

ISTM610 – Business Data Communications

Course Syllabus – Summer II 2019

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Office hours: after class and as needed by appointment

Course Description:

The objective of this course is to provide a basic understanding of the technical and management aspects of computer networking and security. This course builds on the knowledge and skills you have acquired in prior IS courses; I presume that you have a general understanding of information technology and its applications. This syllabus provides a general plan for the course, but some deviations may be necessary.

Book and resources:

Required: none

Recommended: Fitzgerald & Dennis, Business Data Communications and Networking, 11th - 13th editions are OK
www.wiley.com/college/fitzgerald

Grading Policy:

- The following grading scale will be applied to produce the final grade.

90 - 100	A
80 - 89.99	B
70 - 79.99	C
60 - 69.99	D
Below 60	F
- Make-up exams are not encouraged. If you know that you will not be present for an exam, please notify me as soon as possible. In the event that an exam is missed for an excused absence, you will have two options.
 - An all essay make-up exam will be given.
 - The next exam grade will be substituted after subtracting a 10% penalty. (For example, assume you miss Exam 1. If you make a 90 on Exam 2, your Exam 1 grade will be an 80.)
- Final exams will NOT be given early.
- Late work is defined as work presented after the assignment has been requested at the beginning of the class period on the assignment due date. Late work **will not** be accepted.
- Assignments are expected to be printed on a printer, not handwritten (except when applicable). When handwritten assignments are turned in, they will not be accepted if the pages are ripped from a notebook.

Grading

Evaluation	% of final grade
Exams 1-4	16 each
Research Project	12
OS installs	9
RFP	5
Participation	5
Video	5

Assignments:

Additional information about the exams, assignments, labs, and projects will be provided in class. The scheduled due dates for assignments, labs and project activities are subject to change, but all changes will be discussed in class. Assignments are *due on or*

before the start of class on the due date. **Late assignments will NOT be accepted.**

Quizzes:

Quizzes will be given periodically. Notice will be given prior to the first one or two. Questions typically cover material covered within the last one or two class periods.



Participation:

Class participation includes (among other things) punctual attendance, providing discussion in class, not being disruptive, etc.

Attendance:

Students are expected to attend all class regularly and punctually. For late arrivals and absences, it is the *student's responsibility* to obtain information from missed classes from other students (this includes changes to due dates and contents of exams, assignments, labs, and projects). **A late arrival to the class is counted as an absence.**

For one-session summer classes:

Students with absences will begin losing "participation points."

Students having more than 3 absences will drop one letter grade.

Students having more than 6 absences will drop two letter grades.

Absence Notification:

The Department of Student Life (in the Student Services at White Creek complex on west campus) provides instructors with prompt notification of student absences reported to them by parents and students. This office's telephone number is 845-3111, and their email address is studentlife@tamu.edu. Immediately after being notified, the Department of Student Life prepares a memorandum that is sent to ALL of your instructors. This notification provides: (1) the date of notification, (2) the nature of notification (telephone call, official correspondence, etc.), (3) general information regarding the reason for missing class (death in immediate family, medical reasons, etc.), and (4) the dates that you are expected to miss class. You are strongly encouraged to take advantage of this service which precludes you from individually notifying each of your instructors when you will be absent from class. For more information on this service, visit their [website](#).

Cheating:

Cheating will not be tolerated. If the instructor believes a student is guilty of cheating or plagiarism within the instructor's class, any of the following actions may be taken:

- 1. award no credit for the paper or test**
- 2. withdraw the student from the course**
- 3. award the student a failing grade for the course**

Cheating is defined as "the **possession, receipt, use, solicitation or furnishing** of unauthorized aid in an academic endeavor."

"Unauthorized aid" for the purposes of this class includes:

- copying of another student's test or any homework assignment
- completing an assignment **with** another student

The matter may also be brought to the attention of the Department Chair and Dean of the School of Business. If you wish to report academic misconduct or if you want to know more about the Aggie Honor system, visit <http://aggiehonor.tamu.edu>.

The Aggie Honor Code

"An Aggie does not lie, cheat, or steal or tolerate those who do."

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System.

For additional information please visit: <http://aggiehonor.tamu.edu>.

Disabilities

The Office of Support Services for Students with Disabilities coordinates Texas A&M University's programs and efforts for the benefit of disabled students. Students who have documented disabilities or believe they have a disability should be referred to Support Services for Students with Disabilities. This office has the responsibility for verifying the existence of a disability and for

suggesting what accommodations or modifications are appropriate. When there is a need for accommodation of a student's academic program, Support Services for Students with Disabilities will contact the student's classroom instructors regarding this need and direct the student to work directly with the classroom instructors to work out specific arrangements. You should notify your instructor within the first week of the semester if this applies to you. Contact info: <http://disability.tamu.edu>, call 845-1637 or go to the Disability Services building at the Student Services at White Creek complex on west campus.

Copyright of documents

All documents, including handouts, used in this course are to be considered copyrighted. By "handouts," I mean all materials generated for the class, which include but are not limited to the syllabus, quizzes, exams, lab problems, in-class materials, review sheets, presentations, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless I expressly grant permission.

Misc:

Please bring a pencil and Scantron form 882-E (the small green and white one) to each exam

Turn off all cell phones and beepers prior to entering the classroom. No laptops, etc. allowed

TENTATIVE

Tentative Schedule of Classes - Summer II 2019

	Tuesday		Chapter 1 – Intro to Data Communications
	Wednesday		No class
	Thursday		Chapter 2 – Application Layer
	Friday		Chapter 3 – Physical Layer
	Monday		Chapter 3 – Physical Layer
	Tuesday	Paper topic	Exam 1 (material covered thus far)
	Wednesday		Chapter 4 – Data Link Layer
	Thursday		Chapter 4 – Transport and Network Layers
	Friday		Chapter 5 – Transport and Network Layers
	Monday		Chapter 6 – Network Design
	Tuesday	Paper outline	Chapter 7 – Wired and Wireless LANs
	Wednesday		Exam 2 (material covered since last exam)
	Thursday		Chapter 8 - Backbone Networks
	Friday		Chapter 9 – Wide Area Networks
	Monday		Chapter 10 – The Internet
	Tuesday		Lab day
	Wednesday		Lab day
	Thursday		Lab day
	Friday		Lab day
	Monday		Chapter 12 – Network Mgmt
	Tuesday		Exam 3 (material covered since last exam)
	Wednesday	Paper due – ecampus - midnight	Chapter 11 – Network Security
	Thursday	Paper due – hard copy in class	Chapter 11 – Network Security
	Friday		Chapter 11 – Network Security
	Monday	RFP – in class and ecampus by 8am	Chapter 11 – Network Security
	Tuesday	Video due	Exam 4

RFP Project

Develop an RFP for your (fake) company's network. Included below are the main components of the RFP. In addition, also create a one-page business case describing to management how this network you are proposing to add will make "business sense." Please submit one hard copy and an electronic copy via turnitin.com

***** Do not use any CMIS Case Competition (CCC) RFP or other CCC info in any way! *****

Components of an RFP

- **Background Information**
 - Organizational profile; Overview of current network; Overview of new network; Goals of the new network
 - **Network Requirements**
 - Choice sets of possible network designs (hardware, software, circuits); Mandatory, desirable, and wish list items, Security and control requirements; Response time requirements; Guidelines for proposing new network designs
 - **Service Requirements**
 - Implementation time plan; Training courses and materials; Support services (e.g., spare parts on site); Reliability and performance guarantees
 - **Bidding Process**
 - Time schedule for the bidding process; Ground rules; Bid evaluation criteria; Availability of additional information
 - **Information Required from Vendor**
 - Vendor corporate profile; Experience with similar networks; Hardware and software benchmarks; Reference list
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Lab Work

My teaching assistant will have lab hours to help with your questions associated with the install of Windows Server 2008 and Linux. You are required to load the operating systems yourself. Do not wait until the night before the due dates to load the operating systems and/or configure them. Many students will run into problems working with the operating systems so you need to allow yourself time to get help.

Tentative lab exercises:

#1 Install Windows Server 2008 and Red Hat Linux within the Microsoft Virtual PC environment

#2 Chapter 4 (DNS) – Windows only

#3 Chapter 5 (Users) -

#4 Chapter 6 (Web Server) –

#5 Email configuration – Set up Exchange Server on Windows Server and Outlook Express in XP

Research paper info

Submit the completed paper 1.) via email to me, 2.) in hard copy, and 3.) electronically to Turnitin.com

Create your own original work!!! Refer to the course syllabus to see the actions I will take if you do plagiarize. Please be aware that Turnitin.com does a very good job of checking Internet resources, journals, “research paper databases”, etc. Previously, I used it on research papers and had 40% and nearly 20% of students that had high plagiarism scores. Those students that were allowed to remain in my course after that suffered a loss of one to two letter grades on their semester grade.

Please refer to the library.tamu.edu website for more information on plagiarism and academic dishonesty. In addition to the guidelines included there, do not “cut and paste” from another source into your paper. The goal of research papers is to research a particular topic and then write about the topic in your own words.

Here are the guidelines for the paper:

20 15 pages

double line spacing

12-point Arial font

all four margins at 1”

include figures, tables, etc in an appendix

the cover page, references, tables, figures, appendix, etc do not count toward the page total

You must have at least 15 references, with a minimum of 5 being from journals or books. Wikipedia is not a valid source. ~~You also must use at least one Gartner Group reference~~

Use a citation format similar to the example paper.

A list of potential topics is found on the course website. A copy of the grading rubric is available on the course website.

Since this is an INFO class, the paper should (to some extent) touch on the business impacts. For example, if your topic is “wireless communication,” don’t just provide a history and future uses of the technology. Rather, you should include a discussion about how this impacts business (bottom line, efficiencies, effectiveness, etc).

Topic List

Chapter 1 - Introduction to Data Communications

- 1.1 Introduction
- 1.2 Data Communications Networks
 - 1.2.1 Components of a Network
 - 1.2.2 Types of Networks
- 1.3 Network Models
 - 1.3.1 Open Systems Interconnection Reference Model
 - 1.3.2 Internet Model
 - 1.3.3 Message Transmission Using Layers
- 1.4 Network Standards
 - 1.4.1 The Importance of Standards
 - 1.4.2 The Standards-Making Process
 - 1.4.3 Common Standards
- 1.5 Future Trends
 - 1.5.1 Wireless LAN and BYOD
 - 1.5.2 The Web of Things
 - 1.5.3 Massively Online
- 1.6 Implications for Management

Chapter 2 - Application Layer

- 2.1 Introduction
- 2.2 Application Architectures
 - 2.2.1 Host-Based Architectures
 - 2.2.2 Client-Based Architectures
 - 2.2.3 Client-Server Architectures
 - 2.2.4 Cloud Computing Architectures
 - 2.2.5 Peer-to-Peer Architectures
 - 2.2.6 Choosing Architectures
- 2.3 World Wide Web
 - 2.3.1 How the Web Works
 - 2.3.2 Inside an HTTP Request
 - 2.3.3 Inside an HTTP Response
- 2.4 Electronic Mail
 - 2.4.1 How Email Works
 - 2.4.2 Inside an SMTP Packet
 - 2.4.3 Attachments in Multipurpose Internet Mail Extension
- 2.5 Other Applications
 - 2.5.1 Telnet
 - 2.5.2 Instant Messaging
 - 2.5.3 Videoconferencing
- 2.6 Implications for Management

Chapter 3 - Physical Layer

- 3.1 Introduction
- 3.2 Circuits
 - 3.2.1 Circuit Configuration
 - 3.2.2 Data Flow
 - 3.2.3 Multiplexing
- 3.3 Communication Media
 - 3.3.1 Twisted Pair Cable
 - 3.3.2 Coaxial Cable
 - 3.3.3 Fiber-Optic Cable
 - 3.3.4 Radio
 - 3.3.5 Microwave
 - 3.3.6 Satellite
 - 3.3.7 Media Selection
- 3.4 Digital Transmission of Digital Data
 - 3.4.1 Coding
 - 3.4.2 Transmission Modes
 - 3.4.3 Digital Transmission
 - 3.4.4 How Ethernet Transmits Data
- 3.5 Analog Transmission of Digital Data
 - 3.5.1 Modulation
 - 3.5.2 Capacity of a Circuit
 - 3.5.3 How Modems Transmit Data
- 3.6 Digital Transmission of Analog Data
 - 3.6.1 Translating from Analog to Digital
 - 3.6.2 How Telephones Transmit Voice Data

- 3.6.3 How Instant Messenger Transmits Voice Data
- 3.6.4 Voice over Internet Protocol (VoIP)
- 3.7 Implications for Management

Chapter 4 - Data Link Layer

- 4.1 Introduction
- 4.2 Media Access Control
 - 4.2.1 Contention
 - 4.2.2 Controlled Access
 - 4.2.3 Relative Performance
- 4.3 Error Control
 - 4.3.1 Sources of Errors
 - 4.3.2 Error Prevention
 - 4.3.3 Error Detection
 - 4.3.4 Error Correction via Retransmission
 - 4.3.5 Forward Error Correction
- 4.3.6 Error Control in Practice
- 4.4 Data Link Protocols
 - 4.4.1 Asynchronous Transmission
 - 4.4.2 Synchronous Transmission
- 4.5 Transmission Efficiency
- 4.6 Implications for Management

Chapter 5 - Network and Transport Layers

- 5.1 Introduction
- 5.2 Transport and Network Layer Protocols
 - 5.2.1 Transmission Control Protocol (TCP)
 - 5.2.2 Internet Protocol (IP)
- 5.3 Transport Layer Functions
 - 5.3.1 Linking to the Application Layer
 - 5.3.2 Segmenting
 - 5.3.3 Session Management
- 5.4 Addressing
 - 5.4.1 Assigning Addresses
 - 5.4.2 Address Resolution
- 5.5 Routing
 - 5.5.1 Types of Routing
 - 5.5.2 Routing Protocols
 - 5.5.3 Multicasting
 - 5.5.4 The Anatomy of a Router
- 5.6 TCP/IP Example
 - 5.6.1 Known Addresses, Same Subnet
 - 5.6.2 Known Addresses, Different Subnet
 - 5.6.3 Unknown Addresses
 - 5.6.4 TCP Connections
 - 5.6.5 TCP/IP and Network Layers
- 5.7 Implications for Management

Chapter 6 - Network Design

- 6.1 Introduction
 - 6.1.1 Network Architecture Components
 - 6.1.2 The Traditional Network Design Process
 - 6.1.3 The Building-Block Network Design Process
- 6.2 Needs Analysis
 - 6.2.1 Network Architecture Component
 - 6.2.2 Application Systems
 - 6.2.3 Network Users
 - 6.2.4 Categorizing Network Needs
 - 6.2.5 Deliverables
- 6.3 Technology Design
 - 6.3.1 Designing Clients and Servers
 - 6.3.2 Designing Circuits
 - 6.3.3 Network Design Tools
 - 6.3.4 Deliverables
- 6.4 Cost Assessment
 - 6.4.1 Request for Proposal
 - 6.4.2 Selling the Proposal to Management
 - 6.4.3 Deliverables
- 6.5 Implications for Management

Chapter 7 - Wired and Wireless Local Area Networks

- 7.1 Introduction
- 7.2 LAN Components
 - 7.2.1 Network Interface Cards
 - 7.2.2 Network Circuits
 - 7.2.3 Network Hubs, Switches, and Access Points
 - 7.2.4 Network Operating Systems
- 7.3 Wired Ethernet
 - 7.3.1 Topology
 - 7.3.2 Media Access Control
 - 7.3.3 Types of Ethernet
- 7.4 Wireless Ethernet
 - 7.4.1 Topology
 - 7.4.2 Media Access Control
 - 7.4.3 Wireless Ethernet Frame Layout
 - 7.4.4 Types of Wireless Ethernet
 - 7.4.5 Security
- 7.5 The Best Practice LAN Design
 - 7.5.1 Designing User Access with Wired Ethernet
 - 7.5.2 Designing User Access with Wireless Ethernet
 - 7.5.3 Designing the Data Center
 - 7.5.4 Designing the e-Commerce Edge
 - 7.5.5 Designing the SOHO Environment
- 7.6 Improving LAN Performance
 - 7.6.1 Improving Server Performance
 - 7.6.2 Improving Circuit Capacity
 - 7.6.3 Reducing Network Demand
- 7.7 Implications for Management

Chapter 8 - Backbone Networks

- 8.1 Introduction
- 8.2 Switched Backbones
- 8.3 Routed Backbones
- 8.4 Virtual LANs
- 8.5 The Best Practice Backbone Design
- 8.6 Improving Backbone Performance
 - 8.6.1 Improving Device Performance
 - 8.6.2 Improving Circuit Capacity
 - 8.6.3 Reducing Network Demand
- 8.7 Implications for Management

Chapter 9 - Wide Area Networks

- 9.1 Introduction
- 9.2 Dedicated-Circuit Networks
 - 9.2.1 Basic Architecture
 - 9.2.2 T Carrier Services
 - 9.2.3 SONET Services
- 9.3 Packet-Switched Networks
 - 9.3.1 Basic Architecture
 - 9.3.2 Frame Relay Services
 - 9.3.3 Ethernet Services
 - 9.3.4 MPLS Services
 - 9.3.5 IP Services
- 9.4 Virtual Private Networks
 - 9.4.1 Basic Architecture
 - 9.4.2 VPN Types
 - 9.4.3 How VPNs Work
- 9.5 The Best Practice WAN Design
- 9.6 Improving WAN Performance
 - 9.6.1 Improving Device Performance
 - 9.6.2 Improving Circuit Capacity
 - 9.6.3 Reducing Network Demand
- 9.7 Implications for Management

Chapter 10 - The Internet

- 10.1 Introduction
- 10.2 How the Internet Works
 - 10.2.1 Basic Architecture
 - 10.2.2 Connecting to an ISP
 - 10.2.3 The Internet Today
- 10.3 Internet Access Technologies

10.3.1 Digital Subscriber Line (DSL)

- 10.3.2 Cable Modem
- 10.3.3 Fiber to the Home
- 10.3.4 WiMax
- 10.4 The Future of the Internet
 - 10.4.1 Internet Governance
 - 10.4.2 Building the Future
- 10.5 Implications for Management

Chapter 11 - Network Security

- 11.1 Introduction
 - 11.1.1 Why Networks Need Security
 - 11.1.2 Types of Security Threats
 - 11.1.3 Network Controls
- 11.2 Risk Assessment
 - 11.2.1 Develop risk measurement criteria
 - 11.2.2 Inventory IT assets
 - 11.2.3 Identify Threats
 - 11.2.4 Document Existing Controls
 - 11.2.5 Identify Improvements
- 11.3 Ensuring Business Continuity
 - 11.3.1 Virus Protection
 - 11.3.2 Denial of Service Protection
 - 11.3.3 Theft Protection
 - 11.3.4 Device Failure Protection
 - 11.3.5 Disaster Protection
- 11.4 Intrusion Prevention
 - 11.4.1 Security Policy
 - 11.4.2 Perimeter Security and Firewalls
 - 11.4.3 Server and Client Protection
 - 11.4.4 Encryption
 - 11.4.5 User Authentication
 - 11.4.6 Preventing Social Engineering
 - 11.4.7 Intrusion Prevention Systems
 - 11.4.8 Intrusion Recovery
- 11.5 Best Practice Recommendations
- 11.6 Implications for Management

Chapter 12 - Network Management

- 12.1 Introduction
- 12.2 Designing for Network Performance
 - 12.2.1 Managed Networks
 - 12.2.2 Managing Network Traffic
 - 12.2.3 Reducing Network Traffic
- 12.3 Configuration Management
 - 12.3.1 Configuring the Network and Client Computers
 - 12.3.2 Documenting the Configuration
- 12.4 Performance and Fault Management
 - 12.4.1 Network Monitoring
 - 12.4.2 Failure Control Function
 - 12.4.3 Performance and Failure Statistics
 - 12.4.4 Improving Performance
- 12.5 End User Support
 - 12.5.1 Resolving Problems
 - 12.5.2 Providing End User Training
- 12.6 Cost Management
 - 12.6.1 Sources of Costs
 - 12.6.2 Reducing Costs
- 12.7 Implications for Management