

1.	School	Engineering
2.	Department	Computer
3.	Program title (Arabic)	ماجستير في هندسة الحاسوب والشبكات
4.	Program title (English)	Master in Computer Engineering and Networks
5.	Track	Thesis Track

	Specialization #	Degree	Dep #	Faculty #	Year	Track
Plan Number	0907	Ms.c	07	09	2019	Thesis

First: General Rules & Conditions:

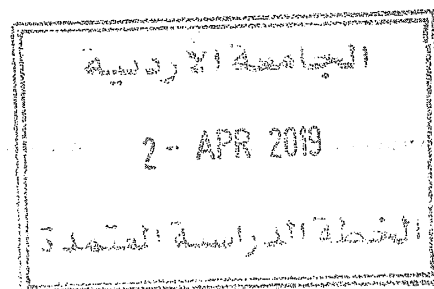
1. This plan conforms to the valid regulations of the programs of graduate studies.
2. Specialties of Admission:
 - The First Priority: Bachelor's in Computer Engineering
 - The Second Priority: Bachelor's in Electrical Engineering
 - The Third Priority: Bachelor's in Networks Engineering
 - The Fourth Priority: Bachelor's in Communications Engineering
 - The Fifth Priority: Bachelor's in Electronics Engineering
 - The Sixth Priority: Bachelor's in Mechatronics Engineering

Second: Special Conditions:..... or None.

Third: Study Plan: Studying (33) Credit Hours as following:

1. Obligatory Courses (15) Credit Hours:

Course No.	Course Title	Credit hrs.	Pre-requisite
0907703	Research Methodology	3	-
0907720	Probability and Queuing Theory	3	-
0907721	Network Systems Design	3	-
0907748	Advanced Networks and Systems Security	3	-
0907731	Advanced Computer Architecture	3	-

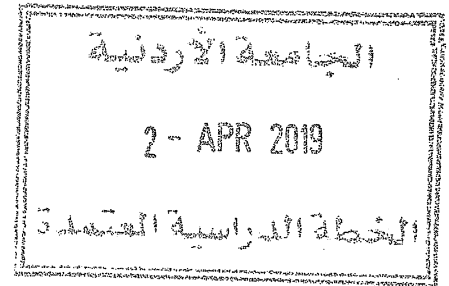


2. Elective Courses: Studying (9) Credit hours from the following:

Course No.	Course Title	Credit hrs.	Pre-requisite
0907749	Advanced Wireless Networks	3	0907721
0907724	Multimedia Engineering	3	-
0907750	Advanced Parallel Processing	3	0907731
0907735	Advanced Digital System Design	3	-
0907741	Advanced Distributed Systems	3	-
0907743	Advanced Artificial Intelligence and Machine Learning	3	-
0907744	Advanced Algorithms	3	-
0907745	Advanced Big Data Analysis	3	-
0907746	Advanced Cloud Computing	3	0907721
0907747	Advanced Digital Image Processing	3	-
0907751	Advanced Topics in Computer Engineering and Networks	3	-

Masters Thesis, 0907799; (9) Credit Hours.

3. Thesis: 0907799 Credit hours (9).



4. Courses Description

0907703 Research Methodology

(3 Credit Hours)

Pre-requisite: -

Issues in Research Mythologies, Performance Evaluation and Benchmarking. Measurement Tools and techniques, Trace Driven and Execution Driven Simulation. Choice of metrics. Benchmarks. Statistical techniques for Performance Evaluation. Trace Generation and Validation, Synthetic Traces, Verification of Simulators. Design of Experiments. Analytical Modeling of Processors, Statistical modeling, Hybrid Techniques. Workload Characterization. Literature Surveys and Writing Research Papers and Reports.

0907720 Probability and Queuing Theory

(3 Credit Hours)

Pre-requisite: -

Probability and random variables, distributions and density functions, stochastic processes, Markov chains, modeling and analysis of queuing systems with applications in computers and networking where topics include birth-death processes and simple Markovian queues, networks of queues and product form networks, single and multi-server queues, multi-class queuing networks, fluid models, adversarial queuing networks, as well as heavy-traffic theory and diffusion approximations.

0907721 Network Systems Design

(3 Credit Hours)

Pre-requisite: -

This course gives a broad view of the current state of computer networking research. Topics include: Internet architecture; Internet routing: the Border Gateway Protocol (BGP), routing characterization, routing security, Internet AS relationships, traffic engineering, end host congestion control; quality-of-service, network security: intrusion detection systems, worms, and honey pots; mobile and wireless networking; peer to peer and overlay networking; content distribution networks; sensor networks; critical network infrastructure services: Domain Name Server (DNS), mail servers, etc.; network measurement: distance estimation, bandwidth measurement, trouble shooting tools; network management.

0907748 Advanced Networks and Systems Security (3 Credit Hours)

Pre-requisite: -

Review of Computer Networks. Number Theory and Field Arithmetic. Sources of Network Threats. Data Encryption: Cryptography and



Ciphering. Risk Management. Key Management. Protocols and Algorithms of Security Systems. Email and Web Security and Firewalls. Performance Evaluation of Security Systems.

0907749

Advanced Wireless Networks

(3 Credit Hours)

Pre-requisite: 0907721

Introduction to wireless networks: physical layer, MAC and IEEE 802.11, HIPERLAN, Bluetooth, channel assignment and channel hopping, power control and rate control, multi-radio, network layer, mobile IP, and naming, routing in mobile networks, transport protocol in wireless networks; types of wireless networks: wireless mesh networks, sensor networks, cellular networks, delay tolerant networks, RFID and WiMax; wireless network management and security: localization, network usage studies, network diagnosis, network security.

0907724

Multimedia Engineering

(3 Credit Hours)

Pre-requisite: -

Signal processing concepts exploited in the field of multimedia applications, issues in multimedia applications design, multimedia data processing and representations, multimedia compression standards (text, image, video and audio), multimedia content representation, content-based multimedia retrieval, watermarking techniques and security, multimedia network communications.

0907731

Advanced Computer Architecture

(3 Credit Hours)

Pre-requisite: -

Review of computer design principles, processor design, RISC processors, pipelining, and memory hierarchy. Instruction level parallelism (ILP), dynamic scheduling, multiple issue, speculative execution, and branch prediction. Limits on ILP and software approaches to exploit more ILP. VLIW and EPIC approaches. Thread-level parallelism, multiprocessors, chip multiprocessors, and multi-threading. Cache coherence and memory consistency. Advanced memory hierarchy design, cache and memory optimizations, and memory technologies. Advanced topics in storage systems. Designing and evaluating I/O systems.

0907750

Advanced Parallel Processing

(3 Credit Hours)

Pre-requisite: 0907731

Architectures for explicit parallelism. Multithreaded processors, small- and large-scale multiprocessor systems. Shared-memory

coherence and consistency. Graphics processing units. Effect of architecture on communication latency, bandwidth, and overhead. Latency tolerance techniques. Interconnection networks. The development of programs for parallel computers. Basic concepts such as speedup, load balancing, latency, system taxonomies. Design of algorithms for idealized models. Programming on parallel systems such as shared or distributed memory machines, networks. Grid Computing. Performance analysis. Case studies.

- 0907735 Advanced Digital System Design (3 Credit Hours)**
Pre-requisite: -
Multi-Level Combinational Design, Programmable Logic Synthesis, Arithmetic Circuits, Sequential System Design, Finite State Machine Optimization, Analysis of Asynchronous Sequential Systems, Asynchronous Sequential System Design, Multi-Valued Logic Synthesis, Multi-Valued System Optimization, Regular Digital System Design, Static and Dynamic Hazards, Testing Techniques for Modern Digital Systems, Design-For-Testability
- 0907741 Advanced Distributed Systems (3 Credit Hours)**
Pre-requisite: -
Introduction to Distributed Systems, Distributed Operating Systems, Processes and Inter-process Communication (IPC), Distributed File Systems, Remote Procedure Calls (RPC), Security Models, Distributed Architectures and Technologies, Middleware, Object Based Distributed Systems, Messaging and Message Oriented Systems, Agent-Based Systems, Distributed Application Project.
- 0907743 Advanced Artificial Intelligence and Machine Learning (3 Credit Hours)**
Pre-requisite: -
Theory and implementation of state-of-the-art machine learning algorithms for large-scale real-world applications. Topics include supervised learning (regression, classification, kernel methods, neural networks, and regularization) and unsupervised learning (clustering, density estimation, and dimensionality reduction). Term projects.
- 0907744 Advanced Algorithms (3 Credit Hours)**
Pre-requisite: -
Emphasis will be placed on fundamental algorithms and advanced methods of algorithmic design, analysis, and implementation. Techniques to be covered include network flows, linear programming, Integer linear programming, NP-completeness, solving NP-complete

problems using approximate and heuristic approaches, and dynamic programming.

0907745 Advanced Big Data Analytics (3 Credit Hours)

Pre-requisite: -

Introduction to the applications, market trend, fundamental frameworks, such as Hadoop and Spark, Overview of other tools, such as IBM System G Graph Visualization. Data storage methods and how to upload, distribute, and process them, Handling analytics algorithms on different platforms, visualization issues and mobile issues, Large-scale machine learning methods that are foundations for artificial intelligence and cognitive networks as an important means to read out value from data. For example, Speech Recognition and Computer Vision obtain valuable information from speech or optical sensor data. Methods to optimize the analytics based on different hardware platforms, such as Intel & Power chips, GPU, FPGA, etc. Future challenges of Big Data.

0907746 Advanced Cloud Computing (3 Credit Hours)

Pre-requisite: 0907721

Cloud computing models, techniques, and architectures, distributed computing models and technologies, Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), virtualization, security and privacy issues, performance and systems issues, capacity planning, disaster recovery, Cloud OS, federated clouds, challenges in implementing clouds, data centers, cloud hosted applications, and other advanced and research topics in cloud computing.

0907747 Advanced Digital Image Processing (3 Credit Hours)

Pre-requisite: -

Introduction to digital image processing techniques for enhancement, compression, restoration, reconstruction, and analysis, 2-D signals and systems, image analysis, image segmentation, achromatic vision, color image processing, color imaging systems, medical imaging, image sharpening, interpolation, decimation, linear and nonlinear filtering, camera modeling, stereo vision, pose calculation, object recognition, optical flows, visual tracking, color vision, and beginning concepts of computational geometry.

**0907751 Advanced Topics in Computer
Engineering and Networks**

(3 Credit Hours)

Pre-requisite: -

Topics of special interest in current computer engineering and networks issues. The course description is specified by the department at every course offering.

