b>SLO 4</b> Analyze the fundamentals of an operating system. Examine the relationship of the operating system to other applications programs.
<b>SLO 5</b> Analyze the effects of malware on an application and an operating system.
<b>SLO 6</b> Apply accounting concepts and principles in making decisions about business operations.
<b>SLO 7</b> Apply accounting concepts for costs used in manufacturing and service operations and analyze the behavior of the cost types.
<b>SLO 8</b> Apply economic concepts and principles in making decisions about business operations.
<b>SLO 9</b> Apply basic legal concepts and principles in various business environments.

**SLO 10** Propose solutions to basic business problems while applying critical thinking methods.

**SLO 11** Apply mathematics in a financial situation.

**SLO 12** Apply statistical methods to make predictions, and draw conclusions to make a hypothesis.

### **A.S. – Web Developer Student Learning Outcomes\***

**SLO 1** Manage a multi-level Web site hosted on a Web server.

**SLO 2** Utilize multiple programs simultaneously in order to develop Web sites.

**SLO 3** Recommend Web scripting language, current markup language or Web authoring software, and cascading style sheets to develop complex Web sites that are uploaded via File Transfer Protocol (FTP) to a Web server.

**SLO 4** Research and implement current, valid World Wide Web Consortium (W3C) standards including technical recommendations for markup languages, and other recommendations as they are introduced.

**SLO 5** Plan a structured approach to Web site development that identifies the information dissemination needs of a client and organizes the content effectively and efficiently in order to communicate to an identified audience; then develop and implement an appropriate Web solution.

**SLO 6** Utilize client-side scripting in order to manipulate interactive objects like navigation bars, forms, rollovers, other event handling, and the control of windows, frames, and/or layers.

**SLO 7** Develop Web solutions that include form validation and processing, server-side programming, and database-driven Web development.

**SLO 8** Demonstrate proficiency in the process of Web project management on a real-world Web site including design specification, research, production, modification, time estimation, and presentation.

**SLO 9** Write code in a currently used Web scripting language.

### **Certificate – Database Analyst-SQL Student Learning Outcomes\***

**SLO 1** List the hardware components of a computer system and differentiate among system and application software.

**SLO 2** Describe the relationship of operating systems to database file management.

**SLO 3** Devise computerized solutions in the development of databases by applying a solid foundation of algorithmic principles.

**SLO 4** Compare and contrast hierarchical, network, and relational databases.

**SLO 5** Design, create, and administer relational databases.

**SLO 6** Create client applications using structured query language (SQL).

### **Certificate – Computer Programmer-SQL Student Learning Outcomes\***

**SLO 1** List and describe the hardware components of a computer system and differentiate among system and application software.

**SLO 2** Describe and assess the relationship of operating systems to database file management.

**SLO 3** Devise computerized solutions in the development of databases by applying a solid foundation of algorithmic principles.

**SLO 4** Compare and contrast hierarchical, network, and relational databases.

**SLO 5** Design, create, and administer relational databases.

**SLO 6** Design and develop tables, forms, queries, and reports using SQL

### **Certificate – Relational Database Administration Student Learning Outcomes\***

**SLO 1** Analyze and list the hardware components of a computer system and differentiate among system and application software.

**SLO 2** Plan and design tables, forms, queries, and reports using office database application software.

**SLO 3** Assess and design multi-table forms, establish table relationships

<b>SLO 4</b> Describe the relationship of operating systems to database file management.
<b>SLO 5</b> Devise computerized solutions in the development of databases by applying a solid foundation of algorithmic principles.
<b>SLO 6</b> Compare and contrast hierarchical, network, and relational databases.
<b>SLO 7</b> Demonstrate ability to design, create, and administer relational databases.
<b>SLO 8</b> Create client applications using structured query language (SQL).

### **Certificate - Server Administrator Student Learning Outcomes\***

<b>SLO 1</b> Manage, implement, and maintain the typically complex computing environment of medium- to large-sized companies
<b>SLO 2</b> Manage and maintain a Windows server environment
<b>SLO 3</b> Manage, implement, and maintain a Windows server network infrastructure

### **Certificate - Web Programming Student Learning Outcomes**

<b>SLO 1</b> Design, develop, support, and maintain professional Web pages.
<b>SLO 2</b> Demonstrate knowledge of web-related technology and media applications.
<b>SLO 3</b> Be competent evaluators and users of the World Wide Web.
<b>SLO 4</b> Adapt to technological changes and select a current solution for a given problem.
<b>SLO 5</b> Understand how to deal with interoperability between different products, systems, and platforms.
<b>SLO 6</b> Find effective solutions to maintaining and supporting web sites and related resources.

### **Certificate - Information Systems Security Student Learning Outcomes\***

<b>SLO 1</b> Evaluate the different types of access control methods in particular authentication, authorization and audit.
<b>SLO 2</b> Configure a firewall to prevent unauthorized access to a network or computer. Students will also learn how to allow access to key services while maintaining an organization's security.
<b>SLO 3</b> Evaluate, implement and manage secure remote-access technologies, such as Internet Detection Systems (IDS), which are powerful tools used for identifying and responding to network- and host-based intrusions.
<b>SLO 4</b> Critique the different ways to secure an operating system. Students will learn how to maintain the integrity, authenticity, availability, and privacy of data.
<b>SLO 5</b> Analyze risks to a network and be able to implement a workable security policy that protects information assets from potential intrusion, damage or theft.

### **Certificate – Object Oriented Software Development Student Learning Outcomes\***

<b>SLO 1</b> Formulate problems as steps so be able to solve systematically.
<b>SLO 2</b> Describe the principles of object oriented programming.
<b>SLO 3</b> Use structure programming skills proficiently in an object oriented program.
<b>SLO 4</b> Apply the concepts of object oriented programming skills such as reusability, portability, data encapsulation, inheritance, polymorphism and etc. to a program.
<b>SLO 5</b> Design and develop programs with Graphical User Interfaces.
<b>SLO 6</b> Use an object oriented language to develop solutions for real life projects in a team work environment.

### **Certificate – Network Helpdesk Technician Security Student Learning Outcomes\***

<b>SLO 1</b> Analyze the fundamentals of an operating system. Examine the relationship of the operating system to other applications programs.
<b>SLO 2</b> Demonstrate knowledge of networking technology. Judge the strengths and weaknesses of the different network

operating systems and technologies.

**SLO 3** Analyze the effects of an application on a network operating system.

**SLO 4** Analyze the effects of network intruders and viruses on an application and an operating system.

### **Certificate – Web Publishing Student Learning Outcomes\***

**SLO 1** Design, develop, support, and maintain professional Web pages.

**SLO 2** Demonstrate knowledge of web-related technology and media applications.

**SLO 3** Be competent evaluators and users of the World Wide Web.

**SLO 4** Adapt to technological changes and select a current solution for a given problem.

**SLO 5** Understand how to deal with interoperability between different products, systems, and platforms.

**SLO 6** Find effective solutions to maintaining and supporting web sites and related resources.

### **Certificate – MIS Application Specialist Student Learning Outcomes\***

**SLO 1** Demonstrate in-depth knowledge of common office computerized application software and operating systems.

**SLO 2** Describe and apply ergonomic principles required to maintain appropriate posture and hand positions, and to avoid eyestrain while using computers for data entry.

**SLO 3** Use the keyboard to input data, operate a numeric keypad by touch, and use a mouse or other pointing device to issue computer commands or access software functions. Students should be able to type 32 words a minute with a five minute timing and a maximum of five errors.

**SLO 4** Create business documents such as letters, presentations, spreadsheets, publications and reports using appropriate business writing style, document appearance, grammar usage, and writing mechanics.

**SLO 5** Operate office equipment such as computers, telephones, fax machines, and reprographic equipment.

### **Certificate – MIS Application Expert Student Learning Outcomes\***

**SLO 1** Demonstrate in-depth knowledge of common office computerized application software and operating systems.

**SLO 2** Describe and apply ergonomic principles required to maintain appropriate posture and hand positions, and to avoid eyestrain while using computers for data entry.

**SLO 3** Use the keyboard to input data, operate a numeric keypad by touch, and use a mouse or other pointing device to issue computer commands or access software functions. Students should be able to type 32 words a minute with a five minute timing and a maximum of five errors.

**SLO 4** Create business documents such as letters, presentations, spreadsheets, publications and reports using appropriate business writing style, document appearance, grammar usage, and writing mechanics.

**SLO 5** Operate office equipment such as computers, telephones, fax machines, and reprographic equipment.

### **Certificate – MIS Application Master Student Learning Outcomes\***

**SLO 1** Demonstrate in-depth knowledge of common office computerized application software and operating systems.

**SLO 2** Describe and apply ergonomic principles required to maintain appropriate posture and hand positions, and to avoid eyestrain while using computers for data entry.

**SLO 3** Use the keyboard to input data, operate a numeric keypad by touch, and use a mouse or other pointing device to issue computer commands or access software functions. Students should be able to type 32 words a minute on a 5-minute timing with a maximum of five errors.

**SLO 4** Create business documents such as letters, spreadsheets, publications and reports using appropriate business writing style, document appearance, grammar usage, and writing mechanics.

**SLO 5** Operate office equipment such as computers, telephones, fax machines, and reprographic equipment.

**SLO 6** Analyze the fundamentals of an operating system. Examine the relationship of the operating system to other applications programs.

**SLO 7** Demonstrate knowledge of networking technology. Judge the strengths and weaknesses of the different network operating systems and technologies.

**SLO 8** Analyze the effects of an application on a network operating system.

**SLO 9** Analyze the effects of network intruders and viruses on an application and an operating system.

### **Certificate – Business Information Worker Student Learning Outcomes\***

**SLO 1** DEMONSTRATE COMMON OFFICE APPLICATIONS SKILLS.

- Diagram and differentiate basic computer terminology and apply it to communication.
- Construct and modify solutions to simple personal, educational or business needs applying use of office workplace computer programs.
- Design, diagram, and construct simple file folder structure on local storage, and access files for upload/download to/from online tools.
- Formulate expressions and construct logic comparisons using proper symbols and syntax in workplace computer programs.
- Create and organize various types of files using various workplace computer programs.
- Construct projects efficiently generating solutions using various workplace computer programs and shortcuts.
- Demonstrate the mechanics and use of word processing software to organize and present data in a multicolumn, multipage newsletter format including banner, bordering, tables, text effects and embedded graphics.
- Demonstrate appropriate pagination and word processing features to apply a formal (MLA/APA/Chicago) style of documentation in the creation of a multi-section research paper or report with Table of Contents, Index, and Bibliography.
- Design and construct a form using multiple content controls.
- Apply advanced Excel tools such as pivot tables, pivot charts, and templates to workbooks.
- Create audience centric business documents to enhance readability.

**SLO 2** DEMONSTRATE COMMON OFFICE ADMINISTRATION SKILLS.

- Integrate the features of working with tasks and schedules to organize both professional and personal information.
- Design and assess plans for backup and maintenance of Outlook files and information.
- Analyze trends in technologies and evaluate their effects on organizational data analysis.

**SLO 3** DEMONSTRATE BASIC OFFICE COMMUNICATION SKILLS.

- Identify techniques to send, receive and manage email messages.
- Analyze business situations and determine appropriate methods to deliver negative and positive messages.

**SLO 4 EXAMINE CUSTOMER SERVICE NEEDS AND REQUIREMENTS.**

- Explain the elements of a service culture.
- Analyze strategies for promoting a positive service culture.
- Analyze the extent to which customer service is facilitated by the effective use of technology.

**Certificate – Linux System Administrator Student Learning Outcomes\***

**SLO 1** Understand the concepts behind free software, run levels, daemons, the kernel, basic networking and devices.

**SLO 2** Install the operating system and configure aspects of it (hard drive, X Window, etc.). Know how the startup and shutdown function works, as well as the basics of disk layout, user accounts, and common processes.

**SLO 3** Comprehend the file system structure and nature of inodes. Know how to create a rescue media, monitor resources, and apply patches.

**SLO 4** Demonstrate the layout of a Local Area Network and how to configure it with TCP/IP. List different protocols and services and how they are tested, including how they are configured in a host, a network, or an adapter.

**SLO 5** Implement basic security methods, such as shadow passwords, log events, and be able to look for commonly known trouble spots.

**Certificate – CIS – Programming in C/C ++ Student Learning Outcomes\***

**SLO 1** Apply Object and Structure programming in programs

**SLO 2** Use a C/C++ programming development tool to develop programs.

**SLO 3** Communicate and analyze programming problems, and determine what object-oriented programming approach would be most appropriate to resolve them.

\* Developed through the Curriculum Committee approval process.