

Course Package for MIS 365

## **DATA COMMUNICATNS & NETWORKING**

### **Big Pictures and Bottom Lines**

(Draft)

This course package includes original thoughts on the improvement of the core course MIS 365 in the department of MSIS. The major objectives are emphasizing inner relationships of network technologies and bridging the gap between technology principles and business implications. Various learning methods are introduced to facilitate the processes of reading, writing, and understanding IT materials at the senior undergraduate level.

Thank Katherine Arens and Janet Swaffar for the enlightenment.

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July 2003

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## Course Description

Internet is one of the most interesting and exciting phenomena in this century and has become the fundamental infrastructure of business activities. This course introduces basic technologies of data communication and provides analysis of Internet applications from a business perspective. It includes a detailed view of the communication environment, data and telecommunication networks as well as basic concepts and principles of networking.

As an introductory course, the targeted audience is senior undergraduate students with basic background in programming. This course is designed to familiarize students with principles and concepts related to data communication, computer networks, and Internets. Moreover, the connections among technologies and business implications will be emphasized in the entire learning process.

At the end of the course, students will acquire a net of basic terminology and applications and will be able to learn new technologies by themselves through comparison and analogy. With examples of contemporary IT artifacts, such as Web Services and securities, a comprehensive view of business communication networks will be established instead of engineering details.

Following activities will be used to shape students into concrete learning patterns.

1. Textbook and articles reading with detail worksheets: with the help of reading instructions (keywords, important paragraphs, questions) students will learn how to read IT materials and map new concepts onto knowledge base constructs.
2. Lab exercises: provide hands-on experiences.
3. Individual technology analysis: following step-by-step instructions, students will learn how to search, analyze, summarize, and critique new technologies in business scenarios individually. This is an important assignment to transfer their learning patterns into a production process.
4. Group project report: a term work which needs information-sharing, peer tutoring, and debating.

## The Need for Improvement

While the Internet mushrooms into the economy, network infrastructures have become one of crucial resources in corporate information systems. “Data Communication and Networking” now is the core course of MIS programs and uses a “technologies – applications – cases” sequence as a standard teaching guidance. However, the economic downturn and the trend of outsourcing create intense competition in the job market of IT management. A simple bundle of computer contents and business applications is not competent.

### 1. Course organization problems

A bottom-up process is the most straightforward method in course organization: First, illustrate physical signals and network devices; then decompose the protocols and architectures; finally, give some examples of organization deployment. However, due to the nature of contents, there is a sharp disjunction between technology sections and business strategy sections. Business implications of technologies are obscure in the current curriculum. Therefore students get a mass of concepts and fell difficult to apply them. The course then looks like a secondary computer science class.

### 2. Student cognitive problems

From physical principles to system architectures, there are several layers of the knowledge of data networks. Since most of students do not have engineering backgrounds, they usually struggle to understand and remember basic mechanisms. Since most of applications are in the second half of the course, they cannot act as instant rewards or feedbacks to reinforce the learning. Without analyses in business scenarios, all the concepts are passive and disjointed.

### 3. Design of assignments

Text reading and group projects are two major methods in delivering course contents. The assumptions behind are students can read effectively and know how to collaborate in technology writing. This is not the case with undergraduate students. Insufficient and disorganized training in professional reading and writing makes them waste a large amount of time to figure out right learning patterns.

## MIS 365 DATA COMMUNICATNS & NETWORKING

In this proposal, I shift the scope of the design of information systems from physical to conceptual. This course will focus on high-level network architectures, e.g. web services, instead of detail implementation. The relationship and implications of different technologies are emphasized through examples of contemporary technologies. By eliminating details and implementations, students will achieve a broad knowledge of the field and use a systematic approach to analysis emerging technologies. The influence of IT on organizational structures will be the key distinction to establish a unique MIS identity.

Some of the practical issues, such as costs and securities, will be iterated along with contemporary examples through class. A set of will-designed worksheets provides a systematic approach to effective reading and writing.

## Teaching Philosophy Statement

A large portion of courses of the Management Information Systems program in business school is technology courses, such as Data communication, Database Management, and Programming. Although facts and basic skills are important, teaching is not just transmitting information to students. Refining learning skills is the general purpose for all courses, but how to incorporate it into technological training is a difficult problem for technology-oriented classes. After giving lectures in various classes and academic research on IT industry and technologies, the interconnection is the key point to solve this problem.

Technologies are not isolated. There will be complicated relationships with their antecedents, substitutes, and complements. Various concepts constitute an integral part of a whole. Emphasizing on the interconnection is like to string the seeds and beans onto the thread. After possessing the intrinsic relations of technologies and their business implication, students easily extend the knowledge base by analogism.

Several teaching methods and techniques are particularly important in this relation-oriented education. Building connection mapping is one of the most effective techniques to organize the knowledge. This is different from an outline. Writing down just the key words on a paper and using lines and arrows to illustrate the connections. It is a process to digest and represent the course materials and reconstitute a panorama. These will be much easier to study and recall later on than pages and pages of notes.

A mutual and collaborative learning environment will be essential to break the traditional one-way communication. Individual investigation, group study, and in-class discussion are used to free their minds. Although the concepts and procedures are deterministic, each individual will have his unique way to assemble and understand them. To me it is rewarding to see students build their own net of knowledge and keep absorbing new things by comparing and analogizing. They will not be lost in the technology maze.

## Appendices

### A. Course Syllabus

#### MIS 365

#### Data Communication and Networking

#### The Beauty of the Net

(Draft)

##### CLASS:

Time: XXX XX:XX-XX:XX

Venue: UTC X.XXX

##### INSTRUCTOR:

Name: XXX XXXXX

Office: CBA XXX

Office Hours: Wed noon-2:00 P.M. or set appointments by email

Office Phone: (512) 471-XXX

Email Address: xxx@mail.utexas.edu

##### COURSE DESCRIPTION:

Internet is one of the most interesting and exciting phenomena in this century. This course introduces basic technologies of data communication and provides analysis of Internet applications from a business perspective. It includes a detailed view of the communication environment, data communication and telecommunication equipment and local and wide area networks.

##### COURSE OBJECTIVE:

This is an **introductory** course and is targeted at advanced undergraduate who have little or no background in the subject. This course is designed to familiarize students with principles and concepts related to data communication, computer networks, and Internets. Moreover, the connection among technologies and business implications will be emphasized. At the end of the course, students will be expected to master the terminology, basic applications, and an overall picture of business communication networks, but not the engineering details.

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You will be asked to learn some concepts by yourself and analyze its position in business scenarios. This thought process is very important to develop a learning skill for more complicated and future technologies.

### **COURSE EVALUATION:**

Homework/Quizzes	20%
Lab Exercises	10%
Individual Technology Report	10%
Group Project	10%
Sub-Exams (10%, 15%)	25%
Final Exam	25%

and will be assigned as follows:

A 90 - 100

B 80 - 89

C 70 - 79

D 60 - 69

F less than 60

For group projects, each group member will individually assess the participation of his or her group members at the end of the course. The grade of each member will be assessed partially based on these evaluations. It is very important that you put in your share of time and effort in the group projects (including attending meetings, contributing ideas, etc.)

### **COURSE MATERIAL:**

#### **REQUIRED TEXTBOOK:**

Raymond R. Panko, *Business Data Communication and Networking*, 4th Edition, Prentice Hall

#### **OTHER TEXTBOOK REFERENCES:**

Stallings, W. and R.V. Slyke, *Business Data Communications*, Third Edition, Prentice-Hall, 1998.

**ONLINE RESOURCES:**

Technical Resources for *Business Data Communications*, by Stallings:

<http://williamstallings.com/BDC4e.html>

Technology term definitions and references: <http://whatis.com>

Resources of Data Communications in ISWorld.org:

<http://www.uis.edu/~hadidi/ISWTelecom.html>

Other readings available on the course website.

**COURSE PREREQUISITE:** XXX XXX or permission of the instructor.

**TOPICS: <???**

**Section I - Overview**

Data Networks

System Network Architecture

TCP/IP

**Section II – Transmission Principles**

Overview Of Data Transmission

Signals

IEEE LAN Protocols

Packet Technologies

SONET

Satellite / Wireless

**Section III – Communication Equipment**

Overview

Analog Devices

Modulation

Digital Devices

Line Coding

Multiplexers

**Section V – Transmission Media**

**STUDENT RESPONSIBILITIES:**

**a) Attendance / Participation**

You are strongly encouraged to participate in various in-class activities that will allow you to exercise your skills and knowledge, and stimulate your critical thinking. Students must be prepared to discuss the assigned chapters and respond to questions during class. Participation will be used as a 'swing' vote when your final grade is sitting right on the A-B or B-C threshold.

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### b) Homework / Quizzes

There will be a number of homework and ad-hoc quizzes during the semester. The scope of each quiz will be fairly narrow. To avoid extreme anxiety, the worst 2 quizzes for each student will be dropped from the computation of final grade. Written assignments are to be handed in by the due date. If some special circumstances arise, it is YOUR responsibility to coordinate with me **prior** to missing a deadline. Otherwise, grades on homework submitted after the due date will be reduced.

### c) Lab Exercises

Lab exercises provide students chances to apply concepts covered in class and gain some practical skills. Please visit <http://www.bus.utexas.edu/dept/msis/netlab2> for details.

### d) Individual Technology Analysis

You will be randomly assigned a specific field in networking (e.g. data filtering, web caching). You need to collect information from articles and the Web and write a short paper (5-6 pages) for technology description and its application in business.

With five separate steps, each student will INDIVIDUALLY prepare and submit one section of the topic analysis based on instructions (will be ready online). The parts are as follows:

1. Description of technologies
2. Pros and cons (comparison of different solutions)
3. Industrial analysis (comparison of different vendors)
4. Demand analysis (market shares, cases of adopters)
5. Opinions and forecast

### e) Group Project

Based on the individual technology analyses, students will be assigned group projects with related topics. Students are expected to use materials of individual analyses, exchange knowledge and viewpoints, write a group report, and present it in class.

The projects are designed to complement the lectures and to provide deeper understanding of various topics in the data communication technology field.

### f) Sub-Exams and Final Exam

There will be two sub-exams and a final exam in this course. The sub-exams will cover the chapters specified. The instructor will point out important topics. The final exam is comprehensive and is designed to not only test your understanding of the basic concepts in the material presented in the text but also your ability to apply these concepts. There is NO makeup.

### ***B. Sample of Assignment Instruction (Individual Technology Analysis)***

### ***C. Sample Quiz & Answers (Introduction of Web Services)***

This quiz will be taken in the beginning of the class to test the concepts taught in last lecture (Chapter 1 the introduction of web services). It covers the concepts web services, XML SOAP, and UDDI. Students have 15 minutes to finish 10 questions (15 points). Most of the questions are emphasized in class and also can be found in the textbook. The “Blake’s 7” story (question 10) is a reading assignment in previous class.

#### **Fill in the blanks: (1.5 points x 2)**

**1. Web Services are software services that are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ independent.**

*(Language, platform, location, each gets 0.5 point. Ignore the order)*

**2. Give a correct order of following technologies (from early to latest): HTTP, TCP/IP, COBRA, XML, RPC, UDDI**

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

*(RPC<HTTP gets 0.5; COBRA<XML gets 0.5; XML<UDDI gets 0.5)*

#### **Multiple-choice questions: (1 point x 5)**

**3. Which of the following sets of code would be considered “well-formed” XML?**  
*(b)*

**I. <firstname>John</firstname><lastname>Robertson</lastname>**

**II. <client><firstname>John<lastname>Robertson</client>**

**a. I    b. II    c. I and II    d. Neither I nor II**

**4. A DTD can do which of the following? (a)**

**a. Validate an XML document**

**b. Transform the appearance of the XML data.**

**c. Allow you to sort your XML data**

- d. Alert the XML developer that there is a syntax problem in the datasheet
5. The following template is an example of: (d)
- ```
<xsl:template match="text()">
<xsl:value-of select="." />
</xsl:template>
```
- a. an invalid template match
- b. a valid template match for any element named "text()"
- c. an implied template that outputs text nodes
- d. B and C
- e. None of the above
6. Which of the following is NOT a feature of SOAP? (b)
- a. Array, objects, and other complex data structure
- b. Publish the interface description
- c. Support request-response, on-way, solicit-response, and notification operations.
- d. Custom encoding types
- e. Heads support security, transactions, and routing
7. Which of the following is the LEAST common transport layer to support SOAP? (c)
- a. HTTP      b. SMTP      c. FTP      d. JMS      e. MQSeries

**Short-answer questions:**

- 8. Why do web services use XML for representing messages? (2 points)**

*(Language and platform independent, general-purpose, simple and portable, self-describing, easily manipulated. Each point gets 0.5 and total up to 2)*

- 9. Why is web services particular good for B2B applications? (2 points)**

*(Interoperability, openness, low cost, platform independent, industry support. Each point gets 0.5 and total up to 2)*

- 10. What is the ingredients of the “Blake’s 7” story? (3 points)**

*(distributed computing, dynamic connections, computer clusters vs. mainframes, component design, etc. Each point and explanation get 1 and total up to 3)*

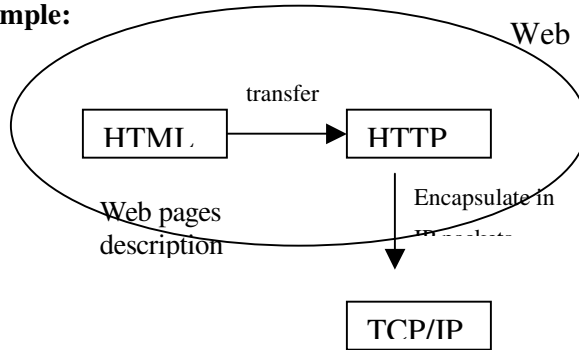
### D. Sample Exercise & Answers (Introduction of Web Services)

1. Find the definition of Web services in the textbook. (1 point)

*(Web services are a new breed of software component the is language, platform and location independent)*

2. Draw a connection map of following concepts: XML, SOAP, WSDL, UDDI, Web services, and XSD. (3 points)

For example:



*(XML->SOAP->WSDL->UDDI, XML->XSD, Web services. Each correct relation gets 0.5)*

3. Browse the web and make a list of six products that currently support web services. (3 points)

*(Each correct item gets 0.5 and total up to 3 points)*

**Short-answer questions:**

4. Make a prediction of what distributed computing technology will come after web services. (3 points)

*(Ideas related to Portal, process automation, and ubiquitous access get 1 point and proper explanations get up to 2 points. Also accept any reasonable predictions)*

5. Predict the kinds of applications that will have the highest early adoption rate of web services. (3 points)

*(Ideas related to B2B, Intranet, and B2C get 1 point and proper explanations get up to 2 points. Also accept any reasonable predictions)*

**Prepare the discussion of following questions for the next class. (reading assignment, not for grading)**

6. Debate whether web services would be better based on a binary message format instead of XML.

7. Before reading Chapter X, think about how you would send objects between applications.

***E. Sample Reading Worksheet***