

Department of Computer Science and Engineering
Faculty of Engineering and Technology
Islamic University, Bangladesh

Syllabus for M.Sc. in CSE (Evening) Program
Group-A
Session: 2026 – 2027 (Summer)

The total credits for the Master of Science (M.Sc.) in Computer Science and Engineering (CSE) shall be 36. The **M.Sc.** program shall extend over one academic year with two semesters for Group-A. The credits and marks distribution among the theoretical, practical, viva-voce, thesis/project works as below.

Group-A:						
Semester	**Course Type**	**No. of Courses**	**Full Marks in Each Course**	**Credit in Each Course**	**Total Marks**	**Total Credit**
1st	Theoretical	4	100	3.0	400	12.0
	Practical	2	100	3.0	200	6.0
2nd	Theoretical	3	100	3.0	300	9.0
	Practical	1	100	3.0	100	3.0
	Project/Thesis	1	100	4.0	100	4.0
	Viva-Voce	1	100	2.0	100	2.0
				Total	**1200**	**36**

Performance of students in a teaching course will be evaluated as under:

Theoretical Courses	**Marks**
Class attendance	10
In-course/tutorial exam/ assignment	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 distribution of marks for class attendance shall be as follows:

Attendance	Marks
• 95% and above	10
• 90% to 94%	9
• 85% to 89%	8
• 80% to 84%	7
• 75% to 79%	6
• 70% to 74%	5
• 65% to 69%	4
• 60% to 64%	3
• Less then 60%	0

Distribution of Courses

Group-A				
Semester	Course No.	Course Title	Marks	Credit
1st	CSE 5111	Advanced Database Systems	100	3.0
	CSE 5112	Digital Signal and Image Processing	100	3.0
	CSE 5113	Pattern Recognition & Neural Networks	100	3.0
	CSE 5114	Advanced Wireless Communication	100	3.0
	CSE 5115	Laboratory-I	100	3.0
	CSE 5116	Laboratory-II	100	3.0
		Total	600	18.0

Semester	Course No.	Course Title	Marks	Credit
2nd	CSE 5121	Data Science	100	3.0
	CSE 5122	Web Engineering	100	3.0
	CSE 5123	Distributed and Cloud Computing	100	3.0
	CSE 5124	Laboratory-III	100	3.0
	CSE 5125	Project/Thesis	100	4.0
	CSE 5126	Viva-Voce	100	2.0
		Total	600	18.0

Detail Outline of the Courses

Group-A: Semester I

CSE 5111: Advanced Database Systems

(Credit: 3 Contact Hours: 3 Hours/Week)

Relation and Semantic Data Models: Object Oriented Databases, Deductive Databases, Data dependencies and Synthesis of Database Schemes, Query processing and Query optimization, Storage organization for very large databases, Database Integrity and Security, Active and Real- time Databases – inference control and auditing.

Distributed Databases: Homogeneous, Heterogeneous, Federated and Multi-database System, Distributed Schema design, Distributed Query processing and optimization.

Concurrency Control and Database Recovery: Transaction and Serializability of Schedules Lock based and Non-locking protocols, Multilevel Concurrency Control Schemes, Concurrency Control in replicated distributed databases, Commit Protocols and schemes for database recovery, Performance evaluation of database systems, Database Machines.

CSE 5112: Digital Signal and Image Processing

(Credit: 3 Contact Hours: 3 Hours/Week)

Introduction to Signals: Concepts of signals, systems and signal processing; classification of signals; Digital signals and systems; Classification of discrete time signals; Sampling theorem; Fourier series and Fourier transform; Autocorrelation.

The Z-Transform: The Z-Transform and its properties; The inverse Z-Transform.

The Discrete Fourier Transform (DFT): The Discrete Fourier Transform (DFT), redundancy in the DFT; The Fast Fourier Transform (FFT); the FFT decimation in time & decimation in frequency; Interrelationship between the DFT & Z-transform; Convolution of sequences & sectioning.

Digital Filter: Digital Filter characterization; Digital filter structures; Design of Digital Filters; Recursive Filter design; Effects of finite word length; Simple models for quantization noise in recursive systems; Non-recursive filter design via the DFT computational techniques; Other radix formulations; Other radix formulations; Spectral analysis using the FFT; Speech processing algorithms;

Image processing: Image perception, sampling & quantization, transforms, representation, enhancement, filtering and restoration, edge detection and histogram, image analysis and computer vision, image reconstruction.

CSE 5113: Pattern Recognition & Neural Networks

(Credit: 3 Contact Hours: 3 Hours/Week)

Introduction to Pattern Recognition: Human perceptions, Definition and approaches, Terminology, 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, The delta rule, Hebbian learning, McCulloch-Pitts Model, The perceptron, ADALINE, MADALINE, Kohonen Self-Organizing Networks, Hopfield model, Associative memory, Back propagation learning algorithms. Applications of Neural Network.

CSE 5114: Advanced Wireless Communication

(Credit: 3 Contact Hours: 3 Hours/Week)

Mobile fundaments - Multiple access techniques: frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), space division multiple access (SDMA) - Space-time processing: multiple antenna techniques, diversity and multiplexing gains, multiple-input multiple-output (MIMO) systems.

Mobile radio channels - Pathloss, large-scale fading, small-scale fading; Power budge of mobile links - Doppler spread and coherent time, delay spread and coherent bandwith; flat fading and frequency selective fading.

Modulation and transmission - Digital modulation overview and digital modulation schemes, spectral efficiency and implementation complexity, power efficiency and green communication - Carrier and clock recovery, coherent receiver and non-coherent receiver - Adaptive signal processing for communication, channel equalisation, combating interference, and multi-user detection - Multi-carrier orthogonal frequency division multiplexing (OFDM) and single-carrier block transmission with frequency domain equalisation.

Practical channel coding schemes - The fundamentals of forward error correction (FEC) coding, convolutional coding, linear block coding, hard-decision channel decoding, soft-decision channel decoding - Turbo principle, turbo coding, turbo decoding-detection, near-capacity three-stage concatenated turbo transceiver.

MIMO technology - The fundamentals of MIMO, diversity and multiplexing gains, beamforming gain, SDMA based multi user system - Vertical Bell Lab layered space-time (V-BLAST), space-time block codes (STBCs), Linear dispersion codes (LDCs), spatial modulation (SM) and space-shift keying (SSK), and spacetime shift keying (STSK) - A unified MIMO - Acquisition of MIMO channel state information (CSI), state-of-the-art near-capacity MIMO systems.

Existing and future wireless systems and standards - 1st generation (1G) system, 2G system, 3G system, and 4G system. - Beyond 4G (B4G) system, massive MIMO, millimeter wave communication, optical wireless.

CSE 5115: Laboratory-I

(Credit: 3 Contact Hours: 6 Hours/Week)

Laboratory works based on CSE 5111 and CSE 5112

CSE 5116: Laboratory-II

(Credit: 3 Contact Hours: 6 Hours/Week)

Laboratory works based on CSE 5113 and 5114

Group-A: Semester II

CSE 5121: Data Science

(Credit: 3 Contact Hours: 3 Hours/Week)

An Introduction to Data Science: Definition, working, benefits and uses of Data Science, Data science vs BI, The data science process, Role of a Data Scientist

Statistical Data Analysis & Inference: Populations and samples, Statistical modeling, probability distributions, fittings a model, Statistical methods for evaluation, Exploratory Data Analysis, Getting started with R, Manipulating and Processing data in R , working with function in R , Working with descriptive Statistics, Working with graph plot in R.
Learning Algorithms: k-nearest neighbor, Simple and multiple Linear Regression, Logistic Regression, Support vector machine, Model-Based Clustering, Clustering High-Dimensional Data
Data Visualization: Data Visualization basics, techniques, types, applications, tools, Data Journalism, Interactive dashboards
Advance Analytical Methods: Text Analysis- Text analysis steps, A text analysis example, Collecting raw text and representing text, TF and TFIDF, Categorizing documents by topics, determining sentiments Time series analytics- overview, ARIMA model,
Business problems and data science: solutions Data Science and Business Strategy: Thinking Data-Analytically, Redux, Competitive Advantage with Data Science, Data Science Case Studies, Case Study: Global Innovation Network and Analysis.

CSE 5122: Web Engineering

(Credit: 3 Contact Hours: 3 Hours/Week)

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 4 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

CSE 5122: Distributed and Cloud Computing

(Credit: 3 Contact Hours: 3 Hours/Week)

Distributed System Models and Enabling Technologies: Scalable Computing over the Internet, Technologies for Network-Based Systems, System Models for Distributed and Cloud Computing, Software Environments for Distributed Systems and Clouds, Performance, Security, and Energy Efficiency.

Computer Clusters for Scalable Parallel Computing: Clustering for Massive Parallelism, Computer Clusters and MPP Architectures, Design Principles of Computer Clusters, Cluster Job and Resource Management, Case Studies of Top Supercomputer Systems.
Virtual Machines and Virtualization of Clusters and Data Centers: Implementation Levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Virtualization of CPU, Memory, and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data-Center Automation.
Cloud Platform Architecture over Virtualized Data Centers: Cloud Computing and Service Models, Data-Center Design and Interconnection Networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms: GAE, AWS, and Azure, Inter-cloud Resource Management, Cloud Security and Trust Management.
Service-Oriented Architectures for Distributed Computing: Services and Service-Oriented Architecture, Message-Oriented Middleware, Portals and Science Gateways, Discovery, Registries, Metadata, and Databases.
Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, Parallel and Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments,
Grid Computing Systems and Resource Management: Grid Architecture and Service Modeling, Grid Projects and Grid Systems Built, Grid Resource Management and Brokering, Software and Middleware for Grid Computing, Grid Application Trends and Security Measures.
Peer-to-Peer Computing and Overlay Networks: Peer-to-Peer Computing Systems, P2P Overlay Networks and Properties, Routing, Proximity, and Fault Tolerance, Trust, Reputation, and Security Management, P2P File Sharing and Copyright Protection.
Ubiquitous Clouds and the Internet of Things: Cloud Trends in Supporting Ubiquitous Computing, Performance of Distributed Systems and the Cloud, Enabling Technologies for the Internet of Things, Innovative Applications of the Internet of Things, Online Social and Professional Networking.

CSE 5124: Laboratory-III
(Credit: 3 Contact Hours: 6 Hours/Week)
Laboratory works based on CSE 5121, CSE 5122 and CSE 5123

CSE 5125: Project/Thesis
100 Marks; 4.0 Credits

CSE 5126: Viva-Voce
100 Marks; 2.0 Credits

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 Applied Physics, Electronics & Communication Engineering, I. U, Kushtia.
4. All teachers, Dept. of Mathematics, IU, Kushtia.
5. All teachers, Dept. of Computer Science & Engineering, D. U.
6. All teachers, Dept. of EEE, 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 CIT, Patuakhali Science and Technology University, Patuakhali.
21. All teachers, Dept. of CSE, Noakhali Science and Technology University, Noakhali.
22. All teachers, Dept. of CSE, Comilla University, Comilla.
23. All teachers, Dept. of CSE, 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, Jessore.
31. All teachers, Dept. CSE, Jagannath University, Dhaka.
32. All teachers, Dept. CSE, Chittagong University, Chittagong.
33. All teachers, Dept. CSE, BSMRSTU, Gopalganj.

Chairman
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