

Jadara University
Faculty of Science and Information Technology
Short Descriptions of Computer Networks Courses

1. Required Courses:

| Course Title | Credit Hours | Course No. | Prerequisite |
|---|--------------|------------|--------------|
| Network technology and data communication | 3 | 502201 | 501291 |

Course Description:

It is a second level course which is an essential course in any network computer study. It starts with emphasizing the OSI Model and Layers, TCP/IP Model and Layers and Transmission concepts and protocols. The aim is to concentrate on the physical and Data Link Layer protocols and characteristics.

| Course Title | Credit Hours | Course No. | Prerequisite |
|--|--------------|------------|--------------|
| Data communication and Computer Networks | 3 | 502201 | 501291 |

Course Description:

Concepts and terminology of data communications and computer networks. Logical and physical realization of computer networks, architecture and transmission alternatives. OSI-reference model, ALOHA protocol, CSMA protocols, LAN, IEEE standards and protocols (token ring, token bus and Ethernet), physical layer basics, data link layer, framing protocols, error detecting and correcting, routing algorithms, flow control, congestion control algorithms, personal computer networks.

| Course Title | Credit Hours | Course No. | Prerequisite |
|---------------------|--------------|------------|--------------|
| Computer Network(1) | 3 | 502251 | 502201 |

Course Description:

The course will continue what is started from the prerequisite course by discussing the protocol architecture and related usability of layers starting from the network layer up to the application layer. Routing, network design, addressing and applications are discussed. The use of different addressing schemes is outlined with IPv4 addresses, subnetting, supernetting, Classless Inter-Domain Routing (CIDR), Variable Length Subnet Mask (VLSM). Unicast and multicast routing protocols will be discussed. The course uses the TCP/IP protocol suite as a use case. **The practical part** of this course will cover the use of networking equipment, setup different networking scenarios, and understand the working environment of networking equipment such as routers, switches, and servers and know the different types of cables.

| Course Title | Credit Hours | Course No. | Prerequisite |
|-----------------------|--------------|------------|--------------|
| Computer Networks (2) | 3 | 502331 | 502251 |

Course Description:

This course is considered as a continuation course for computer networks (1), at this point the student should be able to extend his knowledge in major protocols in the data, and multimedia areas. The course discusses protocols such as ATM, ISDN, Frame Relay, Satellite Networks and Global Positioning System (GPS), Virtual LAN (VLAN), Multicast, and other related topics such as Quality of Service (QoS). The practical part of this course will cover the the understanding of network devices such as Routers, Switches and Bridges. Also start by the initial configurations of these devices establishment of LANs, static and dynamic IPs.

| Course Title | Credit Hours | Course No. | Prerequisite |
|------------------|--------------|------------|--------------|
| Network Security | 3 | 502341 | 502331 |

Course Description:

This course is an introductory class in network security and security applications. Introduction to network security requirements, Firewalls, building secure channels, studying security protocols such as SSL/TLS, sHTTP will be covered.

| Course Title | Credit Hours | Course No. | Prerequisite |
|----------------------------------|--------------|------------|--------------|
| Network and Computer Maintenance | 3 | 502351 | 502331 |

Course Description:

This course will cover the main problems that may face the network after establishment, either hardware or software configuration problems. The student will take this course in two way as studying the expected problems in the class and do practical solution to these problems in the lab. By the end of this course the student should be able to detect the errors in the network (hardware or software) and find the best solutions.

| Course Title | Credit Hours | Course No. | Prerequisite |
|---------------------|--------------|------------|-------------------|
| Network Programming | 3 | 502421 | 501333 +502331 |

Course Description:

Network Programming course is an introduction to the network (Socket) programming with Java™ technology, and the fundamental elements of the Java networking API. The course

provides the knowledge of network programming techniques such as network services, network components, client services and applications, server programs, peer-to-peer services. The practical part of this course will cover the understanding of routing protocols and the way they work and understanding the ISP setup. Also it will give an initial idea on WLAN and access point configuration. (Introduction to networks programming advanced JAVA (covers I/O Routines, Threading Sockets, URL connections, Server-Side programming), database connectivity , distributed programming, and network security, Students are required to do lab. Assignment).

| Course Title | Credit Hours | Course No. | Prerequisite |
|------------------------|--------------|------------|--------------|
| Molding and simulation | 3 | 502431 | 502331 |

Course Description:

This course will start with by defining the need for network simulation and the way these simulation works, by discussing the different types of simulation (event-driven and time-driven) simulations. Then the student will start to download the simulator (OPNET or NS2) and start to know the main parts of each simulator and how to work with each. Next the student will built a simple network; wire or wireless; and studying the output if these simulation and analyzing the output and modify his output by changing his network design and scenarios. (Modeling principles, pre & post conditions, a review of mathematical models and specification languages, properties of modeling languages; modeling of information, behavior, structure, domain, functions, and embedded systems: analysis fundamentals; requirements fundamentals, specification, elicitation, documentation and validation).

| Course Title | Credit Hours | Course No. | Prerequisite |
|--------------------------------|--------------|------------|--------------|
| Data Encryption and protection | 3 | 502441 | 502341 |

Course Description:

This course is a continuation course Network Security course. After securing your network you need to work with data security over your secure network. The course will discuss the security policy; cryptography and its applications to network security; applications of cryptography; secret key and public key cryptographic algorithms; hash functions; authentication.

| Course Title | Credit Hours | Course No. | Prerequisite |
|-------------------|--------------|------------|--------------|
| Wireless Networks | 3 | 502451 | 502331 |

Course Description:

This course will cover the current and upcoming technologies in mobile computing. The course covers hardware and software technologies like distributed computing and wireless communications. The course will start with an Introduction to mobile computing, designing wireless computer networks. Different issues such as quality of service, reliability and scalability in the mobile computing environment will be covered. Ad Hoc networks and the different issues in this type of wireless networks will be covered.

| Course Title | Credit Hours | Course No. | Prerequisite |
|----------------------|--------------|------------|--------------|
| Information Security | 3 | 502441 | |

Course Description

Information security basics, basic cryptography, modern symmetric ciphers, public key cryptosystems, key management, message authentication, hash functions, digital signatures, IP and web security, firewalls and trusted systems, secured software design, application security software threats, social, legal, and ethical issues. Human factors in security.

| Course Title | Credit Hours | Course No. | Prerequisite |
|------------------------------|--------------|------------|--------------|
| Networks Planning and Design | 3 | 502461 | 502331 |

Course Objectives:

This course will cover the main requirements for designing and planning the network in organizations. It starts by studying the different types of requirements; user requirements; application requirements; device requirements and network requirements. Then the student will study different architectural models that fit the proposed network with requirements consideration.

| Course Title | Credit Hours | Course No. | Prerequisite |
|--------------------|--------------|------------|--------------|
| Graduation Project | 3 | 502449 | |

Course Description

The final year project gives the student the opportunity to apply knowledge acquired in the early years. Projects are assigned on a team basis. They are normally proposed by lecturers of the department. However, a student may propose a topic or an area of his/her own research interest. Each team will be assigned a supervisor who is in charge of the entire project. The student is expected to develop the skills of gathering information, analyzing and specifying problem requirements. A final document should be submitted that includes a literature survey, initial plan, requirement specification, design, and a description of the overall system. A CD that includes the code is submitted along with the document. An oral presentation before a committee of three faculty members is given at the end of the semester.

2. Elective Courses: (Sorted ascending based on Course Number)

| Course Title | Credit Hours | Course No. | Prerequisite |
|------------------------------|--------------|------------|--------------|
| Network Security Programming | 3 | 502442 | 502341 |

Course Description:

The course will use JAVA programming language to implement security mechanisms in network protocols, mostly at the application and transport layers in TCP/IP networks.

Topics covered in the course include: review of basic concepts in cryptography and cryptographic protocols, implementing SSL servers, implementing an HTTPS server based on SSL, composing secure email (S/MIME) messages.

| Course Title | Credit Hours | Course No. | Prerequisite |
|-------------------------------|--------------|------------|--------------|
| Selected Programming Language | 3 | 502361 | 501333 |

This course as an elective course will cover any new or well-known programming language that may be related to network programming. The programming language will be selected depending on the need, some programming languages that may be considered are (C#, ASP.Net,..).

| Course Title | Credit Hours | Course No. | Prerequisite |
|---------------|--------------|------------|--------------|
| Voice Over IP | 3 | 502481 | 502331 |

Course Description:

At this course the student will take the idea for VOIP protocol and the internet telephony and the applications the use this protocol and can give the student the security over this protocol. The student will take an idea about SIP (*Session Initiation Protocol*) and the involvement of VOIP protocol in these applications.

| Course Title | Credit Hours | Course No. | Prerequisite |
|--------------------------|--------------|------------|--------------|
| Wireless Networks Design | 3 | 502492 | 502331 |

Course Description:

This course is an introduction to Wireless Sensor Networks (WSNs). The design principles of these tiny sensor nodes, which consist of sensing, data processing, and communicating components, will be covered. This type of networks can be used for different application areas (e.g., health, military, home). These applications need different scenarios in designing the network, these scenarios and performance metrics will be covered.

| Course Title | Credit Hours | Course No. | Prerequisite |
|-----------------------------|--------------|------------|--------------|
| Advanced Internet Protocols | 3 | 502491 | 502331 |

Course Description:

This course will cover and advanced networking topics in TCP/IP, TCP traffic control, routing protocols, multicast routing protocols, and upper layer protocols supporting the new generation of the Internet; compression techniques.

| Course Title | Credit Hours | Course No. | Prerequisite |
|-----------------------|--------------|------------|----------------|
| Special Topics in CNS | 3 | 502493 | Dept. approval |

Course Description:

This course will cover any topic related to computer networks study in topics that the Department feels it should be covered; these topics could be security, wireless, ad hoc and any other related topics. (This course has been designed to offer the detailed knowledge and skills within the field of wireless and mobile networks. This course covers the main concepts of wireless communications and standards, data transmissions, as well as network architectures, types and performance issues. Mainly, the wireless networks are described in terms of the coverage capacity including: Wireless Personal Area Networks (WPANs), Wireless Local Area Networks (WLANs), Wireless Wide Area Networks (WWANs). Satellite communications and applications with a focus on the Global Positioning System (GPS) are described. The mobile networks evolution is thoroughly presented including: GSM, GPRS, HSCSD, EDGE, UMTS, HSDPA, HSUPA, and 4G. This course introduces the mobile TCP/IP suite and Wireless Access Protocol (WAP). Additionally, the mobile devices are described in terms of the main components, architectures, operating systems along with basic knowledge of mobile programming. At last, broad range of the latest applications utilizing wireless and mobile communications are described).