School of Technology  
Eastern Illinois University  

New Course Proposal

1. Catalog Description

a) Course number: AET 2523  
b) Title: Routing and Switching Fundamentals  
c) Meeting times and Credit: 2-2-3  
d) Term to be offered: F 2003  
e) Short title: Route & Switch  
f) Course description: An in-depth hardware course in computer hardware systems, Open Systems Interconnect (OSI) model layers, configuration details of Internet Protocol routing, switching topics, and router operation as applied to industrial settings.

g) Prerequisite: AET 1323

2. Objectives and Evaluation of the Course

a) Students will be able to perform the following tasks as a result of completing this course:
   1. Apply experience with computer system hardware to networks.
   2. Identify and use the OSI model layers in an industrial networking setting.
   3. Apply the basic principles of Local-Area Networks (LANs) to different situations.
   5. Develop a basic working knowledge of Wide Area Networks and Routers.
   6. Use routing principles, routing protocols, and router configuration techniques in a WAN.
   7. Apply network troubleshooting and management techniques in an industrial setting.
   8. Apply the integration of industrial control devices, such as the Programmable Logic Controller (PLC) into a local and wide area network.
   9. Research emerging technologies in the field of industrial networking.

b) Not a general education course.
c) Methods of assessing the objectives:

Tests – Midterm and Final 25%
Lab experiences 25%
Research report on emerging networking technologies in industrial settings 25%
Final project - creating an industrial network 25%

3. Outline of the Course

1. Review of computer system hardware and application of the OSI Model 1
   Lab I, II
2. Applying the basic principles of LAN technologies to creating a network 1
   Lab III, IV
3. Using repeaters, bridges, routers, and switches in networks 1
   Lab IV, V
4. Applying application layer protocols to networks 1
   Lab VI, VII
5. Configuring routers and router architecture for WANs 2
   Lab VII, VIII, IX, X
6. Assigning addresses and IP addressing to LANs and WANs 2
   Lab XI, XII, XIII, XIV
7. Using Subnetting in networks and integrating PLCs into industrial networks 2
   Lab XV, XVI
8. Design of an industrial network integrating PLCs 3
9. Researching emerging technologies in industrial networks 2

4. Rationale

a) Purpose and need: Applied Engineering & Technology students in the Automation and Control Concentration are being required to work with, maintain, and design basic and advanced networking technologies in an industrial environment. Production floor machines are network ready today and are connected into an industrial plant wide network, which can connect into the corporate network.

The interconnection of networks within a facility and to other widely separated facilities and divisions of an organization has become paramount. A recent survey of industrial businesses on the need for e-Manufacturing and networking revealed that businesses want Applied Engineering & Technology graduates to have networking experiences. The survey indicated a 90% level of need for these skills.
b) Justification of the level of the course and a list of all prerequisites: A sophomore level course would give students exposure to the necessary fundamentals of industrial networking and routing. Further, this background would prepare them for additional work in a junior level advanced routing and switching course being proposed and in advanced Applied Engineering & Technology courses, which includes networking. Prerequisite is BUS1950 Computer Concepts and Applications for Business.

c) Similarity to existing courses and/or effect upon programs in other departments: None.

d) Impact on Program: Elective for students in the Automation and Control Concentration of the Applied Engineering & Technology program and Technology Education emphasis of the Career and Technical Education program. No changes to the current catalog necessary.

5. Implementation

a) Faculty: Dr. Sam Guccione School of Technology.

b) Additional costs to students: Engineering Journal and Workbook, Vol I, 2001 to be purchased in the Union Bookstore as a supplemental text.

   b. Lab Companion, Vol I, 2001

d) Term to be first offered: Fall Semester 2003.

6. Community College Transfer: A community college course may be judged as equivalent.

7. Date approved by the School of Technology Curriculum Committee: April 17, 2002

8. Date approved by the Lumpkin College of Business and Applied Sciences Curriculum Committee: September 12, 2002

9. Date approved by Council on Academic Affairs: October 17, 2002