Syllabus

Syllabus: CSE-Autumn-2022

SL	Course Code	Course Title	C.H	Semester	Pre. R
19	CHEM-2301	Chemistry	3	3	
20	CHEM-2304	Chemistry Lab	1.5	3	
21	CSE-2321	Data Structures	3	3	
22	CSE-2322	Data Structures Lab	1	3	
23	CSE-2323	Digital Logic Design	3	3	
24	CSE-2324	Digital Logic Design Lab	1.5	3	
25	CSE-2340	Software Development I	2	3	
26	MATH-2307	Mathematics III (Matrices, Linear System of Equations and Vector Analysis)	3	3	
27	STAT-2311	Probability and Statistics	2	3	
28	URED-2302	Sciences of Quran and Hadith	1	3	

Course Content:

Section-A (Mid-term: 30 Marks)

1. **Matrix Terminology**: Vector presentation by matrix, different types of matrices, algebraic operations on matrices, Transpose of a Matrix, Adjoint and inverse of a matrix, augmented matrix ,row operation method, rank of Matrices, Mathematical Problems using Matrix, distinguish between determinant and matrix, Normal Vector, Ortho-normal Vectors, Orthogonality, Gram-Schmidt Ortho-normalization Process, co-variance matrix,
2. **Linear System of Equations** & Vector Spaces**:** Echelon form, consistency and inconsistency, solution of homogeneous and non- homogeneous linear system of equations , Vector Spaces, subspaces, basis and dimension, linearly dependent and independent vectors
3. **Characteristic equation**: Eigen values, eigenvectors, Graphical presentation of Eigen vectors, Caley-Hamilon theorem, and similar matrices, diagonalization, and Characteristics roots. Adjacency Matrix with graphical representation, Geometrical Application of Matrices.

Section-B (Final Exam: 50 Marks)

Group-A (20 Marks)

4. **Matrix Decomposition**: Eigen Decomposition Theorem, Singular Value Decomposition (SVD), LU Decomposition, QR decomposition, Cholesky decomposition, Physical application of Matrix Decomposition Theorem, Mathematical Analysis of Matrices using MATLAB
5. **Vector analysis**: Scalar and vectors, operation of vectors, vector addition and multiplication - their applications. Vector components in spherical and cylindrical systems, Scalar Field, Vector Field, Derivative of vectors and mathematical problems

Group-B (30 Marks)

6. **Del operator:** Del operator, gradient, divergence and curl and their physical significance.
7. **Vector Integration**: Line Integrals, physical significance of Vector integration and Problems, Plane Polar Coordinates, Cylindrical Polar Coordinates, Spherical Polar Coordinates
8. **Vector's Theorem :**Greens, Gauss & Stocks theorem and their applications, Vector Analysis using MATLAB

Reference Books:

1. Richard Bronson: Linear algebra 2nd edition Academic Press is an imprint of Elsevier Inc 2007"
2. Murray R. Spiegell: Mathematical Handbook of Formulas and Tables 2nd edition 1999 McGraw-Hill Inc Schaum's Outline Series 1970"
3. Matiur Rahman& Isaac Mulolani: Applied Vector Analysis CRC Press LLC New York 2001"
4. P.E. Lewis & J.P .Ward: Vector Analysis for Engineers and Scientists Wesley Publishing Company Inc 1989"
5. Roger A. Horn & Charles R. Johnson: Matrix Analysis Cambridge University Press UK 1985"
6. Rao V. Dukkipati: Engineering Mathematics New age International (p) Ltd New Delhi first edition 2012"
7. P.N. Chattarjee:Matrices 15th edition Rajhans Press 1996"
8. Seymour Lipschutz & Marc Lars Lipson: Linear Algebra 4th edition Schaum's Outline Series. New York McGraw-Hill Inc. 2009"
9. Murray R. Spiegel Seymour Lipschutz: Vector Analysis 2nd edition Schaum Outline Series McGraw-Hill Education – Europe 2009"
10. Richard Bronson: Matrix Operation 2nd edition Schaum Outline Series McGraw-Hill 2011"
11. B. V. Ramana: Higher Engineering Mathematics Tata McGraw-Hill Publishing Company Ltd. 2008"

Course Code:STAT-2311
Course Title: Probability and Statistics
Credit Hours: 2
Contact Hours: 2 per week
Type: Non-engineering Skill
Prerequisite: None
Co-requisite: None

Course Content:

Section-A (Mid-term: 30 Marks)

1. Preliminary idea of Statistics: Origin, History and Development Statistics, Definition of Statistics, Characteristics, Function, Limitations, Necessity & importance of Statistics, The role of Statistics in Engineering, Population and Sample, Variable and Constants, Different types of variables, Parameter, Statistic, Scale of measurement, Statistical data, collecting engineering data, Preparation of Questionnaire and Schedule, Presentation and Classification of Data, Construction of Frequency distribution, Graphical presentation of Frequency distribution.

2. Measures of Central Tendency: Different types of mean with their properties and relationship, Quintiles with their graphical presentation, Application of different measures of central tendency.

3. Measures of Dispersion of a Series of Data: Range, Standard Deviation, Mean Deviation, Quartile Deviation, Variance and Standard Deviation, Coefficient of Variation and their uses, Properties and applications of different measures of dispersion, moments, skewness and kurtosis.

Section-B (Final Exam: 50 Marks)
Group-A (20 Marks)

4. Correlation Theory and Regression Analysis: Simple Correlation and its measure, Scatter Diagram, properties of simple correlation coefficient, Spearman's Rank correlation coefficient, Simple linear regression, properties of regression coefficient, regression curve, regression equation, Least-square method of curve fittings, Co-efficient of determination, Theorems & Problems.

5. Basic concepts of probability: History, meaning and Scope of probability, Approaches of defining probability: Classical, Empirical, Subjective and Axiomatic probability, Experiment, random experiment, Sample Space, Event, different types of events, Tree diagram, Conditional
probability and independence, some elementary theorems on probability, and conditional probability, Laws of Probability – Additive and Multiplicative Law, Prior probability, Posterior probability, total probabilities & Bayes' theorem and their applications.

Group-B (30 Marks)

6. **Random Variables and Mathematical Expectation:** Discrete and continuous random variables, Probability mass function and density function, Distribution function and their properties, Mathematical expectation and variance of a random variables. Theorems & Problems.

7. **Probability Distributions:** Binomial distribution, Poisson distribution and Normal distribution – Their properties, uses, Theorems & Problems.

8. **Test of hypothesis and Estimation:** Preliminary ideas of statistical hypothesis test, level of significance, one tailed and two tailed test, p-value, Test of significance, Test regarding single mean, test of equality of two mean, test of equality of several means (Analysis of variance), test regarding proportion. General concepts of Estimation.

Text Books:

1. Montgomery Douglas C. and Runger George C. Applied Statistics and Probability for Engineers "Fifth Edition "John Wiley and Sons Inc." (2011). ISBN: 978-0-470-05304-1)
2. "Walpole R.E. Myers R.H. Myers S.L. & Ye K.Y." Probability and Statistics for Engineers and Scientist. 9th ed. Prentice Hall (2012). ISBN 978-0-321-62911-1
3. R.N. Shill & S.C. Debnath An introduction to the theory of Statistics 4th Edition STAR Publication 2016

Reference Books:

1. "Probability Statistics and Random Processes for Electrical Engineering" 1st Edition Cambridge University Press 2014 ISBN-13: 978-1107439887 Alberto Leon-Garcia
2. "E. Keshava Reddy E.Rukmangadachari" Probability and Statistics 5th Edition Pearson Education India 2015 ISBN: 9789332558229

Course Code: CHEM-2301
Course Title: Chemistry
Credit Hours: 3
Contact Hours: 3 per Week
Type: Core, Basic Science
Co-Requisite: Chem-2304 (Chemistry lab)

Section –A (Mid-term Exam: 30 Marks)

1. **Periodic Classification of Elements:** Modern periodic table, Periodic law, Periodic system, Correlation of Atomic structure with periodic properties of elements, Ionization potential, Electron affinity, Electromagnetivity, Atomic and ionic radii, Properties of oxides.
2. **Electronic Theory of Elements:** Different types of bonds, ionic, covalent, co-ordinate and hybridization of atomic orbitals, bonding in simple molecules, Elementary idea about MOT.
3. **Chemistry of Transition Elements, Lanthanides and Actinides:** Definitions, Electronic configurations, general properties.

Section-B (Final Exam-50 Marks)
Group-A (20 Marks)

4. **Electrochemistry:** Electrolytic dissociation, Theory of electrolytic conductance. Ionic mobility and transference number, Simple ideas about electrode potential and reversible cells.
5. **Types and properties of solutions:** Units of concentration, ideal and real solutions, Henry's Law, Distribution of solids between two immiscible liquids, Distribution law, Partition coefficient and solvent extraction, Properties of dilute solutions.

Group-B (30 Marks)

6. Chemical Equilibrium: Law of mass action, Determination of equilibrium constant, heterogeneous and homogeneous equilibrium, Le Chateilar principle and Van Hoff equation.

7. Chemical Kinetics: Order and molecularity kinetics of first and second order reaction, Determination of order of reactions, Arrhenius equation and energy of activation,

8. Surface Chemistry and Colloids: Adsorption, Langmuir and Gibbs adsorption isotherm, Colloids, Definitions of terms, Electrodialysis, Classification, Preparation and properties of colloids, Elementary idea about emulsions and gels. Importance of colloids,

Recommended Books:

1.	R. D. Madan	: Modern Inorganic Chemistry
2.	M.M. Haque and M.A. Nawa	: Principles of Physical Chemistry
3.	E.S Gilreath	: Fundamental Concepts in Inorganic Chemistry.

Course Code:CSE-2321
Course Title: Data Structures
Credit Hours: 3
Contact Hours: 3 lecture hours per week
Type: Core, Engineering
Prerequisite: CSE-1121 (Computer Programming I)
Co-requisite: CSE-2322 (Data Structures Lab)

Course Content:

Section-A (Mid-term: 30 Marks)

1. Introduction: Elementary Data organization, Information; Data types; Data Structure, Data Structure operations; Algorithm; Time-Space tradeoff of Algorithms. Mathematical notation & Functions; Algorithmic Notation; Control structures; Sub-algorithms. String; String operations; Pattern matching algorithms

2. Linear Array: Linear Array & its representation in memory; Traversing LA, Insertion & Deletion in LA, Bubble Sort, Linear Search & binary Search. 2D Array & its representation in memory; Matrices; Algebra of matrices; sparse matrices

3. Stack: its representation & applications; PUSH and POP operation on stack. Polish Notation, reverse polish notation; Evaluation of a postfix expression; Transforming infix expression into postfix expression.

Section-B (Final Exam: 50 Marks)

Group-A (20 Marks)

4. Queue – its representation; Insertion & deletion in Queue; Deques; Priority Queues. Recursion [Factorial function, Fibonacci sequence, Ackermann function, Towers of Hanoi]

5. Linked list - Linked list & its representation in memory; Traversing, Searching, Insertion & Deletion operation on Linked list; Header linked lists; two way lists.

Group-B (30 Marks)

6. Complexity of algorithms, Rate of growth: Big O, Ω and Θ notations; Complexity of Linear Search, Binary search & Bubble sort algorithm**. Sorting** - Insertion sort, selection sort, quick sort, merge sort; **Searching** & data modification; Hashing: Hash function, collision resolution

7. Tree- Tree terminology; representation of binary trees in memory; Traversing binary tree; Binary search tree; Insertion & deletion on binary search tree; Heap; Insertion & deletion on heap; Heapsort; B trees; General tree; Balanced binary search tree (AVL tree, red-black tree)

8. Graph – graph terminology; representation of graphs – adjacency matrix, path matrix, adjacency list; Traversing a graph – BFS & DFS

Text Books:

1. Seymour Lipschutz Data Structures Special Indian Tata McGraw-Hill 2014 ISBN-13: 978-0-07-060168-0

Course Code:CSE-2323
Course Title: Digital Logic Design
Credit Hours: 3
Contact Hours: 3 lecture hours per week
Type: Core, Engineering
Prerequisite: EEE-1221 (Electronics)
Co-requisite: CSE-2324 (Digital Logic Design Lab)

Courses Content:

Section-A (Mid-term: 30 Marks)

1. Bynary Systems, Bollean Algebra and Logic Gates: Number system, binary codes, binary logics, logic gates, Boolean algebra, cannonical and standard forms.

2. Simplification of Boolean Functions: The Map Method. Two-, Three-, Four-, Five And Six-variable Maps, Product of Sum Simplification, NAND And NOR Implementation, Don't Care Conditions, Multilevel NAND Circuits, Multilevel NOR Circuits, Exclusive-or and Equivalence Functions.

3. Combinational Logic: Design Procedure, Adders, Subtractors, Code Conversion, Analysis Procedure, designing various types of combinational circuit using logic gates.

Section-B (Final Exam: 50 Marks)

Group-A (20 Marks)

4. Combinational logic with MSI and LSI: MSI and LSI, Binary Parallel Adder, look ahead carry, decimal Adder, Magnitude Comparator, decoder, encoder, multiplexer & demultiplexer.

5. Sequential Logic: Flip-flops, triggering of flip-flops, analysis of clocked Sequential circuits, state reduction and Assignment, design procedure, design with state equations, designing various types of sequential circuits.

Group-B (30 Marks)

6. Digital Integrated Circuits: Bipolar transistor characteristics, RTL, DTL, Integrated-Injection logic, emitter couple logic, metal-oxide semiconductor, complementary MOS.

7. Registrars, Counters, and the Memory: Registers, shift registers, ripple counters, asynchronous counter, and synchronous counter, memory, read only memory, programmable logic array, random access memory, and memory unit.

8. Register Transfer and Processor Logic Design: Interregister transfer, arithmetic-logic and shift-operations, design a simple computer, processor organization, arithmetic logic unit, design of arithmetic logic unit, design of accumulator.

Text Book:

1. M. Morris Mano Digital Logic and Computer Design 4th edition Pearson education ISBN-13: 978- 0-13-277421-5

Reference Books:

2. Md. Mozammel Huq Azad Khan Digital logic design 1st Edition University Grants Commission of Bangladesh 2006 ISBN-13: 978-9848090244
3. Thomas L. Floyd Digital Fundamentals 11th Edition Pearson 2014 ISBN-13: 978-0132737968
4. Tocci-widmer Digital Systems 12th Edition Pearson Prentice Hall 2016 ISBN-13: 978-0134220130

Course Code: CSE 2324
Title: Digital Logic Design Lab
Credit Hour: 1.50 credits
Contact Hours: 3 Hour/Week
Prerequisite: N/A
Type: Core, Engineering
Co-requisite: CSE-2323(Digital Logic Design)

Experiment Names:

1. To construct and study the following logic gates
   - AND, OR, NOT
   - NAND, NOR, EXOR
2. Verify the Demorgans Law: Law(I) and Law(II)
3. To verify different kind of applications of Boolean alg ebra.
4. To construct an AND gate by diode resistors and observe its characteristics.
5. To verify the characteristics of Exclusive OR and Exclusive NOR using basic logic gate.
6. To be familiar with demultiplexer using the 74138 IC.
7. Design and implement various sequential logic circuits.
8. Experiment on synchronous up counter and down counter.
9. To perform other experiments relative to this course.

Text Book:

1. M. Morris Mano Digital Logic and Computer Design 4th edition Pearson education ISBN-13: 978- 0-13-277421-5

Reference Books:

2. Md. Mozammel Huq Azad Khan Digital logic design 1st Edition University Grants Commission of Bangladesh 2006 ISBN-13: 978-9848090244
3. Thomas L. Floyd Digital Fundamentals 11th Edition Pearson 2014 ISBN-13: 978-0132737968
4. Tocci-widmer Digital Systems 12th Edition Pearson Prentice Hall 2016 ISBN-13: 978-0134220130

Course Code	URED-2302
Course Title	Sciences of *Qur'an* and *Hadith*
Status	**University Requirement**
Level	**3**
Credit Hours	**1**
Contact Hour	**2**
Course Assessment	**Attendance** — **10%** **Class test/Assignment** — **10%** **Mid-term Examination** — **30%** **Final Examination** — **50%**

Course Outline	*Section-A (Midterm Exam: 30 Marks)*	
	Chapter# 01	**Sciences of Qur'an:** (1) Definition of the Qur'an Literally and Terminologically (2) Various Names and Attributes of the Holy Qur'an and their Significance (3) Characteristics of the Holy Qur'an (4) Central Subject Matter & the Main Themes of the Holy Qur'an (5) The necessity of the Holy Qur'an (6) The authenticity of the Holy Qur'an.
	Chapter# 02	**Wahi (Revelation) of the Holy Qur'an:** (1) Meaning of *Wahi* (2) Various classifications and procedure of *Wahi* (3) Stages of revelation of the Holy Qur'an (4) Gradual revelation of the Holy Qur'an and the wisdom behind it (5) The First and the Last Revelation.
	Chapter# 03	**The *Ayah* and *Surah* of the Holy Qur'an: (1)**The *Aayah* of the Qur'an: Definition of *Aayah*. The Number of *Ayah*, words and letters of the Holy Qur'an. The Arrangement of the *Ayah* of the Holy Qur'an **(2)** The *Surah* of The Qur'an: Definition of *Surah*. The Arrangement of *Surah* of the Holy Qur'an. The classification of *Surah* of the Holy Qur'an.

	Section-B (Final Exam: 50 Marks)	
	Chapter# 04	***Makki*** & ***Madani*** **Revelations:** (1) The Definition of *Makki* and *Madani* (2) The Characteristics of *Makki* and *Madani* Revelations (3) The benefits of knowing *Makki* and *Madani* Revelations.
	Chapter# 05	**Preservation, Compilation & *Asbabunnuzul* (revelational background):** (1) Preservation & Compilation of the Holy Qur'an (2) The Causes of Revelation (*Asbabunnuzul*): The Definition of *Asbabunnszul.* The classification of *Asababunnuzul.* The benefits of Knowing *Asbanunnuzl.*
	Chapter# 06	***Al-Naskh*** **(Abrogation) &** ***I'jaz*** **(inimitability) of The Qur'an:** **(1) Abrogation (*Al-Naskh*) in the Holy Qur'an:** Definition of *Naskh.* The proofs of *Naskh.* The Classifications of *Naskh.* The benefits of knowing *Nasikh* (abrogating) and *Mansukh* (abrogated) verses. **(2) The Miraculous Nature of The Qur'an (*I'jaz Al-Qur'an)*:** Definition of *I'jaz*. The Proofs of *I`jaz.* Various aspects of *I`jaz Al-Qur'an.*
	Chapter# 07	**Sciences of Hadith:** (1) Definition of Sunnah (2) Difference among Qur'an *Sunnah* and *Hadith Qudshi* (3) The Position, importance and authority of *Sunnah* in Islamic *Shari'ah* (4) Explanation of some important terms of *Sunnah: Isnad/ Sanad, Matn, Rawee* and *Riwayah, Al-jame', Al-Musnad, Al-Sahih, Al-Sunan, Sahihayn, Muttafaqun 'Alayh, Al-kutub As-Sittah*...etc. (5) Collection & Compilation of *Sunnah.*
	Chapter# 08	**The classification of *Hadith* and fabrication in *Hadith*:** **(1) The classification of *Hadith*:** (a) According to the reference to a particular authority (b) According to the links in the *Isnad* (c) According to the number of narrators involved in each stage of the *Isnad* (d) According to the reliability and memory of the narrator. **(2) Fabrication in *Hadith*:** (a) Definition of Fabrication (b) Causes and consequence of fabrication (c) Some examples of commonly used fabricated *Hadith* in our society.