AAS Information Technology Summary and Justification for Changes

# Change Summary –

At first glance, this is a major change. We are adjusting our area of emphasis approach to improve flexibility for students, workforce reskilling or workforce upskilling. The inclusion of electives presents itself as a dramatic change. The typical student schedule for the current default degree path is two new courses, one different general education course and a change to how the internship path will be taken as a single course.

The typical student schedule has been adjusted so that all students will take the same technical courses in their first year. This is a huge improvement for scheduling.

The foremost statement is for the base degree plan, which is presently AAS IT IS emphasis we are proposing the inclusion of three new courses IS166 Secure Mobile Computing (5 Credits) and IS222 Secure Cloud Computing (5 Credits) and IS288 Cooperative Work Experience (no seminar) (Variable credits but recommended 2 Credits for the typical student schedule). The new courses will be replacing IS 132 Computer Law and Ethics (5-credits), IS210 Internet Programming (5-credits), IS266 Coop Work Seminar (1-Credit) and IS267 Coop Work Experience (1-credit). We are also re-phrasing our Math requirement to encourage our students to take higher level math courses if they intend to pursue BAS degrees. We are also including allowing students that intend to go directly into the BAS after completing the AAS to substitute ENGL& 235 Technical Writing with CMST&101 Introduction to Communication. BAS students will take ENGL 335 Technical Writing in the BAS program. They cannot take both ENGL&235 and ENGL335. These courses are cross listed with the significant difference is there more writing in the 300-level course. The total changes are 12 credits out of 90 (approximately 13%).

The last item we will change that doesn’t show anywhere else is to implement an application process for entry into our degree plan. This would eventually be a competitive placement program. The first few quarters might be first-in, first-out until we have a formal application cycle. We will model it after other programs with existing application processes.

# Change Justification –

The motivation for changes to accommodate ever changing needs of the technical professional career field. The two new courses add high demand skills, replacing aging and lower demand skills. The proposed changes in the degree plan presents a better emphasis structure by introducing electives to the degree. Our base AAS IT degree has been a ‘generalist’ style degree building a base of skills needed by most technical professions. Previous specialties were collapsed to ease student advising and course scheduling. Our current degree includes two first quarter courses to assist students in selecting the pathway that best fits their interests. A recent shift to online offerings has greatly eased issues with course scheduling. As we look forward, this model will make it easier to add or remove areas of emphasis to meet constant changing skill demands.

A secondary impact is a more intentional path for students seeking a BAS. Over 70% of our first quarter students declare their interest in starting the AAS as the first step of obtaining the BAS. These changes leave the AAS IT degree as an employable degree but align the general education course requirements of the BAS degree to better meet the needs of industry and the students in both degree paths.

The last item of note is that we have done a significant review of the AAS IT degree. Many of the courses have had course learning outcomes and course descriptions adjusted. Many of the courses have not been updated since they were implemented in 2006. Our designation as an NSA Center of Academic Excellence is the guide and motivator for this process.

# Learning Outcome Changes for the AAS IT Degree

## New Program Outcomes

• List computing concepts and functional elements

• Identify fundamental networking concepts

• Compare standard security concepts

• Make use of common data management technologies

• Construct functional computer scripts

## Current Program Outcomes

* Maintain and administer networks and related computing environment including computer hardware, systems software, applications software, and all configurations.
* Plan, coordinate and implement network/systems security measures to protect data, software and hardware.
* Provide users with technical support for network, computer/systems problems.
* Demonstrate professional conduct including responsibility, effective communication and ethical standards.

# Learning Outcome Changes by Class

## CS223 Programming for IT New Outcomes

* Apply programming processes within the programming language environment
* Create programs using a widely accepted programming language and tools
* Apply the basic concepts of object-oriented programming, modularity, and structured code
* Interpret logically and critically to solve problems, explain conclusions and evaluate or critique the thinking of self and others
* Apply appropriate programming style guides

## CS223 Programming for IT Current Outcomes

* Apply programming processes within the programming language environment.
* Apply the basic concepts of object-oriented programming, modularity, and structured code.
* Verify that the results obtained satisfy the original requirements.
* Think logically and critically to solve problems, explain conclusions and evaluate or critique the thinking of self and others.

## IS101 New Outcomes

* Build and maintain a person degree plan
* Identify student resources available to them at SFCC
* Identify essential skills and expectations as a college student at SFCC

## IS101 Current Outcomes

* Students evaluate the diverse job opportunities related to Information Technology.
* Students develop and maintain a precise documentation of career research, opportunities, education and training requirements.

## IS102 Current Outcomes (unchanged)

* Define common IT career paths and skills needed to start and progress in chosen paths
* Define common Cybersecurity career paths and skills needed to start and progress in chosen paths
* List skills and industry certifications needed to work in IT and Cybersecurity careers
* List skills and industry requirements for entry level IT or Cybersecurity jobs
* Select career paths that they wish to pursue
* Explain the skills and industry expectations to start and progress in selected career paths
* Describe the difference between IT and Cybersecurity career paths

## IS103 New Outcomes

* Explain how a computer works, including but not limited to hardware, network, and security features
* Describe how an operating system interacts with hardware and software and principal differences in various operating systems
* Explain how computers are networked, and the protocols that govern internet and application communication
* Explain basic cybersecurity issues regarding computer operating systems and networks
* Identify computer systems components and their functions and how the fundamentals of a processor function
* Summarize the assembly and configurations of computer systems, networks, and applications

## IS103 Current Outcomes

* Explain principal differences in various operating systems
* Identify computer systems technical specifications
* Assemble, disassemble, and configure a computer system

## IS106 Fundamental IT Applications Current Outcomes (Changed only for consistency)

* Summarize the uses of common IT applications
* Identify most appropriate application by type of business task
* Apply specific functions and actions within specific applications
* Create new projects or documents appropriate to specific business task
* Summarize features of individual applications

## IS125 Linux Fundamentals New Outcomes (change in course title)

* Configure Linux OS including installing updates, software from repositories or from source code
* Create user accounts with appropriate permissions
* Navigate and perform basic operations on a Linux computer using the command-line interface including remote access with SSH
* Describe Linux Operation System concepts and implementations
* Create Linux scripts to automate tasks

## IS125 Linux and Python Fundamentals Current Outcomes

* Configuring the Linux OS including installing updates and software from repositories
* Create user accounts with appropriate permissions
* Navigate and perform basic operations on a Linux computer using the command-line interface including remote access with SSH and shell scripting
* Compile binaries from source code
* Configure Linux as a server
* Create scheduled tasks

## IS132 Computer Ethics and Law New Outcomes (updated for consistency only)

* Analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional
* Apply case law and common law to current legal dilemmas in the technology field
* Identify diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions
* Distinguish enforceable contracts from non-enforceable contracts

## IS132 Computer Ethics and Law Current Outcomes

* Students identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.
* Students locate and apply case law and common law to current legal dilemmas in the technology field.
* Students apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
* Students distinguish enforceable contracts from non-enforceable contracts.
* Students demonstrate leadership and teamwork.

## IS141 Cyber Defender 1 Current Outcomes (unchanged)

* Explain common hacker attack methods
* Differentiate between legitimate and malicious network traffic
* Illustrate the functionality of an exploit kit
* Investigate malicious software
* Locate malicious content in network traffic
* Effectively operate password recovery software

## IS165 Networking Fundamentals Current Outcomes (changed for consistency only)

* Describe the fundamental technologies, components of a communication and data network
* Design a basic network architecture given a basic scenario
* Use a network monitoring tool to observe, identify and track simple TCP/IP packets
* Perform a basic network mapping
* Describe common network vulnerabilities

## IS166 Mobile Computing and Wireless Security New Outcomes (new course)

* Support basic mobile devices
* Identify wireless networking standards
* Identify cellular networking standards
* Describe the unique security and operational attributes in the wireless environment
* Identify how to mitigate security issues associated with wireless environments
* Compare mechanisms for association and authentication with differing cellular networks

## IS210 Internet Programming New Outcomes

* Create and modify web pages using widely accepted web development technologies
* Make use of client and server-side programming techniques and technologies
* Connect client-side web sites with back-end server pages

## IS210 Internet Programming Current Outcomes

* Structure valid Web pages using HyperText Markup Language (HTML) and XHTML
* Format Web pages using Cascading Style Sheets (CSS)
* Design usable Web pages and Web sites
* Code Web pages that are accessible to a diverse, global audience
* Organize and manage complex Web sites
* Insert images, hyperlinks, and image maps into a Web page
* Layout well–designed pages using HTML tables and frames
* Create HTML forms
* Incorporate multimedia and JavaScript to provide dynamic Web pages

## IS215 Operating Systems New Outcomes (new course)

* Identify and define key terms related to operating systems
* Define the concepts of processes, threads, asynchronous signals and competitive system resource allocation
* Explain what multi-tasking is and outline standard scheduling algorithms for multi-tasking
* Give an overview of system memory management
* Explain how file systems are implemented

## IS222 Secure Cloud Computing New Outcomes (new course)

* Describe technical mechanisms of virtualization
* Describe interfaces between elements of a virtual environment
* Describe current cloud service models and services
* Deploy a simple workload or configuration in a cloud service
* Implement basic cloud security configurations

## IS228 New Outcomes

* Apply their technology knowledge to install and configure specified software
* Construct applicable cloud technology solutions
* Implement a database solution
* Explain server and host technologies
* Select appropriate technology solutions for a given scenario

## IS228 Current Outcomes

* Students will learn to work cooperatively with their clients and communicate research needs and propose solutions.
* Students will install internet servers and troubleshoot installation related problems.
* Students will maintain internet secure servers in real world environments.
* Students will install a database service and configure it.

## IS234 Computer Forensics New Outcomes

* Define the concepts of computer forensics
* Apply the concepts of computer forensics
* Conduct basic computer forensic analysis
* Apply current forensic tools
* Summarize forensic investigation findings

## IS234 Computer Forensics Current Outcomes

* Analysis/Problem Solving and information literacy:
  + Students evaluate a problem as being a possible case.
  + Students develop a forensic case using the industry-approved methodology.
  + Students develop and maintain a precise journal / log.
* Communications
  + Students collect information from investigated person and/or client.
  + Students formulate a complete and adequate process plan and measure against it.
  + Students present their conclusion to the rest of the class.
* 3 Responsibility: Students are responsible for own work

## IS241 Cyber Defender 2 Current Outcomes (unchanged)

* Analyze computer memory
* Identify suspicious activities or software using forensic software
* Write a technical analysis of a computer compromise
* Demonstrate the ability to locate information using open source intelligence
* Illustrate a timeline of a computer compromise
* Operate network traffic analysis software

## IS243 Malware Analysis and Exploitation Current Outcomes (unchanged)

* Analyze executable files
* Conduct open source intelligence
* Execute a SQL injection attack
* Develop shellcode exploits
* Deploy social engineering attacks
* Illustrate a successful computer hack and exfiltration of data
* Explain advanced hacker methodologies

## IS244 Network Security 1 New Outcomes

* Define the principal concepts of cybersecurity including common industry vocabulary
* Identify bad actors on the Internet, their motivations, and common attack techniques
* Describe the relationship between security and usability of a computer system
* Describe and compare common risk analysis methods
* Identify optimal risk method based on advantages of each model given a specific scenario
* List common cybersecurity resources such as US-CERT, Mitre, SANS, etc.
* Identify common security failures and methods to remediate those failures

## IS244 Network Security 1 Current Outcomes

* Analysis/Problem Solving and information literacy:
  + Students develop a secure computer network plan.
  + Students evaluate and recognize a problem as being a possible network security threat.
  + Students need to understand the security issues involved with different Network operating systems.
* Communications
  + Students collect information from Computer network logs.
  + Students formulate a complete and adequate counter measure plan and prepare against it.
  + Students present their findings to the rest of the class.
* Responsibility: Students are responsible for their own work.

## IS245 Network Security 2 New Outcomes

* Identify network attackers, attacks, different types of malicious software
* Identify network defense tools and how they can be used to defend against attackers
* Develop a secure computer network plan incorporating key concepts of network defense strategies
* Explain how to access network and computer security policies and procedures via auditing
* Identify elements of a cryptographic system
* Explain how to effectively apply encryption tools, techniques and protocols
* Differentiate between symmetric and asymmetric algorithms
* Describe how relevant US and State laws impact data ownership and legal issues relevant to security

## IS245 Network Security 2 Current Outcomes

* Analysis/Problem Solving and information literacy:
  + Students develop a secure network defense plan.
  + Students evaluate and recognize a problem as being a possible network security threat.
  + Students need to understand the security issues involved with different firewall and intrusion detection technologies.
* Communications
  + Students collect information from firewall Devices logs.
  + Students formulate a complete and adequate counter measure plan and prepare against it.
  + Students present their findings to the rest of the class.
* Responsibility: Students are responsible for their own work.

## IS260 Data Base Theory New Outcomes

* Explain the importance of databases in the business environment
* Describe relational databases and SQL
* Normalize a database
* Explain triggers and other stored procedures
* Summarize transactions and locking to avoid deadlocks
* Explain the causes of splintering and corruption of databases.
* Identify database administration activities such as creating using user accounts and permissions and the backing up and restoring of a database.

## IS260 Data Base Theory Current Outcomes

* Understand the importance of databases in the business environment.
* Describe and use the five database models.
* Describe relational databases and SQL.
* Normalize a database.
* Understand the causes of splintering and corruption of databases.
* Describe and design a data warehouse and perform data mining.

## IS262 Network Management Current Outcomes (unchanged)

* Students will demonstrate the industry networking by implementing a network based on these standards.
* Students will be able to install, configure and maintain a network operating system.
* Students will demonstrate their abilities in designing a Local Area Network (LAN) according to specific business needs.

## IS288 Cooperative Education Work Experience (No Seminar) New Outcomes

* Integrate previous experience and classroom knowledge into a practical work situation.
* 2. Become oriented to the world of work.