Subject:	CIS
Course Number:	198
Descriptive Title:	Networking and Cybersecurity Capstone
Division:	Business
Department:	Computer Information Systems
Course Disciplines:	Computer Information Systems
Catalog Description:	This capstone course focuses on the culmination of skills, knowledge, and abilities that students learn in their earlier CIS courses. As a course designed to be taken during their final semester, students work on and manage a semester-long project to develop a solution to a complex real-world enterprise problem. Students work in groups to analyze a business problem, propose and design a solution, build the technical implementation, and document their findings. Technology used includes end-user computer systems, routers, switches, computer servers, database servers, application servers, web servers, virtual private networks, cloud infrastructure, and directory services. Students explore solutions using Microsoft Windows, Linux, and other operating systems as possible pieces to their solution. Networking and Cybersecurity Capstone is designed to be taken by students earning one of the following: • CIS AS Degree with the Networking Track • CIS AS Degree with the Cybersecurity Track • Cybersecurity Certificate • Cisco Networking Certificate
Prerequisite:	Students need to have completed at least two of the following courses with a minimum grade of C or equivalent experience • Computer Information Systems 40 • Computer Information Systems 48 • Computer Information Systems 137 • Computer Information Systems 141 • Computer Information Systems 119
Co-requisite:	
Recommended Preparation:	• Computer Information Systems 13 • Computer Information Systems 18 • Computer Information Systems 150
Enrollment Limitation:	
Hours Lecture (per week):	2
Hours Laboratory (per week):	4
Outside Study Hours:	4
Total Course Hours:	108
Course Units:	3
Grading Method:	Letter Grade and Pass/No Pass

Credit Status:	Credit, degree applicable
Transfer CSU:	Yes
Effective Date:	
Transfer UC:	Yes
Effective Date:	
General Education ECC:	
Term:	
Other:	
CSU GE:	
Term:	
Other:	
IGETC:	
Term:	
Other:	
CalGETC:	
Term:	
Other:	
Student Learning Outcomes:	At the end of this course, students will be able to: 1. Install, configure, manage, secure and troubleshoot a small office/home office network wired or wireless). 2. Install, configure and manage client and server operating systems. 3. Configure and deploy a data-driven web application
Course Objectives:	1. Review and analyze a request for proposal from a business needing a technical solution. 2. Apply project management fundamentals to a complex information technology project. 3. Deploy application services, databases, and microservices using virtualization in containerization technology. 4. Applied layered security principles to harden a network infrastructure. 5. Apply OSI layer principles to design a complex network as part of a project solution. 6. Research various tools used to test data security. 7. Present a proposal to a tactical solution to an audience of diverse technical proficiency. 8. Communicate challenges of a project with team members to ensure collaborative input towards a solution. 9. Accurately calculate cost estimates for equipment, software, and personnel in an information technology project.
Major Topics:	I. Project Management (2 hours, Lecture) A. Reviewing a Request for Proposal B. Drafting a Project Charter C. Setting up Goals, Dependencies and Milestones D. Budgeting IT Costs

E. Proposal-writing best practices

II. Configure Firewall and Router (2 hours, Lecture)
- A. Configuring DHCP and DNS
- B. Configure Firewall Rules
- C. Configure Port Forwarding

III. Deploying Directory Services Infrastructure (4 hours, Lecture)
- A. Deploying an Active Directory server with Windows Server
- B. Configure Remote Desktop

IV. Advanced Client OS Configuration (2 hours, Lecture)
- A. Joining an end-user computer to an Active Directory Domain
- B. Using Group Policies
- C. Automate software installation
- D. Set up roaming profiles

V. Enterprise Network Infrastructure (2 hours, Lecture)
- A. Virtualization
- B. Wired Networking Overview
- C. Wireless Networking Overview
- D. Computing Services

VI. Advanced Network Design (6 hours, Lecture)
- A. VLANs
- B. Subnetting
- C. VPNs
- D. Wireless Networking Setup

VII. Deploying a multi-tiered application stack (6 hours, Lecture)
- A. Deploying and securing Database Instances
- B. Connect web applications to a database and web server
- C. Configure application ports

VIII. Implementing Device and Network Security (6 hours, Lecture)
- A. Deploying certificates
- B. Set up Client Security Policies
- C. Set up firewalls
- D. Set up HTTPS
- E. Set up IPSEC
- F. Set up Wireguard VPN
- G. Set up Tailscale

IX. Deploy file sharing services (4 hours, Lecture)
- A. Deploying Network Attached Storage devices
- B. Setting up RAID
- C. Mounting file share over a local area network
- D. Connect to a corporate file share over a VPN
- E. Synchronize local file sharing to cloud services

X. Soft Skills and Presentation Best Practices (2 hours, Lecture)
- A. Presentation Design Best Practices

B. Presentation Verbal and Body Language Best Practices

XI. Project Management (4 hours, Lab)
- A. Reviewing a Request for Proposal
- B. Drafting a Project Charter
- C. Setting up Goals, Dependencies and Milestones
- D. Budgeting IT Costs
- E. Proposal-writing best practices
- F. Project Management Software

XII. Configure Firewall and Router (4 hours, Lab)
- A. Configuring DHCP and DNS
- B. Configure Firewall Rules
- C. Configure Port Forwarding

XIII. Deploying Directory Services Infrastructure (8 hours, Lab)
- A. Deploying an Active Directory server with Windows Server
- B. Configure Remote Desktop

XIV. Advanced Client OS Configuration (4 hours, Lab)
- A. Joining an end-user computer to an Active Directory Domain
- B. Using Group Policies
- C. Automate software installation
- D. Set up roaming profiles

XV. Enterprise Network Infrastructure (4 hours, Lab)
- A. Virtualization
- B. Wired Networking Overview
- C. Wireless Networking Overview
- D. Computing Services

XVI. Advanced Network Design (12 hours, Lab)
- A. VLANs
- B. Subnetting
- C. VPNs
- D. Wireless Networking Setup

XVII. Deploying a multi-tiered application stack (12 hours, Lab)
- A. Deploying and securing Database Instances
- B. Connect web applications to a database and web server
- C. Configure application ports

XVIII. Implementing Device and Network Security (12 hours, Lab)
- A. Deploying certificates
- B. Set up Client Security Policies
- C. Set up firewalls
- D. Set up HTTPS
- E. Set up IPSEC
- F. Set up Wireguard VPN
- G. Set up Tailscale

XIX. Deploy file sharing services (8 hours, Lab)

	A. Deploying Network Attached Storage devices B. Setting up RAID C. Mounting file share over a local area network D. Connect to a corporate file share over a VPN E. Synchronize local file sharing to cloud services XX. Solution Proposal (4 hours, Lab) A. Presentation of solution proposal to RFP B. Technical Demonstrations of Proofs of Concept of solutions
Total Lecture Hours:	36
Total Laboratory Hours:	72
Total Hours:	108
A.1. Primary Methods of Evaluation (Part 1 - CCN courses only):	
Primary Method of Evaluation:	3) Skills demonstration
Typical Assignment Using Primary Method of Evaluation:	Create a Windows 10 or Windows 11 virtual machine using a Level 1 Hypevisor. Using the previous AD server your group created, join the Windows client to the domain. Take a screenshot of: • Active Directory Users and Groups console showing the users • Your DNS console, showing your hosts in the Forward Lookup Zones, including the newly joined client. • The System info showing your member computer name and domain.
Critical Thinking Assignment 1:	Using one of the free diagramming applications (or PacketTracer), create the network diagram for your proposal. Decide on your subnet design and explain or show how you arrived to the network size. Detail each subnet that you'll use and what you'll use it for. Identify which subnets will be private and which will be public. Think about what your endpoints might be for the project. Include both visual diagrams of your network and a table or spreadsheet of your network ranges.
Critical Thinking Assignment 2:	Your group is tasked with provisioning a Linux Instance in Hyper-V. You'll want to use bridged networking and give it whatever virtual hardware you deem it needs. Please install Ubuntu Linux 20.10. You may use the desktop client if that's more comfortable for you. This assignment requires that you take screenshots and insert them into a Word document and properly label them. This means you MUST submit a deliverable to get credit. I need to see the following: • Hyper-V virtual machine settings for your VM (# of CPU/Cores, Amount of memory, Networking type)

	• Post installation Login screen showing your Linux user name • Command-line showing that you've updated the the software and OS. • Command-line showing that you've installed the software needed in a LAMP stack. • Set up a PHP page with the following code: <?php phpinfo(); ?> • A working php page showing your PHP info (from above) • The default Apache page • Firewall showing that you've allowed port 22 and port 80. • Your bash history listing the commands you used. **Notable hints:** • You can use nano or vi as text editors to create the PHP code • the location where the index.html file for the web page on ubuntu is /var/www/html/, which is owned by root. • You need to sudo to make any changes to files and directories owned by root • It's important to get this working on the server, but you can work on this at home for the sake of capturing the required screenshots.
Other Evaluation Methods:	Class Performance, Presentation, Reading Reports
If Other:	
Instructional Methods:	Demonstration, Group Activities, Guest Speakers, Lab, Lecture, Multimedia presentations
If other:	
Work Outside of Class:	Answer questions, Problem solving activity, Skill practice, Course is lab only - minimum required hours satisfied by scheduled lab time
If Other:	
Up-To-Date Representative Texts:	(Davie Bruce, Peterson Larry). Computer Networks: A Systems Approach, 6th Edition, 2019. https://oercommons.org/courses/computer-networks-a-systems-approach. Licensed under CC BY 4.0. (Discipline Standard) (Christianson, J Scott). Project Management Fundamentals, 1st Edition, 2016. https://oercommons.org/courseware/lesson/76030/overview. Licensed under CC BY 4.0. (Discipline Standard)
Alternative Texts:	
Required Supplementary Readings:	
Other Required Materials:	
Requisite	Prerequisite
Category	sequential

Requisite course:	Students need to have completed at least TWO of the following courses with a minimum grade of C or equivalent experience • Computer Information Systems 40 • Computer Information Systems 48 • Computer Information Systems 137 • Computer Information Systems 141 • Computer Information Systems 119
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	**Successful completion of this course requires a fundamental understanding of creating solutions involving hardware and software components of networks and systems.** **Demonstrate an understanding of the relationships between various hardware and software components in secure systems and networks** CIS 40 - Analyze various components of network equipment and end devices to assess how these components function together. Components include routers, switches, network interface cards, cabling and media, memory, disk drives, input and output devices, printers, and external storage. CIS 48 - Examine and determine appropriate server hardware for the use-case. CIS 48 - Understand the various storage systems available. CIS 137 - Describe and differentiate the devices and services used to support communications in data networks and the Internet. CIS 119 - Identify software and hardware technologies needed to defend against intrusions from adversaries, malicious actors and malware. **Evaluate computer operating systems and software and the understand the impact various implementations may have on functionality and performance.** CIS 40 - Demonstrate the ability to evaluate computer, operating systems, and applications software in relation to installing and configuring software on small networks. CIS 48 - Compare and contrast the various server operating systems available. **Evaluate network requirements of a system and apply the OSI model to design an appropriate solution.** CIS 137 - Design, calculate, and apply subnet masks and addresses to fulfill given requirements in IPv4 and IPv6 networks. CIS 137 - Evaluate the importance of addressing and naming schemes at various layers of data networks in IPv4 and IPv6 environments. CIS 141 - Analyze the characteristics of network architectures: fault tolerance,scalability, quality of service and security. CIS 141 - Examine the function of well-known TCP/IP applications such as WWW andemail, and their related services (HTTP, DNS, SMB, DHCP, SMPT/POP, andTELNET).

	Evaluate protocols that ensure services running on one kind of device can send to and receive data from many different devices.
Requisite Skill:	
Requisite Skill and Matching skill(s): Bold the requisite skill(s). if applicable	
Requisite course:	• Computer Information Systems 13 • Computer Information Systems 18 • Computer Information Systems 150
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	**For successful completion of this course, it is recommended that students have a fundamental understanding of information systems and the cloud service model.** **Demonstrate an understanding of the components of information systems used in a business.** CIS 13 - Explain the development and use of information systems in business. **Demonstrate successful management of information systems projects** CIS 18 - Manage information systems projects using formal project management methods. **Understand the delivery of computing resources as a service.** CIS 150 - Understand infrastructures, platforms, and software as a service.
Requisite Skill:	
Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). if applicable	
Enrollment Limitations and Category:	
Enrollment Limitations Impact:	
Course Created by:	Khai Lu
Date:	10/06/2025
Original Board Approval Date:	01/21/2026
Effective Term:	FA 2026