

## 【计算机系统与网络技术】

### 【Computer System and Network Technology】

#### 一、基本信息 Basic Information

课程代码 Course Code: 【2140019】

课程学分 Course Credits: 【 3 】

面向专业 Major: 【数字媒体技术（双语）Digital Media Technology】

课程性质 Characteristic of the Course: 【系级必修课 Department-level required courses】

开课院系 Department: 【信息技术学院 College of Information Technology】

使用教材 Teaching and Reference Materials:

主教材 Textbook

【COMPUTER NETWORKING Top-down Approach, James F. Kurose, Keith W. Ross, PEARSON, Eighth Edition】

参考书目 Bibliography:

【An Introduction to Computer Networks, Release 2.0.6, Peter L Dordal】

【计算机网络（第7版），谢希仁】

先修课程 Preface Course: 【无】

#### 二、课程简介 Course Description

<p>The aim of the course is to ensure students understand the components of network systems, network protocols, and network services.</p> <p>本课程旨在确保学生了解网络技术系统、网络协议和网络系统服务的组成部分。</p>	
<p>Be able to explain and evaluate different types of network systems and protocols</p> <p>能解释和评估不同类型的网络系统和网络协议。</p>	<p>Discussing different types of network, (LAN, WAN, internet, PAN, frame delay) and different physical topologies</p> <p>讨论不同类型的网络（LAN, WAN, internet, PAN, frame delay）和不同类型的物理拓扑结构。</p> <p>Identify and discuss network standards and wireless technologies</p> <p>识别并讨论网络标准和无线技术</p> <p>Apply different network protocols, (i.e DNS, DHCP, HTTP, FTP, SMTP)</p> <p>应用不同的网络协议（即 DNS、DHCP、HTTP、FTP、SMTP）</p>
<p>Be able to understand services provided by different networks</p> <p>能明白不同类型网络提供的服务。</p>	<p>Apply different directory service types, Identify differing application services</p> <p>应用不同的目录服务类型，识别不同类型的应用服务</p> <p>Use various file services</p> <p>使用各种文件服务</p> <p>Evaluate different telecommunication services</p> <p>评估不同类型的电信服务</p>
<p>Be able to demonstrate an ability to make network systems secure</p> <p>能展示使用网络安全的能力</p>	<p>Discuss different security methods</p> <p>讨论不同类型的安全方式</p> <p>Evaluate business risks associated to network security</p> <p>评估与网络安全相关的商业风险</p> <p>Identify and discuss hostile and intrusive software</p> <p>识别和讨论恶意与侵入软件</p>

### 三、选课建议 Suggestion for Selection of Course

This course is a professional basic-level course, suitable for senior students to choose to obtain the basic knowledge of computer networks and to prepare for more advanced courses.

本课程为专业基础课程，适合高年级学生选择，以获得计算机网络的基础知识为高级课程做预备。

### 四、课程与专业毕业要求的关联性 Relevance between Curriculum and Graduation Requirements

专业毕业要求 Graduation Requirements	关联 Relation
LO11 表达沟通 Expressing communication 理解他人的观点，尊重他人的价值观，能在不同场合用书面或口头形式进行有效沟通。 Understand the views of others, respect their values, and communicate effectively in writing or orally on different occasions.	
LO21 自主学习 Self-learning 能根据需要确定学习目标，并通过搜集信息，分析信息，讨论，实践，质疑，创造等方法来实现学习目标。 Be able to identify learning goals as needed and achieve them by gathering information, analyzing information, discussing, practicing, questioning.	●
LO3 专业能力 Professional competence	
LO31: 工程素养: 掌握数学、自然科学知识，具有工程意识，能结合计算机、数字媒体技术相关专业知识解决复杂工程问题。 LO31: Engineering literacy: Master mathematics and natural science, have an engineering mindset, and be able to utilize digital media technology to solve complex engineering problems.	●
LO32: 软件开发: 掌握主流设计技术、程序设计思维以及相关数据库技术，具备建设可运行于多种终端网站的能力。 LO32: Software development: Master the mainstream design technology, develop a programming mindset, understand database technology, and be able to build a variety of terminal websites.	
LO33: 系统运维: 系统地掌握计算机硬件、软件的基本理论、基本知识，具备保障系统运行与维护基本技能。 LO33: System maintenance: systematically master the basic theory and knowledge of computer hardware and software, and have the basic skills to ensure system operation and maintenance.	
LO34: 素材采集与处理: 掌握数字媒体的基本理论、主流数字媒体应用软件使用技术，具备素材的采集、存储、处理以及传输的能力。 LO34: Material collection and processing: Master the basic theory of digital media, understand how to use mainstream digital media application software, and have the ability to collect, store, and transmit materials	
LO35: 虚拟现实设计与制作: 熟悉虚拟现实基本原理，掌握虚拟现实产品设计与制作流程及主流的设计、集成平台，具备结合相关硬件实现虚拟现实产品的内容制作和应用开发的能力。	

LO35: Virtual reality design and production: Be familiar with the basic principles of VR, master the design and production process of VR products, mainstream designs, and integration platform. Have the ability to combine relevant hardware to realize content production and application development of VR products.	
LO41 尽责抗压 Do not be pressured 遵守纪律，守信守则，具有耐挫折，抗压力的能力。 Be disciplined, follow the rules, don't be afraid of setbacks, and be able to perform under pressure.	
LO51 协同创新 Collaborative innovation 同团队保持良好的合作关系，做集团中的积极成员；勇于从不同的角度思考问题，勇于提出新设想。 Have good collaboration with team members, be an active member of the group, not be afraid to think from different perspectives and to put forward new ideas.	●
LO61 信息应用 Information application 能在学习，工作中应用信息技术解决问题，具有运用计算机处理工作领域中的信息和技术交流的能力。 Can apply information technology to solve problems in study and work. Have the ability to use computers to process information and technical exchanges in the work field.	
LO71 服务关爱 Service care 愿意服务他人，服务企业，服务社会；为人热忱，富于爱心，痛得感恩（感恩，回报，爱心为我校校训内容之一） Willing to serve others, enterprises and society; be enthusiastic, loving, and grateful (gratitude, return favors, and love are some of the contents of our school motto)	
LO81 国际视野 International Perspective 具有基本的外语表达沟通能力与跨文化理解能力，能够阅读专业外文资料，有国际竞争与合作意识。 Have basic foreign language expression and communication skills, obtain cross-cultural understanding, be able to read professional foreign language materials, and have a sense of international competition and cooperation.	

备注：LO=learning outcomes（学习成果）

## 五、课程目标/课程预期学习成果 Course Objectives / Course Expected Learning Outcomes

序号 No.	课程预期 学习成果 Course Expected Learning	课程目标 (细化的预期学习成果) Course Objectives (Detailed Expected Learning Outcomes)	教与学方式 Teaching and Learning Methods	评价方式 Assessment Methods
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	Outcomes			
1	LO211	To understand different types of network and different physical topologies. To identify and understand network standards, (UDP, 802.2) and wireless technologies (802.11, Bluetooth, 3G) 理解不同类型的网络和物理拓扑结构。识别并理解多种网络标准（UDP、802.2）和无线技术（802.11、蓝牙、3G）	Lecture, Discussion, and Individual Presentation 授课与讨论及个人演示	Multiple Questions, Quizzes, Case Studies, and Team Projects 各类问题，章节测验，案例学习，和团队项目
2	LO31	To apply different network protocols, (i.e DNS, DHCP, HTTP, FTP, SMTP). To apply different directory service types. To use various file services. To evaluate different telecommunication services. To identify differing application services 应用不同的网络协议（即 DNS、DHCP、HTTP、FTP、SMT），应用不同的目录服务类型。使用各种文件服务。评估不同类型的电信服务。识别不同类型的应用服务	Lecture and Discussion 授课与讨论	Multiple Questions, Quizzes, Case Studies, and Team Projects 各类问题，章节测验，案例学习，和团队项目
3	LO511	To identify different security methods. To evaluate business risks associated with network security. To identify and discuss hostile and intrusive software. 识别不同类型的安全方式。评估与网络安全相关的商业风险。识别并讨论各类恶意与入侵软件。	Lecture, Discussion, Case Study and Team Work 授课、讨论、案例分析和团队项目	Multiple Questions, Quizzes, Case Studies, and Team Projects 各类问题，章节测验，案例学习，和团队项目

## 六、课程内容 Course Contents

### Chapter 1 Computer Networks and the Internet 第 1 章 计算机网络和因特网(理论课时 Hours 4)

教学内容 Teaching Content:

What is the Internet? What are protocols? Network edge: hosts, access networks, and physical media.  
Network Core: Packet/Circuit Switching, Internet Architecture. Safety. Protocol layer, and service model

什么是因特网？什么是协议？网络边缘：主机、接入网络、物理介质。网络核心：分组/电路交换，互联网结构。安全。协议层、服务模型。

知识要求 Knowledge Requirements:

- Learn the basics of computer networking through several basic concepts and terms related to the Internet. After graduation, students should have mastered two methods of describing the Internet; description of specific network components and description of services. They must be able to explain host/end systems, network applications, communication links and physical media, transmission rates, packets, packet switches, routing/pathing, ISP, socket interfaces, protocols.

通过与因特网有关的几个基本概念和术语，了解计算机网络的基本知识。课后，学生应该掌握两种描述互联网的方法：具体网络构成描述和服务描述。他们必须解释主机/终端系统、网络应用、通信链路和物理介质、传输速率、分组、分组交换机、路由/路径、ISP、套接字接口、协议。

- Know basic hardware and software components of the Internet: the edge and core of a network. To

understand DSL and HFC access networks, enterprise access networks, and wireless access networks. To distinguish several physical media: Twisted Pair, Coaxial Cable, Optical Fiber, and Radio Links. Students should be able to list several access networks and physical media, and explain their differences.

了解互联网的基本硬件和软件组件：网络的边缘和核心。了解 DSL 和 HFC 接入网、企业接入网和无线接入网。区分几种物理介质：双绞线、同轴电缆、光纤和无线电链路。学生应该能够列出几种接入网络和物理媒体，并解释它们的区别。

3. Understand packet transmission delay, store-and-forward, queueing delay, loss, and internet hierarchical structure. Students should distinguish FDM and TDM, compare packet switching and circuit switching, and explain internet structure.

了解数据包传输延迟、存储转发、排队延迟、丢失和 internet 分层结构。学生应区分 FDM 和 TDM，比较分组交换和电路交换，解释互联网结构。

4. Comprehend protocol layers, corresponding services, and the concept of encapsulation. Students should be able to list several protocol layers of the Internet and interpret their corresponding services, and explain how messages transmit between protocol layers during transmission from source to destination.

理解协议层和相应的服务以及封装的概念。学生应能列出互联网的几个协议层，并解释其相应的服务，并解释消息在从源到目的地的传输期间如何在协议层之间传输。

5. Understand the Internet is vulnerable to many different types of attacks. Students should be able to distinguish between virus, worm, spyware malware, botnet, explain DOS, packet sniffing, and IP spoofing.

了解互联网容易受到不同类型的攻击。学生应区分病毒、蠕虫、间谍软件恶意软件和僵尸网络，解释 DOS、数据嗅探、IP 欺骗。

教学难点 Teaching Topics:

1. The description of two kinds of Internet and the concept of network protocol  
两种因特网的描述方式及网络协议的概念
2. DSL and HFC, and different physical media  
DSL 和 HFC,及不同物理传输媒介
3. Store and forward of packet switch, queueing delay, loss  
数据交换机的存储和转发，排队延迟，丢失
4. Data switching vs circuit switching  
数据交换与电路交换的对比
5. Internet Hierarchy  
互联网分层结构
6. Protocol layers and services models.  
协议分层和服务模型。
7. Different attacks: virus, worm, spyware malware, botnet, DOS, packet sniffing, and IP spoofing.  
不同的攻击：病毒、蠕虫、间谍软件恶意软件、僵尸网络、DOS、数据嗅探和 IP 欺骗。

## Chapter 2 Application Layer 第 2 章 应用层(理论课时 Hours 4/实践课时 Actual Hours 12)

教学内容 Teaching Materials:

Principles of network applications, Web and HTTP, E-mail, The Domain Name System DNS, Video streaming and content distribution networks

网络应用原理, Web 和 HTTP, 电子邮件, DNS, 视频流和内容分发网络.

知识要求 Knowledge Requirements:

1. Master the basic concepts and implementation principles of the application layer: Client-server, P2P architecture, process, API, addressing process, transmission service requirements, TCP, UDP, and application layer protocols. After this class, students should be able to explain two application architectures, distinguish

the transmission service requirements from four sources, understand API and addressing process, TCP/UDP service, SSL, and define a simple application layer protocol.

掌握应用层的基本概念和实现原理：客户端-服务器和 P2P 架构；进程、API 和寻址过程；传输服务要求；TCP 和 UDP；应用层协议。课后，学生应讲解两种应用架构，区分四种来源的传输服务需求，了解 API 及寻址流程、TCP/UDP 服务及 SSL，并定义一个简单的应用层协议。

2. Understand the components of web pages and the corresponding concepts of the Hypertext Transfer Protocol: non-persistent/persistent connections, HTTP message formats, cookies, web caching, and conditional GET. Students should be able to explain the validity of different TCP connections and explain the advantages of cookies and web caching, as well as conditional GET methods.

理解 Web 页面的组件和超文本传输协议的相应概念：非持久/持久连接、HTTP 报文格式、Cookies、Web 缓存和条件 GET。学生应能解释不同 TCP 连接的有效性，并解释 Cookies 和 Web 缓存的优势，以及条件 GET 方法。

3. Learn about the key components of email, SMTP, email formats, and mail access protocols. Students should be able to distinguish between SMTP, HTTP, and the differences between the three mail access protocols.

了解电子邮件的关键组件、SMTP、电子邮件格式和邮件访问协议。学生应区分 SMTP 和 HTTP 以及三种邮件访问协议的区别。

4. Master the basic concepts of DNS, its related services, DNS hierarchy, DNS records and messages. After this class, students should be able to explain two different DNS query solutions and discuss their effectiveness.

掌握 DNS 及其相关服务的基本概念、DNS 层次结构、DNS 记录和消息。课后，学生应解释两种不同的 DNS 查询解决方案，讨论它们的有效性。

教学难点 Teaching Topics:

1. Two Applications Architectures  
两种应用程序的构架。
2. Processes Communicating: Processes, API, and Addressing Processes  
进程通信：进程的概念，应用程序编程接口和寻找进程。
3. Four Transport Services Requirements Applications Needed  
四种应用程序的通信服务需求。
4. HTTP Message Format  
HTTP 报文格式。
5. Differences of SMTP & HTTP  
SMTP 和 HTTP 之间的差异。
6. Mail Message Format  
邮件报文格式。
7. DNS and Services  
域名系统及其服务。
8. DNS Records and Message  
DNS 记录和报文。
9. TCP/UDP Services & SSL  
TCP/UDP 服务与安全接口层。

### Chapter 3 Transport Layer 第3章 传输层(理论课时 Hours 2)

教学内容 Teaching Materials:

Transport-layer services, Connectionless transport: UDP, Principles of reliable data transfer.

Connection-oriented transport: TCP.

传输层服务，无连接传输：UDP，可靠数据传输的原则，面向连接的传输：TCP。

#### 知识要求 Knowledge Requirements:

1. Master the basic concepts of transport services and protocols. After this class, students should be able to distinguish the services provided by the transport layer and the network layer, and describe the advantages and disadvantages of TCP and UDP.  
掌握传输服务和协议的基本概念。课后，学生应区分传输层和网络层提供的服务，讲述 TCP 和 UDP 的优缺点。
2. Learn about UDP and its features. Students should be able to distinguish between UDP, TCP and calculate UDP checksums.  
了解 UDP 及其特性。学生应该区分 UDP 和 TCP 并计算 UDP 校验和。
3. Understand the basic concepts of reliable data transmission principles: stop waiting for reliable data transmission; pipeline reliable data transmission: GBN and SR.  
了解可靠数据传输原理的基本概念：停止等待可靠数据传输；流水线可靠数据传输:GBN 和 SR。
4. Master the basic concepts of TCP, packet formats, reliable data transmission services, and flow control. After this class, students should be able to explain the TCP process: handshake and connection, calculate timeout interval, demonstrate flow control, and TCP connection management.  
掌握 TCP 的基本概念、数据包格式、可靠的数据传输服务、流量控制。课后，学生们应该解释 TCP 的过程：握手和连接，计算超时时间，并演示流控制和 TCP 连接管理。

#### 教学难点 Teaching Topics:

1. Transport Services and Protocols  
传输服务和协议
2. UDP and its characteristics  
UDP 及其特性。
3. Stop-To-Wait RDT and Pipelined RDT.  
停止等待可靠数据传输和流水线可靠数据传输。
4. TCP  
TCP 的基本概念。
5. Segment format, reliable data transfer service, and flow control.  
数据包格式、可靠的数据传输服务、流量控制。

### **Chapter 4 The Network Layer: Data Plane 第4章 网络层:数据面(理论课时 Hours 2/实践课时 Actual Hours 12)**

#### 教学内容 Teaching Materials:

Network Layer Overview, How Routers Work, Internet Protocol.

网络层概述, 路由器工作原理, 互联网协议。

#### 知识要求 Knowledge Requirements:

1. Master the basic concepts of the network layer, the basic concepts of the two important functions of the network layer, and the network service model. After this class, students should be able to explain forwarding and routing, distinguishing between the work on the data plane and the control plane.  
掌握网络层的基本概念、网络层两个重要功能的基本概念和网络服务模型。课后，学生应讲解转发和路由，区分数据平面和控制平面上的工作。
2. Learn about router architecture: input ports, switch fabric, output ports, route processors, and packet scheduling. Students should be able to explain the difference between destination-based forwarding and generalized forwarding, the three switching methods, the rules for FIFO, priority queuing, and round-robin queuing.  
了解路由器架构：输入端口、交换结构、输出端口、路由处理器、分组调度。学生应解释基于目的地的转发和广义转发的区别，三种交换方法，以及 FIFO、优先级排队、循环排队规则。

3. Master the basic concepts of IPv4 and IPv6, IPv4 datagram, IPv4 addressing, Dynamic Domain Name Assignment Protocol, network address translation, and tunneling. After this class, students should be able to explain IPv4 and IPv6 datagram formats, indiscriminate inter-domain routing, and how to encapsulate IPv6 into IPv4.

掌握 IPv4 和 IPv6 的基本概念, IPv4 数据报, IPv4 寻址, 动态域名分配协议, 网络地址转换, 及建隧道。课后, 学生应讲解 IPv4 和 IPv6 数据报格式, 无差别域间路由选择, 以及如何将 IPv6 封装入 IPv4。

教学难点 Teaching Topics:

1. Network layer and two important functions.  
网络层和两个重要功能。
2. Destination-based forwarding.  
基于目的地转发。
3. Longest prefix matching rule.  
最长前缀匹配规则。
4. Router architecture.  
路由器架构。
5. Two important approaches of forwarding.  
两种重要的转发方式。
6. Basic concept of IPv4 and IPv6  
IPv4 和 IPv6 的基本概念。

### **Chapter 5 The Network Layer: Control Plane 第 5 章 网络层: 控制面(理论课时 Hours 2)**

教学内容 Teaching Materials:

Routing Algorithms, Intra-AS Routing in the Internet: OSPF, ICMP: The Internet Control Message Protocol.  
路由算法, 互联网中的 AS 内部路由: OSPF, ICMP: 互联网控制报文协议。

知识要求 Knowledge Requirements:

1. Understand how the control plane of the network layer controls network logic and controls how datagrams are routed through the end-to-end path, controls the configuration, and management of network layer components and services.  
理解网络层的控制平面如何控制网络逻辑和控制数据报如何的端到端路径路由, 控制配置和管理网络层组件和服务。
2. Understand the traditional routing algorithm, which is the widely used Internet routing protocol OSPF. Students learn network protocols through labs.  
理解传统的路由算法, 这些算法是被广泛应用的互联网路由协议 OSPF。学生通过实验学习网络协议。
3. Understand the basic requirements and protocols of IP networks, including ICMP.  
理解一些 IP 网络中基本要求和相关协议, 包括 ICMP (Internet 控制报文协议)

教学难点 Teaching Topics:

1. Characteristics of control plane in network layer  
网络层中的控制面的特点
2. Intra-AS Routing OSPF  
内部路由协议 OSPF
3. The Internet Control Message Protocol  
Internet 控制报文协议 ICMP

### **Chapter 6 Link Layer & LANs 第 6 章 链路层和局域网(理论课时 Hours 4)**

教学内容 Teaching Materials:

Introduction to the Link Layer, Switched Local Area Networks, Data Center Networking



链路层概述, 交换局域网, 数据中心网络

知识要求 Knowledge Requirements:

1. Master the basic concepts of the link layer and the services provided. After this class, students should be able to explain nodes, links, frames, media access control, reliable transmission, error detection and correction at the link layer, and where the link layer is implemented.

掌握链路层和所提供服务的基本概念。课后, 学生应讲解链路层上的节点、链路、帧、媒体访问控制、可靠传输、错误检测和纠正, 以及链路层在哪里实现。

2. Master the basic concepts of link layer addressing and address resolution protocols, Ethernet, switches, and virtual local area networks. After this class, students should be able to explain MAC address, ARP, Ethernet frame format, switch filtering and forwarding, self-study, and compare switches and routers.

掌握链路层寻址和地址解析协议、以太网、交换机、虚拟局域网的基本概念。课后, 学生应讲解 MAC 地址、ARP、以太网帧格式、交换机的过滤和转发、自学, 并比较交换机和路由器。

3. Understand the concepts of data center networking, load balancing and its hierarchy of routers and switches. Students should be able to explain why data center networks exist.

了解数据中心网络的概念、负载平衡及其路由器和交换机的层次结构。学生应解释为什么会出现数据中心网络。

教学难点 Teaching Topics:

1. Basic concept of link layer and service provided

链路层和所提供服务的概念。

2. Link layer addressing and ARP.

链路层寻址。

3. Ethernet

交换以太网。

4. Switches

分组交换器

5. VLAN

虚拟局域网。

6. Data center networks

数据中心网络。

## **Chapter 7 Wireless & Mobile Network 第 7 章 无线网络和移动网络(理论课时 Hours 4)**

教学内容 Teaching Materials:

Overview of Wireless and mobile networks, WiFi:802.11 Wireless LAN, Cellular Internet Access, mobile IP

无线网络和移动网络概述, WiFi:802.11 无线局域网, 蜂窝互联网接入, 移动通信 IP

知识要求 Knowledge Requirements:

1. Master the basic concepts of wireless networks and wireless network taxonomy. After this class, students should be able to list the elements of wireless networks and the classification of wireless networks.

掌握无线网络的基本概念和无线网络分类法。课后, 学生应列出无线网络的要素和无线网络的分类。

2. Understand IEEE802.11 system, IEEE802.11 local area network structure, channel and association, IEEE802.11 MAC protocol, IEEE802.11 frame, and its advanced functions. Students should be able to list the components of IEEE802.11LAN, distinguish passive scanning from active scanning, and explain how to handle collisions in 802.11.

了解 IEEE802.11 系统、IEEE802.11 局域网结构、信道和关联、IEEE802.11 MAC 协议、IEEE802.11 帧及其高级功能。学生应列出 IEEE802.11LAN 的组件, 区分被动扫描和主动扫描, 解释如何处理 802.11 中的碰撞。

3. Master the architecture and standards of cellular network access. Students should be able to describe the evolution of cellular networks and their standards.

掌握蜂窝网络接入的体系结构和标准。学生应说明蜂窝网络的发展及其标准。

4. Learn about Mobile IP, dealing with mobility in cellular networks, and the impact of wireless and mobility on higher layer protocols. Students should be able to list the three components of wireless networking standards, the components of cellular network architecture, and the distinction between cellular and mobile IP.

了解移动 IP，处理蜂窝网络中的移动性，以及无线和移动性对高层协议的影响。学生应能列出无线网络标准的三个组件，蜂窝网络架构的组件，区分蜂窝网路与移动 IP 的区别。

教学难点 Teaching Topics:

1. Basic concept of wireless networks.  
无线网络的基本概念。
2. Wireless network taxonomy.  
无线网络的分类。
3. Important differences from wired link.  
无线网络与有线网路间的重大区别。
4. IEEE802.11 architecture and 802.11 MAC protocols.  
IEEE802.11 体系结构和 802.11MAC 协议。
5. Elements of mobile networks architecture.  
移动网路体系结构中的要素。
6. Standards to mobile IP.  
移动 IP 标准。

### Chapter 8 Security in Computer Networks 第 8 章 计算机网络中的安全(理论课时 Hours 2)

教学内容 Teaching Materials:

Network security, cryptography principles, message integrity and digital signature, network layer security, making wireless LAN secure, operational security

网络安全，密码学原理，报文完整性和数字签名，网络层安全性，使无线局域网安全，操作安全

知识要求 Knowledge Requirements:

1. Master the basic concepts and cryptography principles of network security. After this class, students should be able to explain confidentiality, message integrity, endpoint authentication, operational security, and distinguishing between symmetric key encryption and public key encryption.  
掌握网络安全的基本概念、密码学原理。课后，学生应解释机密性、消息完整性、端点认证和操作安全性，区分对称密钥加密和公钥加密。
2. Learn about message integrity and authentication methods. Students should be able to interpret digital signatures, MD5 and SHA, and certificate authorities.  
了解消息完整性和身份验证的方法。学生应能解释数字签名、MD5 和 SHA、证书颁发机构。
3. Learn about secure email, SSL, IP security, VPN, WEP, firewalls, and IDS. Students should be able to distinguish between two IPsec protocols, toy SSL and real SSL, explain the principles of IKE, WEP encryption and authentication, intrusion detection systems, and list three types of firewalls.  
了解安全电子邮件、SSL、IP 安全、VPN、WEP、防火墙、IDS。学生应区分两种 IPsec 协议，玩具 SSL 和真实 SSL，解释 IKE、WEP 加密和认证、入侵检测系统的原理，并列出三种类型的防火墙。

教学难点 Teaching Topics:

1. Basic concept of network security.  
网络安全基本概念。

2. Principles of cryptography.  
密码学原理。
3. Symmetric key crypto and public key crypto.  
对称加密和公钥加密。
4. Digital signatures and CA.  
数字签名和认证中心。
5. IPsec and VPN.  
IP 安全和虚拟专用网。
6. WEP, Firewalls, and IDS.  
有线等效保密，防火墙和入侵检测系统。

### 七、课内实验名称及基本要求 Course and Lab Requirements

序号 No.	实验名称 Name of Exp.	主要内容 Content	实验时数 Number of Exp.	实验类型 Type	备注 Comment
1	交换机的配置 Set Switches	查看交换机系统和配置信息。View a system and configuration information of switch.	8	设计型 Design	3 人/组 Self
2	路由器基本配置 Set Routers	掌握路由器的基本配置和动态路由的配。Master the basic configuration of routers and the dynamic routing.	8	设计型 Design	3 人/组 Self
3	Apache 基本配置 Set Apache Services	用 Apache 服务器软件搭建一个 Web 网站。 Setting a Web Site using an Apache	8	验证型 Veridate	3 人/组 Self

### 八、评价方式与成绩 Assessment Index & Grading Scale

总评构成 (X) Grading Computation	评价方式 Assessment Index	占比 (%) Weightage (%)
X1	期末考核：个人项目报告 (2000 英语字) Final Assessment: Personal Project Report (2000 Words)	50%
X2	过程考核：个人作业 (800 英语字) Process Assessment: Individual Assignments (800 Words)	20%
X3	过程考核：小组团队作业 (1200 英语字) Process Assessment: Team Work (1200 Words)	20%
X4	过程考核：课堂表现 Process Assessment: Classroom Participation	10%

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