

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
ISLAMIC UNIVERSITY, KUSHTIA-7003, BANGLADESH

Syllabus for Master in Computer Science and Engineering (MCSE)
(Evening Program)
Session: 2017-2018(Winter)

The Syllabus of Master in Computer Science and Engineering (MCSE) Degree program in the department of Computer Science and Engineering shall consist of seven Theoretical Courses each carrying 100 marks and will be taught over one academic year. The total marks for MCSE program shall be 1200 distributed over two semesters. The marks shall be distributed among the theoretical, practical, thesis/project, viva-voce works as below.

Semester	Course Type	No. of Courses	Full marks in each course	Credit in each course	Total marks	Total credit
1 st Semester	Theoretical	4	100	3.5	400	14.0
	Practical	2	100	3.0	200	6.0
2 nd Semester	Theoretical	3	100	3.5	300	10.5
	Project/Thesis	1	100	3.5	100	3.5
	Practical	1	100	3.0	100	3.0
	Viva-Voce	1	100	2.0	100	2.0
TOTAL					1200	39.0

For each theoretical course, the written examination shall be of 3 (three) hours duration. The practical and project examination shall be of 12 (twelve) hours duration.

Each of the courses (Theoretical and Practical) shall be evaluated as follows:

Theoretical Courses (Marks 100)		Marks
Class attendance		10
In-course Test	$3 \times 10 =$	30
Semester-Final Exam		60
TOTAL		100

Practical Courses (Marks 100)		Marks
Class attendance		05
Continuous Evaluation		10
Laboratory Note Book		05
Year End Examination:		
Part 1		40
Part 2		40
TOTAL		100

The semester-wise distribution of courses along with titles and the marks will be as follows:

First Semester(January-2018 to June-2018)

Integrated Courses:	Marks	Credit
MCSE 511: Database Management Systems	100	3.5
MCSE 512: Web Engineering	100	3.5
MCSE 513: Network Design and Management	100	3.5
MCSE 514: Elements of Information Technology	100	3.5
MCSE 515: Laboratory I	100	3.0
MCSE 516: Laboratory II	100	3.0

Total: 600 Total: 20

Second Semester (July-2018 to December-2018)

Integrated Courses:	Marks	Credit
MCSE 521: Pattern Recognition & Neural Networks	100	3.5
MCSE 522: Multimedia Engineering	100	3.5
MCSE 523: Wireless & Mobile Communication	100	3.5
MCSE 524: Laboratory III	100	3.0
MCSE 525: Project /Thesis	100	3.5
MCSE 526: <i>Viva-voce</i>	100	2.0
	Total: 600	Total: 19

Detailed Syllabus

First Semester (January-2018 to June-2018)

MCSE 511: Database Management Systems

100 Marks [60% Exam, 30% Tutorial, 10% Attendance]
3.5 credits, Exam Duration: 3 hours

Introduction to Database Management System

Database System Applications, Database Systems versus File Systems, View of Data, Data Models, Database Languages, Database Users and Administrators, Transaction Management, Database System Structure, Application Architectures, History of Database Systems

Entity Relationship Model

Basic Concepts, Constraints, Keys, Design Issues, Entity Relationship Diagram, Weak Entity Sets, Extended ER Features, Design of an ER Database Schema, Reduction of an ER Schema to Tables

Relational Model and Basic

Structure of SQL Structure of Relational Databases, The Relational Algebra, Extended Relational Algebra Operations, Modification of the Database, Views, Basic Structure of Structured Query Language, the select clause, the where clause, the from clause, (The above clauses has to be taught so that an equivalent SQL statement for a relational algebra can be developed)

Integrity and Security

Domain Constraints, Referential Integrity

Relational Database Design

First Normal Form, Pitfalls in Relational Database Design, Functional Dependencies, Decomposition, Desirable Properties of Decomposition, Boyce Codd Normal Form, Third Normal Form, Fourth Normal, More Normal Forms, Overall Database Design Process

Storage and File Structure

Overview of Physical Storage Media, RAID, Storage Access, File Organization, Organization of Records in Files, Data Dictionary Storage

Indexing and Hashing

Basic Concepts, Ordered Indices, B+ Tree Index Files, BTree Index Files, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Multiple Key Access

Transactions

Transaction Concept, Transaction State, Need for concurrent executions, Serializability concept

Concurrency Control

Idea about locking using lock based protocol and time stamp based protocol, Deadlock Handling, Insert and Delete Operations.

Recovery System

Failure Classification, Storage Structure, Recovery and Atomicity, Log Based Recovery, Shadow Paging.

Database System Architectures

Centralized and Client Server Architectures, Server System Architectures, Parallel Systems, Distributed Systems, Network Types.

Database with Oracle

Oracle Internal Data types, Data Definition Language, Data manipulation Language, Transaction control and data control Language, QUERIES AND SQL FUNCTIONS, Operators in SQL *Plus , SQL *Plus Functions, Set operators, Relating data through join concept , Usage of sub queries.

Recommended Books:

1. Database System Concepts (4th Edition), By Abraham Silberschatz, Henry F.Korth and S.Sudarshan McGraw Hill Publication
2. SQL,PL/SQL, The programming Language of Oracle, 2nd Edition, by Ivan Bayross, BPB Publications.
3. Principles of Database Management, By James Martin

MCSE 512: Web Engineering

100 Marks [60% Exam, 30% Tutorial, 10% Attendance]

3.5 credits, Exam Duration: 3 hours

World Wide Web

Concepts, Web page: static, Dynamic, Active. Scripting languages: Server side, Client Side. Web site development Phases, Web: Designing, Development and Publishing, HTTP, URL registration, browsers, search engines, Web server, Proxy servers.

HTML

Introduction To HTML, Common HTML, Some basic tags, Text formatting tags, Ordered & Unordered Lists , Inserting image, Links: text, image links, image mapping, Tables , Frames, HTML Form.

Javascript

Intro to script, types, intro of JavaScript, JavaScript identifiers, operators, control & Looping structure, Intro of Array, Array with methods, Math, String, Event handling, Validations On Forms

PHP

PHP-Introduction to PHP, Syntax, Operators, Variables, Constants, Control, Date and Time functions. Web Features- Sessions, Forms, GET and POST data, Cookies, HTTP Headers, Database Programming, Streams and Network Programming, Streams File Uploading and File Downloading.

ASP

Introduction of ASP, Working with ASP page, Request & Response object, Application & Session, Error Handling in ASP Database Handling: Connection, Recordset, Command Object

Ms .Net Programming With C#

Introduction to C# .Net language, Creating Your First C# Program, C# Environment, Literals, Variables and Data Types, Operators and Expressions, Classes and Objects, Inheritance, Interfaces, Delegates, Events, Exception Handling

Database Application With Ado .Net

Introduction to ADO .NET ADO .NET Architecture: Understanding the ConnectionObject, Building the ConnectionString, Understanding DataReaders, Understanding DataSets and DataAdapters, DataTable, DataColumn, DataRow, Understanding the DataViewObject, Working with System.Data.OleDb, Using DataReader, Using DataSet

Recommended Books:

1. Complete reference HTML.
2. JavaScript Bible
3. Programming ASP Ivan Bayross
4. PHP and MySQL for Dynamic Web Sites: Visual Quickpro Guide, Second Edition by Larry Ullman

MCSE 513: Network Design and Management

100 Marks [60% Exam, 30% Tutorial, 10% Attendance]

3.5 credits, Exam Duration: 3 hours

Basic Networking Concepts

Goals and applications of Computer Networks; Topologies; Method of Processing- Centralized and Distributed Processing; Categories of Networks - LAN, MAN, WAN, Peer-to-Peer, Server-Based and Broadcast networks.

Network Architecture

Concept of protocols & services; OSI model and functions of its layers; TCP/IP reference model.

Data communication concepts

Components of a data communication system, Transmission modes; Physical layer- transmission media - guided and wireless media; introduction to switching (circuit, message and packet) and multiplexing (frequency division and time division)

Buses, Network Adapters, and LAN Connection Devices

Bus Architectures, FireWire, Network Adapters, Network Adapter Connectors, LAN Connection Devices, Repeaters, Bridges, Hubs, Switches, Internetwork Devices, Routers, Firewalls, Gateways, Voice over Internet Protocol (VoIP), Channel Service Unit (CSU) / Data Service Unit (DSU), Modulator-Demodulator (Modem), How DSL Works.

Medium Access Control and LANs

Multiple Access protocols of MAC sub layer, ALOHA, persistent, persistent and non-persistent CSMA, CSMA/CD, Collision free protocols, Limited contention protocols, Wavelength Division Multiple Access, GSM, CDMA; IEEE Standard 802 for LANs and MANs, Ethernet, token bus, token ring.

Logical Addressing

The IP protocol, IP datagram format, IP addressing, Subnetting.

Routing

Deterministic and Adaptive routing; Centralized and distributed routing; shortest-path; flooding; flow based; optimal; distance vector, link-state, hierarchical; routing for mobile hosts; broadcast and multicast routing.

The Transport Layer

The Transport Service, Elements of Transport Protocols, A Simple Transport Protocol, The Internet Transport Protocols (TCP & UDP).

Network Design, Administration and Management

Network Design Considerations, Wired Networks, Wireless Networking, Wireless Networking Architectures, Phonenumber Networking, Future Trends in Networking, Network Operating Systems, Network Administration, Workgroups, Domains, User Accounts, Security, System Restoration, Redundant Systems, Uninterruptible Power Supply (UPS), Managing and Monitoring Performance, Managing Processor Time, Managing Memory, Changing Visual

Effects, Performance, Event Viewer, Quality of Service (QoS), Storage Options, Network Data Storage; Introduction to Simple Network Management Protocol (SNMP)

The Application Layer

DNS – Domain Name System, Electronic Mail (SMTP), FTP, HTTP, The World Wide Web, Multimedia, Telnet.

Recommended Books:

1. Network Design and Management - Steven T.Karris, Orchard publications
2. Computer Networks - Andrew s. Tanenbaum, Pearson Educations.
3. Data communications and Networking- Behrouz, Forouzan, Tata Mc-Graw Hill.
4. Data and Computer Communications, William Stallings, Pearson education.
5. Data Communications, Computer Networks and Open Systems, fourth edition-Fred Halsall, Addison Wesley.

MCSE 514: Elements of Information Technology

100 Marks [60% Exam, 30% Tutorial, 10% Attendance]

3.5 credits, Exam Duration: 3 hours

Chapter 1: Introduction

Information concept, Information systems, Concept of Global village, Elements of Global Village, Impacts on National and Social factors, Virtual Reality, Contemporary trends of ICT: Artificial Intelligence, Robotics, Cryosurgery, Space Exploration, ICT Dependent Production, Defense, Biometrics, Bioinformatics, Genetic Engineering, Nanotechnology, Ethics in ICT Sector, ICT dependent production.

Chapter 2. Digital Systems

History of Numbers, Number System, Classification of Number System, Conversion of Numbers, Addition and Subtraction in Binary System, Signed Numbers, 1's and 2's Complement, Concept of Code, BCD, EBCDIC, Alphanumeric code, ASCII, Unicode, Boolean Algebra and Digital Device, Boolean Algebra, Boolean Theorem, De Morgan's Theorem, Truth Table

AND, OR, NOT, gate, Universal Gate, XOR, XNOR, gate, Encoder, Decoder, Adder, Register, Counter, Hardware and Software of Computer System.

Chapter 3. Communication Systems and Networking

Communication System: Band Width, Data transmission method, Data transmission mode, Medium of data communication: Co-axial, Twisted pair, Optical fiber, Wireless, Radio wave, Microwave, Wireless communication System: Bluetooth, Wi-Fi, Wi-Max, Mobile communication, Concept and Objectives of Computer Networking, Functions of network,

Types of network, Network topology, Network Devices, NIC, Cloud computing.

Chapter 4: Programming Languages

Concept of Program, Organization of a Model, Steps of Developing a Program, Algorithm, Flow Chart, Program Design Model, Programming Languages: Machine and Assembly Languages, Low-Level, Mid-Level and High Level Languages, Examples: C, C++, Visual Basic, Java, Oracle, Algol, FORTRAN, Python, 4th Generation Language-4GL, Program Translators: Compiler, Assembler, Interpreter, Concept and Characteristics of C Language, Compiling of Programs, Structure of Programs, Types of Data, Constant, Variables, Expressions, Key word, Input Output Statements, Conditional Statement, Loop Statement, Array, Functions.

Chapter 4: Security and Ethical Issues

Security Threats – Malicious Software, Hacking and Cyber vandalism, Spoofing and Sniffing, Denial of Service Attacks, Identity Theft, Data Security, Data Encryption, Digital Signature, Copyright and Licenses, Open Source Software, Business and Technology Ethics.

MCSE 515: Laboratory I

100 Marks [80% Exam, 10%Lab performance/ Continuous Evaluation, 5% Notebook, 5% Attendance]
3.0 credits, Exam Duration: 12 hours

Students will perform **Laboratory I** based on courses MCSE 511 and MCSE 512 as designed by the Academic Committee of the department.

MCSE 516: Laboratory II

100 Marks [80% Exam, 10%Lab performance/ Continuous Evaluation, 5% Notebook, 5% Attendance]
3.0 credits, Exam Duration: 12 hours

Students will perform **Laboratory II** based on courses MCSE 513 and MCSE 514 as designed by the Academic Committee of the department.

Second Semester (July-2018 to December-2018)

MCSE 521: Pattern Recognition & Neural Networks

100 Marks [60% Exam, 30% Tutorial, 10% Attendance]

3.5 credits, Exam Duration: 3 hours

Introduction to Pattern Recognition: Human perceptions, Definition and approaches, Terminologies, Learning methods, Decision space and decision boundary, Pattern recognition system design, Applications.

Syntactic Pattern Recognition: Quantifying structure in pattern description and recognition, Grammar based approach and applications, Elements of formal grammar, Recognition of syntactic description, parsing, The CYK parsing algorithm, Augmented transition networks.

Statistical Pattern Recognition: Probability of events, Conditional probability, Statistical decision making, Baye's theorem, Nonparametric decision making, Clustering: Definition and classification, Hierarchical clustering algorithms, Partitional clustering algorithms.

Artificial Neural Networks: The Basic Neuron, Artificial model of a neuron, Classification of ANN, Learning in ANN, Activation functions, Applications of neural networks, Hebb Net, The delta rule, Hebbian learning, McCulloch-Pitts Model, The perceptron, ADALINE, MADALINE, Associative memories, Autoassociative, Iterative Autoassociative, Heteroautoassociative and Bidirectional associative memories, Back propagation Network.

Recommended Books:

1. Beale R and Jackson, Neural Computing: An Introduction
2. Igor Aleksander and H. Morton An Introduction to Neural Computing
3. S N Sivanandam and M Paulraj Introduction to Artificial Neural Networks

MCSE 522: Multimedia Engineering

100 Marks [60% Exam, 30% Tutorial, 10% Attendance]

3.5 credits, Exam Duration: 3 hours

Introduction to Multimedia

Concepts, Uses of multimedia, General concept of Audio, Video, Sound, Text and Graphics.

Audio and Video

Digital audio, MIDI, Audio processing for Multimedia Project, The role of video in mm production, Video format & standards, Data compression techniques for audio and video.

Animation

Principles of animation, Computer animation types, techniques & applications, Types of light source, 3D animation production process, special effects of animation.

Multimedia Hardware and Networking

Multimedia Hardware Overview, Multimedia storage, Multimedia networking and protocols, Mobile multimedia communications, Multimedia and Internet QOS principles.

Multimedia Software

Operating system support for multimedia, Multimedia Software Classifications, Multimedia database and Multimedia Applications.

Multimedia Project Design

Multimedia Project Design Concept, Multimedia Project preparing, costing and distributing.

Books Recommended

1. S. Gokul Multimedia Majic
2. Anil Elements of Image Processing

MCSE 523: Wireless & Mobile Communication

100 Marks [60% Exam, 30% Tutorial, 10% Attendance]

3.5 credits, Exam Duration: 3 hours

Introduction to Wireless Communication

Evolution of mobile communications, mobile radio systems around the world, trends in cellular radio and personal communications.

Modern Wireless Communication Systems

Second generation (2G) Cellular networks, third generation (3G) wireless networks, wireless local loop (WLL) and LMDS, wireless local area networks (WLANs), Bluetooth Personal area networks (PANs).

The cellular Concept – System Design Fundamentals

Introduction, frequency reuse, channel assignment strategies, type of handoffs, handoff strategies, interference and system capacity, trunking and grade of service, improvement of coverage and capacity in cellular systems.

Mobile Radio Propagation

Introduction to radio wave propagation, free space propagation model, relating power to electric field, basic propagation mechanisms, reflection, ground reflection, diffraction, scattering, outdoor and indoor propagation models.

Small scale Fading and Multi-path

Small scale multi-path propagation, Impulse response model of a multi-path channel, small-scale multi-path measurements, parameters of mobile multi-path channels, types of small scale fading, Rayleigh and Ricean distributions, statistical models for multi-path fading channels, theory of multi-path shape factors for small scale fading wireless channels.

Modulation techniques for mobile radio

Frequency modulation, amplitude modulation, angle modulation, digital modulation, line coding, pulse shaping techniques, geometric representation of modulated signals, linear modulation techniques.

Equalization, Diversity and Channel Coding

Introduction, fundamentals of equalization, linear inequalities, nonlinear equalization, algorithms for adaptive equalization, diversity techniques, interleaving, fundamentals of channel coding.

Speech Coding

Introduction, characteristics of speech signals, quantization techniques, ADPCM, frequency domain coding of speech, vocoders, linear predictive coders.

Multiple Access Techniques for Wireless Communications

Introduction, FDMA, TDMA, spread spectrum multiple access, SDMA, packet radio, reservation protocols, capacity of cellular systems.

Y-Max: Introduction to Y-max technology.

Recommended Books:

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| 1. Wireless Communications | Theodore S. Rappaport |
| 2. Wireless and Mobile Network Architectures | Yi-Bing Lin, Imrich Chlamtac |
| 3. Mobile Wireless Communications | Mischa Schwartz |

MCSE 524: Laboratory III

100 Marks [80% Exam, 10%Lab performance/ Continuous Evaluation, 5% Notebook, 5% Attendance]

3.0 credits, Exam Duration: 12 hours

Students will perform **Laboratory III** based on courses MCSE 521, MCSE 522 and MCSE 523 as designed by the Academic Committee of the department.

MCSE 525: Project /Thesis

100 Marks, 3.5 credits

Each student shall prepare a dissertation/ undertake a project work under the supervision of an honorable teacher of the department. The Academic Committee of the department will approve the theme of the dissertation/project and its title.

MCSE 526: Viva-Voce

100 Marks, 2.0 credits

Each student shall appear at the general viva-voce examination at the end of year-final theoretical examinations.

Panel of Question setters, Script Examiners, and Tabulators

1. All teachers, Dept. of Computer Science & Engineering, I. U, Kushtia.
2. All teachers, Dept. of Information & Communication Technology, I. U, Kushtia.
3. All teachers, Dept. of Electronics & Applied Physics, I. U, Kushtia.
4. All teachers, Dept. of Mathematics, IU, Kushtia.
5. All teachers, Dept. Applied Physics, Electronics & Communication Engineering, D. U.
6. All teachers, Dept. of Computer Science & Engineering, D. U.
7. All teachers, Dept. of Computer Science & Engineering, R. U.
8. All teachers, Dept. of Applied Physics & Electronic Engineering, R. U.
9. All teachers, Dept. of Information & Communication Engineering, R. U.
10. All teachers, Dept. of Electronics & Computer Science, J. U.
11. All teachers, Dept. of Computer Science, C. U.
12. All teachers, Dept. of Computer Science & Engineering, BUET.
13. All teachers, Dept. of Computer Science & Engineering, K. U.
14. All teachers, Dept. of Computer Science & Engineering, KUET, Khulna.
15. All teachers, Dept. of Computer Science & Engineering, RUET, Rajshahi.
16. All teachers, Dept. of Computer Science & Engineering, SUST.
17. All teachers, Dept. of Computer Science & Engineering, DUET.
18. All teachers, Dept. of Computer Science & Engineering, CUET.
19. All teachers, Dept. of Computer Science & Engineering, Jatiya Kabi Kazi Nazrul Islam University, Trisal.
20. All teachers, Dept. of CSE, Jatiya Kabi Kazi Nazrul Islam University, Trishal.
21. All teachers, Dept. of CIT, Patuakhali Science and Technology University, Patuakhali.
22. All teachers, Dept. of CSE, Noakhali Science and Technology University, Noakhali.
23. All teachers, Dept. of CSICT, Comilla University, Comilla.
24. All teachers, Dept. of CSE, Hazi Danesh Science and Technology University (HDSTU), Dinajpur.
25. All teachers, Dept. of Telecommunication Engineering, HDSTU, Dinajpur.
26. All teachers, Dept. of CSE, Begum Rokeya University, Rangpur.
27. All teachers, Dept. of EEE, Pabna Science and Technology University, Pabna.
28. All teachers, Dept. of CSE, Pabna Science and Technology University, Pabna.
29. All teachers, Dept. of APECE, Pabna Science and Technology University, Pabna.
30. All teachers, Dept. of CSE, JSTU, Jassore.

Chairman

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