

**Kingdom of Saudi Arabia
King Saud University**

**College of Computer & Information Sciences
Department of Computer Engineering**

**The MASTER'S PROGRAM
IN COMPUTER ENGINEERING**

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M.S. PROGRAM IN COMPUTER ENGINEERING

1. Program Objectives:

The Graduate Program leading to the degree of M.S. in Computer Engineering has been developed to provide:

- Necessary theoretical background to those willing to pursue further studies.
- Necessary preparation of those willing to acquire advanced knowledge and skills to meet the qualified manpower needs of the country in the computer engineering field.

In this respect the graduate program in Computer Engineering covers major topics in Computer Engineering to cater for the needs mentioned above. It is believed that the department must serve a wide stream of students coming with varying backgrounds and objectives. This program will help to enhance the student's abilities as well as to provide thorough knowledge in various specific application areas in Computer Engineering. The following areas of Computer Engineering are emphasized:

1. Computer Architecture, and Microprocessor Systems
2. Data Communication and Computer Networks
3. Robotics, Automation and Signal Processing

The program was approved from the University Council dated 24/10/1410 H. and the actual study started in the Second Semester 1411/1412 H.

2. Admission to the Program:

Qualified candidates holding a B.Sc. degree in Computer Engineering may apply for the Masters Program which is governed by provision of article (i) and (ii) of the General Regulations for Graduate Studies. Qualified candidates holding a degree in Computer Science, Electrical Engineering as well as related sciences may also apply. They may be given provisional approval subject to their completion of the program's pre-requisites determined by the department council.

3. Degree Requirements:

The degree of Master of Science in Computer Engineering requires the student to meet the University Graduate

Studies regulations. In addition, the student must fulfill the following requirements.

a- Successful completion of 8 courses (equivalent to 24 credit hours of graduate courses) with GPA not less than 3.75.

b- Completion and successful defense of a thesis in the area of study approved by the department.

4. Course Structure:

The graduate program leading to the degree of M.S. in Computer Engineering comprises 8 courses (equivalent to 24 credit hours) scheduled on 4 semesters, with two courses per semester and a thesis.

The program allows students to specialize in one of the following areas:

- 1- Computer Architecture and Microprocessor Systems
- 2- Data Communication and Computer Networks
- 3- Robotics, Automation and Signal Processing

The students study five courses in his major area of specialization plus one course from the other two specializations and one course from other postgraduate programs. This allows students to be specialized in their domain and giving the basic requirements from other specializations.

Also there is a common track (fourth) between the three specializations, such that the students study several courses from each specialization, which gives the students a broad base in all the allowed specialization.

The different areas are specified by the middle digit of the course number as follows:

Middle Digit	Area
2	Computer Architecture and Microprocessor Systems
3	Data Communication and Network

5. Program Courses:

The M.Sc. program in computer engineering includes the following courses:

Courses for M.S. in Computer Engineering

Course System	Computer Architecture & Microprocessor Credit	
CEN 521 (3)	Advanced Computer Architecture	
CEN 523 (3)	Fault-Tolerant Computer Systems	
CEN 524 (3)	Advanced Microprocessor Systems	
CEN 529 (3)	Selected Topics in Computer Architecture	

Course Networks	Data Communication and Credit	Computer
CEN 531 (3)	Computer Networks	
CEN 532 (3)	Computer Communication Systems	
CEN 534 (3)	Local Computer Networks	
CEN 535 (3)	Advanced Data Communication	
CEN 539 (3)	Selected Topics in Computer Networks	

Course Credit	Robotics, Automation and Signal Processing	
CEN 541 (3)	Computer-Controlled Systems	
CEN 543 (3)	Digital Signal Processing I	
CEN 545 (3)	Digital Image Processing	
CEN 549 (3)	Selected Topics in Automation	

Course	Course Description	Credit
CEN 559	Selected Topics in Computer Engineering	(3)

Course	Course Description	Credit
CEN 600	Thesis	(3)

Courses from outside Computer Engineering

Course	Course Description	Credit
CSC 521	Operating Systems	(3)
OR 543	Modeling and Simulation	(3)
CSC 561	Expert Systems	(3)

6. Course Schedules

The student study two courses per semester for a period of four semesters; such courses are chosen from the M.Sc. courses specified in the above tables and postgraduate courses of the university in general as follows:

Distribution of Master Courses in Computer Engineering for Part Time Students

I. Specialization in Computer Systems

Ist Semester

Course	Course Description	Credit
CEN 52 1	Advanced Computer Architecture	3
CEN 53 1	Computer Networks	3

IInd Semester

Course	Course Description	Credit
CSC 52 1	Operating Systems	3
CEN 54 3	Digital Signal Processing	3

IIIrd Semester

Course	Course Description	Credit
CEN 52 4	Advanced Microprocessor Systems	3
CEN 52 6	Real Time Systems	3

IVth Semester

Course	Course Description	Credit
CEN 52 3	Fault Tolerant Computer Systems	3
CEN 52 9	Selected Topics in Computer Architecture	3

II. Specialization in Computer Networks

Ist Semester

Course	Course Description	Credit
CEN 52 1	Advanced Computer Architecture	3
CEN 53 1	Computer Networks	3

IInd Semester

Course	Course Description	Credit
CEN 53 5	Advanced Data Communication	3
CEN 54 3	Digital Signal Processing	3

IIIrd Semester

Course	Course Description	Credit
CEN 53 2	Computer Communication Systems	3
OR 54 3	Modelling and Simulation	3

IVth Semester

Course	Course Description	Credit
CEN 53 4	Local Area Networks	3
CEN 53 9	Selected Topics in Computer Networks	3

III. Specialization in Automation

Ist Semester

Course	Course Description	Credit
CEN 521	Advanced Computer Architecture	3
CEN 531	Computer Networks	3

IInd Semester

Course	Course Description	Credit
CEN 541	Computer Controlled Systems	3
CEN 543	Digital Signal Processing	3

IIIrd Semester

Course	Course Description	Credit
CEN 545	Digital Image Processing	3
CSC 561	Expert Systems	3

IVth Semester

Course	Course Description	Credit
CEN 542	Robotics and Automation	3
CEN 549	Selected Topics in Automation	3

VI. Common Track

1st Semester

Course	Course Description	Credit
CEN 521	Advanced Computer Architecture	(3)
CEN 531	Computer Networks	(3)

IInd Semester

Course	Course Description	Credit
CEN 543	Digital Signal Processing	(3)
CEN 532	Computer Communication Systems	(3)

IIIrd Semester

Course	Course Description	Credit
CEN 534	Local Area Network	(3)
CEN 545	Digital Image Processing	(3)

IVth Semester

Course	Course Description	Credit
CEN 524	Advanced Microprocessor Systems	(3)
CEN 559	Selected Topics in Computer Engineering	(3)

7. Syllabus of M.S. Courses

Courses- Description:

CEN 521 Advanced Computer Architecture:

Large computer systems analysis, Organizational dependence on computations, Theoretical Aspects of multi-processing, Pipelining and parallel Processing, Memory Hierarchy and Organization, Computer Interconnection, Study of a Typical Large Computer Architecture.

CEN 523 Fault Tolerant Computer Systems:

Systems and their failures. Faults, errors and failures. Structuring and fault, Fault error detection. Damage assessment and confinement. Error recovery and fault diagnoses.

CEN 524 Advanced Microprocessors Systems:

Comparison of microprocessor families of LSI chips. Multiprocessor systems. Bus protocols and communication methods. Application areas for microcomputers. Design aids.

CEN 529 Selected Topics in Architecture:

This course is designed to enable students to study variable special topics of interest which are carefully selected from Architecture related topics. The contents of such a course are to be determined by the instructor and the department.

CEN 531 Computer Networks:

Review of OSI layered Architecture, X-25 Protocol, Data link layer: HDLC, Window flow control, Datagram and virtual circuit, Transport protocol: Error-detection and recovery, Presentation layer: Security, Privacy, Text compression, VTP, Application layer: Distributed computing, Network operating systems.

CEN 532 Computer Communication Systems:

Review of Poisson, Markov, and Birth and Death processes, Queues: M/M/1, M/G/1. Analysis of packet-switched networks, Multi-access protocols for satellite, Ground radio and LAN. Fixed assignment and adaptive strategies. Channel stabilities. Evolution towards ISDN: Models of integrated voice and data.

CEN 534 Local Computer Networks:

Evolution of LAN technology, Scope, Topology and Environment, Access protocols, Performance of star, Bus and ring systems, LAN examples, LAN standards, ISLANs, Metropolitan area networks, Wide band LANs, Gateway: LAN-LAN and LAN-WAN interconnection.

CEN 535 Advanced Data Communication:

Voice digitization: TDM Systems, Framing synchronization. Transmission of digital base-band signal and digital carriers, M-ary schemes, Transmission impairments. Data encoding, Modems, Circuit, Message and packet switching. Applications: Electronic mail, Digital PBX's and ISDN. Digital Satellite Communication.

CEN 539 Selected Topics in Computer Networks:

This course is designed to enable students to study variable special topics of interest which are carefully selected from Computer Networks related topics. The contents of such a course are to be determined by the instructor and the department.

CEN 541 Computer-Controlled Systems:

Introduction, Computer-oriented mathematical models, Process-oriented models, Analysis of discrete-time systems, Distribution models, Translation of analog design, State-space design methods, Optimal design methods, Input-output approach, Identification, Implementation of digital controllers.

CEN 543 Digital Signals Processing I:

Discrete time signals, Z-transforms. Discrete Fourier transforms (DFT). Fast Fourier transforms (FFT). Design of finite impulse response filter (FIR) and Infinite impulse response filter (IIR), Effects of finite word length.

DCEN 545 Digital Image Processing:

Physical descriptions of continuous image, Sampling and quantization of images, Matrix representation of image forming. Filtering, Restoration and enhancement. Feature extraction and scene analysis.

CEN 549 Selected Topics in Automation :

CEN 559 Selected Topics in Computer Engineering :