Information Systems Technology
Mississippi Curriculum Framework

Computer Networking Technology (Program CIP: 11.0901 – Computer Systems Network and Telecommunications)
Computer Programming Technology (Program CIP: 11.0201 – Computer Programming/Programmer, General)
Database Administration Technology (Program CIP: 11.0802 – Data Modeling/Warehousing and Database Administration)
Data Analytics Technology (Program CIP: 52.1302 – Business Statistics)
Network Security Technology (Program CIP: 11.1003 – Computer and Information Systems Security)

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The Office of Curriculum and Instruction (OCI) was founded in 2013 under the Division of Workforce, Career, and Technical Education at the Mississippi Community College Board (MCCB). The office is funded through a partnership with The Mississippi Department of Education (MDE), who serves as Mississippi's fiscal agent for state and federal Career and Technical Education (CTE) Funds. The OCI is tasked with developing statewide CTE curriculum, programming, and professional development designed to meet the local and statewide economic demand.

Contents

NATIONAL CERTIFICATION STANDARDS

CompTIA

CompTIA is a vendor neutral provider of IT certifications. At the time of this revision, CompTIA A+ (2017 edition) comprise CompTIA A+220-#01 and CompTIA A+ 220-#02. The following overview has been prepared based directly on information from the CompTIA A+ certification website at www.CompTIA.org.

The certification covers both hardware and software fundamentals that are needed by IT professionals in support and service technician roles. CompTIA A+ 220-#01 covers computer technology fundamentals, such as PC installation, configuration, mobile devices, and networking as well as safety procedures and prohibited content. CompTIA A+ 220-#02 covers installing and configuring PC and mobile operating systems, as well as common functions in networking, email and security.

In order to receive CompTIA A+ certification a candidate must pass two exams. The first exam is CompTIA A+ 220-#01 Certification Exam. The CompTIA A+ 220-#01 and CompTIA A+ 220-#02 examinations measures necessary competencies for an entry-level IT professional with the equivalent knowledge of at least 12 months of hands-on experience in the lab or field. Successful candidates will have the knowledge required to assemble components based on customer requirements, install, configure and maintain devices, PCs and software for end users, understand the basics of networking and security/forensics, properly and safely diagnose, resolve and document common hardware and software issues while applying troubleshooting skills. Successful candidates will also provide appropriate customer support; understand the basics of virtualization, desktop imaging, and deployment.

CompTIA A+ is accredited by ANSI to show compliance with the ISO 17024 Standard and, as such, undergoes regular reviews and updates to the exam objectives. CompTIA Network+ professionals are trained to work with a variety of hardware, software and networks. Take your talents wherever your IT ambitions lead you.

CompTIA Security+ is the certification globally trusted to validate foundational, vendor-neutral IT security knowledge and skills. As a benchmark for best practices in IT security, this certification covers the essential principles for network security and risk management – making it an important stepping stone of an IT security career. CompTIA Security+ meets the ISO 17024 standard and is approved by U.S. Department of Defense to fulfill Directive 8570.01-M requirements. It is compliant with government regulations under the Federal Information Security Management Act (FISMA). According to the Bureau of Labor Statistics, Security Specialists, Administrators and Managers earn over $86,000 per year. Security+ is developed and maintained by leading IT experts. Content for the exams stems from a combination of industry-wide survey feedback and contributions from our team of subject matter experts. Learn more about the people behind the CompTIA Security+ Advisory Committee.

CompTIA Network+ is a vendor neutral networking certification that is trusted around the world. It validates the essential knowledge and skills needed to confidently design, configure, manage and troubleshoot any wired and wireless networks. CompTIA Network+ certified individuals are in-demand worldwide. CompTIA Network+ meets the ISO 17024 standard and is approved by U.S. Department of Defense to fulfill Directive 8570.01-M requirements. It is compliant with government regulations under the Federal Information Security Management Act (FISMA). CompTIA Network+ covers the configuration, management, and troubleshooting of common wired and wireless network devices. Also included are emerging technologies such as unified communications, mobile, cloud, and virtualization technologies.

For more information related to CompTIA examinations, please visit www.CompTIA.org.

SAS

SAS is a software suite used in the statistical analysis of data, data preparation, reporting, data mining and analytics. As the leader in business analytics software and services, SAS helps organizations access and

transform large amounts of data into insights and knowledge that can be used in the discovery of new and exciting opportunities. SAS can be used to manage and retrieve data from a variety of sources and perform a myriad of statistical analyses on it. Having applications in a variety of industries, SAS is used for operations research, project management, quality improvement, forecasting and decision-making. The language's flexibility is what makes it suitable for a variety of vertical applications and programming. Developed and taught by seasoned SAS practitioners with over 70 years of collective experience, this certificate program includes over 120 hours of instruction. The program concludes with a project-based capstone course, allowing students to demonstrate their applied knowledge through a technical paper and presentation.

Certificate Benefits:
Enable the students to develop applicable and, potentially, publishable programs in SAS
Industry neutral curriculum allows for students to apply knowledge to their field of interest
Project-based capstone course will meet standards to merit a presentation at a national conference, such as the SAS Global Forum, SAS Regional Forums or other conferences in a relevant vertical segment.
Hands-on comprehensive training designed to immerse the student in the skills needed to successfully get started or advance their career
The SAS Programming certificate is aimed at those seeking to have a deep understanding of this powerful statistical programming language. Upon completion of this program, graduates will have gained a thorough understanding of the various aspects of SAS and how it can be applied to a variety of industries and professions.

ILE RPG
Certified Associate Application Developer – ILE RPG Programmer Certification is in beta stage. Please watch for updates.

Candidate Profile
6 months performing RPG coding activities
Two semesters of formal RPG education
COMMON Certified Associate Application Developer – ILE RPG Programmer Certification candidates should have at least six months of lab or practical experience coding or maintaining a variety of applications using RPG IV and ILE. The successful candidate has a basic knowledge of RPG.

For more information related to SAS certification please visit http://extension.ucsd.edu/

Microsoft Technology Associate
Microsoft Technology Associate (MTA) is an introductory Microsoft certification for individuals considering a career in technology. MTA certification addresses a wide spectrum of fundamental technical concepts, assesses and validates your core technical knowledge, and enhances your technical credibility. Note: MTA exams do not qualify for MCP certification, nor are they a prerequisite for MCSA or MCSD certification. To become a Microsoft Technology Associate, you must pass an exam in one of the following tracks, depending on your interests and career goals.

The Software Development exam measures your ability to accomplish the technical tasks such as:
Understanding core programming
Understanding object-oriented programming
Understanding general software development
Understanding web applications
Understanding desktop applications
Understanding database

The Network Fundamentals exam measures your ability to accomplish the technical tasks listed below. The percentages indicate the relative weight of each major topic area on the exam.

The Network Fundamentals exam measures your ability to accomplish the technical tasks such as:
Understanding network in fractures
Understanding network hardware
Understanding protocols and services

Microsoft Technology Exam 98-367 Security fundamentals

Skills measured
    Understand security layers
    Understand operating system security
    Understand network security
    Understand security software

For more information related to Microsoft Technology Associate please visit
https://www.microsoft.com/en-us/learning/mta-certification.aspx

CIW
The CIW Database Design Specialist course provides introductory vendor-neutral training for individuals planning to pursue product-focused database specialization. This course introduces you to DB2, Oracle Database 11g, MS SQL and my SQL. You will also learn about Structured Query Language (SQL) and database optimization through normalization. The CIW Database Design Specialist course prepares candidates to take the CIW Database Design Specialist exam, which if passed earns the individual the Database Design Specialist certification.

For more information related to CIW please visit https://www.ciwcertified.com/ciw-certifications

INDUSTRY JOB PROJECTION DATA

The Information Systems occupations require an education level of Bachelor's Degree. There is expected to be a 12.35% increase in occupational demand at the regional level and 16.85% increase at the state level. Median annual income for this occupation is $55,161.60 at the state level. A summary of occupational data from the State Workforce Investment Board Data Center is displayed below:

Table 1: Education Level

Program Occupations	Education Level
Computer System Analyst	Bachelor's Degree

Table 2: Occupational Overview

	Region	State	United States
2010 Occupational Jobs	1004	1335	493490
2020 Occupational Jobs	1128	1560	599431
Total Change	124	225	105941
Total % Change	12.35%	16.85%	21.47%
2010 Median Hourly Earnings	$26.52	$26.52	$37.38
2010 Median Annual Earnings	$55,161.60	$55,161.60	$77,750.40
Annual Openings	12	22	10594

Table 3: Occupational Breakdown

Description	2010 Jobs	2020 Jobs	Annual Openings	2010 Hourly Earnings	2010 Annual Earnings 2,080 Work Hours
Computer System Analyst	1004	1128	12	$26.52	$55,161.60

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Computer System Analyst	124	12.35%1	16.85%	24.47%

Table 1: Education Level

Program Occupations	Education Level
Computer Programmers	Bachelor's Degree
Software Developers, Applications	Bachelor's Degree
Software Developers, Systems Software	Bachelor's Degree

Table 2: Occupational Overview

	Region	State	United States
2010 Occupational Jobs	2800	3494	1207590
2020 Occupational Jobs	3159	3951	1485826
Total Change	359	457	278236
Total % Change	12.82%	13.08%	23.04%
2010 Median Hourly Earnings	$30.93	$30.69	$40.52
2010 Median Annual Earnings	$62,334.40	$63,838.34	$84,281.23
Annual Openings	35	45	27823

Table 3: Occupational Breakdown

Description	2010 Jobs	2020 Jobs	Annual Openings	2010 Hourly Earnings	2010 Annual Earnings 2,080 Work Hours
Computer Programmers	985	939	-4	$24.61	$51,188.80
Software Developers, Applications	998	1284	28	$31.79	$66,123.20
Software Developers, Systems Software	817	936	11	$36.39	$75,691.20

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Computer Programmers	-46	-4.67%	-5.85%	-2.33%
Software Developers, Applications	286	28.66%	28.75%	34.43%
Software Developers, Systems Software	119	14.57%	18.19%	30.46%

Table 1: Education Level

Program Occupations	Education Level
Database Administrators	Bachelor's Degree

Table 2: Occupational Overview

	Region	State	United States
2010 Occupational Jobs	243	424	103660
2020 Occupational Jobs	285	524	125947
Total Change	42	97	22287
Total % Change	17.28%	22.88%	21.50%
2010 Median Hourly Earnings	$24.88	$24.88	$35.33
2010 Median Annual Earnings	$51,750.40	$51,750.40	$73,486.40
Annual Openings	4	9	2228

Table 3: Occupational Breakdown

Description	2010 Jobs	2020 Jobs	Annual Openings	2010 Hourly Earnings	2010 Annual Earnings 2,080 Work Hours
Database Administrators	243	285	4	$24.88	$51,750.740
TOTAL	243	285	4	$24.88	$51,750.40

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Database Administrators	42	17.28%	22.88%	21.50%

Table 1: Education Level

Program Occupations	Education Level
Database Administrators	Bachelor's Degree
Network Administrators	Bachelor's Degree

Table 2: Occupational Overview

	Region	State	United States
2010 Occupational Jobs	1335	1966	434890
2020 Occupational Jobs	1920	2929	630794
Total Change	585	963	195904
Total % Change	43.82%	48.98%	45.05%
2010 Median Hourly Earnings	$24.25	$24.23	$34.29
2010 Median Annual Earnings	$50,429.00	$50,393.90	$71,323.20
Annual Openings	58	96	19590

Table 3: Occupational Breakdown

Description	2010 Jobs	2020 Jobs	Annual Openings	2010 Hourly Earnings	2010 Annual Earnings 2,080 Work Hours
Database Administrators	243	285	4	$24.88	$51,750.740
Network and Computer System Administrators	1092	1635	54	$23.61	$49,108.80
TOTAL	1335	1920	58	$24.25	$50,492.60

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Database Administrators	42	17.28%	22.88%	21.50%
Network and Computer System Administrators	543	49.73%	56.16%	52.42%

ARTICULATION

There is no identifiable articulation pathway at this time. As the secondary program is updated in the future, the curriculum will be reviewed for possible articulation.

TECHNICAL SKILLS ASSESSMENT

Colleges should report the following for students who complete the program with a career certificate, technical certificate, or an Associate of Applied Science Degrees for technical skills attainment. To use the approved Alternate Assessment for the following programs of study, colleges should provide a Letter of Notification to the Director of Career Technical Education at the MS Community College Board. Please see the following link for further instructions: http://www.mccb.edu/wkfEdu/CTDefault.aspx.

CIP Code	Program of Study	
11.0909	Computer Systems Networking and Telecommunication	
Level	Standard Assessment	Alternate Assessment
Career	MS-CPAS-2	CompTIA A+ IT Technician OR Microsoft© Technology Associate (Security Fundamentals)*
Level	Standard Assessment	Alternate Assessment
Technical/AAS	MS-CPAS-2	CompTIA Network + or Microsoft© Technology Associate (Networking)

* MTA Security Fundamentals Exam maps to the following CORE courses: IST 1124, IST 1143, IST 1153 and IST 1154 (Elective course)

CIP Code	Program of Study	
11.0201	Computer Programming/ Programmer, General	
Level	Standard Assessment	Alternate Assessment
Career	MS-CPAS-2	CompTIA A+ IT Technician OR Microsoft © Technology Associate (MTA) (Security Fundamentals) *
Level	Standard Assessment	Alternate Assessment
Technical/AAS	MS-CPAS-2	Microsoft © Technology Associate (MTA) (Software Development) **OR ILE RPG Certified Associate ***

* MTA Security Fundamentals Exam maps to the following CORE courses: IST 1124, IST 1143, IST 1153 and IST 1154 (Elective course)
**MTA Software Development Exam maps to the following elective courses: IST 1154, IST 2374, IST 1213 and IST 1613 (Req. CORE course)
*** ILE RPG Certified Associate Application Developer maps to the following courses: IST 1324 and IST 2354

CIP Code	Program of Study	
11.0802	Data Modeling/warehousing and Database Administration	
Level	**Standard Assessment**	**Alternate Assessment**
Career	MS-CPAS-2	CompTIA A+ IT Technician
Level	**Standard Assessment**	**Alternate Assessment**
Technical/AAS	MS-CPAS-2	CIW Database Design Specialist

CIP Code	Program of Study	
52.1302	Data Analytics Technology	
Level	**Standard Assessment**	**Alternate Assessment**
Career	MS-CPAS-2	CompTIA A+ IT Technician
Level	**Standard Assessment**	**Alternate Assessment**
Technical/AAS	MS-CPAS-2	SAS Certification

CIP Code	Program of Study	
11.1003	Computer and Information Systems Security	
Level	**Standard Assessment**	**Alternate Assessment**
Career	MS-CPAS-2	CompTIA A+ IT Technician
Level	**Standard Assessment**	**Alternate Assessment**
Technical/AAS	MS-CPAS-2	CompTIA Security +

ONLINE AND BLENDED LEARNING OPPORTUNITIES

Course content includes lecture and laboratory semester credit hours. Faculty members are encouraged to present lecture related content to students in an online or blended learning environment. Training related to online and blended learning will be available to faculty members through the MS Community College Board.

INSTRUCTIONAL STRATEGIES

Instructional strategies for faculty members implementing the curriculum can be found through the Office of Curriculum and Instruction's professional development.

ASSESSMENT STRATEGIES

The Office of Curriculum and Instruction's professional development offer assessment strategies to faculty members implementing the curriculum. Additionally, standards were included in course content when appropriate.

RESEARCH ABSTRACT

In the fall of 2016, the Office of Curriculum and Instruction (OCI) met with the different industry members who made up the advisory committees for the Information Systems program. An industry questionnaire was used to gather feedback concerning the trends and needs, both current and future, of their field. Program faculty, administrators, and industry members were consulted regarding industry workforce needs and trends.

Industry advisory team members from the college involved with this program were asked to give input related to changes to be made to the curriculum framework. Specific comments related to soft skills discussed include communication skill, grammar skills, evidence of the ability to learn, must be adaptable, and a well-rounded employee. Occupation-specific skills discussed include a basic understanding of SQL, ERP experience, CompTIA Network+, CompTIA A+, IT Technician and CompTIA Security+ Certification or Microsoft certifications.

During the writing team meeting, several changes were made to the curriculum. The IST core was modified from 5 required courses to 4 required courses and 1 programming language elective. A comparison of the previous IST core and new IST core are shown in the table below.

2012 IST Core	2017 IST Core
IST 1124 – IT Foundations	IST 1124 – IT Foundations
IST 1134 – Fundamentals of Data Communications	IST 1134 – Fundamentals of Data Communications
IST 1143 – Principles of Information Security	IST 1143 – Principles of Information Security
IST 1163 – Concepts of Database Design	IST 1163 – Database and SQL Concepts
IST 1154 – Web and Programming Concepts	Programming Language Elective

Several courses had name modifications and new courses were added. For a complete list of name modifications and new courses, please refer to the course crosswalk at the end of this curriculum document.

The following industry certifications were mapped to the curriculum:
  CompTIA A+ IT Technician
  CompTIA Network+
  CompTIA Security+
  Microsoft Technology Associate (MTA) Software Development
  Microsoft Technology Associate (MTA) Network Server
  Microsoft Technology Associate (MTA) Security Fundamentals
  ILE RPG Certified Associate
  CIW Database Design Specialist
  SAS Certification

All programs of study were modified to follow the 30/45/60 stackable credentials model for a career certificate, a technical certificate, and an Associate of Applied Science degree. Several industry credentials were mapped to the student learning outcomes in the courses as they apply to the appropriate programs of study. In addition, a new program of study, Data Analytics Technology, was added to the curriculum framework.

REVISION HISTORY:

2012, Revised, Research and Curriculum Unit, Mississippi State University
2017, Revised, Office of Curriculum and Instruction, Mississippi Community College Board

PROGRAM DESCRIPTION

The Information Systems Technology program includes a basic core of courses designed to prepare a student for a variety of entry-level positions through selection of a concentration of courses in the following areas:

1. Computer Networking Technology
2. Computer Programming Technology
3. Database Administration Technology
4. Network Security Technology
5. Data Analytics Technology

The curriculum is designed to give each student:

- a broad overview of information systems;
- exposure to career options available within the field; and
- a concentration of skills in a specific area.

Upon successful completion of the program, graduates earn an associate degree in applied science. Course work prepares students for national certification exams pertinent to each field of study.

The Computer Networking Technology option offers training in telecommunications, network technologies, administration, hardware maintenance, operating systems and network planning, and implementation. Computer Networking graduates will have opportunities for employment as computer support specialists, network technicians, and network managers or administrators.

The Computer Programming Technology option offers training in the design, coding, and testing of software applications using a variety of programming languages, database manipulation, hardware maintenance, and operating system functions. Graduates with skills and training in computer programming are prepared for entry level employment as developers and analysts as well as other related information technology positions in a variety of industries.

The Database Administration Technology option is designed to prepare students for entry-level employment in the database administration field. This program of study offers training in the design and manipulation of databases using a variety of programming languages, database software, hardware maintenance, and operating system functions. Students will set up, administer, and maintain small- and large-scale relational database systems.

The Network Security Technology option offers training in the areas of confidentiality, integrity, and availability in information security. Students will learn to install, design, manage, operate, plan, maintain and troubleshoot hardware in a secure information technology infrastructure.

The Data Analytics Technology option is the science of inspecting raw data with the purpose of drawing assumptions about that information. Data Analytics is used in many industries to allow organizations to make better business decisions. The Data Analytics Technology program will prepare students to work in a data-rich business environment and provide them with the skills to be employable in the field of data analytics or business intelligence. This program of study offers training in the design and manipulation of databases using a variety of programming languages, database software, hardware maintenance, and operating system functions. Students will learn programming and data manipulation techniques to solve real-world business problems.

Suggested Course Sequence-Computer Programming, Computer Technology, Networking, Network Security Technology, Data Analytics Technology

Accelerated Integrated Career Pathway

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Contact Hour Breakdown		Certification Information
			Lecture	Lab		Lecture	Lab	Certification Name
IST 1124 OR IST 1183 AND IST 1193*	IT Foundations OR Essentials of Hardware and Software AND Practical Applications of Hardware and Software*	4	2	4				
IST 1134	Fundamentals of Data Communications	4	2	4				
IST 1143	Principles of Information Security	3	2	2				
	Instructor Approved Electives	4						
	Total	**15**						

*Institutions choosing the split option will have fewer available elective hours in this sequence.

Career Certificate Required Courses (Computer Programming)

| Course Number | Course Name | Semester Credit Hours | SCH Breakdown | | Total Contact Hours | Contact Hour Breakdown | | Certification Information |
			Lecture	Lab		Lecture	Lab	Certification Name
IST 1124 OR IST 1183 AND IST 1193*	IT Foundations OR Essentials of Hardware and Software AND Practical Applications for Hardware and Software*	4	2	4				CompTIA A+ IT Technician
IST 1143	Principles of Information Security	3	2	4				
IST 1134	Fundamentals of Data Communications	4	2	4				
	Targeted Programming Elective	3 or 4						
IST 1163	Database and SQL Concepts	3	2	2				
IST 1314 or elective	Visual Basic Programming or other instructor approved programming language	3						
IST 1433	Web Development Using HTML & CSS	3	2	2				
	Programming Elective	3						
	Technical Elective	3						
TOTAL		**30**						

*Institutions choosing the split option will have fewer available elective hours in this sequence.

Technical Certificate Required Courses (Computer Programming)

| Course Number | Course Name | Semester Credit Hours | SCH Breakdown | | Total Contact Hours | Contact Hour Breakdown | | Certification Information |
			Lecture	Lab		Lecture	Lab	Certification Name
IST 2433 or IST 2323	Server-Side Programming I or Script Programming	4	2	4				MTA Software Development OR ILE RPG Certified Associate**
	Programming Electives	8						
	Instructor Approved Elective	3						
TOTAL		**15**						

** These exams map to particular elective courses. Please see section on Technical Skills Assessment (p. 15) for details or the individual course pages.

Career Certificate Required Courses (Computer Networking)

| Course Number | Course Name | Semester Credit Hours | SCH Breakdown | | Total Contact Hours | Contact Hour Breakdown | | Certification Information |
			Lecture	Lab		Lecture	Lab	Certification Name
IST 1124 OR IST 1183 AND IST 1193*	IT Foundations OR Essentials of Hardware and Software AND Practical Applications for Hardware and Software*	4	2	4				CompTIA A+ IT Technician OR MTA
IST 1143	Principles of Information Security	3	2	2				
IST 1134	Fundamentals of Data Communications	4	2	4				
	Targeted Programming Elective	3 or 4						
IST 1163	Database and SQL Concepts	3	2	2				
IST 1223	Network Components	3	2	2				
	Network Electives	6	2	2				
	Instructor Approved Elective	3 or 4						
TOTAL		**30**						

*Institutions choosing the split option will have fewer available elective hours in this sequence

Technical Certificate Required Courses (Computer Networking)

| Course Number | Course Name | Semester Credit Hours | SCH Breakdown | | Total Contact Hours | Contact Hour Breakdown | | Certification Information |
			Lecture	Lab		Lecture	Lab	Certification Name
IST 2224	Network Planning and Design	4	2	4				CompTIA Network + MTA OR Networking Fundamentals
IST 2234	Network Implementation	4	2	4				
	Instructor approved technical electives	7						
TOTAL		**15**						

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Career Certificate Required Courses (Network Security Technology)

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Contact Hour Breakdown		Certification Information
			Lecture	Lab		Lecture	Lab	Certification Name
IST 1124 OR IST 1183 AND IST 1193*	IT Foundations OR Essentials of Hardware and Software AND Practical Applications for Hardware and Software*	4	2	4				CompTIA A+ IT Technician OR MTA
IST 1143	Principles of Information Security	3	2	2				
IST1134	Fundamentals of Data Communications	4	2	4				
	Targeted Programming Elective	3 or 4	2	4				
IST 1163	Database and SQL Concepts	3	2	2				
IST 1223	Network Components	3	2	2				
IST 1244	Network Admin Using MS Windows Server	4	3	2				
IST 1624	Network Security Fundamentals	4	3	2				
	Instructor Approved	1						
	TOTAL	**30**						

*Institutions choosing the split option will have fewer available elective hours in this sequence.

Technical Certificate Required Courses (Network Security Technology)

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Contact Hour Breakdown		Certification Information
			Lecture	Lab		Lecture	Lab	Certification Name
IST 1633	Wireless Security and Privacy	3	2	2				
IST 1643	Network Defense and Countermeasures	3	2	2				CompTIA Security+
	Approved Security Electives	6	2	2				
	Approved Technical Electives	3						
	TOTAL	**15**						

Career Certificate Required Courses (Database Administration)

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Contact Hour Breakdown		Certification Information
			Lecture	Lab		Lecture	Lab	Certification Name
IST 1124 OR IST 1183 AND IST 1193*	IT Foundations OR Essentials of Hardware and Software AND Practical Applications for Hardware and Software*	4	2	4				CompTIA A+ IT Technician
IST 1143	Principles of Information Security	3	2	2				CIW Database Design Specialist
IST 1163	Database and SQL Concepts	3	2	2				
IST 1134	Fundamentals of Data Communications	4	2	4				
	Targeted Program Elective	3 or 4	2	4				
IST 1513	SQL Programming	3	2	2				
IST 1253	Network Admin using Linux	3	2	2				
IST 1533	Database Architecture and Administration	3	2	2				
	Technical Electives	3	2	2				
	TOTAL	**30**						

*Institutions choosing the split option will have fewer available elective hours in this sequence.

Technical Certificate Required Courses (Database Administration)

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Contact Hour Breakdown		Certification Information
			Lecture	Lab		Lecture	Lab	Certification Name
IST 2433	Server- Side Programming	3	2	4				
IST 2464	Power-shell Programming	4	2	4				
	Programming Elective	4	2	4				
	Instructor Approved Elective	4	2	2				
	TOTAL	**15**						

Career Certificate Required Courses (Data Analytics Technology)

| Course Number | Course Name | Semester Credit Hours | SCH Breakdown | | Total Contact Hours | Contact Hour Breakdown | | Certification Information |
			Lecture	Lab		Lecture	Lab	Certification Name
IST 1124	IT Foundations	4	2	4				CompTIA A + IT Technician
IST 1143	Principles of Information Security	3	2	2				
IST 1163	Database & SQL Concept	3	2	2				
IST 1134	Fund Data Communication	4	2	4				
	Targeted Program Elective	3	2	2				
IST 1513	SQL Programming	3						
IST 1733	Data Analysis Using Excel	3	2	2				
IST 14333	Web Development Using HTML & CSS	3	2	2				
IST 1744	SAS Programming I	4	2	4				
	TOTAL	**30**						

Technical Certificate Required Courses (Data Analytics Technology)

| Course Number | Course Name | Semester Credit Hours | SCH Breakdown | | Total Contact Hours | Contact Hour Breakdown | | Certification Information |
			Lecture	Lab		Lecture	Lab	Certification Name
IST 1723	Programming in Python	3						SAS Certificate
IST 2744	SAS Programming II	4						
	Instructor Approved Elective	4						
IST 2734	Data Visualization and Marketing	4						
	TOTAL	**15**						

General Education Core Courses – Information System Technology

To receive the Associate of Applied Science Degree, a student must complete all of the required coursework found in the Career Certificate option, Technical Certificate option and a minimum of 15 semester hours of General Education Core. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester or provided primarily within the last semester. Each community college will specify the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college. The Southern Association of Colleges and Schools (SACS) Commission on Colleges Standard 2.7.3 from the Principles of Accreditation: Foundations for Quality Enhancement1 describes the general education core.

Section 2.7.3   In each undergraduate degree program, the institution requires the successful completion of a general education component at the collegiate level that (1) is substantial component of each undergraduate degree, (2) ensures breadth of knowledge, and (3) is based on a coherent rationale. For degree completion in associate programs, the component constitutes a minimum of 15 semester hours or the equivalent. These credit hours are to be drawn from and include at least one course from the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. The courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Contact Hour Breakdown	
			Lecture	Lab		Lecture	Lab
	Humanities/Fine Arts	3	3		45	45	
	Social/Behavioral Science	3	3		45	45	
	Math/Science Elective	3	3		45	45	
	Other academic courses per local community college requirements for AAS degree.	6					
	TOTAL	**15**					

Southern Association of Colleges and Schools Commission on Colleges. (2012). *The Principles of Accreditation: Foundations for Quality Enhancement*. Retrieved from http://www.sacscoc.org/pdf/2012PrinciplesOfAcreditation.pdf

Complete Information Systems Technology Course listing

Course Number	Course Name	Semester Credit Hours	SCH Breakdown			Total Contact Hours	Contact Hour Breakdown		
			Lecture	Lab	Externship		Lecture	Lab	Externship
IST 1113	Fundamentals of Information Technology	3							
IST 1124	IT Foundations	4							
IST 1134	Fundamentals of Data Communication	4							
IST 1143	Principles of Information Security	3							
IST 1154	Web and Programming Concepts	4							
IST 1163	Database and SQL Concepts	3							
IST 1173	Principles of Database Management	3							
IST 1183	Essentials of Hardware and Software	3							
IST 1193	Practical Applications of Hardware and Software	3							
IST 1213	Client Installation and Configuration	3							
IST 1223	Network Components	3							
IST 1244	Network Administration Using Microsoft© Windows© Server	4							
IST 1254	Network Administration using Linux	4							
IST 1263	Microsoft© Office© Applications	3							
IST 1273	Career Development	3							
IST 1314	Visual Basic Programming Language	4							
IST 1324	RPG Programming Language	4							
IST 1334	COBOL Programming Language	4							
IST 1414	Client-side Programming	4							
IST 1424	Web Design Applications	4							
IST 1433	Web Development Using HTML & CSS	3							
IST 1483	Fundamentals of Virtualization	3							
IST 1513	SQL Programming	3							
IST 1523	Advanced SQL Programming	3							

IST 1534	Database Architecture and Administration	4							
IST 1613	Computer Forensics	3							
IST 1624	Network Security Fundamentals	4							
IST 1633	Wireless Security and Privacy	3							
IST 1643	Network Defense and Countermeasures	3							
IST 1714	Java Programming Language	4							
IST 1723	Programming in Python	3							
IST 1733	Data Analysis Using Excel	3							
IST 1744	SAS Programming I	4							
IST 1754	R Programming Language	4							
IST 1811	IST Seminar I	1							
IST 1821	IST Seminar II	1							
IST 2111	IST Seminar III	1							
IST 2121	IST Seminar IV	1							
IST 2213	Network Security Fundamentals	3							
IST 2224	Network Planning and Design	4							
IST 2234	Network Implementation	4							
IST 2254	Advanced Network Administration Using Microsoft© Window Server	4							
IST 2264	Advanced Network Administration Using Linux	4							
IST 2314	System Analysis and Design	4							
IST 2324	Script Programming Language	4							
IST 2334	Advanced Visual BASIC Programming Language	4							
IST 2344	Database Programming and Design	4							
IST 2354	Advanced RPG Programming Language	4							
IST 2364	Advanced COBOL Programming Language	4							
IST 2374	C++ Programming Language	4							
IST 2384	Advanced C++ Programming Language	4							
IST 2394	Enterprise Resource Planning (ERP) Concepts	4							
IST 2424	XML Programming	4							
IST 2434	Server-Side Programming I	4							
IST 2444	Server- Side Programming II	4							

IST 2454	Mobile Application Development	4							
IST 2464	Programming	4							
IST 2473	E-Commerce Strategies	3							
IST 2483	Web Sever	3							
IST 2514	Advanced Architecture and Administration	4							
IST 2524	Linux Operating System Fundamentals	4							
IST 2534	IT Project Management	4							
IST 2584	C# Programming Language	4							
IST 2594	Advanced C# Programming Language	4							
IST 2613	Windows Security	3							
IST 2623	Linux/ Unix Security	3							
IST 2634	Security Testing and Implementation	4							
IST 2734	Data Visualization and Marketing	4							
IST 2744	SAS Programming II	4							
IST 2753	Big Data Analytics	3							
IST 291 (1-6)	Supervised Work Experience in Information Technology	(1-6)							
IST 292 (1-3)	Special Problem in Information Systems I	(1-3)							
IST 293 (1-3)	Special Problem in Information Systems II	(1-3)							
IST 294 (1-3)	Special Problem in Information Systems III	(1-3)							

Any Course not required in a program of study may be used as an elective for that program of study.

INFORMATION SYSTEMS TECHNOLOGY COURSES

Course Number and Name: **IST 1113   Fundamentals of Information Technology**

Description: This course introduces microcomputer operation, word processing, spreadsheets, database management, presentation, and online applications. It is designed for students with limited computer proficiency and is to be taken by those students in addition to the courses listed in the course sequence

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: None

Student Learning Outcomes:
The student will

1. Apply a basic understanding of an operating system.
   a. Show basic commands of operating system software.
      (1) Use proper file and disk management.
      (2) Explore files and folders.
      (3) Create folders.
      (4) Copy and move files and folders.
   b. Illustrate the use of word processing software.
      (1) Produce a new document.
      (2) Format text and paragraphs.
      (3) Copy, move, and format text.
      (4) Insert graphics.
   c. Demonstrate the use of spreadsheet software.
      (1) Produce a new spreadsheet.
      (2) Set up row and column headings.
      (3) Enter text and formulas.
      (4) Copy, move, and format text and formulas.
      (5) Create and modify charts.
   d. Explore and use a database management program.
      (1) Create a database.
      (2) Create tables and data.
      (3) Modify table data within the database.
      (4) Apply reports in database.
      (5) Query a database to extract information.
      (6) Create and use database forms.
   e. Illustrate the use of a presentation program.
      (1) Create a presentation.
      (2) Select slide layouts.
      (3) Select a design template.
      (4) Enter and format text on a slide.
      (5) Insert graphics on a slide.
   f. Transfer data among applications.
      (1) Import/export word processing text.
      (2) Import/export database fields.
      (3) Import/export spreadsheet data and/or charts.

2. Demonstrate use of the Internet.
   a. Present an overview of the Internet.
      (1) Explain the history of the Internet and how it works.
      (2) Describe connecting to the Internet and Internet protocols.
      (3) Discuss the domain name system (DNS) and uniform resource locators (URLs).
      (4) Discuss intranets and extranets.
   b. Browse the World Wide Web.
      (1) Discuss Web browsers.
      (2) View pages with an Internet browser.
      (3) Customize the browsers.
   c. Send electronic mail.
      (1) Explain e-mail basics.
      (2) Send and receive e-mail.
      (3) Discuss netiquette and privacy issues.
      (4) Create and send e-mail signatures and attachments.

Course Number and Name: **IST 1124   IT Foundations**

Description: This course covers the diagnosis, troubleshooting, and maintenance of computer components and interpersonal communications for information technology (IT) professionals. Topics include hardware compatibility, system architecture, memory, input devices, video displays, disk drives, modems, printers, safety and environmental issues, communication, and professional behavior

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: None

Student Learning Outcomes:
The student will

1. Install, configure, optimize, and upgrade personal computer components.
    a. Identify the fundamental principles of using personal computers.
    b. Use tools, diagnostic procedures, and troubleshooting techniques.
2. Install, configure, optimize, and upgrade laptops and portable devices.
    a. Identify the fundamental principles of using laptops and portable devices.
    b. Use tools, basic diagnostic procedures, and troubleshooting techniques for laptops and portable devices.
    c. Perform preventive maintenance on laptops and portable devices.
    d. Identify additional types of components.
3. Install and troubleshoot operating systems.
    a. Identify principles of using operating systems.
    b. Configure, optimize, and upgrade operating systems.
    c. Diagnose and troubleshoot operating systems.
    d. Perform preventive maintenance on operating systems.
4. Install and troubleshoot printers and scanners.
    a. Install, configure, optimize, and upgrade printers and scanners.
    b. Diagnose and troubleshoot printers and scanners.
5. Explore network technologies.
    a. Install NICS.
    b. Configure wireless connections.
    c. Examine diagnostic tools.
6. Identify security principles.
    a. Optimize hardware, software, and data security.
    b. Identify security tools, diagnostic procedures, and troubleshooting techniques.
    c. Perform preventive maintenance for computer security.
7. Apply safety and environmental procedures.
    a. Identify potential hazards.
    b. Implement proper safety procedures, including ESD precautions and procedures, a safe work environment, and equipment handling.
    c. Identify proper disposal procedures for batteries, display devices, and chemical solvents and cans.

8. Practice proper communication skills, including listening and tact/discretion, when communicating with customers and colleagues.
    a. Use clear, concise, and direct statements.
    b. Apply active listening skills by allowing the customer to complete statements.
    c. Ask pertinent questions.
    d. Avoid jargon, abbreviations, and acronyms.
    e. Listen to customers.
9. Use job-related professional behavior including notation of privacy, confidentiality, and respect for the customers and the customers' property.
    a. Maintain a positive attitude and tone of voice.
    b. Avoid arguing or becoming defensive.
    c. Do not minimize customers' problems.
    d. Avoid being judgmental or insulting.
    e. Avoid distractions.
    f. Respect customers' property.
10. Research new and emerging technology trends.
    a. Investigate recent technology developments.
    b. Identify emerging hardware, operating systems, and applications.

Standards:
CompTIA A+ IT Technician Certification
220-901 Exam Objectives
1.0 Hardware
1.1 Given a scenario, configure settings and use BIOS/UEFI tools on a PC.
1.2 Explain the importance of motherboard components, their purpose and properties.
1.3 Compare and contrast various RAM types and their features.
1.4 Install and configure PC expansion cards.
1.5 Install and configure storage devices and use appropriate media.
1.6 Compare and contrast various PC connection interfaces, their characteristics and purpose.
1.7 Install various types of CPUs and apply the appropriate cooling methods.
1.8 Install a power supply based on given specifications.
1.9 Given a scenario, select the appropriate components for a custom PC configuration to meet customer specifications or needs.
1.10 Compare and contrast types of display devices and their features.
1.11 Identify common PC connector types and associated cables.
1.12 Install and configure common peripheral devices.
1.13 Install SOHO multifunction device/printers and configure appropriate settings.
1.14 Compare and contrast differences between the various print technologies and the associated imaging process.
1.15 Given a scenario, perform appropriate printer maintenance.
2.0 Networking
2.1 Identify the various types of network cables and connectors.
2.2 Compare and contrast the characteristics of connectors and cabling.
2.3 Explain the properties and characteristics of TCP/IP.
2.4 Explain common TCP and UDP ports, protocols and their purpose.
2.5 Compare and contrast various WiFi networking standards and encryption types.
2.6 Given a scenario, install and configure SOHO wireless/wired router and apply appropriate settings.
2.7 Compare and contrast Internet connection types, network types and their features.
2.8 Compare and contrast network architecture devices, their functions, and features.
2.9 Given a scenario, use appropriate networking tools.
3.0 Mobile Devices
3.1 Install and configure laptop hardware and components.

3.2 Explain the function of components within the display of a laptop.

3.3 Given a scenario, use appropriate laptop features.

3.4 Explain the characteristics of various types of other mobile devices.

3.5 Compare and contrast accessories and ports of other mobile devices.

4.0 Hardware and Network Troubleshooting

4.1 Given a scenario, troubleshoot common problems related to motherboards, RAM, CPU and power with appropriate tools.

4.2 Given a scenario, troubleshoot hard drives and RAID arrays with appropriate tools.

4.3 Given a scenario, troubleshoot common video, projector and display issues.

4.4 Given a scenario, troubleshoot wired and wireless networks with appropriate tools.

4.5 Given a scenario, troubleshoot and repair common mobile device issues while adhering to the appropriate procedures.

4.6 Given a scenario, troubleshoot printers with appropriate tools.

CompTIA A+ IT Technician Certification

220-#02 Exam Objectives

1.0 Windows Operating Systems

1.1 Compare and contrast various features and requirements of Microsoft Operating Systems

1.2 Given a scenario, install Windows PC operating systems using appropriate methods.

1.3 Given a scenario, apply appropriate Microsoft command line tools.

1.4 Given a scenario, use appropriate Microsoft operating system features and tools.

1.5 Given a scenario, use Windows Control Panel utilities.

1.6 Given a scenario, install and configure Windows networking on a client/desktop.

1.7 Perform common preventive maintenance procedures using the appropriate Windows OS tools.

2.0 Other Operating Systems and Technologies

2.1 Identify common features and functionality of the Mac OS and Linux operating systems.

2.2 Given a scenario, set up and use client-side virtualization.

2.3 Identify basic cloud concepts.

2.4 Summarize the properties and purpose of services provided by networked hosts.

2.5 Identify basic features of mobile operating systems.

2.6 Install and configure basic mobile device network connectivity and email.

2.7 Summarize methods and data related to mobile device synchronization.

3.0 Security

3.1 Identify common security threats and vulnerabilities.

3.2 Compare and contrast common prevention methods.

3.3 Compare and contrast differences of basic Windows OS security settings.

3.4 Given a scenario, deploy and enforce security best practices to secure a workstation.

3.5 Compare and contrast various methods for securing mobile devices.

3.6 Given a scenario, use appropriate data destruction and disposal methods.

3.7 Given a scenario, secure SOHO wireless and wired networks.

4.0 Software Troubleshooting

4.1 Given a scenario, troubleshoot PC operating system problems with appropriate tools.

4.2 Given a scenario, troubleshoot common PC security issues with appropriate tools and best practices.

4.3 Given a scenario, troubleshoot common mobile OS and application issues with appropriate tools.

4.4 Given a scenario, troubleshoot common mobile OS application security issues with appropriate tools.

5.0 Operational Procedures

5.1 Given a scenario, use appropriate safety procedures.

5.2 Given a scenario with potential environmental impacts, apply the appropriate controls.

5.3 Summarize the process of addressing prohibited content/activity, and explain privacy, licensing and policy concepts.

5.4 Demonstrate proper communication techniques and professionalism.

5.5 Given a scenario, explain the troubleshooting theory.

Course Number and Name: **IST 1134   Fundamentals of Data Communications**

Description: This course presents basic concepts of Internet protocol (IP) telephony, local   area networks, wide area networks, data transmission, and topology methods.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: None

Student Learning Outcomes:
The student will

1. Examine career opportunities.
    a. Examine available certifications.
    b. Determine career paths.

2. Discuss computer hardware components.
    a. Describe the input, process, output, and storage elements of the information processing cycle, and explain each element.
    b. Describe and discuss the main classifications of computers.

3. Analyze communications networks.
    a. Discuss network basics.
    b. Analyze local area networks.
    c. Analyze wide area networks.
    d. Discuss planning, design, and implementation of networks.

4. Analyze network hardware and media.
    a. Discuss uses of modems.
    b. Describe various communications media.
    c. Examine repeaters, bridges, gateways, routers, hubs, switches, and wireless equipment.
    d. Explain the relationships between internetworking devices.
    e. Describe wireless communication and wireless devices.

5. Examine the ISO/OSI model.
    a. List and explain the seven layers of the OSI model.
    b. Identify the reasons why industry uses a layered network.
    c. Classify the functions of the seven layers of the OSI model.
    d. Analyze and differentiate between end system (ES) and intermediate system (IS).
    e. Demonstrate how data are transmitted over a network.

6. Investigate physical topologies.
    a. Identify and compare various topologies.
    b. Evaluate the strengths and weaknesses of current network protocols including wireless and satellite-based solutions.

7. Describe network transport systems.

   a. Explore logical topologies.
   b. Describe data transmission codes and protocols.
   c. Describe various hand-shaking and flow control techniques.
   d. Describe simplex and duplex communications.

8. Analyze TCP/IP as they are used in a networking environment.
   a. Discuss and describe the properties of the TCP/IP suite.
   b. Describe frame relay.
   c. Differentiate among networking standards and protocols; determine which is most appropriate for specific network settings.

9. Apply methods for sub netting and IP binary conversion.
   a. Define sub netting and binary conversion.
   b. Solve sub netting and binary conversion methods.
   c. Describe TCP, IP addressing mechanism, and subnet masking.
   d. Compare IPv4 and IPv6.

10. Evaluate and recommend methods to troubleshoot wiring.
   a. Identify and evaluate twisted pair and fiber-optic cable for local area networks (LANs).
   b. Create a LAN connection using twisted pair cable.
   c. Evaluate and recommend twisted pair and fiber-optic cable for specific LAN scenarios.

11. Evaluate trends of network communication.
   a. Analyze emerging network applications and their implications for business opportunities.
   b. Discuss teleconferencing and videoconferencing techniques.
   c. Evaluate methods for making informed decisions about a cohesive data communications system.

Standards:
CompTIA Network+ Certification Exam Objectives
1.0 Network Architecture
1.1 Explain the functions and application of various network devices.
1.2 Compare and contrast the use of networking services and applications
1.3 Install and configure the following networking service applications
1.5 Install and properly terminate various cable types and connectors using appropriate tools.
1.6 Differentiate between common network topologies.
1.7 Differentiate between network infrastructure implementations.
1.8 Given a scenario, implement and configure the appropriate addressing schema.
1.12 Given a set of requirements, implement a basic network.
2.0 Network Operations
2.3 Given a scenario, use appropriate resources to support configuration management.
2.4 Explain the importance of implementing network segmentation.
5.0 Industry Standards, Practices and Network Theory.
5.1 Analyze a scenario and determine the corresponding OSI layer.
5.2 Explain the basics of network and theory and concepts.
5.3 Given a scenario, deploy the appropriate wireless standard.
5.4 Given a scenario, deploy the appropriate wired connectivity standard.

CompTIA Security + Certification Exam Objectives
1.0 Network Security
1.1 Implement security configuration parameters on network devices and other technologies.
1.3 Explain network design elements and components.

Course Number and Name: **IST 1143**   **Principles of Information Security**

Description: This course is an introduction to the various technical and administrative aspects of information security and assurance. This course provides the foundation for understanding the key issues associated with protecting information assets, determining the levels of protection and response to security incidents, and designing a consistent, reasonable information security system with appropriate intrusion detection and reporting features.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: None

Student Learning Outcomes:
The student will

1. Define security basics.
   a. Define information security as applied to wired and wireless networks, applications, and operating systems.
   b. Explain the concept of information security as a process.
   c. Analyze information security services.
   d. List security standards and organizations.
   e. Describe the role of security professionals to the security process and the organizational structure.
   f. Analyze the importance of ethics in the security field.

2. Discuss security policies.
   a. Identify the assets that need to be protected by a security policy.
   b. Classify the various types of policies needed by an organization.
   c. Explain proper development, deployment, and enforcement of security policies.
   d. Describe the policy review process.

3. Classify security threats and attacks.
   a. Define risk analysis and risk assessment.
   b. Differentiate the various types of security threats and attacks.
   c. Classify the security service targeted by a security threat or attack.
   d. Identify legislation that addresses information security.

4. Discuss the basics of cryptography.
   a. Identify and classify cryptographic algorithms such as symmetric and asymmetric.
   b. Explain the concepts of public key infrastructure (PKI), digital certificates, and hashing functions.
   c. Interpret the various trust models.
   d. Explain key management activities to include creation, distribution, certification, protection, and revocation.

5. Summarize general security concepts.
   a. Define and characterize access control models.

b. Determine essential and nonessential services and protocols.
    c. Describe various security technologies, including the features, strengths, and weaknesses of protocols, virtual private networks VPNs, and firewalls.
    d. Explain techniques involved in operating system hardening.
    e. Describe the use of logging and analysis to security.
    f. Identify and discuss the types of intrusion detection systems.
    g. Convey the value and proper application of vulnerability testing.
    h. Understand how to maintain and perpetuate risk controls.

Standards:
CompTIA Network+ Certification Exam Objectives
3.0 Network Security
3.1 Compare and contrast risk related concepts.
3.2 Compare and contrast common network vulnerabilities and threats.
3.3 Given a scenario, implement network hardening techniques.
3.4 Compare and contrast physical security controls.
3.5 Given a scenario, install and configure a basic firewall.
3.6 Explain the purpose of various network access control models.
3.7 Summarize basic forensic concepts.

CompTIA Security+ Certification Exam Objectives
1.0 Network Security
1.2 Given a scenario, use secure network administration principles.
1.4 Given a scenario, implement common protocols and services.
1.5 Given a scenario, troubleshoot security issues related to wireless networking.
2.0 Compliance and Operational Security
2.1 Explain the importance of risk related concepts.
2.2 Summarize the security implications of integrating systems and data with third parties.
2.5 Given a scenario, install and apply patches and updates.
2.6 Explain the importance of security related awareness and training.
2.7 Compare and contrast physical security and environmental controls.
2.8 Summarize risk management best practices.
2.9 Given a scenario, select the appropriate control to meet the goals of security.
3.0 Threats and Vulnerabilities
3.2 Explain types of malware
3.3 Summarize social engineering attacks and the associated effectiveness with each attack.
3.4 Explain types of wireless attacks.
3.5 Explain types of application attacks.
5.0 Access Control and Identity Management
5.1 Compare and contrast the function and purpose of authentication services.
5.2 Given a scenario select the appropriate authentication, authorization or access control.
6.0 Cryptography
6.2 Given a scenario, use appropriate cryptographic methods.
6.3 Given a scenario, use appropriate PKI, certificate management and associated components.

Course Number and Name: IST 1154   **Web and Programming Concepts**

Description: This course is an introduction to Web site development and programming logic. Students will gain hands-on experience in the development of computer programs. Upon completion of this course, students will be able to create a Web site.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: None

Student Learning Outcomes:
The student will

1. Design a Web page using HTML and/or XHTML.
    a. Explain Web page creation.
    b. Contrast text editors and GUI editors.
    c. Explain HTML and XHTML.
            (1) Describe HTML, XHTML, and the standards of each.
            (2) Discuss Web browsers and standards.
            (3) Discuss Web page accessibility.
    d. Explain HTML and/or XHTML coding.
            (1) Explain markup tags.
            (2) Discuss and use document structure tags.
            (3) Demonstrate and use paragraph formatting, block-level elements, and text level elements.
            (4) Describe and code lists.
            (5) Use comments and good coding practices.
    e. Demonstrate graphical elements.
            (1) Explain and use the horizontal rule.
            (2) Discuss images; use them in a Web page.
            (3) Discuss image file formats; explain image optimization.
            (4) Discuss colors and the Web-safe color palette; implement them.
            (5) Explain special characters.
            (6) Use page colors and backgrounds.
            (7) Incorporate fonts into a Web page.
    f. Describe the use of hyperlinks.
            (1) Explain and code hyperlinks.
            (2) Use image and internal links.
    g. Explain the use of tables.
            (1) Demonstrate tables.
            (2) Use table and data alignment options.
            (3) Explain and use column and row spanning.
    h. Discuss forms.
            (1) Describe form uses and form fields.
            (2) Create forms.
    i. Evaluate image techniques.
            (1) Create image maps.
            (2) Discuss and use image transparency.
            (3) Explain interlacing.
            (4) Demonstrate the use of animated GIF images.

j. Demonstrate Web page layout and elements.
    (1) Demonstrate effective layout.
    (2) Discuss color and Web design.
    (3) Explore font usage.
    (4) Explain Web site usability testing.
k. Demonstrate navigation concepts.
    (1) Explain the elements of navigation design.
    (2) Demonstrate primary and secondary navigation.
    (3) Discuss navigation hierarchy.
    (4) Discuss site structure, uniform resource locators (URLs), and file names.
    (5) Discuss familiar navigation conventions.
l. Research the standards organizations.
    (1) Explain the Internet governing bodies.
    (2) Discuss the Internet Society (ISOC) and Internet Architecture Board (IAB).
    (3) Describe the Internet Research Task Force (IRTF) and Internet Engineering Task Force (IETF).
    (4) Discuss the World Wide Web Consortium (W3C), Names and Numbers (ICANN), and Requests for Comments (RFCs).
m. Demonstrate Web site usability testing

2. Demonstrate cascading style sheets
a. Use CSS language to build cascading style sheets.
    (1) Discuss the history of CSS.
    (2) Discuss basic CSS components.
    (3) Discuss CSS rules.
    (4) Build a basic style sheet.
b. Examine basic CSS techniques.
    (1) Apply selection techniques.
    (2) Apply effective font usage.
    (3) Apply the CSS box model.
    (4) Use color in CSS.
    c. Apply advanced CSS techniques.
    (1) Apply tables.
    (2) Apply lists.
    (3) Apply positioning elements.

3. Use program design tools.
    a. Demonstrate the use of a flowchart.
    b. Develop pseudo code.
    c. Generate a hierarchy chart.

4. Discuss structured or modular programming.
a. Explain sequencing.
b. Explain selection.
c. Explain iteration.

5. Describe the philosophy of object-oriented programming.
a. Demonstrate event-driven programming.
b. Explain procedures.
c. Examine classes.

6. Create applications using program development steps.
    a. Discuss the steps in the program development life cycle.

b. Design a program.
c. Code a program.
d. Test and debug a program

Standards:

Microsoft Technology Associate (MTA) Software Development Exam Objectives
- Understand web page development
- Understand Microsoft ASP.NET web application development
- Understanding web hosting
- Understanding web services

Course Number and Name:　　　**IST 1163**　　　**Database and SQL Concepts**

Description:　　　This course is an introduction to the design and manipulation of relational databases. Emphasis is placed on creation, manipulation, extraction, and display of data from existing databases. QBE and SQL are explored.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite:　　　None

Student Learning Outcomes:
The student will

1. Examine database management.
   a. Describe a database management system DBMS.
   b. Analyze relationships among data types.
   c. Compare advantages and disadvantages of database processing.

2. Design a normalized database.
   a. Convert raw data into normalized tables.
   b. Demonstrate an understanding of normal forms.

3. Create a database using specific criteria.
   a. Design a database.
   b. Construct tables.
   c. Create entities.
   d. Key field data.

4. Update table structure and entities.
   a. Append, modify, and delete entities.
   b. Modify table structures

5. Query a database.
   a. Create a query to extract information from one table.
   b. Create a query to extract information from multiple tables.
   c. Create queries using a variety of criteria.
   d. Print queries.
   e. Save queries.

6. Construct queries using SQL.
   a. Investigate table creation through SQL.
   b. Explore capabilities of SELECT command statements.
   c. Sort rows retrieved.
   d. Modify tables by appending, updating, and deleting entities

Standards:

Microsoft Technology Associate (MTA) Software Development Exam Objectives
- Understand relational database management systems
- Understand database query methods
- Understand database connection methods

CIW Database Design Specialist Exam Objectives

Domain 1: Relational Database Fundamentals

    1.1 Identify basic types and management systems

    1.2 List common database languages and their purposes, and identify language subsets of Structured Query Language (SQL)

    1.3 Identify the steps of the database planning life cycle

Domain 2: Relational Database Design and Application

    2.1 Identify the steps of the database planning life cycle

    2.2 Identify the activities in the conceptual design phase of a database

Domain 3: Normalization and Database Design

    3.1 Apply normalization techniques and processes

    3.2 Describe logical database design steps and practices

    3.3 Interpret logical data models in a physical data model that can be implemented by a particular database management system (DBMS)

Course Number and Name: **IST 1173 Principles of Database Management**

Description: This course is designed to give students a firm foundation in basic database tasks, enabling them to design, create, and maintain a small-scale database. Students will gain a conceptual understanding of database architecture and how its components work and interact with one another. Students will also learn how to create an operational database and properly manage the various structures.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: None

Student Learning Outcomes:
The student will

1. Manipulate database files and format documents and reports.
    a. Design and create a database using specific criteria.
        (i) Open objects in multiple views.
        (ii) Move among records.
        (iii) Create and modify tables.
        (iv) Create lookup fields and modify field properties.
    b. Modify database structure and records to produce desired output.
        (i) Create and modify queries.
        (ii) Enter, edit, sort, filter, and delete records.
    c. Define and create relationships, enforcing referential integrity.
    d. Design, create, and format reports.
    e. Design, create, and format forms.
    f. Import data from spreadsheets, text files, and other databases.
    g. Perform mathematical operations and relate their applications to existing information in a database.

Course Number and Name: **IST 1183 Essentials of Information Systems Technology**

Description: This course covers the diagnosis, troubleshooting, and maintenance of computer components. Topics include hardware compatibility, system architecture, memory, input devices, video displays, disk drives, modems, and printers.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: None

Student Learning Outcomes:
The student will

1. Install, configure, optimize, and upgrade personal computer components.
    a.   Identify the fundamental principles of using personal computers.
    b.   Use tools, diagnostic procedures, and troubleshooting techniques.

2. Install, configure, optimize, and upgrade laptops and portable devices.
    a.   Identify the fundamental principles of using laptops and portable devices.
    b.   Use tools, basic diagnostic procedures, and troubleshooting techniques for laptops and portable devices.
    c.   Perform preventive maintenance on laptops and portable devices.
    d.   Identify additional types of components.

3.   Install and troubleshoot printers and scanners.
    a.   Install, configure, optimize, and upgrade printers and scanners.
    b.   Diagnose and troubleshoot printers and scanners.

4.   Explore network technologies.
    a.   Install NICS.
    b.   Configure wireless connections.
    c.   Examine diagnostic tools.

5.   Research new and emerging technology trends.
    a.   Investigate recent and emerging hardware technologies.

Standards:
CompTIA A+ IT Technician Certification
220-901 Exam Objectives
1.0 Hardware
1.1 Given a scenario, configure settings and use BIOS/UEFI tools on a PC.
1.2 Explain the importance of motherboard components, their purpose and properties.
1.3 Compare and contrast various RAM types and their features.
1.4 Install and configure PC expansion cards.
1.5 Install and configure storage devices and use appropriate media.
1.6 Compare and contrast various PC connection interfaces, their characteristics and purpose.
1.7 Install various types of CPUs and apply the appropriate cooling methods.
1.8 Install a power supply based on given specifications.

1.9 Given a scenario, select the appropriate components for a custom PC configuration to meet customer specifications or needs.

1.10   Compare and contrast types of display devices and their features.

1.11   Identify common PC connector types and associated cables.

1.12   Install and configure common peripheral devices.

1.13   Install SOHO multifunction device/printers and configure appropriate settings.

1.14   Compare and contrast differences between the various print technologies and the associated imaging process.

1.15   Given a scenario, perform appropriate printer maintenance.

2.0   Networking

2.1   Identify the various types of network cables and connectors.

2.2   Compare and contrast the characteristics of connectors and cabling.

2.3   Explain the properties and characteristics of TCP/IP.

2.4   Explain common TCP and UDP ports, protocols and their purpose.

2.5   Compare and contrast various WiFi networking standards and encryption types.

2.6   Given a scenario, install and configure SOHO wireless/wired router and apply appropriate settings.

2.7 Compare and contrast Internet connection types, network types and their features.

2.8   Compare and contrast network architecture devices, their functions, and features.

2.9   Given a scenario, use appropriate networking tools.

3.0   Mobile Devices

3.1   Install and configure laptop hardware and components.

3.2   Explain the function of components within the display of a laptop.

3.3   Given a scenario, use appropriate laptop features.

3.4   Explain the characteristics of various types of other mobile devices.

3.5   Compare and contrast accessories and ports of other mobile devices.

4.0   Hardware and Network Troubleshooting

4.1   Given a scenario, troubleshoot common problems related to motherboards, RAM, CPU and power with appropriate tools.

4.2   Given a scenario, troubleshoot hard drives and RAID arrays with appropriate tools.

4.3   Given a scenario, troubleshoot common video, projector and display issues.

4.4   Given a scenario, troubleshoot wired and wireless networks with appropriate tools.

4.5   Given a scenario, troubleshoot and repair common mobile device issues while adhering to the appropriate procedures.

4.6   Given a scenario, troubleshoot printers with appropriate tools.

Course Number and Name: **IST 1193 Practical Applications in Information Systems Technology**

Description: This course will provide experience with operating systems. Emphasis will be placed on support personnel interaction (communication and professional behavior) with the platform to assist users in business environments. Topics on safety and environmental issues are included.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: None

Student Learning Outcomes:
The student will

1. Install and troubleshoot operating systems.
   a. Identify principles of using operating systems.
   b. Configure, optimize, and upgrade operating systems.
   c. Diagnose and troubleshoot operating systems.
   d. Perform preventive maintenance on operating systems.

2. Install and configure local and network printers.
   a. Install, configure, optimize, and troubleshoot local and network printers.
   b. Configure shared printers over a network.

3. Identify security principles.
   a. Optimize hardware, software, and data security.
   b. Identify security tools, diagnostic procedures, and troubleshooting techniques.
   c. Perform preventive maintenance for computer security.

4. Apply safety and environmental procedures.
   a. Identify potential hazards.
   b. Implement proper safety procedures, including ESD precautions and procedures, a safe work environment, and equipment handling.
   c. Identify proper disposal procedures for batteries, display devices, and chemical solvents and cans.

5. Practice proper communication skills, including listening and tact/discretion, when communicating with customers and colleagues.
   a. Use clear, concise, and direct statements.
   b. Apply active listening skills by allowing the customer to complete statements.
   c. Ask pertinent questions.
   d. Avoid jargon, abbreviations, and acronyms.
   e. Listen to customers.

6. Use job-related professional behavior including notation of privacy, confidentiality, and respect for the customers and the customers' property.
   a. Maintain a positive attitude and tone of voice.
   b. Avoid arguing or becoming defensive.
   c. Do not minimize customers' problems.

        d. Avoid being judgmental or insulting.
            1.Avoid distractions.
            2.Respect customers' property.

       7.   Research new and emerging technology trends.

Standards:
CompTIA A+ IT Technician Certification
220-#02 Exam Objectives
1.0   Windows Operating Systems
1.1   Compare and contrast various features and requirements of Microsoft Operating Systems
1.2   Given a scenario, install Windows PC operating systems using appropriate methods.
1.3   Given a scenario, apply appropriate Microsoft command line tools.
1.4   Given a scenario, use appropriate Microsoft operating system features and tools.
1.5   Given a scenario, use Windows Control Panel utilities.
1.6   Given a scenario, install and configure Windows networking on a client/desktop.
1.7   Perform common preventive maintenance procedures using the appropriate Windows OS tools.
2.0   Other Operating Systems and Technologies
2.1   Identify common features and functionality of the Mac OS and Linux operating systems.
2.2   Given a scenario, set up and use client-side virtualization.
2.3   Identify basic cloud concepts.
2.4   Summarize the properties and purpose of services provided by networked hosts.
2.5   Identify basic features of mobile operating systems.
2.6   Install and configure basic mobile device network connectivity and email.
2.7   Summarize methods and data related to mobile device synchronization.
3.0   Security
3.1   Identify common security threats and vulnerabilities.
3.2   Compare and contrast common prevention methods.
3.3   Compare and contrast differences of basic Windows OS security settings.
3.4   Given a scenario, deploy and enforce security best practices to secure a workstation.
3.5   Compare and contrast various methods for securing mobile devices.
3.6   Given a scenario, use appropriate data destruction and disposal methods.
3.7   Given a scenario, secure SOHO wireless and wired networks.
4.0   Software Troubleshooting
4.1   Given a scenario, troubleshoot PC operating system problems with appropriate tools.
4.2   Given a scenario, troubleshoot common PC security issues with appropriate tools and best practices.
4.3   Given a scenario, troubleshoot common mobile OS and application issues with appropriate tools.
4.4   Given a scenario, troubleshoot common mobile OS application security issues with appropriate tools.
5.0   Operational Procedures
5.1   Given a scenario, use appropriate safety procedures.
5.2   Given a scenario with potential environmental impacts, apply the appropriate controls.
5.3   Summarize the process of addressing prohibited content/activity, and explain privacy, licensing and policy concepts.
5.4   Demonstrate proper communication techniques and professionalism.
5.5   Given a scenario, explain the troubleshooting theory.

Course Number and Name: **IST 1213   Client Installation and Configuration**

Description: This course is designed to help the student install, support, and troubleshoot a current client operating system. Emphasis will be placed on common user operations as well as the network administrator's support of the client

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: None

Student Learning Outcomes:
The student will

1. Describe the OS environment.
    a. Discuss differences in client and server editions.
    b. Describe a stand-alone computer.
    c. Describe a workgroup computer.
    d. Describe a domain.

2. Analyze architecture.
    a. Discuss modularity.
    b. Discuss object-oriented operating systems.
    c. Perform operating system updates.
    d. Distinguish between cooperative multitasking and preemptive multitasking.
    e. Distinguish between user mode and kernel mode.
    f. Explain kernel mode (executive services, micro kernel, HAL, and KM drivers).
    g. Explain memory paging.
    h. Discuss support applications.
    i. Discuss UEFI.

3. Compare file systems.
    a. Explain file system technologies.
    b. Discuss file system allocation.
    c. Choose the best file system.
    d. Explain journaling.
    e. Outline the boot process, and boot files necessary for file systems.
    f. Modify the boot file.

4. Use file management techniques
    a. Manipulate files and folders.
    b. Explore disk management.
    c. Identify drive types (basic and dynamic).
    d. Explain disk pooling.

5. Experiment with different installation methods.
    a. Implement an installation from CD.
    b. Implement an automated (unattended) installation.

      c. Distinguish between the installation programs and common command line options.
      d. Discuss multiboot and dualboot environments.
      e. Discuss remote installation.
      f. Discuss cloning.
      g. Explore virtual installation.

6. Use the configuration and troubleshooting tools.
      a. Use the desktop and desktop settings.
      b. Use the control panel and system settings.
      c. Use the administrative tools.
      d. Create a local computer policy.

7. Support a system.
      a. Manipulate the system configuration and install hardware devices.
      b. Install device drivers and troubleshoot driver issues.
      c. Support peripherals and configure displays, printers, and networking.
      d. Disable and uninstall hardware devices.
      e. Create and discuss hardware profiles.

8. Apply networking protocols and networking services.
      a. Discuss TCP/IP and the TCP/IP model.
      b. Identify and recognize networking services (DNS, DHCP, WINS).
      c. Apply services and protocols.
      d. Distinguish FTP, TELNET, SMTP, and SNMP.
      e. Discuss wireless as a network model.

9. Demonstrate user management.
      a. Set up user accounts.
      b. Set up user profiles (user, mandatory, roaming).
      c. Support remote assistance.

Standards:
Microsoft Technology Associate (MTA) Software Development Exam Objectives
- Understand Window Store apps
- Understand console-based applications
- Understand Windows Services

Course Number and Name: **IST 1223   Network Components**

Description: This course presents local area network and wide area network connectivity. It focuses on architectures, topologies, protocols, and transport methods of a network

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Fundamentals of Data Communication

Student Learning Outcomes:
The student will

1. Review basic network principles.
   a. Examine and analyze capabilities of networks, i.e., LANs, WANs, MANs, and PANs.
   b. List and describe components of networks.

2. Solve subnetting problems.
   a. Explain reasons for subnetting, including security and preservation of address space.
   b. Apply IP subnetting.
   c. Troubleshoot and solve subnetting problems.

3. Examine the principles and purpose of routing.
   a. Examine routers.
   b. Compare routing protocols, i.e., distance-vector and link-state.
   c. Configure routers.
   d. Test connectivity.

4. Analyze network components.
   a. Research and examine hardware and software analyzers.
   b. Identify support tools and resources.
   c. Determine how to use support tools and resources in troubleshooting basic network problems.

Standards:
CompTIA Network+ Certification Exam Objectives
1.0   Network Architecture
1.1   Explain the functions and applications of various network devices.
1.3   Install and configure the following network services/applications.
1.4   Explain the characteristics and benefits of various WAN technologies.
1.7   Differentiate between common network topologies.
1.8   Given a scenario, implement and configure the appropriate addressing schema.
1.9   Explain the basics of routing concepts and protocols.
1.10 Identify the basics elements of unified communication technologies.
1.11 Compare and contrast technologies that support cloud and virtualization.
2.0   Network Operations
2.1   Given a scenario, use appropriate monitoring tools.
2.2   Given a scenario, analyze metrics and reports from monitoring and tracking performance tools.

2.6   Given a scenario, configure a switch using proper features.
2.7   Install and configure wireless LAN infrastructure and implement the appropriate technologies in support of wireless capable devices.
5.0   Industry Standard, Practices and Network Theory
5.9   Compare and contrast the following ports and protocols.
5.10 Given a scenario, configure and apply the appropriate ports and protocols.

Course Number and Name: IST 1244   Network Administration Using Microsoft© Windows© Server

Description: This course focuses on the management of a computer network using the Microsoft© Windows Server network operating system. Emphasis will be placed on daily administrative tasks performed by a network administrator

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: None

Student Learning Outcomes:
The student will

1. Discuss administration functions and responsibilities.
    a. Describe Windows interface (Desktop).
    b. Demonstrate Windows Explorer.
    c. Discuss the control panel.
    d. Describe the software architecture.

2. Apply knowledge of domains.
    a. Describe the purpose of a domain.
    b. Compare domains and workgroups.
    c. Discuss the different trust relationships in domains.
    d. Configure devices to participate within a domain.
    e. Outline components of the active directory.

3. Create user accounts and login security.
    a. Create user accounts.
    b. Describe login security.
    c. Assign access restrictions using appropriate server utilities.
    d. Convert user accounts by copying existing user accounts.
    e. Create user profiles.
    f. Add group membership to users.

4. Create groups.
    a. Discuss default groups.
    b. Create groups.
    c. Support group accounts using appropriate server utilities.
    d. Distinguish domain local group types

5. Plan files systems.
    a. Compare and contrast FAT and NTFS file systems.
    b. Discuss advanced NTFS EFS and compression attributes.
    c. Compare basic and dynamic drives.
    d. Assess dynamic drive types.
    e. Create partitions/volumes using administrative tools/disk management.

6. Manage files and folders.

    a. Discuss folder structure.
    b. Name file and folder attribute settings.
    c. Manipulate file and folder permissions.
    d. Explain permission inheritance.
    e. Create shares and discuss share permissions.
    f. Discuss installation of applications.
    g. Discuss virtualizations technologies.

7. Establish network print services.
    a. Explain print spooling.
    b. Install a logical printer and printer driver.
    c. Create a new printer and share it on the network.
    d. Explain and support the management of printer properties.
    e. Set printer share security.
    f. Use print job management for both local and remote printers.
    g. Discuss printer pooling.

8. Explore fault tolerance.
    a. Discuss RAID.

9. Establish a backup and recovery policy.
    a. Describe the different backup types.
    b. Discuss backup strategies.
    c. Discuss Windows backup utility.
    d. Discuss third party backup software.
    e. Implement a server restoration from backup media.
    f. Plan for server backup and restoration.

10. Research trends in new and emerging technologies.

Course Number and Name: IST 1254 Network Administration Using Linux

Description: This course focuses on the management of a computer network using the Linux operating system. Emphasis is placed on installation, configuration, implementation, and administrative tasks of a functional server.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: None

Student Learning Outcomes:
The student will

1. Explain Linux and Linux server administration functions and responsibilities.
   a. Discuss open source software and the open source movement.
   b. Examine the history of the Linux/Unix network operating system.
   c. Name and contrast the different distributions of Linux.
   d. Explain the relevant differences between Linux and other operating systems.
   e. Describe the role of a network administrator.

2. Install the Linux operating system.
   a. Prepare computer for installation.
   b. Perform server installation.
   c. Configure the server by using GUI utilities and by editing the configuration files.

3. Use the Linux file system.
   a. Investigate the Linux directory structure.
   b. Relate the Linux file system to Windows file systems.
   c. Discuss various file systems.

4. Describe the login process.
   a. Discuss username and passwords.
   b. Discuss the user root.
   c. Differentiate between local login and remote login using a terminal emulator.

5. Use the Linux command line interface.
   a. Compare basic Linux commands to Microsoft© DOS.
   b. Use Linux commands to perform basic file and directory maintenance.
   c. Use Linux shutdown procedure and commands.
   d. Use the startx command to enter the Linux GUI.

6. Set up user accounts and group memberships.
   a. Create and modify user accounts.
   b. Assign access restrictions and permissions using "chmod."
   c. Modify group memberships of users with "chown."

7. Establish network file and print sharing.

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    a. Set file and directory permissions.
    b. Create shares.
    c. Install a local printer.
    d. Install and share a network printer.

8. Install and implement a Linux Web server
    a. Download a third party Web server such as Apache.
    b. Perform Web server installation.
    c. Test Web server operation by posting a Web page and viewing it from a remote computer.

Course Number and Name: **IST 1263   Microsoft© Office© Applications**

Description: This course will introduce an operating system and word processing, spreadsheet, database management, and presentation software application.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: None

Student Learning Outcomes:
The student will

1. Demonstrate skills using a variety of software applications.
   a. Use operating system software.
      (1) Apply basic operating system commands.
      (2) Demonstrate proper file and disk management.
   b. Use word processing software.
      (1) Define terminology related to word processing.
      (2) Produce documents using basic word processing features to include margins, tabs, line spacing, underlining, boldface, centering, inserting, deleting, spell checking, saving, retrieving, and printing.
   c. Use spreadsheet application software.
      (1) Define terminology related to spreadsheet applications.
      (2) Apply basic spreadsheet software features to include alphabetic, numeric, and alphanumeric cell entries, values, formulas, column-widths, column and row headings, deleting, inserting, saving, and printing.
   d. Use database application software.
      (1) Define terminology related to database applications.
      (2) Apply basic database software features to design a file, add records, edit records, generate reports, and select certain records from files.
   e. Use presentation software.
      (1) Define terminology related to presentation applications.
      (2) Apply basic presentation software features to include slide development, transitions, and animation.

Course Number and Name: **IST 1273   Career Development**

Description: This course provides practical exercises in both the technical and social skills necessary for employment. Interpersonal skills, the job search process, and the importance of high standards of personal and professional relationships are stressed

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: None

Student Learning Outcomes:
The student will

1. Assess personal traits.
    a. Categorize strengths and weaknesses.
    b. Perform an interest inventory.
    c. Incorporate techniques to build a positive self-image.

2. Demonstrate effective interpersonal skills.
    a. Apply techniques to improve listening, verbal, and nonverbal communication skills.
    b. Examine special communication requirements with people from diverse cultural and
    c. international backgrounds and with the differently abled.
    d. Apply business etiquette skills.
    e. Apply problem-solving and conflict-resolution skills.

3. Formulate career goals and objectives.
    a. Discuss the importance of goals and objectives.
    b. Determine a personal career path.

4. Compare and contrast factors associated with job success.
    a. Discuss elements of a professional image.
    b. Apply basics of good health practices.
    c. Build a proper business wardrobe.
    d. Practice personal grooming.

5. Practice the job search process.
    a. Research the job market.
    b. Complete job applications.
    c. Prepare a resume.
    d. Write appropriate job-related correspondence.
    e. Demonstrate proper business appearance.
    f. Practice effective interview techniques through mock interviews.

6. Demonstrate factors that contribute to success on the job.
    a. Demonstrate time, stress, and money management techniques.
    b. Determine positive work habits.

c. Discuss the importance of a positive attitude.

Course Number and Name: **IST 1314   Visual BASIC Programming Language**

 Description: This introduction to the Visual BASIC programming language
                                              familiarizes the student with object-oriented programming and a
                                              graphical integrated development environment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

 Prerequisite: None

Student Learning Outcomes:
The student will

1. Describe the process of visual program design and development.
    a. Define design time, run time, and break time.
    b. Identify compile errors, run-time errors, and logic errors.
    c. Discuss events, procedures, and classes.

2. Describe the most common controls.
    a. Illustrate the use of form controls, labels, buttons, text boxes, group boxes (frames), check boxes, and radio buttons (option buttons).
    b. Set properties of controls.
    c. Run events and methods on controls.

3. Write programs using the various types of variables, constants, and relational operators.
    a. Distinguish between variables and constants.
    b. Differentiate among the various data types.
    c. Select the appropriate scope for variables and constants.
    d. Perform calculations using the order of operations.

4. Use decision, selection, and iteration statements.
    a. Use IF/THEN statements to control the flow of logic.
    b. Use case statements to control selections.
    c. Use Do loops and For/Next loops as iteration statements.

5. Create menus and message boxes.
    a. Build applications that contain menus, submenus, and pop-up menus.
    b. Add access keys, shortcuts, separator bars, and checkmarks to menus.
    c. Create message boxes to display errors or information to the user.

Course Number and Name: IST 1324 RPG Programming Language

Description: This course is designed to introduce the student to the RPG language for the creation of business applications.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Discuss the development of the RPG language.
   a. Identify the purpose of RPG.
   b. Discuss the history of RPG.

2. Apply the steps of the program development cycle.
   a. Use the steps involved in the creation of RPG programs.
   b. Use design forms to produce input layouts and output layouts.

3. Apply RPG specifications for a simple program.
   a. Use the RPG language to design and implement the reading of data and to print a report with headings and edit codes.

4. Apply the RPG syntax to perform arithmetic and assignment operations.
   a. Use the RPG language to design and implement calculation specifications, producing a report with accumulated totals.
   b. Demonstrate knowledge and use of numeric literals and fields.
   c. Demonstrate knowledge and use of character literals and fields.
   d. Demonstrate knowledge and use of figurative constants.

5. Develop RPG programs using a top-down, structured approach.
   a. Develop programs using sequence, selection, and iteration.
   b. Develop programs using modular coding techniques.
   c. Prepare the coding necessary to perform control break logic.
   d. Use control break logic to produce a report with subtotals and final totals.
   e. Use selection logic to produce exception output reporting.

6. Use RPG operations for file access and record manipulation.
   a. Use RPG file operations for sequential access of records to produce a report.
   b. Use RPG file operations for random access of records to produce a report.
   c. Use RPG file operations for writing records to a data file.
   d. Use RPG file operations for updating and deleting data file records.

Standards:
Certified Associate Application Developer – ILE RPG Programmer Certification
1. Define computer programming
2. Program Development Life Cycle
3. Program Entry, Compilation and Testing
4. Define variables and constants

5. Describe RPG Program Specifications and the structure of an ILE RPG program
6. Describe the differences between fixed and free format
7. Describe the importance and how to include program documentation (internal and external)
8. Explain database concepts
9. Create physical files/tables using DDS and SQL
10. Create logical files/views using DDS and SQL
11. Describe data types and data storage
12. Implement output editing
13. Understand file structure
14. Define control structures: sequence, selection and looping techniques
15. Describe control break logic
16. Define arithmetic operations and recognize order of operations and symbols used to perform calculations
17. Interactive Application Development
18. Define built-in functions including character and date functions
19. Discuss development software (utility programs and RDi)
20. Define data structures (field/variable, array, table)

Course Number and Name: **IST 1334 COBOL Programming Language**

Description: This course is designed to introduce the student to the use of COBOL language for business applications, including arithmetic operations, report editing, control break processing, and table processing techniques.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Discuss the divisions of a COBOL program.
   a. Identify the divisions of a COBOL program.
   b. Apply the steps involved in designing, coding, executing, and debugging COBOL programs.
   c. Use structured programming techniques in all programs.

2. Use arithmetic operations.
   a. Develop a program that includes addition, subtraction, multiplication, and division; computer.
   b. Develop a program that includes computation of totals.

3. Develop a program that includes signs, zero suppression, and insertion characters.

4. Prepare edited reports.

5. Develop a program that includes logical comparison.

6. Produce reports to initiate control break processing.
   a. Develop a program that includes single-level control breaks.
   b. Develop a program that includes multi-level control breaks.

Course Number and Name: **IST 1414   Client –Side Programming**

Description: This course offers a comprehensive understanding of programming
using JavaScript.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1.   Demonstrate client-side programming using JavaScript.
     a.   Apply JavaScript fundamentals.
          (1) Explain scripting languages.
          (2) Discuss JavaScript versus other languages.
          (3) Discuss client-side versus server-side programming.
          (4) Demonstrate embedding in HTML.
     b.   Discuss JavaScript variables and data.
          (1) Demonstrate communicating with the user.
          (2) Explain variables and keywords.
          (3) Discuss expressions and operators.
          (4) Discuss inline scripting, simple user events, and the onLoad and onUnload
               event handlers.
     c.   Explain functions, methods, and events.
          (1) Discuss functions.
          (2) Use defining and calling functions.
          (3) Use event handlers.
     d.   Apply control structures and statements.
          (1) Apply decision statements.
          (2) Apply repetition statements.
     e.   Examine the document object model (DOM).
          (1) Identify properties and methods of the window object.
          (2) Identify properties and methods of the location object.
          (3) Identify properties and methods of the history object.
          (4) Identify properties of the navigator object.
     f.   Examine forms.
          (1) Discuss validation.
          (2) Validate form data.
     g.   Discuss cookies and security.
          (1) Explain state information.
          (2) Describe query strings.
          (3) Save state information with cookie
     h.   Debug JavaScript.
          (1) Use debugging tools.
          (2) Discuss debugging techniques.

Course Number and Name: **IST 1424   Web Design Applications**

Description   This course involves the application of various professional and**:**
                                     personal Web design techniques. Students will work with the latest
                                     WYSIWYG editors, HTML editors, animation/multimedia products, and
                                     photo editors

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Design Web pages using various applications.
    a.   Demonstrate WYSIWYG editor applications.
            (1) Define and use terminology related to WYSIWYG editor applications.
            (2) Create and edit Web content utilizing WYSIWYG editor applications.
    b.   Demonstrate HTML editor applications.
            (1) Define and use terminology related to HTML editor applications.
            (2) Create and edit Web content utilizing HTML editor applications.
    c.   Demonstrate animated/multimedia applications.
            (1) Define and use terminology related to creating and using multimedia
                 interactive applications.
            (2) Develop and edit animated/multimedia content specific for Web applications.
    d.   Demonstrate digital image editing applications.
            (1) Define and use terminology related to creating and using image editing
                 applications.
            (2) Create and edit Web digital images specifically for Web content.

Course Number and Name: **IST 1433   Web Development Using HTML & CSS**

Description   This course involves the application of various professional and**:**
                                  personal Web design techniques. Students will work with the latest
                                  WYSIWYG editors, HTML editors, animation/multimedia products, and
                                  photo editors

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will
1. Design a Web page using HTML and/or XHTML.
    a. Explain Web page creation.
    b. Contrast text editors and GUI editors.
    c. Explain HTML and XHTML.
        (1) Describe HTML, XHTML, and the standards of each.
        (2) Discuss Web browsers and standards.
        (3) Discuss Web page accessibility.
    d. Explain HTML and/or XHTML coding.
        (1) Explain markup tags.
        (2) Discuss and use document structure tags.
        (3) Demonstrate and use paragraph formatting, block-level elements, and text
level elements.
        (4) Describe and code lists.
        (5) Use comments and good coding practices.
    e. Demonstrate graphical elements.
        (1) Explain and use the horizontal rule.
        (2) Discuss images; use them in a Web page.
        (3) Discuss image file formats; explain image optimization.
        (4) Discuss colors and the Web-safe color palette; implement them.
        (5) Explain special characters.
        (6) Use page colors and backgrounds.
        (7) Incorporate fonts into a Web page.
    f. Describe the use of hyperlinks.
        (1) Explain and code hyperlinks.
        (2) Use image and internal links.

    g. Explain the use of tables.
        (1) Demonstrate tables.
        (2) Use table and data alignment options.
        (3) Explain and use column and row spanning.
    h. Discuss forms.
        (1) Describe form uses and form fields.
        (2) Create forms.

i. Evaluate image techniques.
  (1) Create image maps.
  (2) Discuss and use image transparency.
  (3) Explain interlacing.
  (4) Demonstrate the use of animated GIF images.
j. Demonstrate Web page layout and elements.
  (1) Demonstrate effective layout.
  (2) Discuss color and Web design.
  (3) Explore font usage.
  (4) Explain Web site usability testing.
k. Demonstrate navigation concepts.
  (1) Explain the elements of navigation design.
  (2) Demonstrate primary and secondary navigation.
  (3) Discuss navigation hierarchy.
  (4) Discuss site structure, uniform resource locators (URLs), and file names.
  (5) Discuss familiar navigation conventions.
l. Research the standards organizations.
  (1) Explain the Internet governing bodies.
  (2) Discuss the Internet Society (ISOC) and Internet Architecture Board (IAB).
  (3) Describe the Internet Research Task Force (IRTF) and Internet Engineering
        Task Force (IETF).
  (4) Discuss the World Wide Web Consortium (W3C), Names and Numbers
        (ICANN), and Requests for Comments (RFCs).
m. Demonstrate Web site usability testing

2. Demonstrate cascading style sheets
  a. Use CSS language to build cascading style sheets.
    (1) Discuss the history of CSS.
    (2) Discuss basic CSS components.
    (3) Discuss CSS rules.
    (4) Build a basic style sheet.
  b. Examine basic CSS techniques.
    (1) Apply selection techniques.
    (2) Apply effective font usage.
    (3) Apply the CSS box model.
    (4) Use color in CSS.
  c. Apply advanced CSS techniques.
    (1) Apply tables.
    (2) Apply lists.
    (3) Apply positioning elements

Course Number and Name: **IST 1483 Fundamentals of Virtualization**

Description: This course presents basic concepts of operating-system virtualization, server virtualization, cloning, teams, and virtual networks

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Explore system requirements.
    a. Identify host system requirements.
    b. Examine virtual machine specification and supported guest operating systems

2. Install and configure virtual software.
    a. Identify installation prerequisites.
    b. Install virtual software on Windows and Linux hosts.

3. Explore the basics of virtual software.
    a. Configure preferences in virtual software.
    b. Identify the windows in virtual software.
    c. Identify and configure virtual-machine settings.
    d. Create a virtual machine quickly.
    e. Perform a shutdown of a virtual machine and exit the software.

4. Explore creating and upgrading a virtual machine.
    a. Configure memory allocation, virtual-machine location, network connection type, and virtual and physical disks.
    b. Perform a manual installation of a guest operating system.
    c. Upgrade a guest operating system.
    d. Identify files that make up a virtual machine

5. Identify various ways of installing a virtual machine.
    a. Install a virtual machine using an ISO.
    b. Install a virtual machine from an existing physical machine.

6. Practice maintaining a virtual machine.
    a. Configure autologon in a Windows guest virtual machine.
    b. Use the pause and unpause features in a virtual machine.
    c. Use the encryption feature to encrypt a virtual machine.
    d. Remove a virtual machine.

7. Practice files maintenance with virtual machines.
    a. Use the drag-and-drop and copy-and-paste features to transfer files between the host and guest.
    b. Use and set up shared folders.
    c. Practice mapping or mounting a virtual disk to a drive on the host.

8. Explore preserving the state of a virtual machine.
    a. Use the suspend and resume features.
    b. Use snapshots to preserve the state of a virtual machine.

9. Practice cloning, moving, and sharing virtual machines.
    a. Configure a linked clone and full clone.
    b. Practice moving a virtual machine to another host.
    c. Practice sharing a virtual machine with another user.

10. Explore recording and replaying virtual machine activity.
    a. Use the record feature to create a recording.
    b. Use the replay feature to replay a recording.
    c. Use the trace feature to create a trace file of a recording.

11. Explore teams of a virtual machine.
    a. Identify benefits of using teams.
    b. Practice creating and opening teams.
    c. Practice closing and powering off teams.
    d. Practice deleting a team.
    e. Configure teams by adding and removing members.

12. Practice configuring a virtual network.
    a. Identify the components of a virtual network.
    b. Configure a bridged, host-only, and NAT virtual network.
    c. Practice changing the subnet and DHCP settings in a virtual network.
    d. Configure host virtual network adapters.

13. Explore connecting devices to virtual machines.
    a. Configure a parallel port to a virtual machine.
    b. Practice adding a virtual serial port.
    c. Configure keyboard features in a virtual machine.
    d. Use USB devices in a virtual machine.

Course Number and Name: **IST 1513   SQL Programming**

Description: This course is the first of a two-part series that offers students an
                                                extensive introduction to data server technology, covering   the
                                                concepts of both relational and object relational databases and the
                                                structured   query language (SQL).Students are taught to retrieve data
                                                and produce readable output.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Write basic SQL statements.
    a. Explore the capabilities of SQL SELECT statements.
    b. Execute basic SELECT statements.
    c. Use tools that recognize and submit SQL statements for processing.

2. Restrict and sort data.
    a. Limit the rows retrieved by a query.
    b. Sort the rows retrieved by a query.

3. Use single-row functions.
    a. Describe the various types of functions available in SQL.
    b. Use character, number, and date functions in SELECT statements.
    c. Demonstrate the use of conversion functions and conditional expressions.
    d. Use comparison operators and logical operators.
    e. Use range conditions, membership conditions, and pattern matching.
    f. Discuss rules of precedence.

4. Display data from multiple tables.
    a. Write SELECT statements to access data from more than one table.
    b. Describe the Cartesian product.
    c. Compare and use types of joins.

5. Aggregate data using group functions.
    a. Identify the available group functions.
    b. Discuss the uses of group functions.
    c. Demonstrate the grouping of data and include or exclude grouped rows.

6. Write subqueries.
    a. Identify the types of problems that subqueries can solve.
    b. Describe subqueries.
    c. List the types of subqueries.
    d. Write single-row and multiple-row subqueries.

7. Produce readable output.

        a. Produce queries requiring an input variable.
        b. Use tools to control environmental
        c. Create and execute script files.

8. Manipulate data in the database.
        a. Describe data manipulation commands.
        b. Insert rows into a table, update rows in a table, and delete rows from a table.
        c. Control database transactions.
        d. Discuss and implement read consistency.

9. Create and manage tables.
        a. Create tables.
        b. Describe the data types that can be used when specifying column definitions.
        c. Alter table definitions.
        d. Delete, rename, and truncate tables.

10. Use constraints.
        a. Describe constraints.
        b. Create and maintain constraints.

11. Create views.
        a. Describe views and their uses.
        b. Demonstrate how to create and delete a view.
        c. Retrieve data through a view.
        d. Alter the definition of a view.
        e. Insert, update, and delete data through a view.
        f. Discuss inline views.

12. Use other database objects in
        a. Manage database objects using a data dictionary.
        b. Create, maintain, and delete sequences.
        c. Create, maintain, and delete indexes.
        d. Create and delete private and public synonyms.

13. Control user access.
        a. Analyze the concepts of users and their roles and privileges.
        b. Practice creating users.
        c. Grant and revoke privileges.
        d. Create roles and grant privileges to roles.
        e. Change user passwords.

Standards:
CIW Database Design Specialist Exam Objectives
Domain 4:
4.1   Identify SQL commands and syntax
4.2   Create statements using Data Definition Language (DDL)
4.3   Form commands using Data Manipulation Language (DML)
4.4   Use Data Control Language (DCL) statements to control the access to data in a database and to grant users permission for data operations.

Course Number and Name: **IST 1523   SQL Programming II**

Description: This course is the first of a two-part series that offers students an
                               extensive introduction to data server technology, covering   the
                               concepts of both relational and object relational databases and the
                               structured   query language (SQL).Students are taught to retrieve data
                               and produce readable output.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Write basic SQL statements.
    a. Explore the capabilities of SQL SELECT statements.
    b. Execute basic SELECT statements.
    c. Use tools that recognize and submit SQL statements for processing.

2. Restrict and sort data.
    a. Limit the rows retrieved by a query.
    b. Sort the rows retrieved by a query.

3. Use single-row functions.
    a. Describe the various types of functions available in SQL.
    b. Use character, number, and date functions in SELECT statements.
    c. Demonstrate the use of conversion functions and conditional expressions.
    d. Use comparison operators and logical operators.
    e. Use range conditions, membership conditions, and pattern matching.
    f. Discuss rules of precedence.

4. Display data from multiple tables.
    a. Write SELECT statements to access data from more than one table.
    b. Describe the Cartesian product.
    c. Compare and use types of joins.

5. Aggregate data using group functions.
    a. Identify the available group functions.
    b. Discuss the uses of group functions.
    c. Demonstrate the grouping of data and include or exclude grouped rows.

6. Write subqueries.
    a. Identify the types of problems that subqueries can solve.
    b. Describe subqueries.
    c. List the types of subqueries.
    d. Write single-row and multiple-row subqueries.

7. Produce readable output.

    a. Produce queries requiring an input variable.
    b. Use tools to control environmental
    c. Create and execute script files.

8. Manipulate data in the database.
    a. Describe data manipulation commands.
    b. Insert rows into a table, update rows in a table, and delete rows from a table.
    c. Control database transactions.
    d. Discuss and implement read consistency.

9. Create and manage tables.
    a. Create tables.
    b. Describe the data types that can be used when specifying column definitions.
    c. Alter table definitions.
    d. Delete, rename, and truncate tables.

10. Use constraints.
    a. Describe constraints.
    b. Create and maintain constraints.

11. Create views.
    a. Describe views and their uses.
    b. Demonstrate how to create and delete a view.
    c. Retrieve data through a view.
    d. Alter the definition of a view.
    e. Insert, update, and delete data through a view.
    f. Discuss inline views.

12. Use other database objects in
    a. Manage database objects using a data dictionary.
    b. Create, maintain, and delete sequences.
    c. Create, maintain, and delete indexes.
    d. Create and delete private and public synonyms.

13. Control user access.
    a. Analyze the concepts of users and their roles and privileges.
    b. Practice creating users.
    c. Grant and revoke privileges.
    d. Create roles and grant privileges to roles.
    e. Change user passwords.

Course Number and Name: **IST 1534   Database Architecture and Administration**

Description: This course is the first of a two-part series designed to give students a firm foundation in basic database tasks enabling them to install, create, and maintain a database. Students will gain a conceptual understanding of database architecture and how its components work and interact with one another. Students will also learn how to create an operational database and properly manage the various structures

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	3	2	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Illustrate and examine the architectural components of a database.
   a. Describe the server architecture and its main components.
   b. List the structures involved in connecting a user to the database.
   c. Identify the stages in processing SQL queries and DML statements.

2. Discuss how to install database software.

3. Explain how to create a database.

4. Manage a database connection.
   a. Create, manage, and use initialization files.
   b. Identify the various states of starting a database.
   c. Discuss the various options available to shut down a database.

5. Demonstrate how to retrieve information about the database and its users.

6. Use software tools to configure and manage the network environment for the database.
   a. Establish database connections.
   b. Test connectivity.

7. Manage database storage structures.
   a. Discuss how table data is stored.
   b. Maintain tables using appropriate storage settings.

8. Administer user security.
   a. Create and manage database user accounts.
   b. Discuss password management and resources management.
   c. Grant and revoke database privileges.
   d. Create and manage roles and profiles.

9. Manage data and concurrency.
   a. Manipulate data using insert, update, and delete commands.
   b. Monitor and resolve locking conflicts.

10. Implement and maintain data integrity constraints.

Standards:
CIW Database Design Specialist Exam Objectives
Domain 5:
5.1   Define and describe the use of relational algebra in order to create new relationships from existing database relations
5.2   Compose joins in a database
Domain 6:
6.1   Create transactions and enable currency control
6.2   Identify elements of database security

Course Number and Name: **IST 1613 Computer Forensics**

Description: This course is an introduction to the various technical and administrative aspects of computer forensics and laws pertaining to cybercrime. This course provides the foundation for understanding the key issues associated with computer forensic investigations, understanding the boot processes and disk structure for multiple operating systems, and understanding the processes related to data acquisition during investigations.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: None

Student Learning Outcomes:
The student will

1. Describe the elements of computer crimes and cyber attacks.
    a. Identify the types of computer crimes and cyber attacks.
    b. Compare and contrast corporate and criminal investigations regarding electronic evidence (e-evidence).
    c. Discuss the role of computer forensics examiners in corporate and criminal investigations.

2. Identify elements of the e-evidence collection.
    a. Employ industry-recognized tools, equipment, and environments for e-evidence collection and analysis.
    b. Compare and contrast acceptable procedures for e-evidence collection and analysis for corporate and criminal investigations.
    c. Assess considerations of personal data devices in e-evidence collection and analysis.
    d. Formulate proper forensic examination report.

3. Demonstrate proper data acquisition and investigation involving computer operating systems
    a. Classify various operating systems and file structures.
    b. Cite various operating system page file and network connection information.
    c. Explain considerations for e-mail and Web-mail.

Course Number and Name: **IST 1624 Network Security Fundamentals**

Description: This course provides the fundamental understanding of network security principles, implementations, and the concepts, models, and technologies involved in creating a secure network environment. Topics include, but are   not limited to, authentication, types of attacks and malicious code, and best practices for securing a network environment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Interpret general security concepts.
   a. Discuss and explain the access control models (mandatory, discretionary, and role-based).
   b. Explain authentication methods and technologies including kerberos, CHAP, certificates,
   a. username/password, tokens, multi-factor, mutual, and biometric.
   b. Differentiate between essential and nonessential services and protocols based on various operational
   c. environments.
   d. Differentiate various types of cyber attacks and identify appropriate strategies for defense.
   e. Discuss malicious code and appropriate strategies to reduce risk to systems.

2. Recognize the importance of operational and organizational security.
   a. Analyze the significance of physical security to information security.
   b. Discuss the security implications of disaster recovery and business continuity.
   c. Discuss the proper implementation and use of policies and procedures.
   d. Explain the concepts of privilege management.
   e. Discuss the security relevance of the education and training of end users, executives, and human
   f. resources.
   g. Recognize various social engineering techniques and effective security strategies to deter successful
   h. social engineering attacks.

3. Describe the elements of communication security.
   a. Explain the administration and vulnerabilities of current remote access technologies.
   b. Discuss current e-mail security technologies and vulnerabilities.
   c. Explain the administration of Internet security concepts, including Web content, wireless technologies,
   d. instant messaging, and vulnerabilities.
   e. Discuss the administration of file transfer protocols and concepts.

4. Describe the elements of infrastructure security.
   a. Discuss the security concerns of network devices.
   b. Explain the security concerns of various types of digital communication media.

       c. Discuss current security topologies.

       d. Differentiate types of intrusion detection systems.

       e. Discuss the concepts of security baselines and operating system and network hardening.

5. Summarize cryptography standards.
   a. Explain hashing, symmetric, and asymmetric cryptographic algorithms.
   b. Differentiate the various cryptographic standards and protocols.
   c. Describe the concepts of public key infrastructure.
   d. Discuss and explain the concepts of key management and certificate lifecycles.

6. Recognize domestic and international law regarding security.
   a. Identify restrictions on import and export of encryption technologies.
   b. Discuss domestic and international law on apprehension and prosecution of cyber criminals.
   c. Explain the concept of digital rights management

Standards:

CompTIA Security+ Certification Exam Objectives

2.0 Compliance and Operational Security

2.1 Explain the importance of risk related concepts.

2.2 Summarize the security implication of integrating systems and data with third parties.

2.3 Given a scenario. Implement appropriate risk mitigation strategies.

2.6 Explain the importance of security related awareness and training.

2.7 Compare and contrast physical security and environmental controls.

5.0 Access Control Identity Management

5.2 Given a scenario, select the appropriate authentication, authorization or access control.

6.0 Cryptography

6.1 Given a scenario, utilize general cryptography concepts.

6.2 Given a scenario, use appropriate cryptographic methods.

6.3 Given a scenario, use appropriate PKI, certificate management and associated components.

Course Number and Name: **IST 1633 Wireless Security and Privacy**

Description: This course provides a fundamental understanding of wireless architecture, security principles, and the technologies and principles involved in creating a secure wireless computer network environment. Topics include wireless hardware, protocols, encryption, and how to prevent weaknesses in wireless technology

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	4	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Define wireless network concepts.
    a. Discuss the variations of applications and tools used in wireless networks.
    b. Compare and contrast traditional network media with wireless network media.
    c. Interpret wireless technology acronyms.

2. Discuss and differentiate wireless network technologies.
    a. Identify the components of wireless network technologies.
    b. Differentiate wireless topologies.
    c. Analyze wireless challenges and issues.
    d. Discuss radio frequency fundamentals.
    e. Explain spread spectrum technology.

3. Assess various attacks on wireless networks.
    a. Explain the application of wireless encryption standards.
    b. Identify security weaknesses in wireless networking technologies.
    c. Describe best practices for securing wireless networks.

4. Implement a wireless network solution.
    a. Install and configure a wireless access point.
    b. Install and configure a wireless NIC.
    c. Implement a wireless encryption solution.
    d. Implement best practices in security and wireless network

5. Discuss a wireless antenna.
    a. Explain and demonstrate directional antennas.
    b. Explain and demonstrate omni-directional antennas.

Standards:
CompTIA Security+ Certification Exam Objectives
    1.0 Network Security
    1.4 Given a scenario, implement common protocols and services.
    1.5 Given a scenario, troubleshoot security issues related to wireless networking
    3.0 Threats and Vulnerabilities
    3.4 Explain types of wireless attacks

Course Number and Name: **IST 1643 Network Defense and Countermeasures**

Description: This course provides a solid foundation of network security and the understanding of the process to create a network defense and counter defense strategy measure policy to respond to intrusion detection. Topics include network address translation, packet filtering, proxy servers, firewalls, and virtual private networks used to design a network

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1.   Summarize network security principles.
     a. Define information security and its components.
     b. Explain the various types of attacks and threats.
     c. Analyze the goals of information security services.
     d. Interpret the concept of layering as it applies to network defense technology.

2.   Apply risk management concepts.
     a. Perform risk assessments.
     b. Apply security policy implementation as a tool for risk management.

3.   Explain intrusion detection systems.
     a. Analyze network traffic to determine a baseline of legitimate network traffic.
     b. Differentiate legitimate network traffic from suspicious events.
     c. Evaluate available intrusion detection systems.
     d. Develop an appropriate security incident response team.
     e. Identify the steps for incident response.

4.   Explain virtual private network (VPN) concepts.
     a. Describe VPN activities.
     b. Describe the advantages and disadvantages of VPNs.
     c. Identify the steps in designing and configuring a VPN.

5.   Describe firewall technologies.
     a. Differentiate various firewall configurations.
     b. Formulate an appropriate firewall rule set based on various operations environments.
     c. Identify various firewall topologies.
     d. Discuss authentication considerations as they apply to firewalls.

Standards:
CompTIA Security+ Certification Exam Objectives
     2.0 Compliance and Operational Security
     2.3 Given a scenario, implement appropriate risk mitigation strategies.
     2.4 Given a scenario, implement basic forensic procedures.

2.5 Summarize common incident response procedure.

2.8 Summarize risk management

2.9 Given a scenario, select the appropriate control to meet the goals of security.

3.0 Threats and Vulnerabilities

3.6 Analyze a scenario and select the appropriate type of mitigation and deterrent techniques.

3.7 Given a scenario, use appropriate tools and techniques to discover security threats and vulnerabilities.

3.8 Explain the proper use of penetration testing verses vulnerability scanning.

4.0 Application, Data and Host Security

4.1 Explain the importance of application security controls and techniques.

4.2 Summarize mobile security concepts and technologies.

4.3 Given a scenario, select the appropriate solution to establish host security.

4.4 Implement the appropriate controls to ensure data security.

4.5 Compare and Contrast alternative methods to mitigate security risks in static environments.

5.0 Access Control and Identity Management

5.3 Install and configure security controls when performing account management, based on best practices.

Course Number and Name: **IST 1714 Java Programming Language**

Description: This introduction to the Java programming language is to include
                                   sort, loops, and arrays.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Develop programs that use arithmetical operations and logical operations.
    a.   Use variables, constants, and strings.
    b.   Use methods, classes, and objects.

2. Develop programs using decision making and conditional breaks.
    a.   Develop programs that utilize the "if and if...else" structure.
    b.   Develop programs that utilize the nested If structure.

3. Use looping structures in programs.
    a.   Develop programs that implement "while" and "do while" loops.
    b.   Develop programs that implement "for the" loop.
    c.   Develop programs that implement nested loops.

4. Use arrays.
    a.   Develop programs that require defining, loading, and searching an array.
    b.   Develop programs that sort an array.

Course Number and Name: **IST 1723   Programming in Python**

Description   This course is designed to provide an introduction to programming concepts and data informatics using Python through lecture and a series of practical hands-on exercises.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Describe proper programming techniques.
    a. Discuss Python terminology
    b. Explore the building blocks of programs
    c. Develop algorithms

2. Using fundamental Python concepts.
    a. Declare variables and determine data types
    b. Create expressions while following the proper order of operations
    c. Manipulate strings
    d. Add proper comments for documentation
    e. Request user input and process output
    f. Debug python programs

3. Execute conditional structures to control program flow
    a. Use Boolean expressions and logical operators
    b. Incorporate decision structures and loops in programs

4. Design programs using functions
    a. Use functions call and built in functions
    b. Provide parameters and arguments as required by functions

5. Process data
    a. Open, read, search and write to files
    b. Use lists, tuples and strings
    c. Discuss dictionaries and sets

6. Discuss object-oriented programming
    a.   Develop programs with classes
    b.   Discuss inheritance and recursion

Course Number and Name: **IST 1733   Data Analysis Using Excel**

Description   This course teaches the presentation and application of business
                                   functions in Excel. Emphasis will be placed on data analysis.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: None

Student Learning Outcomes:
The student will

1.   Create workbooks in Excel
     a. Enter data into cells
     b. Format cells and workbooks

2.   Perform calculations on data
     a. Create and revise formulas
     b. Discuss absolute verses relative addressing.
     c. Using statistical functions
3.   Used advanced functions and create scenarios
     a. Explore financial tools and functions
     b. Make decisions using an IF function
     c. Perform What- If Analyses
     d. Analyze data with business intelligence
4.   Manage and present data visually
     a. Analyze data using basic charts
     b. Link and summarize data using Pivot Tables and Pivot Charts

5.   Secure and share workbooks
     a. Protect workbooks using passwords
     b. Discuss collaboration and workbook distribution
     c. Use shared workbooks

Course Number and Name: **IST 1744   SAS Programming I**

Description   This course is the first of two- part series designed to give students an
                                   introduction to programming in SAS. Students will learn to navigate the
                                   SAS programming and windows environments, read various types of
                                   data into SAS data sets, and create SAS variables and subset data.
                                   Students will gain an understanding of how to create SAS variables and
                                   subset data, as well as combine SAS data. Students will also learn how
                                   to create and enhance listing and summary reports.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	3	2	75

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

  1. Write basic SAS programs
        a. Explore the capabilities of SAS programs.
        b. Submit a SAS program.
        c. Use proper SAS program syntax.

  2. Access data
        a. Examine SAS data sets
        b. Assess SAS libraries

  3. Produce detail reports

  4. Subset report data

  5. Demonstrate the sorting and grouping of report data.

  6. Discuss how to enhance report.

  7. Format data values.
        a. Use SAS formats
        b. Create user-defined formats

  8. Read data
        a. Discuss how to read a SAS data set, spreadsheet data, and database data.
        b. Produce a customized SAS data set
        c. Discuss how to read raw data files.
        d. Demonstrate how to read standard and nonstandard delimited data.
        e. Handle missing data.

  9. Manipulate data
        a. Discuss how to manipulate data using SAS functions
        b. Demonstrate the use of conditional processing.

10. Combine data sets
    a. Concatenate data sets
    b. Merge data sets one-to-one and one-to- many
    c. Merge data sets with nonmatches.

11. Create summary reports

Standards:
SAS Certified Based Programmer for SAS 9 Credential
1. Use FORMATTED and LIST input to read raw data files.
2. Use INFILE statement options to control processing when reading raw data files.
3. Use various components of an INPUT statement to process raw data files including column and line pointer controls, and trailing @ controls.
4. Combine SAS data sets.
5. Access an Excel workbook.
6. Create temporary and permanent SAS data sets.
7. Create and manipulate SAS date values.
8. Export data to create standard and comma-delimited raw data files.
9. Control which observations and variables in a SAS data set are processed and output.
10. Investigate SAS data libraries using base SAS utility procedures.
11. Sort observations in a SAS data set.
12. Conditionally execute SAS statements.
13. Use assignment statements in the DATA step.
14. Modify variable attributes using options and statements in the DATA step.

Course Number and Name: **IST 1754 R Programming Language**

Description: In this course, students will learn how to program in R and how to use R for effective data analysis, graphics representation, and reporting.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: IST 1733 Data Analysis Using Excel and any programming language

Student Learning Outcomes:
The student will

1. Discuss data structures.
    a. Use vectors.
    b. Use arrays and matrices.

2. Use ordered and unordered factors.

3. Use R programming structures.
    a. Use built-in functions, assign functions, and return values.
    b. Provide parameters and arguments as required by functions.
    c. Use mathematical and statistical functions.

4. Process data.
    a. Open, read, search, and write to files.
    b. Discuss directors and access permissions.
5. Discuss object-oriented programming
6. Use graphical facilities in R.

Course Number and Name: **IST 1811**   **IST Seminar I**

Description: The Information Systems Technology Seminars are designed to prepare students to enter the workplace. Students learn the value of teamwork, cooperation, community involvement, professionalism, and the latest developments in the computer field

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	1	0	15

Prerequisite: None

Student Learning Outcomes:
The student will

1. Demonstrate proper interaction and cooperation in the modern workplace.
   a. Demonstrate communication skills by completing projects within a team setting.
   b. Evaluate new technologies used in the workplace

2. Demonstrate thinking and learning skills.
   a. Complete basic logical thinking assignments.
   b. Complete basic creative thinking puzzles and projects.
3. Participate in community events.
   a. Assist in a class-organized community service project.
   b. Assist in at least two community service projects.

Course Number and Name: **IST 1821**   **IST Seminar II**

Description: The Information Systems Technology Seminars are designed to prepare students to enter the workplace. Students learn the value of teamwork, cooperation, community involvement, professionalism, and the latest developments in the computer field

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	1	0	15

Prerequisite: None

Student Learning Outcomes:
The student will

1. Demonstrate proper interaction and cooperation in the modern workplace.
    a. Demonstrate communication skills by leading a team learning project.
    b. Evaluate new technologies used in the workplace.

2. Demonstrate thinking and learning skills.
    a. Complete intermediate logical thinking assignments.
    b. Complete intermediate creative thinking puzzles and projects.

3. Participate in community events.
    a. Assist in a class-organized community service project.
    b. Assist in at least two community service projects

Course Number and Name: **IST 2111**   **IST Seminar III**

Description: The Information Systems Technology Seminars are designed to prepare students to enter the workplace. Students learn the value of teamwork, cooperation, community involvement, professionalism, and the latest developments in the computer field.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	1	0	15

Prerequisite: Instructor Approved

Student Learning Outcomes:
The student will

1. Demonstrate proper interaction and cooperation in the modern workplace
   a. Demonstrate communication skills by leading a class workshop project.
   b. Evaluate new technologies used in the workplace.

2. Demonstrate thinking and learning skills.
   a. Complete advanced logical thinking assignments.
   b. Complete advanced creative thinking puzzles and projects.

3. Participate in community events.
   a. Assist in a class-organized community service project.
   b. Assist in at least two community service projects.

Course Number and Name: **IST 2121**   **IST Seminar IV**

Description: The Information Systems Technology Seminars are designed to prepare
                                  students to enter the workplace. Students learn the value of teamwork,
                                  cooperation, community involvement, professionalism, and the latest
                                  developments in the computer field.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	60

Prerequisite: None
Student Learning Outcomes:
The student will

1. Demonstrate proper interaction and cooperation in the modern workplace.
    a. Demonstrate communication skills by developing and leading a team learning project.
    b. Evaluate new technologies used in the workplace.

2. Demonstrate thinking and learning skills.
    a. Complete superior logical thinking assignments.
    b. Complete superior creative thinking puzzles and projects.

3. Participate in community events.
    a. Assist in a class-organized community service project.
    b. Assist in at least two community service projects.

Course Number and Name: **IST 2213   Network Security**

Description: This course provides an introduction to network and computer security. Topics such as ethics, security policies, legal issues, vulnerability testing tools, firewalls, and operating system hardening will be discussed. Students will receive a deeper understanding of network operations and protocols through traffic capture and protocol analysis

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Review the importance of operational and organizational security.
    a. Analyze the significance of physical security to information security.
    b. Discuss the security implications of disaster recovery and business continuity.
    c. Discuss the security relevance of the education and training of end users, executives, and human resources.
    d. Review various social engineering techniques and effective security strategies to deter successful social engineering attacks
    e. Review general security concepts.

2. Review communication security.
    a. Characterize the administration of remote access technologies.
    b. Define and discuss remote access protocols, such as VPN, RADIUS, TACACS, L2TP/PPTP, SSH, andIPSEC.
    c. Define and discuss e-mail security concepts, technologies, and protocols such as S/MIME, PGP,
    i.   SPAM, SMTP Relay, and hoaxes.
    d. Define and discuss Internet security concepts, technologies, and protocols such as SSL/TLS, HTTP/S, instant messaging, Java Script, ActiveX, buffer overflows, cookies, and signed applets.
    e. Define and discuss wireless security concepts, technologies, and protocols such as WTLS, 802.11x, and WEP/WAP

3. Recognize domestic and international law regarding security.
    a. Identify restrictions on import and export of encryption technologies.
    b. Discuss domestic and international law on apprehension and prosecution of cyber criminals.
    c. Explain the concept of digital rights management.

4. Operate vulnerability testing tools.
    a. Perform password cracking and auditing.
    b. Perform vulnerability testing.
    c. Perform port mapping.

          d. Use a protocol analyzer to capture packets.
          e. Demonstrate packet sniffing of text and passwords.

5. Use operating system hardening.
          a. Install service patches.
          b. Install encryption services.
          c. Establish access controls.

6. Demonstrate use and operation of firewall configuration.
          a. Define common firewall terms.
          b. Install and configure port and service filters.
          c. Configure a simple firewall.
          d. Install and demonstrate a proxy server.

7. Use logging and analysis.
          a. Use baseline in log analysis.
          b. Configure centralized logging system.
          c. Review various operating system logging capabilities.
          d. Audit logons, system restarts, and specific resource use.

8. Describe the elements of computer crimes and cyber attacks.
          a. Identify the types of computer crimes and cyber attacks.
          b. Compare and contrast corporate and criminal investigations regarding electronic evidence
          c. Discuss the role of computer forensics examiners in corporate and criminal investigations.

Standards:
CompTIA Network+ Certification Exam Objectives
2.0 Network Operations
2.5 Given a scenario, install and apply patches and updates.
3.0 Network Security
3.1 Compare and contrast risk related concepts.
3.2 Compare and contrast common network vulnerabilities and threats.
3.3 Given a scenario, implement network hardening techniques.
3.4 Compare and contrast physical security controls.
3.5 Given a scenario, install and configure a basic firewall.
3.6 Explain the purpose of various network access control models.

Microsoft Technology Associate (MTA) Networking Fundamentals Exam
- Understand the concepts of Internert, intranet and extranet
- Virtual Private Network (VPN), security zones, firewalls
- Under local are networks (LANs)
- Perimeter networks; addressing ;reserved address ranges for local use (including local loopback IP), VLANs; weird LAN and wireless LAN
- Understand wide area networks (WANs)
- Leased lines, dial-up, ISDN, VPN T1, T3, E1, E3, DSL, cable, and more, and their characteristics (speed, availability)
- Understand wireless networking
- Types of wireless networking standards and their characteristics (802.11a,b,g,n, including different GHz ranges) types of network security (WPA, WEP, 802.1X, and others),point to-point (P2P) wireless bridging
- Understand network topologies and access methods.

- Understand switches
- Transmission speed, number and type of ports, number of uplinks, speed of uplinks, managed or unmanaged switches, VLAN capabilities, Layer 2 and Layer 3 switches and security options, hardware redundancy, support, backplane speed, switching types and MAC table, understand capabilities of hubs versus switches
    - Understand routers
    - Understand media typesCable types and their characteristics, including media segment length and speed; fiber optic; twisted pair shielded or nonshielded; catxx cabling, wireless; susceptibility to external interference (machinery and power cables); susceptibility to electricity (lightning), susceptibility to interception
    - Understand the Open Systems Interconnection (OSI) model
    - Understand IPv4
    - Subnetting, IPconfig, why use Internet Protocol version 4 (IPv4), addressing, ipv4toipv6 tunneling protocols to ensure backward compatibility, dual IP stack, subnetmask, gateway, ports, packets, reserved address ranges for local use (including local loopback IP)
    - Understand IPv6
    - Understand name resolution
    - Understand networking services
    - Understand TCP/IP
    - Understand the concepts of Internet, intranet, and extranet
    - Perimeter networks; addressing; reserved address ranges for local use (including local loopback IP), VLANs; wired LAN and wireless LAN
    - Understand wide area networks (WANs)
    - Leased lines, dial-up, ISDN, VPN, T1, T3, E1, E3, DSL, cable, and more, and their characteristics (speed, availability)
    - Understand IPv4
    - Understand IPv6
    - Understand switches
    - Understand routers

Course Number and Name: **IST 2224**   **Network Planning and Design**

Description: This course involves applying network concepts in planning and designing a functioning network. Emphasis is placed on recognizing the need for a network, conducting an analysis, and designing a solution.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Network Components (IST 1223)

Student Learning Outcomes:
The student will

1. Perform analysis and design for developing a network.

   a. Plan preliminary investigation.
   b. Create a data gathering strategy.
   c. Create a data analysis strategy.
   d. Discuss requirement reports.

2. Determine hardware design.
   a. Assess factors and components.
   b. Assess topology components.
   c. Assess cabling.
   d. Assess wireless requirements.
   e. Assess file server requirements.
   f. Assess workstation requirements.
   g. Assess design scalability, adaptability, and manageability.

3. Determine software design.
   a. Compare network operating systems.
   b. Compare workstation operating systems.
   c. Use network utilities.
   d. Evaluate network management applications.
   e. Examine virtualization.

4. Examine current network technologies.
   a. Discuss VLSM and CIDR.
   b. Discuss advances in switches and switch technologies.
   c. Implement VLANS.
   d. Discuss routing and routed protocols as they pertain to the local area network.

5. Solve design cases.
   a. Analyze, design, and construct a solution for implementation of a local area network.
   b. Present this solution to a class

Standards:

CompTIA Network+ Certification Exam Objectives
>   3.0 Network Security
>   3.1 Compare and contrast risk related concepts.
>   3.2 Compare and contrast common network vulnerabilities and threats.
>   3.3 Given a scenario, implement network hardening techniques.
>   3.4 Compare and contrast physical security controls.

Microsoft Technology Associate (MTA) Networking Fundamentals Exam

- Understand the concepts of Internert, intranet and extranet
- Virtual Private Network (VPN), security zones, firewalls
- Under local are networks (LANs)
- Perimeter networks; addressing ;reserved address ranges for local use (including local loopback IP), VLANs; weird LAN and wireless LAN
- Understand wide area networks (WANs)
- Leased lines, dial-up, ISDN, VPN T1, T3, E1, E3, DSL, cable, and more, and their characteristics (speed, availability)
- Understand wireless networking
- Types of wireless networking standards and their characteristics (802.11a,b,g,n, including different GHz ranges) types of network security (WPA, WEP, 802.1X, and others),point to-point (P2P) wireless bridging
- Understand network topologies and access methods.
- Understand switches
- Understand routers
- Understand media types
- Understand the Open Systems Interconnection (OSI) model
- Understand IPv4
- Understand IPv6
- Understand name resolution
- DNS, Windows Internet Name Service (WINS), steps in the name resolution process
- Understand networking services
- Understand TCP/IP
    - Virtual Private Network (VPN), security zones, firewalls
    - Perimeter networks; addressing; reserved address ranges for local use (including local loopback IP), VLANs; wired LAN and wireless LAN
    - Understand wide area networks (WANs)
    - Leased lines, dial-up, ISDN, VPN, T1, T3, E1, E3, DSL, cable, and more, and their characteristics (speed, availability)
    - Types of wireless networking standards and their characteristics (802.11a,b,g,n, including different GHz ranges), types of network security (WPA, WEP, 802.1X, and others), point-to-point (P2P) wireless, wireless bridging
- Understand IPv4
- Understand IPv6
- Understand switches
- Understand routers

Course Number and Name: **IST 2234   Network Implementation**

Description: This course is the culmination of all concepts learned in the network curriculum. Topics include planning, installation, evaluation, and maintenance of a network solution.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Network Planning and Design (IST 2224)

Student Learning Outcomes:
The student will

1. Extend a local area network (LAN) to a wide area network (WAN).
    a. Differentiate between LAN technologies and WAN technologies.
    b. Discuss WAN protocols (PPP, PPPoE, and frame relay).
    c. Implement WAN protocols.

2. Discuss solutions for IP address shortage.
    a. Discuss IPv4 and IPv6.
    b. Explain network address translation (NAT) and port address translation (PAT).
    c. Explain DHCP.
    d. Implement NAT and PAT.
    e. Implement DHCP.

3. Plan and implement a network solution.
    a. Perform analysis and design of hardware and software.
    b. Create a network.
    c. Test the network.
    d. Monitor and troubleshoot the network.
    e. Assess the effectiveness of the network solution.

Standards:
CompTIA Network+ Certification Exam Objectives
   3.0 Network Security
   3.5 Given a scenario, install and configure a basic firewall.
   3.6 Explain the purpose of various network access control models.
   4.0 Toubleshooting
   4.1 Given a scenario, implement the following network troubleshooting methlogy.
   4.2 Given a scenario, anlyze and interpret the output of troubleshooting tools.
   4.3 Given a scenario, troubleshoot and resolve common wireless issues.
   4.4 Given a scenario, troubleshoot and resolve common coper cable issues.
   4.5 Given a scenario troubleshoot and resolve common fiber cable issues.
   4.6 Given a scenario troubleshoot and resolve common network issues.
   4.7 Given a scenario, troubleshoot and resolve common security issues.
   4.8 Given a scenario, troubleshoot and resolve common WAN issues.

5.0 Industry Standards, Practices and Network Theory

5.5 Given a scenario, implement the appropriate policies or procedures.

5.6 Summarize safety practices.

5.7 Given a scenario, install and configure equipment in the appropriate location using best practices.

5.8 Explain the basics of change management procedures.

Miscrosoft Technology Associate (MTA) Networking Fundamentals Exam

- Virtual Private Network (VPN), security zones, firewalls

- Perimeter networks; addressing; reserved address ranges for local use (including local loopback IP), VLANs; weird LAN and wireless LAN

- Understand wide area networks (WANs)

- Leased lines, dial-up, ISDN, VPN T1, T3,E1, E3, DSL, cable, and more, and their characteristics (speed, availability)

- Understand routers

- Understand IPv4

- Understand IPv6

Course Number and Name: **IST 2254   Advanced Network Administration Using Microsoft©**
Windows© Server

Description: This course is a continuation of Network Administration Using Microsoft© Windows Server. Emphasis is placed on installation, configuration, and implementation of a functional server

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Network Administration Using Microsoft© Windows Server (IST 1244)

Student Learning Outcomes:
The student will

1. Install a Windows server.
   a. Compare upgrade options.
   b. Prepare computer for installation.
   c. Complete a server installation.
   d. Prepare server for server-based client installation.
   e. Complete a server upgrade.

2. Use tools to configure a Windows server.
   a. Discuss the registry.
   b. Discuss the control panel components.
   c. Examine administrative tools.
   d. Examine the policy editor.
   e. Examine the registry editor.

3. Plan system policy and policy inheritance.
   a. Explain system policies and how they work.
   b. Implement system policy at local, site, domain, and organization unit levels.
   c. Examine policy templates.

4. Design network infrastructure.
   a. Plan the installation of network services.
   b. Implement Active Directory domain.
   c. Examine Windows DHCP management tool.
   d. Discuss Windows Internet naming service (WINS).
   e. Illustrate distributed processing.
   f. Contrast dial-up networking and remote routing access service (RRAS).
   g. Implement a RRAS Server.
   h. Discuss terminal services.
   i. Implement remote access for the administrator.
   j. Implement Windows backup service.

5. Summarize Microsoft© Server networking strategies.
   a. Differentiate between Internet and intranet.

b. Explain Microsoft© Internet strategy.

c. Configure Internet information server (IIS).

d. Discuss interoperability with other platforms.

6. Integrate network clients.
   a. Discuss licensing.
   b. Create installation startup disks.
   c. Connect clients.

7. Discuss file replication and directory replication.
   a. Explain DFS.
   b. Explain directory replication.

8. Audit system resources.
   a. Discuss resource auditing.
   b. Create audit policy.
   c. Perform system resource auditing.
   d. Report and analyze information from audit logs.

9. Monitor system resources.
   a. Discuss system resource monitoring.
   b. Use utilities to manage server properties.
   c. Apply system alerts using the performance tool.
   d. Perform remote administration.

10. Explore the boot process.
    a. Discuss failures in the boot process.
    b. Examine the recovery console.
    c. Discuss automated system recovery (ASR).

11. Tune and troubleshoot server.
    a. Identify bottlenecks.
    b. Examine basic troubleshooting techniques.

12. Plan for and perform disaster recovery.

13. Discuss and implement RRAS.
    a. Discuss remote access capabilities.
    b. Implement server as a router.
    c. Implement server as a VPN server.

Course Number and Name: **IST 2264   Advanced Network Administration Using Linux**

Description: This course is a continuation of Network Administration Using Linux. This is an advanced administration course in network services for Linux users who wish to increase their skills. Students will learn how to apply security to network user profiles and resources, manage and compile the Linux kernel, manage network clients, and troubleshoot network processes and services.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Network Administration Using Linux (IST 1254)

Student Learning Outcomes:
The student will

   1. Install and implement a Samba server.
           a. Discuss smb, cifs, and data sharing with Windows operating systems.
           b. Discover and connect to Windows computers.
           c. Configure Windows clients.
           d. Complete a share that can be seen in the Windows Network Neighborhood.

   2. Apply file system management.
           a. Explain partitions and partitioning software such as f disk.
           b. Install drivers and mount an NTFS partition.
           c. Edit /etc/fstab to mount a partition at boot.
           d. Demonstrate repair of a file system with fsck.

   3. Manage backup and recovery strategies and techniques.
           a. Develop a backup strategy.
           b. Discuss and assess backup media.
           c. Demonstrate file backup and recovery with tar.
           d. Demonstrate data backup and recovery with dd.

   4. Create a secure server.
           a. Discriminate between necessary system services and unnecessary system services.
           b. Discover and restrict suid access to applications and to system and shared accounts.
           c. Install and implement a network firewall.
           d. Appraise firewall effectiveness.
           e . Test the firewall.

   5. Develop shell scripts.
           a. Discuss task automation via shell scripting.
           b. Build scripts using basic script elements.
           c. Use script variables and control structures.
           d. Use iteration constructs.
           e. Investigate advanced scripting techniques.

6. Compile software from source code.
   a. Discuss the basics of C programming.
   b. Use the gnu C compiler (gcc and g++).
   c. Discuss the concept of shared libraries.
   d. Perform a standard build process.
   e. Compile a kernel from source.
   f. Investigate Linux socket programming and network applications.

Course Number and Name: **IST 2314 System Analysis and Design**

Description: This course introduces techniques used in systems analysis and design. Emphasis will be placed on the design, development, an implementation of an information system

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: At least one introductory programming language course.

Student Learning Outcomes:
The student will

1. Examine the role of systems analysts.
    a. Identify the functions of systems analysts.
    b. Identify skills required for systems analysts.

2. Demonstrate the steps involved in a system project.
    a. Employ the phases in a system project.
    b. Employ basic fact-gathering techniques.

3. Discuss initiation of a system project and preliminary investigation.
    a. Plan the objectives of preliminary investigation.
    b. Conduct a preliminary investigation.

4. Apply a detailed system investigation and analysis.
    a. Use detailed system investigation techniques.
    b. Record facts gathered in a detailed system investigation.

5. Apply the system design phase.
    a. Use the steps in system design.
    b. Design system output files, system input files, and processing.
    c. Present system design to management.

6. Apply system development techniques.
    a. Demonstrate the tasks involved in systems development.
    b. Write programming specifications.
    c. Program, test, and document the system.

7. Apply system implementation and evaluation.
    a. Plan the conversion method for existing files.
    b. Convert existing files.
    c. Implement the system.
    d. Conduct post-implementation evaluation.

Course Number and Name: IST 2324 Script Programming Language

Description: This course is an introduction to the use of integrating scripts to add functionality to Web pages.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Explore script programming fundamentals.
    a. Explain scripting languages.
    b. Discuss various scripting languages.
    c. Discuss client-side versus server-side.
    d. Demonstrate embedding in HTML.

2. Examine programming language fundamentals and syntax.
    a. Explain objects, variables, data types, and scope.
    b. Implement control structures, operators, logical expressions, and statements.
    c. Use functions, methods, procedures, subroutines, modules, etc.
    d. Discuss inline scripting, simple user events, and the on Load and on Unload event handlers.

3. Examine script control structures and statements.
    a. Discuss decision statements.
    b. Describe repetition statements.

4. Explain script functions, methods, and events.
    a. Explain functions.
    b. Discuss defining and calling functions.
    c. Discuss event handlers.

5. Discuss script cookies and security.
    a. Explain the state information.
    b. Describe query strings.
    c. Save state information with cookies.
    d. Explain script security issues.

6. Explore the server-side environment.
    a. Differentiate between server-side and client-side programming.
    b. Discuss middleware.
    c. Illustrate the data flow process.
    d. Download, install, and/or configure required software.

7. Explain string manipulation.
    a. Use built-in string functions.
    b. Employ regular expressions and pattern matching.

8. Demonstrate form processing.
   a. Evaluate form submission methods.
   b. Validate and process user-entered data.
   c. Create form-based file upload.

Course Number and Name: **IST 2334 Advanced Visual BASIC Programming Language**

Description: This course is a continuation of the Visual BASIC Programming Language
                                        course.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Visual BASIC Programming Language (IST 1314)

Student Learning Outcomes:
The student will

1. Use array/table structures.
    a. Create programs that require defining, loading, and searching an array/table.
    b. Create programs that use arrays to store data.

2. Demonstrate database access.
    a. Retrieve and process data.
    b. Update/maintain database records.
    c. Compose basic SQL statements.

3. Demonstrate the use of controls and properties for database files.
    a. Build an application that uses the data control or data adapters and data sets.
    b. Build an application using the data grid control.

4. Use text files.
    a. Create and read data files.
    b. Read and write records to a data file.
    c. Use error checking on files.

5. Build multi-tier programs.
    a. Create your own class and instance based on the class.
    b. Divide an application into multiple tiers.

6. Create Web applications.
    a. Create a Web form.
    b. Create a data-driven application.

Course Number and Name: **IST 2344 Database Programming and Design**

Description: This course will introduce programming using a database
                                              management software application. Emphasis will be placed on menus
                                              and file maintenance.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Visual Basic Programming (IST 1314)

Student Learning Outcomes:
The student will

1. Discuss the phases involved in developing a project.
    a. Identify each phase and its importance during project development.

2. Create a database management system
   a. Define basic terminology.
   b. Create a DBMS using multiple tables, simple and compound queries, complex forms, and complex
   reports, to include the following:
   (1) Multiple tables with data types, input mask, validation rules, etc.
   (2) Simple and compound queries that sort, extract, and delete information from tables
   (3) Complex forms that edit, delete, and add information to tables
   (4) Complex reports that sort, calculate, and retrieve information from queries and multiple tables, switchboards, and passwords

3. Implement a database as the backend of a project.
   a. Using the created DBMS, remove all features except tables.
   b. Create the user interface using Visual BASIC (VB), including calculations, additions, deletions, and modifications of fields in the DBMS tables

Course Number and Name: **IST 2354 Advanced RPG Programming Language**

Description: This course is a continuation of the RPG Programming Language
course. Emphasis is placed on advanced table processing, file
maintenance, and interactive programming

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: RPG Programming (IST 1324)

Student Learning Outcomes:
The student will

1. Integrate RPG techniques to develop interactive applications.
    a. Illustrate table and array definition techniques.
    b. Illustrate methods of loading data into tables and arrays.
    c. Illustrate techniques to search tables and arrays.
    d. Develop an RPG program using table and array techniques.

2. Create interactive applications using RPG techniques.
    a. Create display screen formats to be used in RPG interactive application programs.
    b. Use RPG programming theory and techniques to develop interactive RPG programs to
    maintain database files.

3. Demonstrate the ability to create, compile, and test CL programs.
    a. Explore parameters and their flexibility.
    b. Declare and manipulate program variables.
    c. Investigate CL control structures.
    d. Use files and data areas in a CL program.

4. Produce and evaluate business applications of the RPG language using the program
   development cycle. Complete a case study that requires the use of RPG to do the following:
    a. Use design tools to plan and design.
    b. Enter and compile using a mid-range computer.
    c. Test and correct using appropriate test data.
    d. Document using comments.

Course Number and Name: **IST 2364 Advanced COBOL Programming Language**

Description: This course will introduce programming using a database management software application. Emphasis will be placed on menus and file maintenance.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: COBOL Programming Language (IST 1334)

Student Learning Outcomes:
The student will

    1. Create programs for processing tables/arrays.
        a. Create programs with single-dimensional tables/arrays.
        b. Create programs with multi-dimensional tables/arrays.

    2. Use multiple level tables/arrays.
        a. Formulate sequential searches.
        b. Formulate binary searches.

    3. Create programs that re-sequence data.
        a. Develop a program that incorporates a sort routine.
        b. Use the merge command.
        c. Employ logical files.

    4. Create a program that illustrates file maintenance techniques.
        a. Create a program that adds records to a file.
        b. Create a program that changes records in a file.
        c. Create a program that deletes records from a file.

    5. Apply interactive programming techniques.
        a. Develop a program that uses screens for input and output.
        b. Develop a program that uses subfile processing.

Course Number and Name: **IST 2374**   **C++ Programming Language**

Description: This course is designed to introduce the student to the C++ programming language and its basic functions

Hour Breakdown

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Demonstrate proper programming techniques.
    a. Use structured design and coding techniques in all programs.

2. Use fundamental C++ concepts.
    a. Develop programs that use the following:
       (1) Input/output
       (2) Arithmetic operations
       (3) Operator precedence

3. Use decision-making techniques.
    a. Develop a program using conditional and relational operations.
    b. Develop a program using a switch statement.

4. Use repetitive structures.
    a. Create programs using various loops.

5. Develop a program that uses preprocessor commands.

6. Use functions.
    a. Prepare programs that pass parameters to functions by reference and by value.
    b. Use recursive function calls in a program.

7. Use C++ string handling capabilities.
    a. Create a program using string manipulation.

Microsoft Technology Associate (MTA)
- Understand the fundamentals of classes
- Understand inheritance
- Understand polymorphism
- Understand encapsulation
- Understand application life cycle management

Course Number and Name: **IST 2384   Advanced C++ Programming Language**

Description   This course is a continuation of the C++ Programming Language course

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: C++ Programming Language (IST 2374)

Student Learning Outcomes:
The student will

1. Use array processing.
    a. Create a program that uses a single-dimension array.
    b. Create a program that uses a multidimensional array.

2. Review pointers and linked lists.

3. Review functions.
    a. Discuss passing arguments by reference and value.
    b. Discuss recursive functions.
    c. Describe points to functions.
    d. Explore arrays as function arguments.

4. Classify user-defined data types.
    a. Explain the typedef statement.
    b. Examine enumerated types.
    c. Compare named and anonymous data types.
    d. Create and employ user-written header files.

5. Explore records (C++ Structs).
    a. Analyze records, arrays of records, and hierarchical records.
    b. Implement appropriate data structures.

6. Demonstrate classes and data abstraction.
    a. Compare public and private class members.
    b. Explain class scope and information hiding.
    c. Compile and link a multifile program.
    d. Discuss constructors and deconstructors.

7. Create object-oriented programming
    a. Explain objects.
    b. Discuss inheritance and composition.
    c. List the steps in object-oriented design.

8. Evaluate linked structures.
    a. Compare sequential structures and linked structures.
    b. Explore dynamic data representation.

9. Develop exception-handling routines.
   a. Evaluate exception-handling types.
   b. Examine exception hierarchies and resource management.
   c. Design programs that include exception handlers.

Course Number and Name: **IST 2394   Enterprise Resource Planning (ERP) Concepts**

Description   To gain a basic understanding of the different parts involved with an
ERP system and how these are used by businesses.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Discuss EPR concepts as used with in business processes.
    a. Discuss the Planning process.
    b. Discuss Accounts Receivable.
    c. Discuss Accounts Payable
    d. Discuss Manufacturing .
    e. Discuss Warehousing
    f. Discuss Shipping

2. Discuss different ERP software packages

3. Explain EPR system using modular structure, data flow and interconnections.
    a. Discuss how purchasing is driven by manufacturing.
    b. Discuss process improvement.
    c. Discuss workflow tools.

4. Discuss Supply Chain
    a. Discuss Make to Order
    b. Discuss Make to Stock
    c. Discuss Material Requirements Planning (MRP)
    d. Discuss Distribution Resource Planning (DRP)
    e. Discuss Capacity Planning as related to MRP/ DRP

5. Discuss ERP systems reporting
    a. Discuss how inventory control and production reporting affects the scope of a project.
    b. Discuss various reports.

Course Number and Name: **IST 2424   XML   Programming**

Description: This course provides a comprehensive understanding of the
                                                        Extensible Markup Language (XML)

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Outline the history and development of SGML, HTML, and XML.
    a.Summarize evolution of XML.
    b.Explore XML development organizations.
    c.Examine W3C specifications and guidelines.
    d.Discuss XML directives.
    e.Examine XML-driven technologies.
        (1)Outline the XML family of technologies.
        (2)Compare various XML-based languages.

2. Compare XML tools; explore document components and structure.
    a.Use XML creation and editing software.
    b.Examine XML browsers.
    c.Explain XML parsers.
    d.Explain XML tags.
    e.Discuss XML elements and attributes.
    f.Compare parent–child relationships.
    g.Create well-formed XML documents.
    h.Define the XML namespace.

3. Assess XML validation, transformation, and styling.
    a.Discuss the document object model (DOM).
    b.Describe XML document type declarations.
    c.Explain XML encoding.
    d.Use XML validator.
    e.Analyze XML schemas.
    f.Differentiate CSS, XSL, and XSLT.
    g.Critique style sheet syntax
    h.Discover data binding and data islands.

Course Number and Name: **IST 2434   Server-side Programming I**

Description: This course provides the student with an introduction to creating dynamic Web applications using server-side technologies.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Client-Side Programming (IST 1414)

Student Learning Outcomes:
The student will

   1. Create Web applications using server-side technologies.
        a. Explore the server-side environment.
             (1) Differentiate between server-side and client-side programming.
             (2) Discuss middleware.
             (3) Illustrate the data flow process.
             (4) Download, install, and/or configure required software.
        b. Examine programming language fundamentals and syntax.
              (1) Explain objects, variables, data types, and scope.
              (2) Implement control structures, operators, logical expressions, and statements.
              (3) Use functions, methods, procedures, subroutines, modules, etc.
        c. Explain string manipulation.
              (1) Use built-in string functions.
             (2) Employ regular expressions and pattern matching.
        d. Demonstrate form processing.
             (1) Evaluate form submission methods.
             (2) Validate and process user-entered data.
             (3) Create form-based file upload.
        e. Discuss file system interaction and directory services.
             (1) Demonstrate file object creation and destruction.
             (2) Use directory functions.
             (3) Create, delete, and move files and directories.
             (4) Retrieve and change file properties.
             (5) Identify file opening modes.
             (6) Read, write, and append file data.
        f. Use Web database technologies.
             (1) Identify data-driven content.
             (2) Explore SQL fundamentals.
             (3) Establish database connectivity.
             (4) Perform database operations.

Course Number and Name: **IST 2444   Server-side Programming II**

Description: This course is a continuation of Server-side Programming I with an increased emphasis on data-driven content

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Server-side Programming I (IST 2434)

Student Learning Outcomes:
The student will

1. Create Web applications using advanced server-side technologies.
    a. Extend programming capabilities.
        (1) Discuss, install, and use add-ins, modules, and so forth.
    b. Identify benefits of reusable code.
        (1) Discuss parameters, scope, and passing data.
        (2) Return data from functions, methods, procedures, subroutines, modules, etc.
    c. Explore object-oriented programming concepts.
        (1) Illustrate classes and objects.
        (2) Explain polymorphism and inheritance.
        (3) Discuss class structure, constructors, deconstructors, and instantiation.
        (4) Demonstrate use of class attributes and call class operations.
    d. Employ application structure techniques.
        (1) Diagram application architecture.
        (2) Discuss coding standards and practices.
        (3) Establish naming conventions.
        (4) Demonstrate use of standard directory structure.
        (5) Organize code into logical units.
    e. Maintain the state between the client and server.
        (1) Describe the uses and types of cookies.
        (2) Create, modify, read, and delete cookies.
        (3) Discuss session identifiers.
        (4) Store, retrieve, and remove session variables.
    f. Analyze security issues.
        (1) Explore error handling techniques.
        (2) Discuss user authentication procedures.
        (3) Demonstrate encryption methods.

Course Number and Name: **IST 2454   Mobile Application Development**

Description: The emergence of a new generation of highly-capable devices and
platforms has opened up opportunities for application developers.
mobile development differs from conventional desktop development in
that mobile devices operate in a constrained world with smaller screens,
slower network connections, as well as limited memory and processing
power.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Distinguish between the types of application platforms.
    a. Identify and evaluate desktop applications.
    b. Identify and evaluate native mobile applications.
    c. Identify and evaluate Internet/Web-based applications.

2. Recognize the benefits, implications, and significance of mobile applications.
    a. Discuss the convenience and mobility of mobile applications.
    b. Examine the competition among businesses and organizations caused by the
       emergence of mobile applications
    c. Examine the security issues involved with mobile applications.

3. Compare existing software technologies used in the development of mobile applications.
    a. Evaluate Xcode software (Cocoa Frameworks/Objective-C/iOS simulator/Swift).
    b. Evaluate Eclipse software (Android development tools/Android application
       framework/Java/Android device simulator).
    c. Evaluate Windows Phone software (Windows Phone SDK, Visual Studio)
    d. Evaluate other software technologies as developed.

4. Compare the hardware used by mobile applications.
    a. Investigate smartphone hardware and its capabilities.
    b. Investigate tablet hardware and its capabilities.

5. Design effective user interfaces for mobile platforms.
    a. Demonstrate effective use of screen real estate.
    b. Demonstrate effective use of accelerometers, global positioning systems, and other
       onboard devices.
    c. Demonstrate effective use of touch input.

6. Design and deliver a mobile application.
    a. Demonstrate effective use of object-oriented programming in the design of mobile
       applications.

7. Discuss the distribution methods of mobile applications.
      a. Compare the various channels for application distribution.

Course Number and Name: IST 2464   PowerShell Programming

Description: This course is designed to introduce the student to the PowerShell command line language and its use in monitoring and maintaining Microsoft$^{©}$ network. The student will become familiar with the syntax of the command.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	3	2	75

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Formulate a basic understanding the PowerShell interface.
    a. Creating Command Line Functionality
    b. Creating Text Based Scripts
    c. Executing Scripts

2. Demonstrate the use of Basic Programming elements
    a. Use Variables
    b. Use Functions
    c. Use Conditional Statements
    d. Use Objects and Members

3. Understand Cmdlets
    a. Explain the Verb-Noun Structure
    b. Differentiate Between Arguments and Switches
    c. Explain Aliases

4. Evaluate Externals
    a. Gather External Variables
    b. Collect Local Data
    c. Publish Local Data

5. Explore Data Manipulation
    a. Incorporate Collections
    b. Incorporate External Objects

6. Gather User Input
    a. Analyze Text Input
    b. Analyze External Data

7. Debug and Test Program
    a. Correct Syntax Errors
    b. Correct Runtime Errors

Course Number and Name: IST 2473   E-commerce Strategies

Description: This course provides opportunities for students to examine strategies and products available for building electronic commerce sites, how such sites are managed, and to explore how they can complement an existing business infrastructure. Students get hands-on experience implementing the technology to engage cardholders, merchants, issues, payment gateways, and other parties in electronic transactions

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Design electronic commerce sites.
    a. Construct an online product promotion.
        (1) Identify Web marketing goals.
        (2) Examine existing Web marketing models.
        (3) Create marketing goals and strategies.
        (4) Identify the target market.
        (5) Evaluate positive and negative growth factors.
        (6) Compute product pricing.
        (7) Specify product distribution and availability.
        (8) Generate banner ads.
        (9) Track banner ads.
        (10) Develop customer incentives.
        (11) Manipulate search engine placement.
        (12) Design effective e-mail marketing strategies
    b. Critique e-business models.
        (1) Assess e-service methods.
        (2) Differentiate between synchronous and asynchronous services.
        (3) Create user-friendly self-service strategies.
        (4) Analyze successful customer relationship management practices.
        (5) Identify customer relationship management (CRM) software.
        (6) Compare customized, interactive Web sites that exemplify effective CRM strategies.
        (7) Differentiate business to business, business to consumer, consumer to business, and consumer to consumer models.
        (8) Describe market places, portals, and hubs.
        (9) Explain supply chains and procurement.
        (10) Discuss inventory, freight and shipping arrangements, and order tracking processes.
        (11) Identify interoffice productivity and cost reduction tools
    c. Develop storefront solutions.
        (1) Determine outsourcing needs.
        (2) Appraise storefront packages.

(3) Define security, privacy, and ethical issues (i.e., credit card transaction, copyrights, encryption, and cookies).

(4) Assess Web site performance.

 (a) Test links.

 (b) Measure download time on different connection speeds.

d. Discuss payment systems and security.

 (1) Discuss electronic payment media.

 (2) Describe e-commerce threats.

 (3) Explain encryption methods.

Course Number and Name: **IST 2483   Web Server**

Description: This course introduces students to Web, e-mail, and proxy servers and
                                   the platforms on which they reside. Students will be able to install and
                                   configure Web, e-mail, and proxy servers

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Select, install, and configure Web, e-mail, and proxy servers.
   a. Install a network server operating system.
      (1) Compare the advantages and disadvantages of current net server operating system.
      (2) Install and configure a network service operating system.
      (3) Install and configure protocols.
      (4) Set up user accounts.
      (5) Set up domains (DNS).
      (6) Implement network security procedures.
   b. Configure user network management, security, and permissions.
   c. Use Internet services (FTP, SSH, etc.).
   d. Install Web server components.
      (1) Compare advantages and disadvantages of current Web server applications.
      (2) Discuss Web server and platform dependence.
      (3) Discuss e-commerce issues (i.e., security, catalogs, shopping carts, and database directories).
      (4) Discuss aliases and virtual directories.
      (5) Install and name a Web server.
      (6) Configure a Web server to host Web sites.
      (7) Configure an ODBC connection.
      (8) Configure Web server security features.
      (9) Analyze Web server performance.
      (10) Configure a proxy server.
   e. Explore e-mail servers.
      (1) Discuss e-mail server software.
      (2) Install e-mail server software.
      (3) Configure SMTP.
      (4) Configure POP3.
      (5) Discuss and configure Web mail.

Course Number and Name: IST 2514 Advanced Architecture and Administration

Description: This course is a continuation of Database Architecture and Administration. It is designed to provide a firm foundation in basic database tasks, enabling students to design, create, and maintain a database. Students will gain a conceptual understanding of database architecture and how its components work and interact with one another. Students will also learn how to create an operational database and properly manage the various structures

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Database Architecture and Administration (IST 1534)

Student Learning Outcomes:
The student will

1. Manage "undo" data.
> a. Describe "undo" data.
> b. Understand transactions as they relate to "undo" data.

2. Implement database security.
> a. Describe database security.
> b. Use standard database auditing.

3. Perform database maintenance.
> a. Gather and manage statistics.
> b. Manage alert notifications and set thresholds.

4. Discuss performance management.

5. Discuss backup and recovery concepts.
> a. Identify the types of failures that can occur in a database.
> b. Identify the importance of checkpoints, redo log files, and archived log files.
> c. Create and manage database backups.
> d. Perform database recovery.

6. Describe and use methods to move data.

Course Number and Name: **IST 2524 Linux Operating System Fundamentals**

Description: In this course, students develop proficiency in using and customizing a Linux operating system for common command line processes and desktop productivity roles

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: IT Foundations (IST 1124) or Operating Platforms (CPT 1333) and Systems Maintenance (CNT 2423/CPT 2383)

Student Learning Outcomes:
The student will

1. Navigate and use the Linux file and directory system.
   a. Identify the components of the Linux User Interface.
   b. Explain the Linux file system.
   c. Use Linux commands.
   d. Manipulate files and directories.

2. Manage users, groups, and system information.
   a. Identify types of users and groups.
   b. Identify various user and system information commands.

3. Implement file and directory access permissions.
   a. Change file access permissions.
   b. Allocate access permissions.

4. Use the vi editor for editing text.
   a. Create and edit files with the vi editor.
   b. Use vi commands for editing text.

5. Discuss shells and environment variables.

Course Number and Name: **IST 2534 IT Project Management**

Description: In this course, students develop proficiency in using and customizing a project timeline for IT implementation.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Explain the need for project management within IT.
   a. Describe the attributes of a project and project management.
   b. Describe the role of a project manager.

2. Outline a project life cycle.
   a. Explain project development and product development.
   b. Outline project phases.
   c. Explain the system view of a project.

3. Demonstrate project scope management.
   a. Plan the scope of a project.
   b. Define the scope of a project.

4. Demonstrate project time management.
   a. Develop project schedules.
   b. Evaluate available resources needed to recommend a project schedule.

5. Demonstrate project cost management.
   a. Differentiate various types of cost estimates.
   b. Use project management software to assist in project cost management.

Course Number and Name: **IST 2584 C# Programming Language**

Description: This course is designed to introduce the student to the C#
                                programming language and its basic functions.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

    1. Demonstrate proper programming techniques.
        a. Use structured design and coding techniques in all programs.

    2. Use fundamental C# concepts.
        a. Develop programs that use the following:
          (1) Input/output
          (2) Arithmetic operations
          (3) Operator precedence

    3. Use decision-making techniques.
        a. Develop a program using conditional and relational operations.
        b. Develop a program using a switch statement.

    4. Use repetitive structures.
        a. Create programs using various loops.

    5. Develop a program that uses preprocessor commands.

    6. Use functions.
        a. Prepare programs that pass parameters to functions by reference and by value.
        b. Use recursive function calls in a program.

    7. Use C# string handling capabilities.

Course Number and Name: **IST 2594 Advanced C# Programming Language**

Description: This course is a continuation of the C# Programming Language course

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: IST 2584 C# Programming Language

Student Learning Outcomes:
The student will

1. Use array processing.
    a. Create a program that uses a single-dimension array.
    b. Create a program that uses a multidimensional array.

2. Review pointers and linked lists.

3. Review functions.
    a. Discuss passing arguments by reference and value.
    b. Discuss recursive functions.
    c. Describe points to functions.
    d. Explore arrays as function arguments.

4. Classify user-defined data types.
    a. Explain the typedef statement.
    b. Examine enumerated types.
    c. Compare named and anonymous data types.
    d. Create and employ user-written header files.

5. Explore records (C# Structs).
    a. Analyze records, arrays of records, and hierarchical records.
    b. Implement appropriate data structures.

6. Demonstrate classes and data abstraction.
    a. Compare public and private class members.
    b. Explain class scope and information hiding.
    c. Compile and link a multifile program.
    d. Discuss constructors and deconstructors.

7. Create object-oriented programming
    a. Explain objects.
    b. Discuss inheritance and composition.
    c. List the steps in object-oriented design.

8. Evaluate linked structures.
    a. Compare sequential structures and linked structures.
    b. Explore dynamic data representation.

9. Develop exception-handling routines.

a. Evaluate exception-handling types.
b. Examine exception hierarchies and resource management.
c. Design programs that include exception handlers.

Course Number and Name: **IST 2613 Windows Security**

Description: This course provides the knowledge and fundamental understanding of Windows security, how to harden current Windows operating systems, and how to defend against attacks. Topics include designing Active Directory, authentication for Windows, group security and policy, service security, remote access security, planning a public key infrastructure, securing file resources, Internet Protocol Security, and additional Windows security topics

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Network Administration Using Microsoft© Windows Server (IST 1244)

Student Learning Outcomes:
The student will

1. Plan and configure an authentication strategy.
      a. Define the components of an authentication model.
      b. Implement an authentication strategy for internal users and Web access.
      c. Create trusts.

2. Plan and configure an authorization strategy.
      a. Define the components of an authorization strategy to include access control lists and permissions.
      b. Apply group management techniques to an authorization strategy.
      c. Explain the concept of least privilege.

3. Explain the use of security templates.
      a. Plan and create a security template.
      b. Deploy a security template with Active Directory.
      c. Deploy a security template without Active Directory.

4. Employ concepts of operating system hardening.
      a. Apply operating system hardening techniques to client systems.
      b. Apply operating system hardening techniques to server systems.
      c. Apply baseline techniques to client and server systems.
      d. Employ tools such as Microsoft© Baseline Security Analyzer.

5. Plan for operating system update and patch management.
      a. Identify update types.
      b. Formulate a plan for testing and deploying updates.

6. Install, configure, and manage certification services.
      a. Identify public key infrastructure considerations.
      b. Manage certificates.
      c. Deploy and revoke certificates.
      d. Archive and recover certificates.

   7. Plan and configure IPSec.
      a. Secure communications from host-to-host, host-to-network, and network-to-network.
      b. Identify Active Directory and authentication considerations of IPSec.

c. Use tools to configure IPSec.
d. Deploy IPSec.
e. Monitor IPSec.

8. Plan and configure a wireless network.
a. Design an authorization strategy for a wireless network.
b. Configure a wireless client.
c. Deploy WEP encryption.

9. Deploy, configure, and manage SSL certificates.
a. Configure SSL for IIS.
b. Enable SSL with other applications.
10. Identify remote access methods.
a. Configure remote access servers and clients.

Course Number and Name: **IST 2623 Linux/ Unix Security**

Description: This course provides the knowledge and fundamental understating of Linux/Unix security, how to harden Linux/Unix, and how to defend against potential attacks against vulnerabilities and unused system services. Topics include how to protect password files, monitor log files, and use port scanners and network scanners, and additional Linux/Unix security topics

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Install the Linux operating system (OS).
   a. Explain the Linux boot process.
   b. Use common Linux administration commands.

2. Design a perimeter network.
   a. Apply the principles of security services to network design.
   b. Describe firewalls, DMZs, and the appropriate allocation of network resources.

3. Implement security strategies with Linux OSs.
   a. Discuss and implement Linux OS hardening principles.
   b. Discuss and implement automated hardening utilities.
   c. Discuss and implement account and password policies.
   d. Analyze the appropriateness of various Linux services for different operating environments.
4. Discuss secure communication services.
   a. Discuss secure shell.
   b. Discuss LDAP for authentication.

5. Secure various server implementations.
   a. Implement strategies for securing database and file servers.
   b. Implement strategies for securing Web servers.
   c. Implement strategies for securing Internet e-mail.
   d. Implement strategies for securing DNS servers.

6. Identify and analyze hacking techniques.
   a. Identify Linux system weaknesses and hacker exploits.
   b. Identify Linux remote services and default port configurations.
   c. Discuss footprinting, scanning, port redirection, and other exploits.

7. Define intrusion detection.
   a. Explain the principles of intrusion detection systems.
   b. Identify the various components of intrusion detection systems.
   c. Use various intrusion detection utilities.

Course Number and Name: **IST 2634 Security Testing and Implementation**

Description: This course provides an in-depth exploration of various methods for gaining unauthorized access to networks and explores network security concepts from the point of view of hackers and their methodologies. Topics include hackers, crackers, ethical hackers, attacks, intrusion detection systems, malicious code, computer crime, and industrial espionage

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
  The student will

1. Discuss the ethical hacker concept.
   a. Discuss the importance of security.
   b. Compare and contrast penetration testing, ethical hacking, and malicious attacks.
   c. Identify the importance of ethics and the legalities of ethical hacking and penetration.
      testing
2. Identify various network and computer attacks.
   a. Analyze types of malicious software.
   b. Analyze types of attacks.
   c. Explain various hacker reconnaissance methods.

3. Summarize malicious code types.
   a. Discuss the impact of malicious code attacks.
   b. Discuss historic and infamous malicious code attacks, response, and industry-accepted management strategies.
   c. Analyze the known types of malicious code.

4. Discuss strategies for combating malicious code and other attacks.
   a. Discuss the optimum management mind-set for risk management of malicious code attacks.
   b.Explain the importance of security policy implementation as a tool for risk management of malicious code attacks.
   c. Explain the importance of training IT and non-IT employees as a critical tool for combating malicious code and other attacks.

5. Classify various infection methods for malicious code.
   a. Identify known vulnerabilities for malicious code.
   b. Identify known exploits and strategies of attack for malicious code.
   c. Discuss various defensive strategies for combating malicious code attacks.
   d. Explain the importance of appropriate incident response plans.

  6. Discuss various prevention strategies and techniques for malicious code.

a. Identify organizational considerations for preventing a malicious code attack.
b. Identify and classify current software and hardware solutions for malicious code
c. Explain the policy as a tool for prevention infection..
d. Develop an incident response plan for malicious code attacks and security violations.

7. Discuss the future of malicious code.
a. Discuss the implications of malicious code with regard to national security, homeland and infrastructure security, and information warfare.
b. Discuss efforts of the government and civilian entities to combat malicious code.

8. Summarize vulnerabilities of common computer and server operating systems.
a. Analyze Microsoft© operating system vulnerabilities.
b. Analyze Linux operating system vulnerabilities.
c. Analyze Web server vulnerabilities.
d. Analyze wireless network vulnerabilities.

9. Identify various cryptographic algorithms.
a. Compare and contrast symmetric versus asymmetric cryptographic algorithms.
b. Explain public key infrastructure.
c. Analyze possible attacks on cryptosystems.

10. Describe network security devices.
a. Compare firewall implementations.
b. Explain intrusion detection systems.
c. Explain honeypots and their implementation.

Course Number and Name: **IST 2724 Advanced Java Programming**

Description: This course is a second of a two-part series that offers students an extensive introduction into Java Programming. Students will be taught advanced concepts of arrays, inheritance, applets, and swing components.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Use multidimensional arrays
    a.   Use two-Dimensional arrays in programs
    b.   Demonstrate the use of different Array classes

2. Develop Programs using advance Inheritance concepts
    a.   Use Extend classes in programs
    b.   Use override superclasses in programs
    c.   Understand and employ information hiding in programs
    d.   Create and use Abstract Classes
    e.   Use Arrays of subclass objects

3. Process File input and Output
    a.   Open, read, search and write to files
    b.   Discuss random access data files

4. Demonstrate and understand Swing Components
    a.   Use the JFrame and JLabel in programs
    b.   Discuss event-driven programming
    c.   Demonstrate Using GUI based classes

Course Number and Name: IST 2734 Data Visualization and Marketing

Description: This course teaches students the fundamentals of data visualization
                                         and how to communicate effectively with data. Students will learn to
                                         present, explore, and understand data using various visualization tools.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Discuss data visualization
    a. Describe visual analysis concepts and terminology.
    b. Demonstrate various data visualization tools.

2. Prepare data for visualization
    a. Create data visualizations and explorations.
    b. Perform data analysis.
    c. Examine various chart types.

3. Design visualizations
    a. Examine various interfaces to effectively create visualizations.
    b. Select data sources to be used for creating reports.
    c. Enhance report effectively.

4. Describe web analytics services that provide statistics for marketing purposes.

Course Number and Name: **IST 2744   SAS Programming   II**

Description: This course is a continuation of SAS Programming. It is designed to provide a firm foundation in data manipulation techniques using SAS DATA. Students will gain an understanding of the procedures steps to access, transform, and summarize SAS data sets. Students will learn how to control SAS data set input and output, combine SAS data sets, and summarize, read, and write different types of data.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Control input and output
   a. Write observations explicitly.
   b. Write to multiple SAS data sets
   c. Select variable and observations

2. Summarize data
   a. Create an accumulating total variable
   b. Accumulate totals for a group of data

3. Read raw data files with formatted input
   a. Read raw data files with formatting input
   b. Control when a record loads

4. Use data transformations and debugging techniques
   a. Transform data by manipulating character and numeric values.
   b. Convert variable types
   c. Utilize the PUTLOG statement

5. Process data iteratively
   a. Process DO loops and conditional DO loops
   b. Use SAS arrays

6. Restructure and combine SAS data sets
   a. Demonstrate rotating with the DATA step
   b. Use data manipulation techniques with match-merging

7. Create and maintain permanent formats
   a. Use the SQL procedure
   b. Use the SAS macro language

8. Discuss other SAS languages

   a. Use the SQL procedure.
   b. Use the SAS macro language

9. Complete a project using a large set of real data.

SAS Certified Based Programmer for SAS 9 Credential
1. Accumulate sub-totals and totals using DATA step statements.
2. Use SAS functions to manipulate character data, numeric data, and SAS date values.
3. Use SAS functions such as SCAN, SUBSTR, TRIM, UPPERCASE, and LOWCASE to perform tasks.
4. Use SAS functions to convert character data to numeric and vice versa.
5. Process data using DO LOOPS.
6. Process data using one-dimensional SAS arrays.
7. Validate and clean data.
8. Generate list reports using the PRINT procedure.
9. Generate summary reports and frequency tables using base SAS procedures.
10. Enhance reports through the use of user-defined formats, titles, footnotes and SAS System reporting.
11. Generate reports using ODS statements.
12. Identify and resolve programming logic errors.
13. Recognize and correct syntax errors.
14. Examine and resolve data errors.

Course Number and Name: **IST 2753 Big Data Analytics**

Description   This course teaches Big Data concepts and technologies as well as the techniques to manage   them. Students will be introduced to emerging tolls and NoSQL (Not Only SQL) databases.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor approved

Student Learning Outcomes:
The student will

1. Discuss the concepts and terminology of big data.
   a. Describe data sets, data analytics, and business intelligence.
   b. Explore big data characteristics.
   c. Distinguish between different types of data

2. Explore enterprise technologies and Big Data Business Intelligence (BI).
   a. Discuss Online Transaction Process (OLTP), Describe Analytical Processing
   b. Describe Data Warehouses and Data Marts.
   c. Discuss traditional business intelligence versus Big Data business intelligence
   d. Discuss traditional data visualization versus data visualization for Big Data

3. Apply Big Data storage concepts
   a. Discuss various Not –only SQL (No SQL) non-relational databases.
   b. Implement a NoSQL database.

Course Number and Name: IST 291 (1-6) Supervised Work Experience in Information System Technology

Description: This course is a cooperative program between industry and education designed to integrate the student's technical studies with industrial experience. Variable credit is awarded on the basis of one semester hour per 45 industrial contact hours

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Externship	Contact Hours
1-6	0	0	3-18	45-270

Prerequisite: None

Student Learning Outcomes:
The student will

1. Follow a set of instructor-written guidelines for the supervised work experience program.

2. Apply skills needed to be a viable member of the workforce.
   a. Prepare a description of skills to be developed in the supervised work experience program.
   b. Practice skills needed to be a viable member of the workforce.

3. Practice human relationship skills in the supervised work experience program.

4. Practice positive work habits, responsibilities, and ethics.

5. Develop written occupational objectives in the supervised work experience program.

6. Assess performance of occupational skills.
   a. Prepare daily written assessments of work performance as specified in the occupational objectives.
   b. Present weekly written reports to the instructor of activities performed and objectives accomplished.

Course Number and Name: **IST 292 (1-3) Special Problems in Information System Technology**

Description

This course provides students with an opportunity to utilize skills and knowledge gained in other Information Systems Technology courses. The instructor and student work closely together to select a topic and establish criteria for completion of the project

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1-3	0	2-6	30-90

Prerequisite: Consent of instructor

Student Learning Outcomes:
The student will

1. Develop a written plan that details the activities and projects to be completed.
   - a. Use a written plan that details the activities and projects to be completed.
   - b. Perform written occupational objectives in the special problem.

2. Assess accomplishment of objectives.
   - a. Prepare daily written assessments of accomplishment of objectives.
   - b. Present weekly written reports of activities performed and objectives accomplished to the instructor.

3. Use and follow a set of written guidelines for the special problem.
   - a. Develop and follow a set of written guidelines for the special problem.
   - b. Use the FREQ, MEANS, and UNIVARIATE procedures.
   - c. Use the Output Delivery System.

Course Number and Name: **IST 293 (1-3) Special Problems in Information System Technology**

Description   This course provides students with an opportunity to utilize skills and knowledge gained in other Information Systems Technology courses. The instructor and student work closely together to select a topic and establish criteria for completion of the project

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1-3	0	2-6	30-90

Prerequisite: Consent of instructor

Student Learning Outcomes:
The student will

1. Develop a written plan that details the activities and projects to be completed.
   a. Use a written plan that details the activities and projects to be completed.
   b. Perform written occupational objectives in the special problem.

2. Assess accomplishment of objectives.
   a. Prepare daily written assessments of accomplishment of objectives.
   b. Present weekly written reports of activities performed and objectives accomplished to the instructor.

3. Use and follow a set of written guidelines for the special problem.
   a. Develop and follow a set of written guidelines for the special problem.
   b. Use the FREQ, MEANS, and UNIVARIATE procedures.
   c. Use the Output Delivery System.

Course Number and Name: **IST 294 (1-3) Special Problems in Information System Technology**

Description   This course provides students with an opportunity to utilize skills and knowledge gained in other Information Systems Technology courses. The instructor and student work closely together to select a topic and establish criteria for completion of the project

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1-3	0	2-6	30-90

Prerequisite: Consent of instructor

Student Learning Outcomes:
The student will

1. Develop a written plan that details the activities and projects to be completed.
    a. Use a written plan that details the activities and projects to be completed.
    b. Perform written occupational objectives in the special problem.

2. Assess accomplishment of objectives.
    a. Prepare daily written assessments of accomplishment of objectives.
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3. Use and follow a set of written guidelines for the special problem.
    a. Develop and follow a set of written guidelines for the special problem.
    b. Use the FREQ, MEANS, and UNIVARIATE procedures.
    c. Use the Output Delivery System.

RECOMMENDED TOOLS AND EQUIPMENT

CAPITALIZED ITEMS

1. Computer work centers, including desk and chair (1 per student)
2. Multimedia computer with speakers, sound card, and USB port for jump drive (1 per student)
   a. Color laser printer (1 per classroom)
   b. Laser printer (1 per lab)
   c. Scanner, color page (1 per lab)
   d. Internet access
3. Data projector (1 per lab)
4. Teacher workstation (laptop computer with printer, scanner, and Internet access)
5. Bank teller curriculum software

NON-CAPITALIZED ITEMS

1. Financial calculator (1 per student)
2. Digital camera
3. Telephone line with phone (dedicated)
4. Overhead projector

RECOMMENDED INSTRUCTIONAL AIDS

It is recommended that instructors have access to the following items:

1. Microsoft© Office software or equivalent productivity, latest version
2. Windows, latest version
3. QUICKEN, or equivalent financial software, latest version
4. Access to banks and loan documentation software/hardware, data communications, multimedia, presentation, scan, and clip art
5. Digital camera
6. Financial calculator

CURRICULUM DEFINITIONS AND TERMS

- Course Name – A common name that will be used by all community colleges in reporting students

- Course Abbreviation – A common abbreviation that will be used by all community and junior colleges in reporting students

- Classification – Courses may be classified as the following:
    - Career Certificate Required Course – A required course for all students completing a career certificate.
    - Technical Certificate Required Course – A required course for all students completing a technical certificate.
    - Technical Elective – Elective courses that are available for colleges to offer to students.

- Description – A short narrative that includes the major purpose(s) of the course

- Prerequisites – A listing of any courses that must be taken prior to or on enrollment in the course

- Corequisites – A listing of courses that may be taken while enrolled in the course

- Student Learning Outcomes – A listing of the student outcomes (major concepts and performances) that will enable students to demonstrate mastery of these competencies

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

- The content of the courses in this document reflects approximately 75% of the time allocated to each course. The remaining 25% of each course should be developed at the local district level and may reflect the following:
    - Additional competencies and objectives within the course related to topics not found in the state framework, including activities related to specific needs of industries in the community college district
    - Activities that develop a higher level of mastery on the existing competencies and suggested objectives
    - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed or revised
    - Activities that include integration of academic and career–technical skills and course work, school-to-work transition activities, and articulation of secondary and postsecondary career–technical programs
    - Individualized learning activities, including work-site learning activities, to better prepare individuals in the courses for their chosen occupational areas

- Sequencing of the course within a program is left to the discretion of the local college. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors. Programs that offer an Associate of Applied Science Degree must include all of the required Career Certificate courses, Technical Certificate courses **AND** a minimum of 15 semester hours of General Education Core Courses. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester. Each community college specifies the

actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college.

- In order to provide flexibility within the districts, individual courses within a framework may be customized by doing the following:

  o Adding new student learning outcomes to complement the existing competencies and suggested objectives in the program framework
  o Revising or extending the student learning outcomes
  o Adjusting the semester credit hours of a course to be up 1 hour or down 1 hour (after informing the Mississippi Community College Board [MCCB] of the change)

COURSE CROSSWALK

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Course Crosswalk
Information Systems Technology
CIP 11.0201 Computer Programming
CIP 11.0802 Database Administration
CIP 11.0901 Networking
CIP 11.1003 Information
CIP 52.1302 Data Analytics

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IST 2111	Seminar III	1	IST 2111	Seminar III	1
IST 2121	Seminar IV	1	IST 2121	Seminar IV	1
IST 2213	Network Security	3	IST 2213	Network Security	3
IST 2224	Network Planning and Design	4	IST 2224	Network Planning and Design	4
IST 2234	Network Implementation	4	IST 2234	Network Implementation	4
IST 2254	Advanced Network Administration Using Microsoft Windows Server	4	IST 2254	Advanced Network Administration Using Microsoft Windows Server	4
IST 2264	Advanced Network Administration Using Linux	4	IST 2264	Advanced Network Administration Using Linux	4
IST 2314	Systems Analysis and Design	4	IST 2314	Systems Analysis and Design	4
IST 2324	Script Programming Language	4	IST 2324	Script Programming Language	4
IST 2334	Advanced Visual BASIC Programming Language	4	IST 2334	Advanced Visual BASIC Programming Language	4
IST 2344	Database Programming and Design	4	IST 2344	Database Programming and Design	4
IST 2354	Advanced RPG Programming Language	4	IST 2354	Advanced RPG Programming Language	4
IST 2364	Advanced COBOL Programming Language	4	IST 2364	Advanced COBOL Programming Language	4
IST 2374	C Programming Language	4	IST 2374	C++ Programming Language	4
IST 2384	Advanced C Programming Language	4	IST 2384	Advanced C++ Programming Language	4
			IST 2394	Enterprise Resource Planning (ERP)	
IST 2424	XML Programming	4	IST 2424	XML Programming	4
IST 2433	Server-Side Programming I	3	IST 2434	Server-Side Programming I	4
IST 2443	Server-Side Programming II	3	IST 2444	Server-Side Programming II	4
IST 2454	Mobile Application Development	4	IST 2454	Mobile Application Development	4
	New Course		IST 2464	Power-Shell Programming	4
IST 2473	E- Commerce Strategies	3	IST 2474	E-Commerce Strategies	4
IST 2483	Web Server	3	IST 2483	Web Server	3
IST 2514	Advanced Database Architecture and Administration	4	IST 2514	Advanced Database Architecture and Administration	4
IST 2524	Linux Operating System Fundamentals	4	IST 2524	Linux Operating System Fundamentals	4
IST 2534	IT Project Management	4	IST 2534	IT Project Management	4
			IST 2584	C# Programming Language	
			IST 2594	Advanced C# Programming Language	4
IST 2613	Windows Security	3	IST 2613	Windows Security	3
IST 2623	Linux/ Unix Security	3	IST 2623	Linux/ Unix Security	3

IST 2634	Security Testing and Implementation	4	IST 2634	Security Testing and Implementation	4
			IST 2724	Advanced Java Programming	4
			IST 2734	Data Visualization and Marketing	4
			IST 2744	SAS Programming II	4
			IST 2753	Big Data Analytics	3
IST 291 (1-6)	Supervised Work Experience in Information Technology	(1-6)	IST 291 (1-6)	Supervised Work Experience in Information Technology	(1-6)
IST 292 (1-3)	Special Problems in Information Systems	(1-3)	IST 292 (1-3)	Special Problems in Information Systems	(1-3)
IST 293 (1-3)	Special Problems in Information Systems	(1-3)	IST 293 (1-3)	Special Problems in Information Systems	(1-3)
IST 294 (1-3)	Special Problems in Information Systems	(1-3)	IST 294 (1-3)	Special Problems in Information Systems	(1-3)