

IT Infrastructure

Catalog Description

This course provides an introduction IT infrastructure issues for students majoring in Information Systems. It covers topics related to both computer and systems architecture and communication networks, with an overall focus on the services and capabilities that IT infrastructure solutions enable in an organizational context. It gives the students the knowledge and skills that they need for communicating effectively with professionals whose special focus is on hardware and systems software technology and for designing organizational processes and software solutions that require in-depth understanding of the IT infrastructure capabilities and limitations. It also prepares the students for organizational roles that require interaction with external vendors of IT infrastructure components and solutions. The course focuses strongly on Internet-based solutions, computer and network security, business continuity, and the role of infrastructure in regulatory compliance.

Learning Objectives

The students will be able to:

- Understand key principles of data representation and manipulation in computing solutions.
- Understand the principles underlying layered systems architectures and their application to both computers and networks.
- Understand the differences and similarities between the core elements of an IT infrastructure solution, such as clients, servers, network devices, wired and wireless network links, systems software, and specialized security devices.
- Understand how IT infrastructure components are organized into infrastructure solutions in different organizational environments.
- Understand the principles underlying service virtualization.
- Understand through practical examples how protocols are used to enable communication between computing devices connected to each other.
- Configure an IT infrastructure solution for a small organization, including a network based on standard technology components, servers, security devices, and several different types of computing clients.
- Apply the core concepts underlying IP networks to solve simple network design problems, including the design of simple IP subnetting solutions.
- Understand the role and structure of the Internet as an IT infrastructure component.
- Understand the components and structure of a large-scale organizational IT infrastructure solution at a level that allows them to utilize it effectively and negotiate with vendors providing design and implementation solutions.
- Understand the opportunities that virtual computing service provision models, such as cloud computing, create for organizations.
- Analyze and understand the security and business continuity implications of IT infrastructure design solutions.
- Understand the environmental and resource consumption impacts of IT infrastructure decisions.

Topics

- Core Computing System Architecture Concepts
- Core Computing System Organizing Structures
- Core Technical Components of Computer-Based Systems
- Role of IT Infrastructure in a Modern Organization
- Operating Systems
 - Core operating systems functionality
 - Internal organization of an operating system
 - Types of devices that require and utilize operating systems
 - Multitasking and multithreading
 - File systems and storage
 - User interfaces
 - Operating system configuration
 - Securing an operating system
 - Virtualization of computing services
- Networking
 - Types of networks
 - Core network components
 - TCP/IP model (Internet model)
 - Physical layer: wired and wireless connectivity
 - Data link layer: Ethernet
 - Network layer: IP, IP addressing and routing
 - Transport layer: TCP
 - Application layer: Core internet application protocols
 - Network security and security devices
 - The Internet as a key networking platform
 - Network device configuration
- Network Management
 - Securing IT infrastructure
 - Principles of encryption and authentication
 - Component level security: clients, servers, storage network devices, data transport, applications
 - Perimeter security: firewalls
 - Using public networks for secure data transport: VPNs
 - Ensuring business continuity
 - System performance analysis and management
 - Cost management
 - Purchasing of IT infrastructure technologies and services
 - Cost of maintaining and staffing of IT infrastructure technologies and services
 - End user support
- Organizing Storage on Organizational Networks
- Data Centers
- Grid Computing
- Cloud Computing
 - Computing as a service

Discussion

- This course recognizes that Information Systems programs are increasingly preparing students for organizational roles that do not require in-depth skills in designing or configuring hardware and systems software solutions. The key focus is on helping the students understand the infrastructure issues at a level that is required for effective work as business and systems analysis.
- The course also forms the foundation for further study related to both computer architecture and communication networks. Specifically, it is important to recognize that many technically focused IT risk management, security, and forensics jobs require more in-depth understanding of technology issues than this single course can provide.
- This course will provide an overview of the foundational management skills needs to manage a complex and diverse network in an organization. This includes an overview of the basic components in IT infrastructure and the issues involved in managing the infrastructure.
- Whenever possible, it is recommended that this course uses hands-on laboratory work and practical exercises to teach the complex concepts that are often too abstract to grasp without practical examples.