Course Title: ITAP 2431: Network Management

Semester Credit Hours: 4 (3,1)

I. Course Overview

This course introduces students to business data communications and networking concepts, tools and methods. The goal is to prepare students to apply networking tools and methods to the solution of business problems. The course covers the use of basic data communications and networking hardware such as hubs and routers, and of simple programming tools to customize and integrate existing software. It introduces networking, distributed transaction processing, and Web-related concepts. The course also covers concepts for managing distributed storage and connectivity related to data, voice, image, and video. Its specific focus is on Web-based systems. The course includes a mix of lectures, laboratory demonstrations and assignments, and discussions on contemporary articles from industry publications.

II. PMU Competencies and Learning Outcomes

This course helps students become conversant with network management issues and understand the related terms and issues that are important for network management professionals around the world. Additionally, the course provides the students with the communication, leadership and teamwork skills necessary to effectively work as professionals in teams, or in charge of teams, responsible for operating complex network environments. Finally, the course imparts on the students an understanding of networks as more than webs of switches and cables – namely as resources that support the core and mission-critical business processes of an organization.

III. Detailed Course Description

The course begins with a discussion of ethical issues, legal issues, and aspects conducive to effective teamwork, in the context of network management. It then proceeds with a review of key introductory topics such as packet switching, types of communication signals, types of networking media and topologies, the OSI Model, and networking protocols. Next the course covers core technological ideas and elements used for networking computers in organizations, such as local area networks (LANs), wireless LANs, wide area networks, hubs, wireless access points, and routers. The course concludes with a discussion of advanced issues in connection multimedia delivery and distributed computing using the Web. The emphasis on this course is on networking infrastructure set up and management, rather than on distributed programming and other programming-related topics.

IV. Requirements Fulfilled

This course is required for all students majoring in Information Technology in the College of Information Technology. It is also recommended as an elective for students in majoring in programs focusing on computer science, computer engineering, and management information systems.

V. Required Prerequisites

- GEIT 1411: Computer Science I
- GEIT 1412: Computer Science II
- GEIT 1311: Computer Organization I.

VI. Learning Outcomes

In this course, students learn:

- To become conversant with network management issues and understand the related terms and issues relevant to network management professionals around the world.
- To acquire the communication, leadership and teamwork skills necessary for effectively work as professionals in teams, or in charge of teams, responsible for operating complex network environments.
- To understand the role of networks as more than switches and cables, that is, as resources that support the core and mission-critical business processes of an organization.

VII. Assessment Strategy

Students are assessed based on: their performance in two exams (midterm and final); their performance in connection with laboratory assignments; their class participation, which includes the discussion of recent articles taken from online industry publications; and the quality of a final team project and related oral presentation. The relative weights of each of these items on the final grade are as follows:

- The midterm and final exams each account for 15% of the grade. Combined, they account for 30% of the grade.
- The successful completion of laboratory assignments accounts for 20% of the grade.
- Class participation accounts for 10% of the grade, and is evaluated based on the ability of students to add to the material already provided by the instructor to them.

- The final team project accounts for 40% of the grade. It is evaluated based on a project document, oral presentation, and client perceptions of the team project. The project must be conducted in collaboration with a client organization (for example, a department at a large company or non-profit organization). A letter from the main contact person at the client organization, discussing and evaluating the project and its outcomes, must be provided to the instructor. The letter should contain the contact information of the person writing so the instructor can call him/her up and inquire about the project.

The exams encourage the students to review all of the concepts and methods discussed in class, which are primarily based on textbook material. This is complemented by laboratory assignments, where students apply the concepts and methods learned in practice. Another complement are the class discussions on recent articles taken from online industry publications, which help the students to become conversant with the industry-specific lingo related to network management issues. The final project provides an experience where concepts, methods, and industry-relevant issues are all brought together in a very applied manner to solve a real problem faced by a real organization. While this project is not as extensive as a program capstone project, it gives the students the necessary exposure to industry-relevant issues to prepare them for the future challenge of conducting a final program capstone project, and subsequently pursuing a successful career as IT professionals.

VIII. Course Format

The course is made up of a mix of class meetings and laboratory activities geared at helping the students learn the several steps involved in designing, implementing and managing a computer network infrastructure. The class meetings are split into two main components: lectures, and class discussions. The lectures cover topics outlined in this syllabus. The class discussions are based on recent articles taken from online industry publications such as *Network Computing* and *CIO Magazine*, which are freely available from the Web. The instructor provides the links to the articles, which are then downloaded by the students and read prior to class. In class, the students discuss the articles in small teams for about 20 minutes, developing three provocative questions per team. This is followed by a discussion involving the whole class, where each team asks one of the questions they developed, and other teams answer them, until all teams asked at least one of their questions. This discussion format is likely to lead to lively debate on topics that are directly addressed by the article, as well as on topics that are indirectly related to the article.

Classroom Hours (6 hours per week) **Class: 3**
Lab: 3

IX. Topics to be Covered

A. Ethical issues, legal issues, and effective teamwork
   1. Ethical and legal issues in network management
   2. Typical network management team composition
   3. Conflict resolution in network management teams
   4. Effective teamwork in network management teams
B. Concepts and methods
   1. Basic networking components
   2. Packet switching
   3. Types of communication signals
   4. Types of networking media and topologies
   5. The OSI Model
   6. Networking protocols
C. Networking in organizations
   1. Local area networks (LANs)
   2. Wireless LANs
   3. Wide area networks
   4. Hubs
   5. Wireless access points
   6. Routers
D. Advanced issues
   1. Audio and video streaming
   2. Web-based multimedia applications
   3. Virtual private networks
   4. Distributed computing

X. Laboratory Exercises

The laboratory component of this course consists of a weekly series of activities spanning a period of three hours. The laboratory activities involve demonstrations and practical assignments. The topics to be covered are:

A. Coax and twisted pair cabling
B. Hubs and local area networks (LANs)
C. Isolated LANs
D. Isolated wireless LANs
E. Hubs versus routers
F. Basic router set up and configuration
G. Static and dynamic IP addressing
H. Bus versus star topologies
I. Internet connectivity of LANs and wireless LANs
J. Multiple hot spots and portable wireless computing
K. Performance analysis in wired and wireless LANs
L. Audio and video streaming
M. Distributed computing

XI. Technology Component

A. In class, the instructor makes use of state-of-the art multimedia projection equipment and software. These are used to project slides and Web-based content, as well as play freely available Web-based video clips from Web sites covering topics relevant to the class (for example, CNN.com Technology).

B. Outside class, the instructor uses Web-based course management software to interact with students, provide feedback on their performance, make available links to online articles, as well as receive documents (for example, draft versions of project reports) and provide feedback on them.

C. Outside class, in the laboratory setting, the instructor makes use of commercial networking equipment and software to create a simulated business networking environment.

XII. Special Projects/Activities

The team project consists of meeting with members of a client organization (for example, a department at a large company or non-profit organization), gathering relevant information from them, and developing a document containing the following elements:

- A set of organizational problems that could potentially be solved through the implementation of a technology related to one or more of the topics covered in this course. For example, a team may study a manufacturing plant and find out that the deployment of a particular wireless LAN technology could solve key problems in one of its assembly lines.
- A detailed description of a technology solution to the problems above. This description should include hardware and software details, as well as details in connection with how the technology is integrated with existing technologies in the client organization.
- A detailed description of the costs and potential benefits, from an organizational perspective, associated with the technology solution.

Oral presentation. Teams summarize and explain the information contained in their project document in an oral presentation in class at the end of the semester.

XIII. Textbooks and Teaching Aids

A. Required Textbook

Jerry FitzGerald and Alan Dennis, *Business Data Communications and Networking*; 8th edition (July 9, 2004) John Wiley & Sons ISBN: 0471348074.

B. Alternative Textbooks

Teresa Rubinson Piliouras, Piliouras Rubinson, Teresa C. Mann-Rubinson and Kornel Terplan; *Network Design: Management and Technical Perspectives*; ; 2nd edition (October 2004); Auerbach Pub ISBN 0849316081.

C. Supplemental Print Materials

None

D. Supplemental Online Materials

Recent articles taken from online industry publications such as Network Computing and CIO Magazine. The instructor provides the links to the articles, which are freely available from the Web.