Bachelor of Science in Computer Science & Engineering (CSE)
Course Description

CORE COURSES: COMPUTER SCIENCE (48 CREDITS)

COURSE NAME: CSC 1101 Introduction to Computer Studies

CREDIT HOUR(S): 1/Lab **CONDUCT HOURS:** 3 hours of Laboratory classes per week

PRE-REQUISITE: NIL

COURSE DESCRIPTION:

- This course is designed for the freshers (1st semester students). It is an introductory course on computer studies. Also, students will understand the key differences between university education and Higher Secondary level along with the full four years CSE program structure.
- Fundamental topics of computing such as number systems, hardware and software systems, flow chart design, aspects of the different operating systems, using Office-365 tools, etc.
- Students will achieve knowledge on very basic structural programming (how to write a simple program using variables, printf and scanf). This course also focuses on safe internet browsing for 21st century.
- Students will undertake CISCO IT Essentials training during this course.
- The course will highlight university and department's rules, regulations and policies (pre-registration, registration, exam permit, Set-B exams, Adding/Dropping, Grading scale, Course Evaluation procedures) etc. along with the online learning system VUES (Virtual University Expert Systems) which they have to use throughout their bachelor studies for every educational and official operations.
- Concept of Digital Piracy and Academic Integrity

REFERENCE BOOK LIST:

1. CISCO Netspace (https://www.netacad.com/)
2. Discovering Computers: Fundamentals, Fourth Edition by Gary B. Shelly, Thomas J. Cashman, Misty E. Vermaat
3. Digital Computer Fundamentals by Thomas C. Bartee
4. Peter Norton's Computer Fundamentals, Fouth Edition, McGraw-Hill
5. AIUB Undergraduate Hand Book.
6. AIUB VUES systems.

COURSE NAME: CSC 1102: Introduction to Programming Language &
CSC 1103: Introduction to Programming Language Lab

CREDIT HOUR(S): 3 & 1/Lab **CONDUCT HOURS:** 3 hours of Theory classes & 3 hours of Laboratory class per week

PRE-REQUISITE: NIL

COURSE DESCRIPTION:

- The goal of this course is to teach the key programming and problem-solving skills where the students will be able to design, implement, debug, and test structured and Object-Oriented Programs (OOP).
- Fundamentals of Structured and OOP programming including – Data types, Operators & Expressions; Standard input/output (I/O); Conditional statements (if…else), Switch; Loops (do...while, while, for); Arrays (single, multidimensional); Pointers, Functions; Structure, Unions & Enumerations; Strings using C++
- The Object Oriented Programming (OOP) Principles such as Classes and Objects; Constructors; Operator Overloading; Inheritance and Polymorphism; Encapsulation, Abstract Class; Stream Input/Output, File Processing, Templates, Exception Handling, String Processing, Standard Template Library (STL) etc using C++.

REFERENCE BOOK LIST:

1. Let Us C, 13th Edition, by,Yashavant Kanetkar
2. Teach Yourself C, 3rd Edition, by Herbert Schildt
3. C++ How To Program, 8th Edition, by Deitel and Deitel
4. C: The Complete Reference,4th Edition, by Herbert Schildt
5. Teach Yourself C++, 3rd Edition, by Herbert Schildt
6. The C++ Complete Reference, 4th Edition, Herbert Schildt.

COURSE NAME: CSC 1204: Discrete Mathematics

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MAT 1102: Diff. Calculus & Co-0rdinate Geometry
CSC 1102: Introduction to Programming Language

COURSE DESCRIPTION:

- Explain propositional logic and propositional equivalences
- Explain different types of sets and set operations
- Determine whether two compound propositions are logically equivalent using different techniques
- Describe different types of functions
- Discuss different representations of graphs
- Describe different types of tree traversal algorithms such as Preorder, Inorder, Postorder
- Explain Euler and Hamilton paths and circuits
- Discuss Relations and their properties

REFERENCE BOOK LIST:

1. Discrete Mathematics, *Richard Johnsonbaugh*, Pearson education, Inc.
2. Discrete Mathematical Structures, *Bernard Kolman*, *Robert C. Busby*, *Sharon Ross,* Prentice-Hall, Inc.
3. Discrete and Combinatorial Mathematics, *R. P. Grimaldi,* 3rd Edition, Addison-Wesley
4. *SCHAUM'S outlines Discrete Mathematics(2nd edition)*, by *Seymour Lipschutz*, *Marc Lipson*
5. Discrete Mathematics Models, *F. S. Roberts*, Prentice Hall

---

COURSE NAME: CSC 1205: Object Oriented Programming 1

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class &
3hours of Laboratory class per week

PRE-REQUISITE: CSC 1102 & CSC 1103: Introduction to Programming Language & Lab

COURSE DESCRIPTION:

- Create Java technology applications that leverage the object-oriented features of the Java language, such as developing and declaring classes, encapsulation, inheritance, polymorphism and abstraction;
- Execute Java applications from the command line; Use Java technology data types and expressions; flow control constructs; arrays and other data collections; concept of package;
- Implement error-handling techniques using exception handling
- Perform multiple operations on database tables, including creating, reading, updating and deleting using both JDBC
- Create an event-driven graphical user interface (GUI) using Swing components: panels, buttons, labels, text fields, and text areas
- Implement input/output (I/O) functionality to read from and write to data and text files and understand advanced I/O streams
- Create multithreaded programs

REFERENCE BOOK LIST:

1. Java Complete Reference, 7th Edition, By Herbert Schildt.
2. Java How to Program Java, 9th Edition, By Deitel and Deitel.
3. The Java Language Specification, By J. Gosling, B. Joy, G. Steele, G.Bracha and A. Buckley
4. Introduction to Programming Using Java, 6th Edition, By David j. Eck
5. Head First Java, By Kathy Sierra and Bert Bates
6. The Java Tutorials. http://docs.oracle.com/javase/tutorial/

COURSE NAME: CSC 2106: Data Structure
CSC 2107: Data Structure Lab

CREDIT HOUR(S): 3 & 1/Lab **CONDUCT HOURS:** 3 hours of Theory classes & 3 hours of Laboratory class per week

PRE-REQUISITE: CSC 1204: Discrete Mathematics & CSC 1205: Object Oriented Programming 1

COURSE DESCRIPTION:

- Define data structure for computer programming.
- Explain ADTs along with their advantages and disadvantages; Details of array, stack, queue, linked list and trees and their applications.
- Explain different types of algorithms to search and sort and manipulate data using such data structure; Sorting Algorithm: Selection Sort, Bubble Sort, Counting Sort; Searching Algorithm: Linear and Binary Search.
- Demonstrate algorithms for efficient searching, insertion and deletion operation for every data structure by computer programs.
- Explain Tree; Basic terminology (Node, Vertex, Leaf, Left subtree, Right subtree, Height, Depth, m-ary tree), Binary tree, Binary tree representation, Binary tree traversal, Simulations.; Binary search tree
- Explain Graphs: Definition and terminology, Representation techniques using 2D arrays and linked lists

REFERENCE BOOK LIST:

1. Introduction to Algorithms (Second Edition), Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Cliff Stein, published by MIT Press and McGraw-Hill.
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaz Sahni, and Rajasekaran, Published by W.H. Freeman and Company, 1998. Indian Edition published by Galgotia Publications, 2000.
3. Algorithms in C, Parts 1-4: Fundamentals, Data Structures, Sorting, Searching, 3rd Edition,Robert Sedgewick, Published by Addison Wesley Professional.
4. Data Structures and Program Design In C (2nd Edition), Robert L. Kruse, Bruce P. Leung, Clovis L. Tondo.

COURSE NAME: CSC 2108: Introduction to Database

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 1205: Object Oriented Programming 1

COURSE DESCRIPTION:

- Identify the drawbacks of file-based management system and the necessity of Database management system; Use of modern tools used in Database management system
- Understanding different types of terminologies used in Database management system
- Discuss different tools and techniques for better performance of Database management system
- Execute necessary and sufficient SQLs; Design ER Models and Diagrams; Use of different types of Normalization process; Analyze a system with a view to DBMS implementation; Understand different types of joining and use of different complex queries

REFERENCE BOOK LIST:

1. Modern Database Management (Sixth Edition) by Fred R. McFadden, Jeffrey A. Hoffer, Mary B. Prescott
2. Database System Concepts (Fifth Edition) by Henry F. Korth, S. Sudarshan, A. Silberschatz
3. Oracle-database-10g-sql-fundamentals-1-student-guide-volume-1
4. SQL and Relational Theory: How to Write Accurate SQL Code by C.J. Date
5. Database Systems: A Practical Approach to Design, Implementation and Management (4th Edition) by Thomas M. Connolly, Carolyn E. Begg
6. Fundamentals of Database Systems, 5th Edition by RamezElmasri, Shamkant B. Navathe
7. Database Design and Relational Theory: Normal Forms and All That Jazz by C. J. Date
8. An Introduction to Database Systems 8th Edition, by C.J. Date

---

COURSE NAME: CSC 2209: Object Oriented Analysis and Design

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 2108: Introduction to Database

COURSE DESCRIPTION:

- Explain the necessity of formal modelling techniques in system development
- Describe system analysis and design using object oriented concepts and techniques
- Quote the UML building blocks along with their notations
- Demonstrate the use of object oriented analysis concept with UML diagrams
- Solve complex engineering problems using UML concepts and tools

REFERENCE BOOK LIST:

1. The Unified Modeling Language User Guide by Grady Booch, James Rumbaugh, Ivar Jacobson
2. UML Weekend Crash Course by Thomas A Pender
3. Head first design patterns by Eric Freeman, Elisabeth Freeman, Kathy Sierra, Bert Bates
4. Design Patterns- Elements of Reusable Object-Oriented Software by Eric, Gamma, Richard Helm, Ralph Johnson, John Vlissides
5. An Integrated Approach to Software Engineering by PankajJalote
6. Object Oriented Software Engineering-Ivar J., Magnus C., Patrik J., Gunnar O.
7. The Unified Modeling Language Reference Manual by Grady Booch, James Rumbaugh, Ivar J.
8. Object Oriented System Analysis and Design, Second Edition by Grady Booch

---

COURSE NAME: CSC 2210: Object Oriented Programming 2

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 2106: Data Structure & CSC 2208: Introduction to Database

COURSE DESCRIPTION:

- Introduction to the .Net Framework
- C# language basics
- Creating User Interfaces for Console, Widows and WPF applications
- Creating and Managing Components and .NET Assemblies
- Consuming and Manipulating Data
- Testing and Debugging
- Deploying projects
- Maintaining, Supporting, Configuring and Securing
- Prepared, developed and presented a group project using .Net Solution Architectures.

REFERENCE BOOK LIST:

1. Introduction to Algorithms, Third Edition, Thomas H. Cormen, Charle E. Leiserson, Ronald L. Rivest, Clifford Stein (CLRS).
2. Fundamental of Computer Algorithms, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran (HSR)
3. Helpful link for Problem Solving : http://acm.uva.es/problemset/
4. Lectures and Laboratory works will be provided online at the course website weekly.

COURSE NAME: CSC 2211: Algorithms

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 2106 & CSC 2207: Data Structure & Laboratory

COURSE DESCRIPTION:

- Discuss the principles, objectives, purpose and necessity of Algorithms in the program domain.
- Distinguish computational problems with respect to inputs and outputs in addition to their solutions in efficient ways.
- Simplify in different ways to find out solutions of fundamental computational problems, their solutions and performances.
- Justify the necessary and sufficient condition behind a solution of any widely accepted or self-developed algorithm.
- Demonstrate well known algorithmic solutions of different problems as essential parts of study along with recent improvements.
- Discuss efficiencies of different types algorithms on different problem domains; Analyze time and space complexities of any widely accepted or self-developed algorithm.
- Apply appropriate data structures to implement the efficient algorithms; Explain classical tools and techniques for algorithms analysis and design.
- Judge creativity in designing algorithms.

REFERENCE BOOK LIST:

1. Introduction to Algorithms, Third Edition, Thomas H. Cormen, Charle E. Leiserson, Ronald L. Rivest, Clifford Stein (CLRS).
2. Fundamental of Computer Algorithms, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran (HSR)
3. Helpful link for Problem Solving : http://acm.uva.es/problemset/
4. Lectures and Laboratory works will be provided online at the course website weekly.

COURSE NAME: CSC 3112: Software Engineering

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 2209: Object Oriented System Analysis and Design

COURSE DESCRIPTION:

- Comprehend introduction to the modern study of software engineering.
- Discuss the present software engineering practices; Discuss various process models used software engineering
- Describe requirements engineering and design process; Comprehend the technologies used in coding and testing; Discuss the software project management and planning
- Prepare software requirement specification and design document based on standard SRS and Design document templates.
- Assess and prepare a project plan using standard project planning process and tools.
- Assess project associated risks and prepare Risk management documentation.

REFERENCE BOOK LIST:

1. Software Engineering: A Practitioner's Approach, 7th Edition, Roger S. Pressman
2. Software Engineering, Sommereville
3. An Integrated Approach to Software Engineering, Pankaj Jalote
4. Object Oriented Software Engineering, Ivar Jacobson, Magnus Christerson, Patrik Jonsson, Gunnar Overgaard
5. Systems Analysis and Design: An Object-Oriented Approach with UML, 5th Edition, Alan Dennis
6. Component Software: Beyond Object-Oriented Programming, Clemens Szyperski
7. Practices of an Agile Developer: Working in the Real World, Venkat S., Andy H.
8. Code Complete: A Practical Handbook of Software Construction, S. McConnell

---

COURSE NAME: CSC 3113: Theory of Computation

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 2211: Algorithms

COURSE DESCRIPTION:

- Introduction to computational theory, Understand and use of Computational models to solve problems, Basic Notations.
- Finite automata: deterministic finite automata, nondeterministic finite automata, equivalence and conversion, pushdown automata;
- Language Theory; Context free languages, Context free grammars;
- Turing Machines: basic machines, configuration, computing and combining Turing machines;
- Undecidability

REFERENCE BOOK LIST:

1. Introduction to the Theory of Computation (Latest Edition) by Michael Sipser
2. Introduction to Automata Theory, Languages, and Computation (Latest Edition) by John E. H., et al
3. Elements of the Theory of Computation (Latest Edition) by Harry R. Lewis, Christos H. Papadimitriou

---

COURSE NAME: CSC 3214: Operating Systems

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class &
3 hours of Laboratory class per week

PRE-REQUISITE: COE 3102: Microprocessor & Embedded Systems & CSC 2211: Algorithms

COURSE DESCRIPTION:

- Explain modern operating systems; Overview and history of the structure of modern operating systems
- Describe the fundamental concepts and issues involved in operating system design and explain about the basic services provided by operating systems in general (main focus on UNIX-based operating systems along with alternative operating systems, including Windows.)
- Analyze in detail each of the major components of an operating system (from processes to threads);
- Explore the topics – process description and control, critical sections and mutual exclusion, deadlock, process scheduling, threads, process synchronization, semaphores and memory management strategies and file input/output.
- Present two central building blocks of modern operating systems: Processes and Threads.
- Processes (instances of a running computer program) and threads (a specific task running within a program) are integral to the understanding of how an OS executes a program and the communication of information between each of the computer's architectural layers;
- Differentiate between processes and threads; Explain process on Context Switching; Analyze process synchronization methods and techniques

- Justify and explain different levels of access control, operating system protection and security.
- Analyze CPU scheduling algorithm; Categorize different scheduling algorithms and justify a good algorithm which will allocate resources, allowing an efficient execution of all running programs.
- Describe Deadlock in Operating system. Relate Deadlock with previous two units of CPU Scheduling and Processes and Threads; Analyze different algorithms to prevent Deadlock; Discuss about deadlock detection, as well as methods for recovering from a deadlocked state.
- Discuss the role of memory in an Operating System.
- Implement error-handling techniques using exception handling.
- Create multithreaded programs and explain the advantage compared with single threaded programs.

REFERENCE BOOK LIST:

1. Silberschatz, A and Galvin, P (and Gagne, G), Operating System Concepts (Ninth Edition)
2. Modern Operating Systems (3rd Edition) by Andrew S. Tanenbaum.
3. William S. Davis and T. M. Rajkumar, Operating Systems, A Systematic View, Sixth Edition, Addison Wesley, 2004.
4. Kanetkar, Yashavant P., Unix shell programming, BPB Publications, 1996.
5. Online tutorials. (You will be guided in the class).

COURSE NAME: CSC 3215: Web Technologies

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 3112: Software Engineering & CSC 2210: Object Oriented Programming 2

COURSE DESCRIPTION:

- Escalate the increasing importance of Web technology and how it is changing the role of the IT.
- Understand what strategic web development is and apply a framework to help identify strategic uses of Internet
- Compare the fundamental types of web technologies and how they can be used to provide real business benefit;
- Explore new technologies and issues affecting the web development
- Apply a web development approach in analyzing the role of web technology in organizations
- Describe the process used in developing information systems and the concepts of web engineering and web process reengineering
- Analyze the skills needed for web development professionals
- Develop real life and society targeted Web Applications

REFERENCE BOOK LIST:

1. JavaScript Phrasebook; Christian Wenz; Sams Publishing; 2007
2. JavaScript for Programmers Paul J. Deitel and Harvey M. Deitel; Prentice Hall; 2009
3. W3Schools Online Web Tutorials; URL: http://www.w3schools.com
4. PHP Documentation; URL: http://www.php.net/docs.php
5. Sams Teach Yourself Ajax JavaScript and PHP All in One; Phil Ballard and Michael Moncur; Sams Publishing; 2010
6. PHP and MySQL Web Development, 4/E; Luke Welling and Laura Thomson; Addison-Wesley Professional; 2009
7. Beginning PHP5, Apache, and MySQL Web Development; Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz and Michael K. Glass; Wiley Publishing; 2005
8. XML in a Nutshell, 3/E; Elliotte Rusty Harold and W. Scott Means; O'Reilly Media; 2004

COURSE NAME: CSC 3216: Compiler Design

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 3113: Theory of Computation

COURSE DESCRIPTION:

- Define Preprocessor, compiler, Assembler and Linker;
- Describe how high-level languages can be implemented on a computer.
- Include specification of languages and its relation to automata, lexical analysis, finite state machines, context free languages, LL and LR parsing methods, syntax directed translation, error recovery, code generation, and portability
- Analyze the principles, algorithms and data structures involved in the design and constructions of compilers.

REFERENCE BOOK LIST:

1. Compilers-Principles, techniques and tools (2nd Edition), V. Aho, Sethi and D. Ullman
2. Principles of Compiler Design (2nd Revised Edition 2009), A. A. Puntambekar
3. Basics of Compiler Design, Torben Mogensen

COURSE NAME: CSC3217: Artificial Intelligence and Expert System

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 2211: Algorithms & MAT 3103: Computational Statistics & Probability

COURSE DESCRIPTION:

- Analyze four different types of intelligent agents and their environment.
- Compare the learning agent with other agents.
- Solve problems using BFS, DFS, UCS, DLS and IDS search techniques.
- Solve informed search and exploration methods like A*, Hill Climbing, Genetic Algorithms etc.
- Solve Constraint satisfaction problems and search techniques in game playing.
- Analyze Logic representation in propositional and first-order logic.
- Solve the problem using Genetic Algorithm.
- Use Neural Network notations and architectures. Solve problems using perception learning rules.

REFERENCE BOOK LIST:

1. Stuart J. Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach,” Prentice Hall, Second Edition, 2003.
2. J. Ross Quinlan, “Programming for machine learning,” Morgan Kaufmann, 1993.
3. Philip D. Wasserman, “Neural Computing Theory and Practice,” Van Nostrand Reinhold, 1989.
4. Martin T. Hagan, Howard B. Demuth, Mark H. Beale, “Neural Network Design,” 2002.
5. Randy L. Haupt and Sue Ellen Haupt, “Practical Genetic Algorithms,” Second Edition, 2004.
6. David E. Goldberg, “Genetic Algorithms in Search, optimization and Machine learning,” Pearson Education, 1989.
7. Carl Townsend, “Introduction to Turbo Prolog,” First Edition (Revised), 2000.
8. http://www.perfectlogic.com/articles/AI/ExpertSystems/ExpertSystems.html

---

COURSE NAME: CSC 4118: Introduction to Data Science

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 3217: Artificial Intelligence and Expert Systems

COURSE DESCRIPTION:

- Data Science is the study of extract knowledge from data. Familiar with the field of data science and prepare the students with basic principles and tools.
- Fundamental concepts, techniques and tools to deal with various aspects of data science application, including data collection, data types, statistical description of data, data visualization, data pre-processing, data classification, data clustering, model evaluation, outlier detection methods, and algorithmic techniques used in recommender systems.

REFERENCE BOOK LIST:

1. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber, and Jian Pei 3rd Edition
2. Principles of Data Mining, Max Bramer, 2nd Edition
3. Python Data Science Handbook: Essential Tools for Working with Data, Jake VanderPlas, 1st Edition
4. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data, Garret Grolemund and Hadley Wickham, 1st Edition
5. An Introduction to Statistical Learning: with Application in R, Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani, 1st Edition
6. Mining of Massive Datasets, Jure Leskovec, Anand Rajaraman, Jeff Ullman, 2nd Edition

CORE COURSES: COMPUTER ENGINEERING (26 CREDITS)

COURSE NAME:	EEE 2108: Introduction to Electrical Circuits & EEE 2109: Introduction to Electrical Circuits Lab		
CREDIT HOUR(S):	3 & 1/Lab	**CONDUCT HOURS:**	3 hours of Theory classes & 3 hours of Laboratory class per week
PRE-REQUISITE:	PHY 1101: Physics 1 & PHY 1102: Physics 1 Lab		

COURSE DESCRIPTION:

- Basic concepts of DC circuit. Familiarizing with different components: Resistor, capacitor, Inductor, Voltage source, etc.
- Familiarizing with Series, Parallel and Series-parallel circuits Basic idea about alternating quantity: Period and cycle, frequency, angular velocity, angular frequency, Sinusoidal waveform. Vector Diagram.
- Ohm's Law; Total resistance of series & parallel circuits; KVL; KCL. Equation of instantaneous voltage, current and power of an R branch, L branch, C branch, RL, RC and RLC circuits. Impedance of R, L and C; Total impedances of their series or parallel combinations. Calculation of power and power factor Brief study of transients in capacitive networks.
- AC Power. Y-Delta and Delta-Y conversions; Dependent Current Source, Dependent Voltage Source; Network Theorems for DC and AC circuits: Superposition theorem Network Theorems for DC and AC circuits. Electromagnetism, Flemings hand rules,
- DC generator and DC motor, Transformer, Induction motor, Synchronous generator, Alternator, Stepper Motor, Induction Motor, Universal Motor, Servo Motor, Permanent-magnet Synchronous motor, hysteresis motor, Reluctance motor, Linear motor,

REFERENCE BOOK LIST:

1. Robert L. Boylestad, "Introductory Circuit Analysis", 12th Edition, Prentice Hall Inc.
2. R. M. Kerchner and G. F. Corcoran, "Alternating Current Circuits", 4th Edition, John Wiley & Sons, Inc.
3. Robert. L. Boylestad & Louis Nashelky, "Electronics Devices and Circuit Theory", 11th edition, Prentice Hall.
4. Adel S. Sedra & Kenneth C. Smith, "Microelectronic Circuit", 5th edition, Oxford University press.
5. Robert P. Ward, "Introduction to Electrical Engineering", 3rd Edition,Prentice Hall Inc
6. Charles K. Alexander & Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", 3rd edition, The McGraw-Hill companies
7. John O'Malley, "Schaum's Outline of Basic Circuit Analysis"
8. James W. Nilsson and Susan A. Riedel, "Electric Circuits", available latest edition.
9. David E. Johnson & Johny R. Johnson," Electric Circuit Analysis", 2nd Edition, Prentice Hall Inc.
10. Richard C. Dorf," Introduction to Electric Circuits", Second Edition, John Wiley & Sons, Inc.
11. Dale Patrick and Stephen Fardo, "Understanding DC Circuits".
12. Ralph A. Oliva, "Basic Electricity and DC Circuits"
13. John Reeder, "Using Multisim 9: Troubleshooting DC/AC Circuits"
14. Richard S. Muller, Theodore I. Kamins & Mansun Chan, "Device Electronics for Integrated Circuits".
15. John Henderson, "Electronic Devices: Concepts and Applications".
16. Ali Aminian & Marian Kazimierczuk, "Electronic Devices: A Design Approach".
17. Ben. G. Streetman & S.K. Banerjee, "Solid State Electronics", 6th edition, Prentice Hall
18. Jacob Millman & Christos C. Halkias, "Integrated Electronics", Tata McGrew-Hill edition
19. Paul Horowitz & Winfield Hill, "The Art of Electronics", 2nd Edition, Cambridge University Press

---

COURSE NAME: EEE 2103: Electronic Devices &
EEE 2104: Electronic Devices Lab

CREDIT HOUR(S): 3 & 1/Lab **CONDUCT HOURS:** 3 hours of Theory classes & 3 hours of Laboratory class per week

PRE-REQUISITE: EEE 2108 & EEE 2109: Introduction to Electrical Circuits & Laboratory

COURSE DESCRIPTION:

- Semiconductors: electron and holes in an intrinsic semiconductor, donor and acceptor impurities.
- Introduction to solid state electronics: Energy band structure in solids, insulators, semiconductors and metals, Conductance and semiconductors, electrons and holes,
- Diodes: open circuit p-n junction, diode characteristics, small signal model of diode, and circuit applications of diode, rectifiers and zener diode.
- Bipolar junction transistors: characteristics, different configuration of transistor amplifiers, voltage and current amplifiers small signal low frequency h parameter model analysis of transistor amplifier using h parameters, high input resistance transistor circuits, transistor biasing and thermal stabilization.
- MOSFET: Introduction- PMOS, NMOS and CMOS transistors and their switching characteristics, depletion and enhancement MOSFET. Analog Electronics Operational Amplifiers (Op-Amp), Introduction to Op-Amps and its applications, AC Performance of Op-Amp: Familiarize with the frequency response of Op-Amp, Active Filter: Analyze and design diverse types of filter, Transistor at High Frequencies: Observe the performance of hybrid model and the amplifier response, Feedback Amplifiers: Classify the amplifiers and analyze different methods of a feedback amplifier, Multistage Amplifiers: Achieve a clear idea about RC coupled amplifiers and their frequency

response.

REFERENCE BOOK LIST:

1. Robert. L. Boylestad & Louis Nashelky, "Electronics Devices and Circuit Theory", 11th edition, Prentice Hall.
2. Muhammad H. Rashid, "Microelectronic Circuits Analysis and Design", 2nd edition, CL Engineering, 2010
3. Adel S. Sedra & Kenneth C. Smith, "Microelectronic Circuit", 5th edition, Oxford University press
4. Jimmie J. Cathey, "Schaum's Outline of Electronic Devices and Circuits", 2nd Edition
5. Richard S. Muller, Theodore I. Kamins & Mansun Chan, "Device Electronics for Integrated Circuits".
6. John Henderson, "Electronic Devices: Concepts and Applications".
7. Ali Aminian & Marian Kazimierczuk, "Electronic Devices: A Design Approach".
8. Ben. G. Streetman & S.K. Banerjee, "Solid State Electronics", 6th edition, Prentice Hall
9. Jacob Millman & Christos C. Halkias, "Integrated Electronics", Tata McGrew-Hill edition
10. Paul Horowitz & Winfield Hill, "The Art of Electronics", 2nd Edition, Cambridge University Press

---

COURSE NAME: EEE 3101: Digital Logic and Circuits &
EEE 3101: Digital Logic and Circuits Lab

CREDIT HOUR(S): 3 & 1/Lab **CONDUCT HOURS:** 3 hours of Theory classes & 3 hours of Laboratory class per week

PRE-REQUISITE: EEE 2103: Electronic Devices & EEE 2104: Electronic Devices Lab

COURSE DESCRIPTION:

- Digital Logic and Circuits Perform arithmetic operations in many number systems, Definition and Problem solving on Fan out, Noise Margin, Propagation Delay, Speed Power Product, Basic Diode Transistor,
- Logic Gates: RTL, DTL and HTL, ECL & CML with operational detail, Simplify the Boolean expressions using Karnaugh Map, Implement the Boolean Functions using various Logic Gates, Analyze and design various combinational logic circuits,
- Basic memory units and operations. RAM and ROM Family, Flash memory, Magnetic and optical storage, CCDs,
- Sequential Circuits: Analyze and design clocked sequential circuits, Timing Analysis: Introduction to timing analysis of combinational and sequential circuits,
- Briefly introduce the concept of Hardware Description Language (HDL) using VHDL, Programmable Logic Devices (PLDs); Implementation with PAL, PLA, CPLD and FPGA.

REFERENCE BOOK LIST:

1. Thomas L. Floyd, "Digital Fundamentals" 9th edition, Prentice Hall.
2. M. Morris Mano, "Digital Logic & Computer Design" Prentice Hall.
3. Ronald J. Tocci & Neal S. Widmer, "Digital Systems" 7th edition, Prentice Hall.
4. Digital design – Karim and Johnson
5. Brian Holdsworth and Clive Woods, "Digital Logic Design"-Fourth Edition.
6. Stephen B, & Zvonko V., "Fundamentals of Digital Logic with VHDL Design with CD-ROM"
7. William J. Dally and R. Curtis Harting, "Digital Design: A Systems Approach"
8. Victor Nelson, H. T. Nagle, Bill D. Carroll & David Irwin, "Digital Logic Circuit Analysis and Design"
9. John P. Hayes, "Introduction to Digital Logic Design"
10. Norman Balabanian and Bradley Carlson, "Digital Logic Design Principles"
11. Enoch O. Hwang, "Digital Logic and Microprocessor Design with VHDL"
12. Joseph Cavanagh, "Digital Computer Arithmetic: Design and Implementation (Computer

Science)"

COURSE NAME: EEE 2216: Engineering Ethics

CREDIT HOUR(S): 2 **CONDUCT HOURS:** 2 hours of Theory class per week

PRE-REQUISITE: CSC 3112: Software Engineering
COE 3102: Microprocessor & Embedded Systems

COURSE DESCRIPTION:

- Technology has a pervasive and profound effect on the contemporary world, and engineers play a central role in all aspects of technological development. To hold paramount the safety, health, and welfare of the public, engineers must be morally committed and equipped to grapple with ethical dilemmas they confront. This course will provide an introduction to the issues in engineering ethics. It places those issues within a philosophical framework, and it seeks to exhibit their social importance and intellectual challenge.
- Explain basic ethical concepts, basic theory of professional ethics, professional codes of ethics, moral reasoning.
- Explain ethical issues to uphold paramount the safety, health and welfare of the public.
- Illustrate different case studies for resolving various ethical dilemmas and making proper decision.
- Make oriented students for research and development.
- Make improvement of communication skills through arranging presentation session.

REFERENCE BOOK LIST:

1. Martin, Mike & Schinzinger, Ronald: Ethics in Engineering, 4th ed., McGraw-Hill.
2. Mike W. Martin, Roland Schinzinger, "Introduction to engineering ethics" 2nd ed, McGraw-Hill.

COURSE NAME: BAE 2101: Computer Aided Design & Drafting Lab

CREDIT HOUR(S): 1/Lab **CONDUCT HOURS:** 3 hours of Laboratory classes per week

PRE-REQUISITE: EEE 2108: Introduction to Electrical Circuits

COURSE DESCRIPTION:

- Introduction to design & drafting using computer, drafting instruments and materials, lettering, alphabet of lines, dimensioning, geometric construction, conic sections, orthographic projection, isometric and oblique views, free hand sketching, construction of scale, sections and conventions, surface development.
- Making plan, section and elevation of residential building. Safety rules, electricity rules and electricity codes.
- Electrical and Electronic symbols. Electrical wiring, house wiring and industrial installation wiring.
- Insulation measurement. Use of Meggars. Battery charging. Creating PCB layout, editing PCB layout, printing PCB layout. Laboratory works based on taught theory.

REFERENCE BOOK LIST:

1. Modern Commercial Wiring, Author: Harvey N. Holzman 6th Edition, ISBN-13 978-1619608542 ISBN-10 1619608545 Goodheart - Willcox Company, Inc. (Publisher)
2. AutoCAD Electrical 2011 for Electrical Control Designers, Tickoo and Pandita, CADCIM Technologies., 2010
3. Electronics Drafting by Frostad, 4th edition, published by GW publishers, ISBN: 978-1-60525-348-0

COURSE NAME: COE 3101: Data Communication

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: EEE 3101 & EEE 3102: Digital Logic & Circuits with Laboratory

COURSE DESCRIPTION:

- Introduction to data communication concepts, Protocol concepts and functionality,
- Network Architectures - OSI Model and TCP/IP Model;
- Physical Layer: Signals, Analog and Digital Signals, Data Rate Limits, Transmission impairments;
- Transmission Media: Guided media, Wireless media; Digital Transmission: Line Coding, Block Coding, Sampling, Transmission Mode; Analog Transmission: Modulation of digital data, Telephone modems, Modulation of analog signals.
- Multiplexing: FDM, WDM, TDM; High Speed Digital Access: DSL, Cable Modems, and SONET;
- Data Link Layer: Error Detection and Correction, Data Link Control and Protocols; Point-to-point Access: PPP, Multiple Access; Local Area Networks;
- Wireless LAN: IEEE 802.11, Bluetooth; Internetworking devices, Frame Relay, ATM.

REFERENCE BOOK LIST:

1. "Forouzan Behrouz A., "Data Communications and Networking", 4th Edition, Tata McGraw-Hill. ISBN 0-07-058408-7
2. Kurose J.F and Ross K.W – "Computer Networking: A Top-Down Approach Featuring the Internet" – 2nd / 3rd Edition
3. William Stallings – "High-Speed Networks and Internets: Performance and Quality of Service" – 2nd Edition.
4. Mark Crovella, Balachander Krishnamurthy, "Internet Measurement: Infrastructure, Traffic and Applications",Wiley, 2006
5. Larry Peterson, Bruce Davie, "Computer Networks, a system approach", 4 ed., Morgan Kaufmann.

COURSE NAME: COE 3102: Microprocessor and Embedded Systems

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: EEE 3101 & EEE 3102: Digital Logic & Circuits with Laboratory

COURSE DESCRIPTION:

- Introduction to microprocessor and microcontroller, understanding their basic differences and applications. Introduction to embedded systems and their applications.
- Understanding principles of operation of microcontrollers, including assembly language programming as well as internal architecture of processors.
- Learning about hardware-software interfacing and different interfacing techniques.
- Understanding the concept of built-in timers in microcontrollers and their uses. Learning about hardware and software interrupts in microcontroller and effectively implementing them in the lab to observe the performance improvement of the program.
- Understanding processor speed (oscillator frequency). Learning how to change the default frequency and observing the change effects.
- Introduction to serial communication and different protocols. Emphasis will be given on RS-232 communication, understanding the principle of RS-232 communication and its implementation. Introduction to SPI and I2C protocols.
- Introduction to ADC conversion, principle of operation and implementing an ADC converter using Arduino.

- Understanding the basics of pulse-width modulation (PWM), duty cycle and observing the effect of PWM through a stepper motor.
- Introduction to Embedded systems, a brief overview of the system and internal architecture, state of the art technology.

REFERENCE BOOK LIST:

1. Jeremy Blum, Exploring Arduino: Tools and Techniques for Engineering Wizardry
2. Ytha Yu, Charles Marut-Assembly Language Programming Organization of the IBM PC (1992)
3. Microprocessor and Microcomputer-based System Design – by Mohammad Rafiquzzaman.
4. Digital Logic and Computer Design – by M. Morris Mano
5. Barry B. Brey, "The Intel Microprocessors", Fourth Edition, Prentice-Hall of India, ISBN 81-203-2158-8.
6. Ytha Yu, Charles Marut, "Assembly Language Programming and Organization of the IBM PC", Mcgraw-hill International Editions, ISBN 0-07-072692-2.
7. John Uffenbeck,"The 8086/8088 Family: Designing, Programming and Interfacing", Second Edition, Prentice Hall, ISBN: 0132467526.
8. Douglas V. Hall, "Microprocessors and Interfacing – Programming and Hardware", Second Edition, TATA McGRAW-HILL, ISBN 0-07-463639-1.
9. Albert Paul Malvino, Jerald A. Brown, "Digital Computer Electronics", Third Edition, Tata McGraw-Hill Publishing Company Ltd.
10. William Buchanan and Austin Wilson, "Advanced PC Architecture".
11. Michael J. Debenham, "Microprocessors: Principles and Applications".
12. N Senthil Kumar, M Saravanan and S Jeevananthan, "Microprocessors and Microcontrollers".
13. Walter A. Triebel and Avtar Singh, "The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware, and Applications", Fourth Edition.
14. (2015) MIT Open Courseware [Online]. Available: http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-823-computer-system-architecture-fall-2005/lecture-notes/

COURSE NAME: COE 3203: Computer Organization & Architecture

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: COE 3102: Microprocessor & Embedded System

COURSE DESCRIPTION:

- Fundamental concepts of computer organization
- Instruction types and their formats
- Assembling and executing assembly language program
- Program Structure Input and Output Instructions; Use of subroutines and macros; Interrupts and system services; Flag Registers
- Translation of high-level language to assembly language
- Fundamental concepts of computer architecture
- Components of the computer and how they interact
- Computer BUS standards; Addressing methods; High level control structure formation; Registers; cache;
- Numeric processing and string processing; Concurrent processes and high level linking
- Disk geometry
- File system and file I/O handling
- Application development using Raspberry/Arduino.

REFERENCE BOOK LIST:

1. Assembly Language Programming and Organization of the IBM PC, Ytha Yu and Charles Marut, McGraw Hill, 1992. (ISBN: 0-07-072692-2).
2. Essentials of Computer Organization and Architecture, (Third Edition), Linda Null and Julia Lobur
3. W. Stallings, "Computer Organization and Architecture: Designing for performance", 67h Edition, Prentice Hall of India, 2003, ISBN 81 – 203 – 2962 – 7
4. Computer Organization and Architecture by John P. Haynes.

COURSE NAME: COE 3204: Computer Networks

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: COE 3101: Data Communication

COURSE DESCRIPTION:

- Introduce students with modern and up to date concepts on computer networks, beginning at the application layer and works its way down toward the physical layer.
- Application Layer protocols – HTTP, FTP, DNS, SMTP
- Transport Layer- TCP & UDP protocols; TCP congestion control, Flow control, three way handshake
- Network layer - Introduction of IPv4 addressing; Subnetting – FLSM, VLSM, routing algorithms simulation using Dijkstra and Bellman-ford.
- Data Link Layer - Introduction different multiple access protocols; Error Detection and Correction (CRC)
- Switching- Circuit & Packet Switching, network delay calculation

REFERENCE BOOK LIST:

1. "Forouzan Behrouz A., "Data Communications and Networking", 4th Edition, Tata McGraw-Hill. ISBN 0-07-058408-7
2. Kurose J.F and Ross K.W – "Computer Networking: A Top-Down Approach Featuring the Internet" – 2nd / 3rd Edition
3. William Stallings – "High-Speed Networks and Internets: Performance and Quality of Service" – 2nd Edition.
4. Mark Crovella, Balachander Krishnamurthy, "Internet Measurement: Infrastructure, Traffic and Applications",Wiley, 2006

CORE COURSES: MATHEMATICS (18 CREDITS)

COURSE NAME: MAT 1102: Differential Calculus and Coordinate Geometry

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: NIL

COURSE DESCRIPTION:

- Rectangular coordinates in two and three dimensions, direction cosines and direction ratio of a line, pair of straight lines, scalar and vector products of vectors, plane and straight line using vectors, identification of conics, equation of sphere, paraboloid and ellipsoid,

- Domain and range, limit, continuity and differentiability of functions, Rolle's, Mean value and Taylor's theorem, analysis of functions, derivative of functions of several variables, homogeneous function and Euler's theorem.

REFERENCE BOOK LIST:

1. Calculus by JAMES STEWART- 8th edition
2. Calculus– H. Anton, I. C. Bivens and S. Davis
3. Differential and Integral Calculus-F.Ayres (Schaum's Outline Series)

COURSE NAME: MAT 1205 Integral Calculus and Ordinary Differential Equations

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MAT 1102: Differential Calculus and Coordinate Geometry

COURSE DESCRIPTION:

- Integral Calculus – Indefinite and definite integrals, numerical integrations, improper integrals and application of integration, multiple integrals. Solutions of different types of ordinary differential equations and their applications. System of linear ordinary differential equations.

REFERENCE BOOK LIST:

1. Calculus by JAMES STEWART- 8th edition
2. Differential Equations – P. Blanchard, R. L. Devaney, G. R. Hall
3. Differential Equations – S.L. Ross.- 3rd edition, John Wiley & Sons Inc
4. Differentials and Integral Calculus – F. Ayres (Schaum's Outline Series).-2nd edition, McGraw Hill

---

COURSE NAME: MAT 2101: Complex Variables, Laplace and Z-transformations

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MAT 1205 Integral Calculus and Ordinary Differential Equations

COURSE DESCRIPTION:

- Laplace transform, inverse Laplace transform (Cauchy Residue Theorem, partial fraction and convolution theorem) and Application of Laplace transform. Complex Variables (complex number, conjugate, algebra of complex numbers, graphical representation of complex numbers, polar form, modulus and argument of complex number. De Moiver's theorem and roots of complex number.
- Function of complex variables, analytic function, Cauchy-Riemann equations in Cartesian and polar forms, construction of analytic function, Laplace equation, Harmonic and conjugate Harmonic functions).
- Complex integrals (line integrals, Cauchy-Goursat's theorem, Cauchy's integral formula, Cauchy's integral formula for higher order derivative, Taylor's theorem and Laurents theorem). Singularity, poles, zeros and residue of complex valued function. Residue theorem, contour integration and mapping.
- Finally, the Z-transform will be discussed here and Z- transform includes properties of Z-transform and inverse Z-transform, methods of finding inverse Z-transform and application of Z-transform.

REFERENCE BOOK LIST:

1. Complex Variables and Applications – R.V. Churchill and J.W.Brown.
2. Laplace Transform – Murray R. Spiegel
3. Complex Variables and Applications – M.R.Spiegel.
4. Advanced Engineering Mathematics- E. Kreyszig.

COURSE NAME: MAT 2202 Matrices, Vectors and Fourier Analysis.

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MAT 2101: Complex Variables, Laplace and Z-transformations

COURSE DESCRIPTION:

- Different types of matrices, adjoint and inverse of a matrix, elementary row transformations of a matrix, row echelon and canonical forms of a matrix,
- Inverse matrix by elementary row transformations, rank of a matrix, solution of a system of linear equations by matrix inversion and row transformations, transformation matrix,
- Application of transformation matrix in robotics, characteristic polynomial, eigenvalues and eigenvectors,
- Cayley-Hamilton theorem, linear combination and linear dependency of vectors, differentiation of a vector function, gradient and directional derivative of a scalar function, divergence and curl of a vector function in Cartesian,
- cylindrical and spherical coordinate systems, Divergence theorem and Stokes theorem in Cartesian, cylindrical and spherical co-ordinate systems.,
- periodic function, Fourier series of a periodic function, half range Fourier series, finite Fourier transformations, Fourier integral, Fourier sine and cosine integrals, Fourier transformations and inverse Fourier transformations, applications of Fourier

REFERENCE BOOK LIST:

1. Elementary Linear Algebra: Applications Version – H. Anton and C. Rorres, 11th edition, Wiley, 2013.
2. Linear Algebra and It's Application – David C. Lay and Steven R. Lay, 5th edition, Pearson, 1997,
3. Advanced Engineering Mathematics - E. Kreyszig, 10th edition, John Wiley and Sons, 2010
4. Fundamentals of Applied Electromagnetics - Fawwaz T. Ulaby and Umberto Ravaioli, 7th edition, Pearson, 1999.

COURSE NAME: MAT 3103: Computational Statistics and Probability

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MAT 1205 Integral Calculus and Ordinary Differential Equations

COURSE DESCRIPTION:

- Introduction of statistics, representation of data by measurement, counting methods and measures of central tendency and dispersion are designed.
- Basic concepts of probability, probability laws, use of probability in Statistics, conditional probability using Bayes' theorem and check for independence of events.
- Random variable, random experiment, mathematical expectation and variance and different types of distributions, sampling theory and estimation theory. Stochastic process. Hypothesis testing. Compute the covariance and correlation between jointly distributed variables and regression. Use of statistical packages to analyse data.

REFERENCE BOOK LIST:

1. Applied Statistics and Probability for Engineers – D. C. Montgomery, G. C. Runger, and Wiley,
2. Probability and Stochastic Processes – A Friendly Introduction for Electrical and Computer Engineers, Second Edition, R.D.Yates and D.J.Goodman, John Wiley & Sons Inc., 2005.
3. Statistics and Probability for engineering Applications, D.J. Decoursey, Elsevier science, 2003.
4. Sampling – S. K. Thompson, John Wiley & Sons, Third Edition 2012.

5. Distributions with Applications -K. Krishnamoorthy, Chapman and Hall, 2006.
6. Applying Regression and Correlation- J. Miles, M. Shevlin, SAGE Publication Ltd., First Edition, 2001.

COURSE NAME: MAT 3101: Numerical Methods for Science and Engineering

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MAT 2202: Matrices, Vectors and Fourier Analysis

COURSE DESCRIPTION:

- Introduction to MATLAB. Basic commands, syntax and function. Basics introduction to decimal places, significant figures, rounding, loss of significance. Gaussian elimination with pivoting. Gauss-Seidal Iterative method of solution.
- Application of MATLAB for linear system. Newton's divided difference formula. Lagrange polynomial. Applying MATLAB to find polynomial. Linear, quadratic and cubic splines using MATLAB. Interpolation using a fixed curve. Least square method. To find interpolating curve using MATLAB. Number of roots by graphical method. Bisection, secant and Newton-Raphson methods. Fixed point iteration method. Solution of non-linear system of equation using Newton-Raphsons and fixed point iteration methods.
- Application of MATLAB to find roots for non-linear equations. Solution of system of non-linear equations using Newton-Raphsons and iterative methods. Application of MATLAB to find roots for non-linear systems. Derivation of forward, backward and central difference formulae for first and second derivative. Richardson's extrapolation.
- Application of MATLAB to find various order derivatives. Introduction. Newton-Cotes quadrature rules. Composite trapezoidal and Simpson's rules. Romberg integration. Double Integration Gaussian quadrature rule. To find single and multiple (definite) integration using MATLAB. Solution of Initial value problems using Taylor series, Euler's and modified Euler's method, The Runge-Kutta methods (Rk-2 and RK-4 methods). Solution of two points boundary value problems using finite difference method. Application of MATLAB to find the solution of ODEs and system of ODEs.

REFERENCE BOOK LIST:

1. Numerical Methods For Mathematics, Science, and Engineering– J.H. Mathews , Kurtis K. Fink, 4th Edition, 2010, Pearson Education Limited, UK.
2. Applied Numerical Analysis – C.F.Gerald & P.O.Wheatley, 7th Edition, 2003, Pearson Education Limited, USA
3. Numerical Analysis & Computing – W. Cheney & D. Kincaid, 6th Edition, 2007, Cengage Learning, Inc, USA.
4. Numerical Analysis – J. Douglas Faires , Annette Burden , Richard Burden, 10th Edition, 2015, Cengage Learning, Inc, USA.

CORES COURSES: NATURAL SCIENCE (11 CREDITS)

COURSE NAME: PHY 1101: Physics-1

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: NIL

COURSE DESCRIPTION:

- Motion in 2D and 3D, Applications of Newton's laws of motion, Static and Kinetic friction, Work-Kinetic energy theorem, Power, Conservative forces, Conservation of energy, Gravitation, Gravitational field, Kepler's Law, Center of mass motion, Conservation of linear momentum for a system of particles, Elastic and inelastic collision in 1D, Angular velocity and acceleration, relation between linear and angular velocity, Calculating rotational inertia, Parallel-axis theorem, Conservation of angular momentum.
- Electric charge, Coulomb's law, Calculation of Electric fields for different charge distributions; Dipole in an electric field; Gauss' law and its applications; Electric potential and its calculation for different charge distributions; Capacitance and its calculation for different geometrical shapes, energy stored by a capacitor; dielectrics and Gauss' law; Concept of electric current, resistance and Ohm's law, DC circuits, Kirchhoff's rules, RC circuits, Magnetic field, The Hall effect, Biot-Savart law, Ampere's law, Faraday's Law, LR circuits, LC circuits and LRC circuits.

REFERENCE BOOK LIST:

1. Fundamentals of Physics by Halliday, Resnick & Walker, 10th Edition (Extended)
2. University Physics with Modern Physics by Young and Freedman, 13th Edition
3. PHYSICS for Scientists and Engineers by Tipler, 4th Edition
4. PHYSICS for Engineers [Part- 2] Dr. Gias Uddin Ahmad

COURSE NAME: PHY 1102: Physics 1 Lab

CREDIT HOUR(S): 1/Lab **CONDUCT HOURS:** 3 hours of Laboratory classes per week

PRE-REQUISITE: NIL

COURSE DESCRIPTION:

- Undergraduate labs are designed to reinforce information presented during course lectures by providing students "hands-on" opportunities to explore the concepts and principles of physics taught in the course Physics 1. Topics include:
- Determination of acceleration due to gravity using a simple pendulum; determination of projectile motion and collision of a ball
- Verification of Newton's second law of motion by Atwood's machine;
- Measurement of moment of inertia of a flywheel about its axis of rotation; Measurement of Young's modulus of a wire using Searle's apparatus; measuring the surface tension of water using capillary tube method
- Verification of Ohm's law and verification of the laws of series and parallel combinations of resistances; Measurement of temperature co-efficient of resistance of a wire;
- Determination of DC & AC voltages and frequencies using cathode ray oscilloscope;
- Investigation of DC voltage and frequency of a full-wave bridge-rectifier circuit
- Measurement of RC time constant in an RC circuit; internal resistance/emf of a cell.

REFERENCE BOOK LIST:

1. AIUB Physics Lab Manual
2. Fundamentals of Physics by Halliday, Resnick & Walker, 10th Edition (Extended)
3. University Physics with Modern Physics by Young and Freedman, 13th Edition
4. PHYSICS for Scientists and Engineers by Tipler, 4th Edition
5. PHYSICS for Engineers [Part- 2] Dr. Gias Uddin Ahmad

COURSE NAME: PHY 1203: Physics 2

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: PHY 1101: Physics 1

COURSE DESCRIPTION:

- Specific heat, First law of thermodynamics, Working principle of Carnot cycle and efficiency of heat engines; Second law of thermodynamics, idea of entropy, change in entropy for different processes, Thermodynamic functions and Maxwell's thermodynamic relations, Clausius-Clapeyron equations.
- Wave motion, characteristics of wave motion, equation of simple harmonic progressive wave, particle velocity and wave velocity, energy of a progressive wave, formation of Stationary wave, analytical treatment of stationary waves, velocity of a particle in a stationary wave, change of density at places traversed by a stationary wave, acceleration of a particle in the stationary wave, energy of a stationary wave, distinction between progressive and stationary waves, wave velocity and group velocity, velocity of a transverse wave along a stretched string, laws of vibration of a stretched string, Melde's experiment.
- An introduction to the nature and propagation of light, reflection and refraction, total internal reflection, dispersion, polarization, scattering of light, Huygens' principle;
- Interference, interference and coherent sources, constructive and destructive interference, Young's double slit experiment, Interference in thin films, Newton's Rings;
- Fresnel and Fraunhofer Diffraction, diffraction from a single slit, diffraction by a double slit, multiple slit diffraction, the diffraction gratings.
- Laser basics and applications, optical effects in crystals, Nonlinear optics – an introductory discussion, elementary discussion on fiber optics.

REFERENCE BOOK LIST:

1. Fundamentals of Physics by Halliday, Resnick & Walker, 10th Edition (Extended)
2. Waves and Oscillations by Dr. Tafazzal Hossain.
3. A text book of Heat by Dr. Tafazzal Hossain.
4. University Physics wit h Modern Physics by Young and Freedman, 13th Edition
5. PHYSICS for Scientists and Engineers by Tipler, 4th Edition

---

COURSE NAME: PHY 1204, Physics 2 Lab

CREDIT HOUR(S): 1/Lab **CONDUCT HOURS:** 3 hours of Laboratory classes per week

PRE-REQUISITE: PHY 1102: Physics 2 Lab

COURSE DESCRIPTION:

- Undergraduate labs are designed to reinforce information presented during course lectures by providing students "hands-on" opportunities to explore the concepts and principles of physics taught in the course Physics 1. Topics include:
- Determination of acceleration due to gravity using a simple pendulum; determination of projectile motion and collision of a ball
- Verification of Newton's second law of motion by Atwood's machine
- Measurement of moment of inertia of a flywheel about its axis of rotation
- Measurement of Young's modulus of a wire using Searle's apparatus; measuring the surface tension of water using capillary tube method
- Verification of Ohm's law and verification of the laws of series and parallel combinations of resistances
- Measurement of temperature co-efficient of resistance of a wire;
- Determination of DC & AC voltages and frequencies using cathode ray oscilloscope;

- Investigation of DC voltage and frequency of a full-wave bridge-rectifier circuit
- Measurement of RC time constant in an RC circuit; internal resistance/emf of a cell.

REFERENCE BOOK LIST:

1. AIUB Physics Lab Manual
2. Fundamentals of Physics by Halliday, Resnick & Walker, 10th Edition (Extended)
3. University Physics with Modern Physics by Young and Freedman, 13th Edition
4. PHYSICS for Scientists and Engineers by Tipler, 4th Edition
5. PHYSICS for Engineers [Part- 2] Dr. Gias Uddin Ahmad

COURSE NAME: Chem 1101: Chemistry

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: PHY 1203: Physics 2

COURSE DESCRIPTION:

- Introduction to atomic structure: Dalton, Rutherford and Bohr atomic models, quantum theory radiation, atomic spectra, calculation of radius and energy of orbits of hydrogen atom.
- Wave mechanical approach of the atom: Dual nature of matters, de Broglie's equation, Heisenberg's certainty principle, probability distribution curve, quantum numbers, shapes of orbitals and principle of electronic configuration.
- Modern periodic table: Law of periodicity, main features of modern periodic table, classification of elements based on their properties into metal, nonmetal and metalloid, studies on group chemistry of elements.
- Chemical bonds: Main types of chemical bonds and their properties, bond energy, bond length and bond angle; theories of covalent bonding; molecular structure of compounds.
- Chemical reactions: Types of chemical reactions, concept of acids and bases, electrolytes, neutralization reactions, oxidation-reduction reactions, pH and ionization of water.
- Solutions, solubility and solubility product: Different types of solutions, solubility, solubility product law, solubility product vs ionic product, solubility product principle with its applications and properties of dilute solution.
- Electrochemistry: Principle of electrolysis and its application, conductance of electrolytes, specific conductance and equivalent conductance, Kohlrausch's law of electrolysis, conductometric titration, conductometric titration behavior of acids and bases, electrochemical cells, photolithography.
- Phase rule and phase diagram: Phase rule and its characteristics, phase diagram of a mono component system, water system and sulphur system.
- Solid state chemistry: Crystalline and amorphous solids, crystal lattices and unit cells, closed packed structures, coordination number and packing efficiency, formation of voids in closed packing, crystal defects, band theory of conductivity, electrical properties of solids: conductors, insulators and semiconductors; n-type and p-type semiconductors.
- Thermo chemistry: Laws of thermochemistry, exothermic and endothermic systems with block diagrams, total energy of a body, energy and its units, enthalpy and entropy, types of heat of reactions, fuels.
- Chemical kinetics and chemical equilibrium: Rate of reaction, rate laws and order of reaction, equilibrium law and its characteristics.
- Some selected topics: Sources and importance of organic compounds, classification and functional groups and selected organic reactions, Selected topics of nanoscience, polymer chemistry and biochemistry.

- Laboratory experiments based on theory involving quantitative inorganic analysis: Acid-base titration, pH measurements, oxidation-reduction titration, determination of total hardness of water, estimation of Cu, Fe, Ca etc. and conductometric analysis.

REFERENCE BOOK LIST:

1. B. S. Bahl, G. D. Tuli and Arun Bahl, "Essentials of Physical Chemistry" 24th ed. (1997), S. Chand & Compnay Ltd, ISBN: 81-219-0546-X;
2. S. Z. Haider, "Introduction to Modern Inorganic Chemistry" 2nd ed. (2000), Friends International, ISBN: 984-30-0087-0;
3. M. Mahbubul Huque and A. Jabber Mian, "Practical Chemistry" 2nd ed. (1972), Student Ways, ISBN:
4. M. M. Huque and M. A. Nawab, "Principles of Physical Chemistry" 3rd ed. (1974), Student Publication, ISBN: Not found; 2. A. Q. Chowdhury, "Chemistry Fundamentals" 3rd ed. (1995), AERS & Bureau of Research, Testing and Consultation (BUET), ISBN: Not found;
5. S. Z. Haider, "Selected Topics on Advanced Inorganic Chemistry" 4th ed. (2002), Student Publication, ISBN: Not found;
6. B. K. Sharma, "Electrochemistry", 5th ed., GOEL Publishing House, ISBN: 81-85842-96-5;
7. Maitland Jones, "Organic Chemistry", 1st ed. (1997), Norton Company, ISBN: 0-393-97079-5;
8. Jerry March, "Advanced Organic Chemistry", 4th ed. (1999-2000), John Wiley & Sons, ISBN: 9971-51-257-2;
9. O. P. Aggarwal, "Engineering Chemistry", 3rd ed. (1995), Khanna Publishers, Delhi;
10. J. Mendham, R. C. Denney, J. D. Barnes and M. Thomas, "Vogel's Text Book of Quantitative Chemical Analysis", 6th ed. (2000), Pearson Education Ltd, ISBN: 81-7808-538-0;

CORE COURSES: LANGUAGE (9 CREDITS)

COURSE NAME: ENG 1101: English Reading Skills and Public Speaking

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: NIL

COURSE DESCRIPTION:

- Extracting information from academic texts: Reading about a Process; eading for Specific Information; Reading for Main Ideas; Scanning Graphs for Information
- Comparing & Contrasting: Understanding Vocabulary in Context; Using Comparative Structures
- Understanding Cause & Effect relations: Identifying Cause and Effect; Reading for Gist;Listening and Note-Taking
- Academic Presentations: Making Informative Presentations; Making Argumentative Presentations
- Generalizing & Specifying: Reading Descriptions of Graphs; Describing Functions; Generalizing
- Making Arguments & Providing Evidence: Distinguishing Fact and Opinion; Justifying Opinions; Evaluating Opinions; Giving Opinions

REFERENCE BOOK LIST:

1. English for Academic Purposes 1, General Module, M Hamidul Haque, Md. Shayeekh-Us-Saleheen, Monjurul Alam, Published by University Grants Commission of Bangladesh, 2017.
2. The Art of Public Speaking, Stephen Lucas, Published by McGraw-Hill Education, NY, 2015
3. Wide Angle: Student Book, Published by Miles Craven, Oxford University Press, NY, 2019.

COURSE NAME: ENG 1202: English Writing Skills and Communication

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: ENG 1101: English Reading Skills and Public Speaking

COURSE DESCRIPTION:

- Understanding the Writing processes; Academic Writing
- Identifying key features, types and purposes; Gathering Ideas and Developing Focus in Academic Writing; Generate ideas for a writing task through Brainstorming, Mind mapping, etc.; Narrowing down a topic
- Using Sources, Data, and Graphics in Academic Writing; Selecting suitable sources for writing essays and reports; Identifying Types of data and graphics; Using appropriate language to interpret data and graphics
- Organizing Ideas: Outlining an Essay Plan; Formulating Thesis Statements for Essays; Developing Effective Introductions
- Structure an Academic Essay; Writing Well-structured Paragraphs; Writing Body, an Introduction and a Conclusion;
- Writing in Academic Style; Using Objective and Impersonal Language; Developing Precision
- Understanding Formality and Tone of Academic Writing; Using Cohesive Devices to Connect Ideas
- Referencing: Paraphrasing, Summarizing; Using References in Writing; Paraphrasing and Summarizing information and ideas from different sources;
- Avoiding plagiarism; providing in-text citation and a bibliography;
- Comparing and Contrasting; Planning and writing a comparative essay; Evaluating different styles of organizing comparative essays; Making an outline of a comparative essay.
- Cause and Effect; Using Cause Effect Language to express cause effect relationship; Planning, organizing and writing a cause and effect essay
- Argument and Problem-solving; Avoiding weak arguments; Planning, organizing and structuring argumentative writing; Using appropriate language and structuring to discuss problems and solutions; Structure a problem-solution essay
- Letter writing for academic purposes

REFERENCE BOOK LIST:

1. English for Academic Purposes 2: Essay and Report Writing, Q. H. Chowdhury, A.R.M.M. Rahman & M.A. Kamal published by University Grant Commission of Bangladesh.
2. College Writing Skills with Readings (10th ed, 2019), John Langan and Zoe Albright published by McGraw Hill, USA.

COURSE NAME: ENG 2103 Business Communication

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: ENG 1202: English Writing Skills and Communication

COURSE DESCRIPTION:

- Use of Technology: Describing technical functions and applications; Explaining how technology works;
- Employment Communication; Analysing Job Advertisements; Preparing a Résumé/CV and covering letter
- Technical Specifications and Instructions, Processes; Giving hardware specification; Giving instruction for using a GUI; Describing different multimedia types; Explaining an installation process

- Materials in Technology; Describing specific materials; Categorizing materials; Specifying and describing properties
- Components and Assemblies; Describing component shapes and features; Explaining and assessing manufacturing techniques; Explaining jointing and fixing techniques; Describing positions of assembled components
- Communicating through E-mails; Understanding differences between traditional letters and e-mails in work related context; Writing work related e-mails using clear, simple language; Incorporating abbreviations and acronyms in e-mails when appropriate
- Technical Presentation; Giving presentation on a product; Writing in a note taking framework; Taking notes from product presentations
- Designing an experiment; Describing approaches to data collection; Designing an experimental set-up; Describing material phenomena and forces; Making predictions of experimental results; Describing an experiment; Describing a process; Evaluating the results of an experiment; Describing problems with an experiment; Keeping a Lab notebook
- Writing up research: materials and methods; Describing states and processes; Describing data: numbers / numerical values; Writing up from Lab notes; presenting data; Analysing data (statistical analysis); Summarising data in visual form; Writing captions for figures; Describing visual data; results and discussion; Organising the results and discussion sections;
- Preparing and writing the results section; Preparing and writing the discussion section; introduction and abstract; Writing the introduction; Writing the abstract; Giving a title to your paper

REFERENCE BOOK LIST:

1. Ibbotson, Mark (2008) Cambridge English for Engineering. Cambridge: Cambridge University Press.
2. Armer, Tamzen (2011) Cambridge English for Scientists. Cambridge: Cambridge University Press.
3. Gerson, Sharon J. and Gerson, Steven M. (2012) Technical Communication: Process and Product. Seventh Edition. New Jersey: Prentice Hall.

CORE COURSES: BUSINESS ADMINISTRATION (6 CREDITS)

COURSE NAME: BBA 1102: Principles of Accounting

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MAT 1205 Integral Calculus and Ordinary Differential Equations

COURSE DESCRIPTION:

- Basic accounting equation and the meaning of assets, liabilities, and owner's equity, analysing business transactions and its effects on basic accounting equation, understanding the four financial statements etc.
- The Recording Process; What is an account, debits and credits, basic steps in accounting process, journal and its recording process, ledger and its recording process, preparation of trial balance etc.
- Adjusting the Accounts; Time-period assumption, accrual basis of accounting, adjusting entries, adjusting entries for prepayments and accruals, purpose of adjusted trial balances.
- Completion of Accounting Cycle; Preparing a work sheet, processing of closing the books, the content and purpose of post-closing trial balance, the required steps in accounting cycle, correcting

entries, reversing entries, classified balance sheet.

- Inventories and concept of depreciation; Steps in determining inventory quantities, inventory cost flow methods, financial statements and tax effects of inventory cost flow methods; concept of depreciation, depreciation by using different methods
- Managerial Accounting Basics: Distinguishing features of Managerial Accounting, functions of management, defining classes of manufacturing costs, product & period cost.
- Cost concepts and classification: Manufacturing costs, difference between merchandising & manufacturing Income Statement & Balance Sheet, determining cost of goods manufactured, Cost Terms & Concept, Cost behavior, Cost driver & cost estimation etc.
- CVP Analysis: Cost behavior and its pattern; types of variable and fixed costs; contribution margin ratio; application of CVP concepts; break-even analysis; target profit analysis; the margin of safety; operating leverage.
- Variable Costing: Absorption costing and variable costing; income comparison of absorption costing and variable costing; effect of changes in production on net income.

REFERENCE BOOK LIST:

1. "Principles of Accounting", Jerry J. Weygandt, Doland E. Keiso, Paul de Kimmel; 13th Edition; Wiley & Sons, Inc.
2. "Managerial Accounting", Ray H. Garrison, Eric W. Noreen & Peter C. Brewer, 16th edition, McGraw-Hill Irwin.

COURSE NAME: MGT 3202: Engineering Management

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: EEE 2216: Engineering Ethics

COURSE DESCRIPTION:

- Introduction to Management: Course Introduction, Engineering Management
- Introduction to productivity, productivity measures, productivity growth, problem solving
- Fundamentals of forecasting, forecasting models
- Decision Making Tools: Decision tree model, formulation of decision problem, graphical presentation
- Linear Programming (LP), problem solving, Capacity Planning; Fundamentals of capacity planning, BEP analysis, problem solving
- Fundamentals of inventory management, inventory models (ABC, EOQ, ROP), case study;
- Fundamentals of location decisions, location analysis (Cost-Volume- Profit analysis and Centre of Gravity method), problem solving
- Transportation Model and problem; scenario, requirements, assumptions, formulation of LP, problem and network presentation, transportation models
- Basics of quality, quality control tools (Histogram, Control Chart, Pareto and check Sheet), problem solving, case study
- Fundamentals of project management, project management tools: (WBS, PERT/CPM, Gantt chart), case study; Fundamentals of project cost management, cost monitoring: (planned value, earned value, actual cost), Case study
- Project Software: Microsoft Project

REFERENCE BOOK LIST:

1. Operations Management (12th Edition), William J. Stevenson and McGraw-Hill.
2. Organization and Management, (6th Edition) Fremont E. Kast and James E. Rosenzweig, McGraw-Hill Educatio

3. Operations Management: Processes and Supply Chains (12th Edition) Lee J. Krajewski, Manoj K. Malhotra, Larry P. Ritzman , Pearson
4. A Guide To The Project Management Body of Knowledge (5th Edition) Project Management Institute, Inc.
3. Supply Chain Management: Strategy, Planning, and Operation (6th Edition) Sunil Chopra and Peter Meindl, Pearson.

CORE COURSES: ARTS & SOCIAL SCIENCE (5 CREDITS)

COURSE NAME: ECO 3150: Principles of Economics

CREDIT HOUR(S): 2 **CONDUCT HOURS:** 2 hours of Theory classes per week

PRE-REQUISITE: MAT 3103: Computational Statistics & Probability

COURSE DESCRIPTION:

- Introduce the principles that is essential to understand the basic economizing problem and specific economic issues and policy alternatives for dealing with them.
- Two fortunate outcome of this course are an ability to reason accurately and dispassionately about economic matters and a lasting interest in economics.
- Topics included are concept of demand and supply, elasticity, theory of production, theory of cost, market structure, unemployment, inflation, fiscal and monetary policies.

REFERENCE BOOK LIST:

1. Mankiw, Gregory, 2003, Principles of Economics, 7th Edition
2. Samuelson and Nordhaus, Economics, 18th Edition.
3. R. McConnel & S. L. Brue, Macroeconomic, 17th Ed, McGraw-Hill.

COURSE NAME: BAS 2101: Bangladesh Studies

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 1101: Introduction to Computer Studies

COURSE DESCRIPTION:

- Bangla Language and Literature: Explore the socio-cultural context of Bangla through the basic tenets of its linguistic features. Texts and poems of several literary maestros make students acquainted with Bangla's rich literary elements in relation to Bangladeshi cultural values. In this course, students will grasp the evolution of modern Bengali language, culture, history and arts (including cinema, painting and songs as well as literature). This course will also give the students brief idea about literary periods or age divisions in the history of Bangla literature and Language.
- National Culture and Heritage: By taking a historical approach, this course explores the political process and institutions, the building blocks of a national economy, and key cultural debates in the country. Discuss electoral system, political parties, parliament, and forms of government. Explore the building blocks of a national economy such as budget, taxation, banking and share market. Discuss key cultural issues such as identity, secularism, and nationalism.
- History of Emergence of Bangladesh: Present a general overview of political events, organizations and issues that contributed to the birth of Bangladesh and post-independence developments till

today. This part will focus on peasant resistance, marginalized peoples, ethnic and caste issues, women and culture, Iconic historic moments, such as the 1857 movement, how the first partition of Bengal in 1905 and its multiple nationalist implications; Hindu-Muslim conflict; partition of Bengal in 1947; the 1952 Language Movement, Pakistan experiences, as a background to the war of 1971; democracy, authoritarianism and militarism in post-independent Bangladesh.

REFERENCE BOOK LIST:

The Booklist will be provided by the course teacher based on the topics.

CAPSTONE COURSES: COMPUTER SCIENCE & ENGINEERING (9 CREDITS)

COURSE NAME: CSC 4197: Research Methodology

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: Students must complete 100 credits

COURSE DESCRIPTION:

- Define and Comprehend research, research perspective and need to conduct research.
- Comprehend basic building blocks of research (e.g., framework).
- Define and Explain different research methods; ethics, research ethics, and its integration in real life scenarios.
- Analyze and Formulate research proposal.
- Evaluate and Design a research based on problem analysis.
- Comprehend and associate experimental validation techniques in relation to research methods and solution.
- Comprehend the basics of scientific writing;
- Compose a demo research article.

REFERENCE BOOK LIST:

1. Zelkowitz, M. V. and Wallace, D. R. (1998), Experimental models for validating technology, Computer, vol. 31, no. 5, pp. 23-31.
2. Dillman, D. A., Smyth, J. D., & Christian, L. M. (2009). Internet, mail, and mixed-mode surveys : the tailored design method (3rd ed.).
3. Hoboken, N.J.: Wiley & Sons.Fowler, F. J. (1995). Improving survey questions: design and evaluation. Thousand Oaks: Sage Publications.
4. Cohen, J., Cohen, P., West, S., & Aiken, L. (2003). Applied multiple regression/correlation analysis for the behavioral sciences (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.
5. Shadish W.R., Cook T.D. & Campbell P.T. (2002) Experimental and Quasi-Experimental Design for Generalized Causal Inference. Boston, Mass: Houghton Mifflin
6. Bruning, J. L. & Kintz, B. L. (1997). Computational handbook of statistics (4th ed.). New York: Longman.

COURSE NAME: CSC 4298: Thesis

CREDIT HOUR(S): 3 **CONDUCT HOURS:** Student meet with the supervisor every week

PRE-REQUISITE: CSC 4197

COURSE DESCRIPTION:

- Study of problems in the field of Computer Science & Engineering.

- A supervisor is assigned to guide the progress & outcome the thesis
- The final outcome is documented as a furnished book/report (in AIUB Thesis Format) with the supervisor's endorsement.
- The document is then presented & defended in front of a board consisting of internal & external experts on the field to be evaluated.

REFERENCE BOOK LIST:

1. Books, Papers, and articles are referenced by the supervisor based on the selected topic.
2. AIUB Thesis Book Format

COURSE NAME: CSC 4299: Internship

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: Students must complete 140 credits

COURSE DESCRIPTION:

- The student, under the supervision of a faculty, is assigned or placed in a Technological Firm/Institution/Organization for a semester's practicum (at least 10 weeks).
- The student prepares an Affiliation Report and submits this for evaluation and endorsed by the supervisor.
- This report is then presented for oral defense before a panel.

REFERENCE BOOK LIST:

1. Books, Papers, and articles are referenced by the supervisor based on the selected topic.
2. AIUB Internship Report Format

ELECTIVE COURSES (15 CREDITS)

The Elective courses are divided into four Major Areas. Students must take at least three courses (9 credits) from one major area and another two courses (6 credits) from any area. The four Major Areas are –

- ***Computational Theory***: Representing the core computer science courses.
- ***Computer Engineering***: Representing the core engineering courses, mainly from the field of electrical & electronics engineering and computer engineering.
- ***Software Engineering***: Representing the core Software Engineering courses.
- ***Information Systems***: Representing the core Information Systems courses.

Following are the course description for each Major Areas.

MAJOR AREA ELECTIVE COURSES: COMPUTATIONAL THEORY

COURSE NAME: CSC 4131: Computer Graphics

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: MAT 2202: Matrices, Vectors & Fourier Analysis & CSC 2211: Algorithms

COURSE DESCRIPTION:

- Broad overview of the basic concepts of computer graphics. Both 2D raster graphics and 3D graphics will be covered.
- 2D Raster graphics include transformations, color theory and scan conversion of lines and polygons.
- 3D graphics include projective geometry, representations of curves and surfaces, modeling and viewing transformations, hidden surface removal algorithms, reflection models and illumination algorithms.
- In addition, with this a practical glimpse of computer graphics will be given using OpenGL. Learn to use mathematical transformations and vector techniques in the production of computer graphics as well as how to use these things in real world using OpenGL. Gain familiarity with the OpenGL library as a tool for writing C/C++ programs to create real graphics application.

REFERENCE BOOK LIST:

1. Foley, van Dam, Feiner, Hughes, Computer Graphics: principles and practice, Addison Wesley, Second Edition.
2. Peter Shirley Steve Marschner , "Fundamental of computer graphics", Third Edition.
3. Schreiner et. al., OpenGL Programming Guide, Fourth Edition, also known as "The Red Book"
4. Schaum's Outline of Theory & Problems of Computer Graphics.
5. Helpful link for Problem Solving : http://nehe.gamedev.net/
6. Lecture notes will be provided online at the course website weekly.

COURSE NAME: CSC 4132: Computer Science Mathematics

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MAT 3101: Numerical Methods of Science & Engineering & CSC 2211: Algorithms

COURSE DESCRIPTION:

- The objective of this course is to teach how we can construct, implement, and compare algorithms using "Abstract Mathematics" needed for a thorough, well-grounded understanding of computer programs. It is the controlled manipulation of mathematical formulas, using collection of techniques for solving problems.
- Recurrent problems (Tower of Hanoi, Lines in the plane, Josephus problem),
- Sum, Integer Functions, Number Theory, Binomial Coefficients (Basic identities, Practice, Tricks of the trades, generating functions).
- Special Numbers, Generations Functions (Domino Theory, basic maneuvers, solving recurrences),
- Discrete Probability, Asymptotic, Random Numbers, Polynomial Arithmetic.

REFERENCE BOOK LIST:

1. L. Lovász, J. Pelikán, K. Vesztergombi. Discrete mathematics: elementary and beyond. Springer
2. I. Niven. Mathematics of Choice: How to Count Without Counting. Mathematical Association of America.
3. Lecture Notes

COURSE NAME: CSC 4133: Basic Graph Theory

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 2211: Algorithms

COURSE DESCRIPTION:

- Fundamental Concepts of Graph; Paths, Cycles, and Trails. Vertex Degrees and Counting. Directed Graphs), Trees and Distance (Basic Properties. Spanning Trees and Enumeration. Optimization and Trees),
- Matchings and Factors (Matchings and Covers. Algorithms and Applications. Matchings in General Graphs), Connectivity and Paths (Cuts and Connectivity. k-connected Graphs. Network Flow Problems), Coloring of Graphs (Vertex Colorings and Upper Bounds. Structure of k-chromatic Graphs. Enumerative Aspects) Planar Graphs (Embeddings and Euler's Formula. Characterization of Planar Graphs. Parameters of Planarity), Edges and Cycles (Line Graphs and Edge-Coloring. Hamiltonian Cycles. Planarity, Coloring, and Cycles), Additional Topics (Optional) (Perfect Graphs. Matroids. Ramsey Theory. More Extremal Problems. Random Graphs. Eigenvalues of Graphs).

REFERENCE BOOK LIST:

1. Introduction to Graph Theory, 4th edition by Robin J. Wilson
2. Introduction to Graph Theory, 2nd edition by Douglas B. West, Prentice Hall.

COURSE NAME: CSC 4134: Advanced Algorithm Techniques

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 3217: Artificial Intelligence and Expert Systems

COURSE DESCRIPTION:

- Computational, Parameterized, Amortized analysis & complexity,
- Algorithms for combinatorial optimization, Practical computing and heuristics,
- Advanced Data Structures: Binomial Heaps, Fibonacci Heaps, Splay Trees
- Approximation algorithms, LP based approximation algorithms,
- Randomized algorithms, Online algorithms
- Algorithms in state-of-the-art fields like Bioinformatics, Grid Computing, VLSI design etc

REFERENCE BOOK LIST:

1. An Introduction to Computational Learning Theory (The MIT Press), Michael J. Kearns, Umesh Vazirani
2. Algorithm Design 1st Edition, Jon Kleinberg, Éva Tardos
3. Randomized Algorithms 1st Edition, Rajeev Motwani, Prabhakar Raghavan
4. Probability and Computing: Randomized Algorithms and Probabilistic Analysis, Michael Mitzenmacher, Eli Upfal
5. Approximation Algorithms, Vijay V. Vazirani
6. Introduction to Algorithms (Second Edition), Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Cliff Stein, published by MIT Press and McGraw-Hill.

COURSE NAME: CSC 4135: Linear Programming

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 3217: Artificial Intelligence and Expert Systems

COURSE DESCRIPTION:

- Introduction and overview, Linear inequalities, Geometry of linear programming, The linear programming problem, Structural optimization, FIR filter design,

- Applications in control, Network optimization, Duality, The simplex method, The barrier method, Convergence analysis of the barrier method, Primal-dual interior-point methods, Self-dual formulations, Large-scale linear programming, Integer linear programming.

REFERENCE BOOK LIST:

1. Chvatal, V., Linear Programming (1983).
2. Dantzig, G. B. and Thapa, M. N., Linear Programming 1: Introduction. Springer Verlag.
3. Dantzig, G. B. and Thapa, M. N., Linear Programming 2: Theory and Extensions. Springer Verlag
4. Vanderbei, Robert J., Linear Programming: Foundations and Extensions, 4th ed..
5. Ye, Y. 1997. Interior Point Algorithms: Theory and Analysis. John Wiley and Sons, New York.

COURSE NAME: CSC 4241: Data Warehouse and Data Mining

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 4118: Introduction to Data Science

COURSE DESCRIPTION:

- Introduction to knowledge discovery and data mining in databases and to present basic concepts relevant to real data mining applications, as well as reveal important research issues related to the knowledge discovery and mining applications.
- Fundamental concepts underlying knowledge discovery, data mining and hands-on experience with implementation of some data mining algorithms applied to real world cases.
- Research issues as well as mining strategies and issues relating specific industrial sectors; Systems for data mining.

REFERENCE BOOK LIST:

1. Principles of Data Mining – Max Bramer
2. Data Mining Practical Machine Learning Tools and Techniques; 2nd Edition Ian H. Witten, Eibe Frank
3. Data Mining Techniques: For Marketing, Sales, and Customer Support (Michael J. Berry, Gordon Linoff, Wiley)
4. Data Mining: Concepts and Techniques, Third Edition (The Morgan Kaufmann Series in Data Management Systems)
5. http://www.cs.waikato.ac.nz/ml/weka/documentation.html

COURSE NAME: CSC 4242: Human Computer Interaction

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 3217: Artificial Intelligence and Expert Systems

COURSE DESCRIPTION:

- Overview of human-computer interaction strategies from a number of perspectives including that of the engineer, cognitive psychologist, and end-user.
- Major themes include the design and evaluation of usable interfaces, matching computer systems with the cognitive capabilities of users and an investigation of novel paradigms in human-computer interaction.
- A team-based project, dealing with the design, development, and evaluation of a computer-based device to support distributed human communication.

REFERENCE BOOK LIST:

1. Dix A. et al., Human-Computer Interaction. Harlow, England: Prentice Hall, 2004, ISBN-10: 0130461091
2. Yvonne Rogers, Helen Sharp, Jenny Preece, Interaction Design: Beyond Human Computer

Interaction, 3rd Edition, Wiley, 2011, ISBN-10: 0470665769

3. About Face: The Essentials of Interaction Design, Fourth Edition by Cooper, Reimann, Cronin, & Noessel

---

COURSE NAME: CSC 4243: Computer Vision & Pattern Recognition

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 4131: Computer Graphics & CSC 4118: Introduction to Data Science

COURSE DESCRIPTION:

- Bayesian Decision Theory: A solid treatment of classification theory in terms of Bayesian costs, decision functions and the geometry of decision regions for continuous and discrete random variables.
- Classification error probabilities and bounds; missing features; Bayesian belief networks. Maximum-Likelihood & Bayesian Parameter Estimation, and Bayesian Recognition Using A Priori Partially Unknown Distributions: General theory; Sufficient statistics; Large sample behavior for arbitrary distributions; Principal component analysis and discriminants; EM algorithm. Nonparametric Recognition: Parzen windows classifiers; K-Nearest-Neighbor classifiers. Support Vector Machines. Multilayer Neural Networks: Introduction to feedforward operation and classification; Backpropagation algorithm; Behavior considerations. Decision Trees: CART (classification and regression trees).
- Algorithm-Independent Machine Learning: Resampling for estimating statistics and classifier accuracy --- Bootstrap; Boosting. Unsupervised Learning & Clustering: Mixture densities and identifiability; K-Means clustering; Unsupervised Bayesian learning; Decision-directed approximation; Hierarchical clustering; Minimum spanning trees. Applications to estimation and recognition of 3D geometry from 3D range data or from multi-view images.

REFERENCE BOOK LIST:

1. "Fundamentals of Computer Vision" by Mubarak Shah,
2. "Computer Vision: Algorithms and Application" by Richard Szeliski
3. "Introductory Techniques for 3-D Computer Vision" by Emanuele T., Alessandro V., Prentice Hall, 1998.
4. "Multiple View Geometry in Computer Vision", 2nd Edition, by R. Hartley, and A. Zisserman
5. "Computer Vision: A Modern Approach", by D.A. Forsyth and J. Ponce, Prentice Hall, 2002.
6. "Pattern Classification" (2nd Edition), by R.O. Duda, P.E. Hart, and D.G. Stork, Wiley-Interscience, 2000.

COURSE NAME: CSC 4244: Image Processing

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class &
3hours of Laboratory class per week

PRE-REQUISITE: CSC 4243: Computer Vision & Pattern Recognition &
EEE 2213: Signals and Linear Systems

COURSE DESCRIPTION:

- This course introduces the basic concepts and methodologies of digital image processing.
- The covered topics include image enhancement, high-dimensional spectral analysis, spatial and frequency domain linear image filtering, nonlinear image filtering, binary image processing, edge detection, image segmentation, feature extraction, and the basics of digital video processing. The course will also discuss the fundamentals of deep learning with its application to machine vision

REFERENCE BOOK LIST:

1. S. Birchfield, Image Processing and Analysis, Cengage Learning, 2016.
2. C. Solomon and T. Breckon, Fundamentals of Digital Image Processing: A Practical Approach with Examples in MATLAB, John Wiley & Sons, 2011.
3. A. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, 1989.

4. K. R. Castleman, Digital Image Processing, Prentice Hall, 1996.
5. B. Jane, Digital Image Processing: Concepts, Algorithms, and Scientific Applications, Springer Verlag, 1995.
6. R. C. Gonzalez and R. E. Woods, Digital Image Processing, Prentice Hall, 2008.

COURSE NAME: CSC 4250: Advanced Topics in Computing

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: 120 Credits

COURSE DESCRIPTION:

Topics will be of an advanced computing in nature and will be selected by the Department.

REFERENCE BOOK LIST:

Based on the selected topics

MAJOR AREA ELECTIVE COURSES: SOFTWARE ENGINEERING

COURSE NAME: CSC 4151: Software Requirement Engineering

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 3112: Software Engineering

COURSE DESCRIPTION:

- Despite the wealth of development knowledge, experience, and tools available today, a substantial percentage of software projects fail, often because requirements are not correctly determined and defined at the outset or are not managed correctly as the project unfolds. This course focuses on this critical cause of failure and offers a practical, proven approach to building systems that meet customers' needs on time and within budget.
- In this course the students will learn how analysts and developers can effectively identify requirements by applying a variety of techniques, centered on the power of use cases.

REFERENCE BOOK LIST:

1. Software Requirements, Third Edition, by Karl E. Wiegers, ISBN: 978-0-7356-7966-5, Microsoft Press © 2013.
2. Managing Software Requirements: A Use Case Approach, Second Edition, By Dean Leffingwell, Don Widrig. Publisher: Addison Wesley (Object technology Series), Pub Date: May 05, 2003, ISBN: 0-321-12247-X.
3. Managing Software Requirements: A Unified Approach, Second Edition, By Dean Leffingwell, Don Widrig, Publisher: Addison Wesley (Object technology Series), Pub Date: Nov 2000, ISBN: 0-321-12247-X.
4. Software Requirement Patterns, by Stephen Withall, ISBN: 978-81-7853-124-3, Microsoft Press © 2007.
5. Software Engineering – A practioners approach, Latest Edition, by Pressman.
6. Software Engineering, Latest Edition, by Ian Sommerville.
7. http://www.agilemodeling.com/artifacts/userStory.htm
8. https://www.mountaingoatsoftware.com/presentations/introduction-to-user-stories

COURSE NAME: CSC 4152: Advance Database Management Systems

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 2108: Introduction to Database

COURSE DESCRIPTION:

- Advance database module is designed to enhance the knowledge of database for those students who has already completed basic database.
- Completion of this module will provide the student s with the insight of RDBMS and ORDBMS using ORACLE.
- A real-life project is also designed for this module to help the students with their concepts of RDBMS and present business need regarding database.

REFERENCE BOOK LIST:

1. Modern Database Management (Fifth Edition) Fred R. McFadden, Jeffrey A. Hoffer, Mary B. Prescott
2. Database System Concepts Henry F. Korth, S. Sudarshan, A. Silberschatz
3. ORACLE 11g Complete Reference By Kevin Loney, George Koch
4. Introduction to Oracle 9i : SQL (Volume 1 and 2)
5. Oracle 11g : PL/SQL Fundamentals (Volume 1 and 2)
6. ORACLE 10g Complete Reference By Kevin Loney, George Koch
7. ORACLE 9i Complete Reference By Kevin Loney, George Koch
8. Oracle 9i Database: Fundamentals 1 (Volume 1)
9. Oracle 9i : PL/SQL (Volume 1 and 2)

[Book number 2, 3 and 4 are Oracle hand books published by Oracle Press]

COURSE NAME: CSC 4153: Multimedia Systems

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 3215: Web Technologies

COURSE DESCRIPTION:

- This course introduces the multimedia system and its applications. The basic components of multimedia system and their usage will be introduced.
- The basic idea about the Signals, audio, video system in multimedia system. Different compression technique such as MPEG, JPEG etc. will be taught in this course.
- Multimedia communication system will introduce the session management, resource reservation technique, QoS in multimedia system.
- Database system provides the basic idea about the database management process in multimedia system.
- Multimedia operating system introduces the management process of real-time data in different operating systems; Vector Graphics and Virtual Reality;
- The impact of computer networks, synchronization technique, hypertext, hypermedia and different application in multimedia system will also be taught in this course.

REFERENCE BOOK LIST:

1. Multimedia: Computing, Communications & Applications; By Ralf Steinmetz and Klara Nahrstedt
2. Lectures will be provided online at the course website periodically.

COURSE NAME: CSC 4261: Software Development Project Management

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 4151: Software Requirement Engineering

COURSE DESCRIPTION:

- A basic knowledge of software project management principles.
- The ability to come up with a project schedule and assign resources.
- Choose an appropriate project development methodology (e.g. waterfall, spiral, etc.)
- Identify project risks, monitor and track project deadlines.
- The capability to work in a team environment and be aware of different modes of communications.
- Examine the software project management principles in real life scenarios.
- Be able to independently evaluate a particular topic of research interest and critically analyze the issues.

REFERENCE BOOK LIST:

1. Software Project Management, Bob Hughes and Mike Cottrell
2. Software Engineering, Pressman
3. Software Engineering, Ian Somerville
4. Applied Software Project Management, Jennifer Greene and Andrew Stellman
5. Peopleware: Productive Projects and Teams, Tom DeMarco
6. Code Leader: Using People, Tools, and Processes to Build Successful Software, Patrick Cauldwell
7. Project Management Lite, Juana Clark Craig
8. Strategic Project Management Made Simple, Terry Schmidt
9. Project Management Absolute Beginner's Guide (Third Edition), Gregory Horine
10. PMBOK, http://www.pmi.org/PMBOK-Guide-and-Standards.aspx

COURSE NAME: CSC 4262: Software Quality and Testing

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 4151: Software Requirement Engineering

COURSE DESCRIPTION:

- This course provides a comprehensive study of software quality assurance and testing.
- Topics include levels and techniques of testing, verification and validation, quality assurance processes and techniques,
- ISO 9126 and CMMI models. The course focuses on real-life software quality assurance and testing activities as well.
- The course covers both manual and automated testing techniques with an introduction to functional and regression testing tools like Selenium.

REFERENCE BOOK LIST:

1. Software Quality Engineering: Testing, Quality Assurance and Quantifiable Improvement, by Jeff Tian, published by Wiley, ISBN 0-471-71345-7, is the required text.
2. Software Testing and Quality Assurance: Theory and Practice, by Kshirasagar Naik, Priyadarshi Tripathy
3. Software Quality Assurance: From Theory to Implementation, by Daniel Galin
4. Software Testing and Continuous Quality Improvement, by William E. Lewis
5. The Art of Software Testing, by Glenford J. Myers, Corey Sandler and Tom Badgett
6. Software Testing Fundamentals: Methods and Metrics by Marnie L. Hutcheson
7. http://www.sei.cmu.edu/cmmi
8. http://www.istqb.org/
9. http://istqbexamcertification.com
10. http://www.softwaretestingfundamentals.com
11. ISTQB study materials
12. Lecture notes will be posted at the course website on a regular basis

13. Additional handouts/photocopies will be provided by the Instructor

---

COURSE NAME: CSC 4263: Mobile Application Development

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 3215: Web Technologies

COURSE DESCRIPTION:

- Students learn how to develop applications for mobile devices, including smartphones and tablets.
- Students are introduced to the survey of current mobile platforms, mobile application development environments, mobile device input methods, as well as developing applications for two popular mobile platforms.
- Students will design and build a variety of Apps throughout the course to reinforce learning and to develop real competency.
- Upon successful completion of the course, the student will demonstrate the ability to:
- Explain mobile devices, including their capabilities and limitations.
- Use current mobile platforms and their architectures.
- Develop mobile applications on a popular mobile platform.
- Evaluate development with another mobile platform

REFERENCE BOOK LIST:

1. Wei-Meng Lee, Beginning Android™ 4 Application Development, 2012 by John Wiley & Sons, Inc., Indianapolis, Indiana, ISBN: 978-1-118-19954-1
2. Dawn Griffiths & David Griffiths , Head First Kotlin: A Brain-Friendly Guide , O'Reilly Media, ISBN-13: 978-1491996690
3. Joseph Annuzzi Jr. & Lauren Darcey, Advanced Android Application Development (4th Edition), ddison-Wesley Professional, ISBN-13: 978-0133892383
4. Android Developers, URL: http://developer.android.com/index.html
5. Professional Android 4 Application Development (Wrox Professional Guides) by Reto Meier, 2012

COURSE NAME: CSC 4264: Programming in Python

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 3215: Web Technologies

COURSE DESCRIPTION:

- The goal of this course is to teach the advance programming and problem-solving techniques where the students will be able to design, implement, debug, and test in Python by creating a variety of scripts and applications for the Web and for systems development.
- Python is a versatile programming language, suitable for projects ranging from small scripts to large systems. The course will emphasize best practices such as version control, unit testing and recommended styles and idioms. Students will explore the large standard library of Python 2.7 and Python 3, which supports many common programming tasks.

REFERENCE BOOK LIST:

1. Benjamin Baka. Python Data Structures and Algorithms.
2. Python Cookbook, 3rd Edition [Book] - O'Reilly Media
3. Phuong Vothihong, Martin Czygan, Ivan Idris, Magnus Vilhelm Persson & Luiz
4. Felipe Martins. Python: End to End Data Analysis.

COURSE NAME: CSC 4265: Advanced Programming with JAVA

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 3215: Web Technologies

COURSE DESCRIPTION:

- The Java Enterprise Edition or Java EE course covers the fundamentals components of Oracle's enterprise Java computing platform. The framework supports network and web services, and supports large-scale, multi-tiered, scalable, reliable, and secure network application. Topics covered will include J2EE architecture, Web Server, Servlets, and JSPs.
- J2EE Architecture; Multi-tiered client-server architecture; Configure Http Server and/or Web Server Architecture (specially Apache Tomcat 7.0); Servlet Architecture; JSP Architecture; Model View Controller (MVC) Architecture; Implement multi-tiered application using J2EE technologies

REFERENCE BOOK LIST:

1. Core-servlets-and-javaserver-pages-vol-1
2. O'Reilly - Java Servlet & JSP Cookbook
3. Core Servlets and Javaserver Pages, Advanced Technologies, Vol. 2
4. J2EE Bible: Justing Couch & Daniel H.SteinBerg-pub Wiley
5. JSP beginners Guide Maduhshree Ganguli-pub WILEY
6. Java Servlet Programming- pub: O'Reilly
7. J2EETutorial (online Edition) http://docs.oracle.com/javaee/1.4/tutorial/doc/
8. Netbean tutorial from www.netbean.org
9. Core Servlets and Javaserver Pages, Advanced Technologies, Vol. 2

COURSE NAME: CSC 4266: Advanced Programming with .NET

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 3215: Web Technologies

COURSE DESCRIPTION:

- Introduction to the ASP.Net Framework, ADO.NET, AJAX and web Services.
- Concept of the ASP.Net Framework 4.0; programming Web-based applications in Visual C# 2005/2008
- Programming the security for applications in Visual C# 2005/2008
- Prepared and presented a group project using .Net Solution Architectures.

REFERENCE BOOK LIST:

1. C# 4.0 The Complete Reference; Herbert Schildt; McGraw-Hill Osborne Media; 2010
2. Beginning ASP.NET 4: in C# and VB; Imar Spaanjaars,2010
3. Beginning ASP.NET 3.5 in C# 2008: From Novice to Professional; 2nd edition, Matthew MacDonald,2007
4. ASP.NET 3.5 Unleashed by Stephen Walther, 2008
5. Pro ASP.NET 3.5 in C# 2008: Includes Silverlight 2 by Matthew MacDonald,2008
6. ASP.NET 3.5 For Dummies by Ken Cox,2008
7. MSDN Library; URL: http://msdn.microsoft.com/library
8. Programming Microsoft ASP.NET 3.5 by Dino Esposito,2008
9. ASP.NET; URL: http://www.asp.net
10. Windows Server 2008 Inside Out by William R. Stanek, 2008

COURSE NAME: CSC 4267: Advanced Programming in Web Technologies

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 3215: Web Technologies

COURSE DESCRIPTION:

- At the end of the course, the following objectives shall have been attained
- Understood and appreciated the object-oriented programming concept using JavaScript
- Understood and appreciated programming Web-based applications using JS framework
- Prepared and presented a group project using JS framework
- Understood and appreciated the object-oriented programming concept using PHP
- Understood and appreciated programming Web-based applications using PHP framework
- Understood and appreciated programming the security for framework-based applications
- Prepared and presented a group project using PHP framework

REFERENCE BOOK LIST:

1. PHP Advanced and Object-Oriented Programming, 3rd Edition; Larry Ullman; Peachpit, Press, 2013
2. PHP Objects, Patterns and Practice, 5th Edition; Matt Zandstra; Apress, 2016
3. Learning PHP, MySQL, JavaScript and CSS, 2nd Edition; Robin Nixon; O'Reilly, 2009
4. Eloquent JavaScript: A Modern Introduction to Programming; Marijn Haverbeke; 2011
5. Learning Node.js: A Hands On Guide to Building Web Applications in JavaScript; Marc Wandschneider; Addison-Wesley, 2013
6. Beginning Node.js; Basarat Ali Syed; Apress, 2014
7. PHP: Hypertext Preprocessor, URL: http://php.net
8. W3Schools Online Web Tutorials, URL: http://www.w3schools.com
9. CodeIgniter Web Framework, URL: https://codeigniter.com/
10. Node.js, URL: https://nodejs.org/en/

COURSE NAME: CSC 4269: Advanced Topics in Programming

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 3215: Web Technologies

COURSE DESCRIPTION:

Topics will be of an advanced programming Language in nature and will be selected by the Department.

REFERENCE BOOK LIST:

Based on the selected topics

COURSE NAME: CSC 4270: Advanced Topics in Software Engineering

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 4261: Software Development Project Management

COURSE DESCRIPTION:

Topics will be of an advanced software engineering in nature and will be selected by the Department.

REFERENCE BOOK LIST:

Based on the selected topics

COURSE NAME: CSC 4295: Software Project

CREDIT HOUR(S): 3 **CONDUCT HOURS:** Students will meet the supervisor every week

PRE-REQUISITE: 100 Credits

COURSE DESCRIPTION:

- Development of significant software system, employing knowledge gained from courses throughout the program. Includes development of requirements, design, implementation, and quality assurance.
- Students may follow any suitable process model, must pay attention to quality issues, and must manage the project themselves, following all appropriate project management techniques. Success of the project is determined in large part by whether students have adequately solved their customer's problem.

REFERENCE BOOK LIST:

1. Books referred by the supervisor based on the project outcome
2. AIUB Software Project Guidelines and documentation

ELECTIVE COURSES FOR MAJOR AREA: COMPUTER ENGINEERING

COURSE NAME: EEE 2101: Basic Mechanical Engineering

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: PHY 1203: Physics 2

COURSE DESCRIPTION:

- Basic introductory knowledge and theory behind the major mechanical applications such as internal combustion engines and their thermodynamic cycles, steam generators and turbines, refrigeration and air conditioning system etc. Introduces students to the terminology related to the topics included and approach to solve associated complex engineering problems.
- Summarize the properties of water and steam, the working principle of steam boiler, purpose of the mountings and accessories of boiler, the performance of steam boilers.
- Illustrate the working principle of external combustion engine, working strokes and thermodynamic cycles of internal combustion engines (Spark Ignition and Compression Ignition engines).
- Explain the steam power cycles (thermodynamic vapor cycles). Review the laws of thermodynamics, methods of heat transfer and heat transfer laws. Demonstrate the vapor compression refrigeration system.
- Describe the psychrometric terms, psychrometric processes and psychrometry of air conditioning system. Recapitulate the properties of fluid, Newton's law of viscosity, Bernoulli's principle and types of fluid flow.

REFERENCE BOOK LIST:

1. R.S. Khurmi & J.K.Gupta, "A Text Book of Thermal Engineering", S.Chand & Company Ltd., Reprint 2007
2. R.S. Khurmi, "A Text Book of Hydraulics, Fluid Mechanica and Hydraulic Machines", S.Chand & Company Ltd, Reprint 2007
3. V.P.Vasandani & D.S. Kumar, "Heat Engineering", Metropolitan Book Co.(Pvt.) Ltd., Reprint 2008
4. R.K. Rajput, "Basic Mechanical engineering", Laxmi Publications (P) Ltd., 2002
5. R.S. Khurmi & J. K. Gupta, "A Text Book of Refrigeration and Air Conditioning", Eurasia Publishing House (P) Ltd., Reprint 2016
6. Ahmadul Ameen, "Refrigeration and Air Conditioning", Prentice Hall of India Private Limited, 2006

7. M.J. Moran & H.N. Shapiro, "Engineering Thermodynamics", John Wiley and Sons.2000
8. Rayner Joel, "Basic Engineering Thermodynamics", Dorling Kindersley (India) Pvt. Ltd, licensees of pearson Education in South Asia, 2008
9. Frank M. White, "Fluid Mechanics", McGRAW Hill series in mechanical engineering
10. Springer Handbook of Mechanical Engineering, Volume 10 edited by Karl-Heinrich Grote, Erik K. Antonsson, 2009

COURSE NAME: EEE 2213: Signals and Linear Systems

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MAT 2202: Matrix, Vectors, and Fourier analysis

COURSE DESCRIPTION:

- Characteristics, classifications and operations of signals.
- Characteristics of linear and time-invariant systems.
- Methods of transient and steady state solution of Differential equations.
- Methods of transient and steady state solution of Integral-Differential equations.
- Convolution integral and their applications.
- Matrix with simple applications in circuit: network function.
- State equation and state variables for small linear systems.
- Network theorems and Analogous systems.
- Fourier series properties and applications.
- Fourier Transform and its applications to signals and systems
- Laplace transform and its application to linear circuits.

REFERENCE BOOK LIST:

1. Samir S. Soliman and Mandyam D. Srinath, "Continuous and Discrete Signals and Systems", 2/e, Prentice-Hall Inc., 1998.
2. Alan V. Oppenheim and Alan S. Willsky, "Signals & Systems", 2/e, Prentice-Hall Inc., 2008.
3. B.P. Lathi, "Principles of Linear Systems and Signals", 2/e, Oxford University Press, 2009
4. Simon Haykin and Barry Van Veen, "Signals and Systems", John Wiley & Sons, Inc. 1999
5. Rodger E. Ziemer, William H. Tranter and D. Ronald Fannin, "Signals & Systems Continuous and Discrete", 4/e, Pearson Education, Inc., 1998
6. Simon Haykin,"Communication Systems", 3/e, John Wiley & Sons, 1996
7. Steven T. Karris, "Signals and Systems with MATLAB application", 2/e, Orchanrd Publications, 2003
8. Hwei P. Hsu, "Signals and Systems Schaum's Outlines", McGraw-Hill, 1995
9. Zoher Z. Karu "Signals and Systems made ridiculously simple", Zizi Press, 2001
10. M.J. Roberts, "Signals and Systems: Analysis of Signals Through Linear Systems", McGraw-Hill, 2003

COURSE NAME: EEE 3103: Digital Signal Processing (DSP)

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class &
3hours of Laboratory class per week

PRE-REQUISITE: EEE 2213: Signal and Linear System

COURSE DESCRIPTION:

- This course covers the techniques of modern digital signal processing that are fundamental to a wide variety of application areas. The summarized course description is as follows:

- Discrete Fourier Transform and Fast Fourier Transform algorithms and applications, Z- transforms.
- Frequency domain analysis of discrete-time systems.
- Design and implementation of FIR and IIR filters with Computer-aided design projects.
- Discrete time signals and systems. Discrete Fourier Transformation of Discrete signals.
- Frequency domain analysis of discrete-time systems.
- Performing Z and inverse Z transforms using the definitions, and properties and partial fraction expansion.
- Determining if a DT (Discrete-time) system is linear, time-invariant, causal, and memory less.
- Determining the BIBO stability of systems given in frequency domain.
- Designing and implementing digital filters by theoretical calculation and by using MATLAB.
- Using computers and MATLAB to create, analyze and process signals, and to simulate and analyze
- systems to plot and interpret magnitude and phase of LTI system frequency responses.

REFERENCE BOOK LIST:

1. John G. Proakis & Dimitris G. Manolakis, " Digital Signal Processing – Principles, Algorithms and Applications", Prentice – Hall India, 3rd Edition.
2. A. V. Oppenheim and R. W. Schafer, "Discrete-Time Signal Processing" 2nd Edition, Prentice-Hall, New Jersey, 1999, ISBN 0-13-083443-2.
3. V.K. Ingle and J.G. Proakis, "Digital Signal Processing using MATLAB", Bookware Companion Series, 2000, ISBN 0-534-37174-4.
4. Richard G. Lyons, "Understanding Digital Signal Processing", 3rd Edition.
5. Li Tan and Jean Jiang, "Digital Signal Processing: Fundamentals and Applications", Second Edition.
6. Andreas Schwarzinger, "Digital Signal Processing in Modern Communication Systems".
7. Sen M. Kuo, Bob H. Lee and Wenshun Tian, "Real-Time Digital Signal Processing: Fundamentals, Implementations and Applications".
8. Michael Weeks , "Digital Signal Processing Using MATLAB & Wavelets"
9. John G. Proakis and Dimitris K. Manolakis, "Student Manual for Digital Signal Processing using MATLAB".
10. Li Tan, "Digital Signal Processing: Fundamentals and Applications".
11. Rabinar L.R. and Gold B., "Theory and Application of Digital Signal Processing".
12. Johnson, "Introduction to Digital Signal Processing".

COURSE NAME: EEE 4141: Industrial Electronics, Drives & Instrumentation

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: EEE 3101: Digital Logic and Circuits & EEE 2101: Basic Mechanical Engineering

COURSE DESCRIPTION:

- Industrial Electronics and Drives Introduction to solid state devices : Thyristors, BJT, MOSFET and IGBT; Turning On and turning Off mechanisms Introduction to triggering devices: UJT, Programmable UJT (PUT), DIAC.
- Power semiconductor circuits: AC to DC controlled converters, DC to DC converters, Single phase AC power control circuits, triggering and control circuits design. DC to AC converters with frequency and voltage control, PWM and Harmonic elimination, Resonant converters, Switch mode power supplies.
- Introduction to SVM. Machine drives: fundamentals, quadrants of operation, torque balance, acceleration and deceleration control. DC motor drives: speed control, braking and plugging circuits for separately excited, series and shunt motors. Induction motor Drives: constant torque and constant power operation, scalar control, V/f control, slip power recovery. Control of motor speeds and

applications of drives in the industries.

- Introduction to power supplies, push-pull power supply, UPS etc. Heating: Induction and dielectric heating. Measurement and Instrumentation Define measurement and instrument system. Different static and dynamic characteristics of measurement and instrument system. Acquire knowledge about different methods of resistance measurement.

REFERENCE BOOK LIST:

1. Muhammad H. Rashid, "Power Electronics Circuits, devices and applications", Prentice Hall of India Pvt Ltd, 2nd Edition, 1998.
2. Ned Mohan, Tore M. Underland, William P. Robbins, "Power Electronics Converters, Applications and Design", John Wiley and Sons, 2nd Edition.
3. Charles A. Schuler and William L. McNamee, Industrial Electronics and Robotics, McGraw-Hill Book Company, Singapore, 1986.
4. J.A. Cage, "Theory and Application of Industrial Electronics", McGraw-Hill Book Company and Kogakusha Company Ltd, Tokyo, International Student Edition, 1951.
5. Cyril W. Lander, "Power Electronics", McGraw-Hill Book Company, (UK), London, 1981.
6. Timothy J. Maloney, "Industrial Solid State Electronics- Devices and Systems", Prentice-Hall Inc., New Jersey, USA, 1986.
7. P.C. Sen, "Power Electronics", 1987 Tata Mcgraw-Hill, New Delhi.
8. Howard M. Berlin, "The 555 Timer Applications sourcebook with experiments", BPB Publications.
9. Bishwanath Paul, "Industrial Electronics".
10. G. K. Mittal, "Industrial Electronics", Khanna Publishers
11. Principles of Electrical Machines -V.K. Mehta, Rohit Mehta

---

COURSE NAME: EEE 4209: Telecommunications Engineering

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: COE 3101: Data Communication & EEE 2101: Basic Mechanical Engineering

COURSE DESCRIPTION:

- This is core course of Electrical and Electronic Engineering program that presents basic understanding of Telecommunications Engineering. It serves as a foundation for the students to make them familiarized with all important aspects of Telecommunications Engineering, ranging from the old simple telephony system up to the high-tech mobile communications networks while covering microwave and radar technologies, Fiber-optic communication, satellite communication systems etc. The goal of this course is to:
- Introduce to simple telephony and Telecommunication systems, signal spectra, Modulation, Analog modulation: Amplitude modulation and demodulation (DSB-SC, SSB, VSB), Frequency modulation and demodulation (NBFM, WBFM), Phase Modulation (PM), Sampling theorem, Pulse Modulation (Voice Digitization: PAM, PCM, Quantization, Binary Coding, SQNR, Companding, DPCM, Delta Modulation.
- Understand digital modulation techniques (ASK, PSK, FSK, CPFSK, MSK, GMSK and QAM) and Multiplexing techniques: FDM, TDM.
- Introduce to different Switching, systems: space and time switching, SPC, and digital switching
- Introduce to Circuit Switching and Packet Switching network.
- Understand tele traffic theory and traffic analysis.
- Introduce to Optical Fiber communications, LED, Laser, APD, WDM, and Optical Fiber Cable.
- Familiarize with broadband transmission system: ATM, SONET and SDH.
- Introduce to cellular mobile communications (Cellular concepts, GSM, CDMA, and UMTS).

- Familiarize with radio wave propagation, effects of ionosphere and earth's curvature, Basics of RADAR and Satellite Communication.
- Introduce to Spectrum Management Issues, Emerging Technologies (Bluetooth, Wi-Fi).

REFERENCE BOOK LIST:

1. Bellamy, John C. Digital Telephony (Wiley Series in Telecommunications and Signal Processing). Wiley-Interscience, 2000.
2. Forouzan, B. A. "Data Communication and Networking. Tata McGraw." (2005).
3. Haykin, Simon. Communication systems. John Wiley & Sons, 2008.
4. Frenzel, Louis E. "Communication electronics, principles and applications. Electrónica aplicada a los sistemas de las comunicaciones/." (2003).
5. Viswanathan, Thiagarajan, Telecommunication switching systems and networks, Prentice Hall of India, New Delhi, 2002.
6. Lee, William CY. Mobile cellular telecommunications: analog and digital systems. McGraw-Hill Professional, 1995.
7. Freeman, Roger L. Telecommunication system engineering. Vol. 82. John Wiley & Sons, 2004.
8. Dunlop, John, and D. Geoffrey Smith. Telecommunications engineering. CRC Press, 1994.
9. Goleniewski, Lillian. Telecommunications essentials: the complete global source for communications fundamentals, data networking and the Internet, and next-generation networks. Addison-Wesley Professional, 2002.
10. Horak, Ray. Telecommunications and data communications handbook. John Wiley & Sons, 2007.
11. Penttinen, Jyrki TJ. The Telecommunications Handbook: Engineering Guidelines for Fixed, Mobile and Satellite Systems. John Wiley & Sons, 2015.
12. Rappaport S. Theodore "Wireless Communication Principles & Practice". 3nd edition, Prentice Hall, 2002
13. Agarwal Prokash Dharma, Zeng An-Qing, "Introduction to Wireless and Mobile Systems", 2nd edition, Thomson Learning, 2007.
14. Sklar BernARD, Roy Kumar Prabitra, "Digital Communications Fundamentals and Applications", 2nd edition, Pearson Inc, 2007.
15. Alan Bansky "Short Range Wireless Communication –Fundamentals of FF System Design and Application".

COURSE NAME: EEE 4217: VLSI Circuit Design

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: EEE 4241: Industrial Electronics, Drives & Instrumentation

COURSE DESCRIPTION:

- This is a core course of Electrical and Electronic Engineering program that presents performance parameters (delay, power, robustness etc.) of CMOS digital circuits and their geometric/physical design.
- VLSI technology: terminologies and trends
- MOS transistor characteristics and equations; NMOS and CMOS inverters, DC transient characteristics
- Pass transistors and pass gates
- CMOS layout and design rules; Complex CMOS gates
- Resistance and capacitance
- Estimation and modeling, Signal propagation, delay, noise margin and power consumption
- Interconnect
- BiCMOS circuits

- CMOS building blocks, Adders, Counters, Multipliers and barrel shifters
- Datapaths
- Memory Structures
- PLAs and FPGAs
- VLSI testing, Objectives and strategies.

REFERENCE BOOK LIST:

1. Neil H. E. Weste, David Harris, CMOS VLSI Design - A Circuits and Systems Perspective, 4th Edition, Addison Wesley, 2010, ISBN-10: 0321547748.
2. Jan M. Rabaey, Anantha Chandrakasan, and Borivoje Nikolic, Digital Integrated Circuits - A Design Perspective, 2nd Edition, Prentice Hall, 2003, ISBN-10: 0130909963.
3. John E Ayers-Digital Integrated_Circuits-Analysis and Design, CRC Press, 2004, ISBN-10: 0-203-48690-0
4. Behzad Razavi, Fundamentals of Microelectronics-2nd Edition, John Wiley & Sons, Inc., 2014, 10987654321.
5. Richard Jaeger, Travis Blalock-Microelectronic Circuit Design-4th Edition, McGraw Hill, 2011, ISBN-10: 978-0-07-338045-2.
6. Muhammad H. Rashid-Microelectronic Circuits Analysis and Design-2nd Edition, Cengage Learning, 2011, ISBN-10: 0-495-66772-2.
7. R. Jacob Baker, CMOS Circuit Design Layout and Simulation-3rd Edition, 2010, ISBN-10: 978-0-470-88132-3.
8. Bahukudumbi, Chakrabarty, Wafer-level Testing and Test During Burn-in for Integrated Circuits, Artech House, 2010, ISBN-10: 1596939893.
9. Michael D. Ciletti, Advanced Digital Design with the Verilog HDL, 2nd Edition, Prentice Hall, 2010, ISBN-10: 0136019285.
10. Jan M. Rabaey-Low Power Design Essentials, Springer, 2009, ISBN-10: 978-0-387-71712-8.
11. Liming Xiu, VLSI Circuit Design Methodology Demystified-A Conceptual Taxonomy, Wiley-IEEE Press, 2008, ISBN-10: 0470127422
12. Hubert Kaeslin, Digital Integrated Circuit Design From VLSI Architectures to CMOS Fabrication, Cambridge University Press, 2008, ISBN-10: 0521882672.
13. Stephen Brown and Zvonko G. Vranesic, Fundamentals of Digital Logic Design with VHDL, 3rd Edition, McGraw-Hill Science/Engineering/Math, 2008, ISBN-10: 0077221435.
14. Stephen Brown and Zvonko G. Vranesic, Fundamentals of Digital Logic with Verilog Design, 2nd Edition, McGraw-Hill Science/Engineering/Math, 2007, ISBN-10: 0077211642.
15. Jeorge S. Hurtarte, Evert A. Wolsheimer, Lisa M. Tafoya, Understanding Fabless IC Technology, 2007, ISBN-10: 0750679441.

COURSE NAME: EEE 4233: Digital Design with System Verilog, VHDL & FPGAs

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: EEE 4217: VLSI Circuit Design

COURSE DESCRIPTION:

- This is an elective course of Electrical and Electronic Engineering & Computer Engineering program that presents Register Transfer Level design with System Verilog HDL and VHDLs and targeted to FPGAs. The goal of this course is to teach:
- Introduction to HDL-based Top-Down design methodology for ASICs and FPLDs (CPLDs/FPGAs), FPLD and ASIC architectures and Electronic Design Automation (EDA). RTL and Logic Synthesis, Mapping, Place and Route (P & R), Device Configuration, Functional and Timing Simulation. Use of an industrial EDA tool for

Simulation, Synthesis, Implementation (P & R) and Hardware Realization.

- Introduction to a standard Hardware Description Language (HDL)—Verilog HDL (IEEE Std 1364) and a standard Hardware Description and Verification Language (HDVL)—System Verilog (IEEE Std 1800). Basic language constructs—module, interface, ports, data types (i.e. unresolved (i.e. reg, logic) and resolved (wire) multi-valued data types, signed), design management (library and config, User-defined packages), parameterization (parameter), hierarchical structuring (component instantiation, structural replication (generate)), concurrent code (assign statements), procedural code (always), control structures (i.e. if, case, case x, while), event-control (posedge, negedge), conditional compilation. Levels of Abstraction—Behavior, Dataflow, Gate and Switch. Importance of Synthesis.
- Advanced Digital Design with Verilog HDL and System Verilog—Emphasis on Behavioral Modeling and Synthesizable coding style. Design of combinational logic (adder-subtractors, multipliers, ALUs etc.) and sequential logic (registers, counters, shift registers, LFSR, Explicit and Implicit FSMs).
- Design of FSMs and FSMDs with and without Controller-data path partitioning. ASM and ASMD charts. Emphasis on FSM/FSMD design techniques. FSM/FSMDs for signal (pulse) generator, UART, stepper motor control and central ALU-based computation units.
- Design of complex digital systems such as RISC processors.
- Introduction to Pipelining.
- Writing stimulus (Test benches) for Verification. Introduction to Assertion-based verification—using assert and embedded PSL. Simulator control ($stop, $finish).
- IP Encryption (`protect).
- Introduction to VHSIC HDL (VHDL) standard Hardware Description Language (IEEE Std 1076). Basic language constructs. Synthesizable fixed and floating point data types (i.. ufixed, sfixed, float).
- A brief introduction to advanced verification features in SystemVerilog—Constrained Random Verification (CRV) and Functional Coverage.

REFERENCE BOOK LIST:

1. Mark Zwoli´nski, Digital System Design with System Verilog, 2009.
2. Douglas J. Smith, HDL Chip Design: A Practical Guide for Designing, Synthesizing & Simulating ASICs & FPGAs using VHDL or Verilog, Doone Pubications, 1996, 6th Printing- 1999 (minor revisions and code updates for FPGA synthesis), ISBN-10: 0965193438.
3. S. Palnitkar, Verilog HDL A Guide to Digital Design and Synthesis, 2nd Edition, Prentice Hall, Mountain View, CA, USA, 2003, ISBN: 0-13-044911-3.
4. Digital Computer Design: Algorithms to Hardware, Prentice Hall PTR, 1999 (Reprinted with corrections), ISBN-10: 0136392539.
5. Michael D. Ciletti, Advanced Digital Design with the Verilog HDL, 2nd Edition, Prentice Hall, 2010, ISBN-10: 0136019285.
6. Stephen Brown and Zvonko G. Vranesic, Fundamentals of Digital Logic with Verilog Design, 2nd Edition, McGraw-Hill Science/Engineering/Math, May 14, 2007, ISBN-10: 0077211642.
7. Clive Maxfield, The Design Warrior's to FPGAs, Burlington, MA, USA, Elsevier, 2004.
8. Stuart Sutherland, S. Davidman and P. Flake, SystemVerilog for Design : A Guide to Using SystemVerilog for Hardware Design and Modeling, 2nd Edition, Springer Science+Business Media, New York, NY, USA, 2006, ISBN-10: 0-387-33399-1.
9. Justin Davis and Robert Reese, Finite State Machine Datapath Design, Optimization, and Implementation, Morgan & Claypool, 2008, ISBN-10: 1598295292.
10. Hubert Kaeslin, Digital Integrated Circuit Design From VLSI Architectures to CMOS Fabrication, Cambridge University Press, 2008, ISBN-10: 0521882672.
11. Stephen Brown and Zvonko G. Vranesic, Fundamentals of Digital Logic Design with VHDL, 2nd Edition, McGraw-Hill Science/Engineering/Math, July 15, 2004, ISBN-10: 0072499389.

12. Peter J. Ashenden and Jim Lewis, The Designer's Guide to VHDL, 3rd Edition, Morgan Kaufmann, 2008, ISBN-10: 0120887851.
13. Peter J. Ashenden and Jim Lewis, VHDL-2008: Just the New Stuff, Morgan Kaufmann, 2008, ISBN-10: 9780123742490

COURSE NAME: COE 4235: Robotics Engineering

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: EEE 2101: Basic Mechanical Engineering & CSC 3217: Artificial Intelligence and Expert Systems

COURSE DESCRIPTION:

- Expose students to the history and current developments in the field of robotics;
- Strengthen students' grasp of the mathematics and physics involved in the design, construction and control of robots, with a focus on linear algebra and geometry.
- Introduce students to fundamental concepts of electrical and mechanical engineering that will help them better understand the design and development challenges in the field of robotics;
- Help students develop and deepen their grasp of programming concepts and their programming skills.
- Give students hands-on practice in building and programming an actual robot;
- Engage students in an engineering design task that sharpens their analytical, planning, presentation and teamwork skills;
- Provide a challenging, highly engaging and personally rewarding learning experience.

REFERENCE BOOK LIST:

1. Robotics: Modelling, Planning and Control, B. Siciliano, et al., Springer-Verlag, 2009.
2. Corke, P., Robotics, Visionand Control: Fundamental Algorithms in Matlab, 2017, Springer
3. Spong, M., Hutchinson, S. and Vidyasagar, M., Robot Modeling and Control, 2006, John Wiley & Sons.

COURSE NAME: COE 4171: Advanced Operating Systems

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: CSC 3214: Operating Systems

COURSE DESCRIPTION:

- Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.,
- Understand how the operating system abstractions can be used in the development of application programs, or to build higher level abstractions; how the operating system abstractions can be implemented,
- Understand the principles of concurrency and synchronization, and apply them to write correct concurrent programs/software,
- Understand basic resource management techniques (scheduling or time management, space management) and principles and how they can be implemented. These also include issues of performance and fairness objectives, avoiding deadlocks, as well as security and protection.
- Basic understanding of Unix operating system; Different Unix command; Different Server Configuration of UNIX Operating System; Different Features, Porting, and Implementation of Tizen (Smart Mobile Phone) Operating System.

REFERENCE BOOK LIST:

1. Unix for programmers and users a complete guide by Graham Glass
2. Understanding the Linux Kernel, 3rd Ed by Bovet & Cesati
3. Operating system concepts (Seventh Edition) by Silberchatz, Galvin and Gagne
4. Modern Operating System, Design and Implementation by Andrew S. Tanenbaum
5. Modern Operating System by Andrew S. Tanenbaum
6. Unix Shell Programming by Yashavant Probhakar Kanetkar
7. Web Resource: www.iotforall.com, www.iotworldtoday.com, internetofthingsagenda.techtarget.com

---

COURSE NAME: COE 4172: Advanced Computer Networks

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: COE 3204: Computer Networks

COURSE DESCRIPTION:

- Introduction to IPv6 addressing, special addressing of IPv6, address mapping
- Introduction to Virtual Local Area Network (VLAN), Inter-VLAN communication and Virtual Trunk Port(VTP)
- Introduction to Network Address Translation (NAT) and Port Address Translation (PAT) in details.
- Introduction to different protocols – DHCP, ARP, ICMP, OSPF
- Routing table formation and optimization of routing protocols.
- Analyze the network security threads for example virus, intrusion types etc. and introduction to basic network security,
- Multimedia;
- Introduction to advanced topics of networking – wireless sensor networks (WSN), IoT, SDN, Cloud Computing,

REFERENCE BOOK LIST:

1. Forouzan Behrouz A., "Data Communications and Networking", 4th Edition, Tata McGraw-Hill. ISBN 0-07-058408-7
2. Kurose J.F and Ross K.W – “Computer Networking: A Top-Down Approach Featuring the Internet” – 2nd / 3rd Edition
3. William Stallings – “High-Speed Networks and Internets: Performance and Quality of Service” – 2nd Edition
4. Computer Networking: A Top-Down Approach, Featuring the Internet(5th Edition), by James Kurose and Keith Ross, Addison-Wesley Pub Co, 2010
5. H. Soliman, "Mobile IPv6 - Mobility in a wireless Internet", Addison-Wesley, 2004
6. Silvia Hagen, "IPv6 Essentials", OReilly, 2002
7. Michael Welzl, "Network Congestion Control: Managing Internet Traffic", John Wiley & Sons, 2005
5. Mark Crovella, Balachander Krishnamurthy, "Internet Measurement: Infrastructure, Traffic and Applications",Wiley, 2006

COURSE NAME: COE 4173: Digital System Design

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class & 3hours of Laboratory class per week

PRE-REQUISITE: COE 3203: Computer Organization & Architecture
EEE 2101: Basic Mechanical Engineering

COURSE DESCRIPTION:

- Know the difference between computer organization and computer architecture.
- Understand the computer as a layered system.
- Learn the components common to every modern computer system.
- Understand a simple architecture invented to illuminate these basic concepts, and how it relates to some real architecture.
- Instruction set design; I/O organization, memory organization, Control unit design.
- Measuring performance;
- Instructions and data access methods: Operations and operands of computer hardware,
- Arithmetic Logic Unit (ALU) operations,
- Floating point operations,
- Designing ALU;
- Processor design
- Single cycle and multicycle implementations;
- Designing I/O system; I/O devices; Designing Microprocessor based system with interfacing chips
- Design special purpose controllers

REFERENCE BOOK LIST:

1. Null and Lobur, "Jones & Bartlett, Computer Organization and Architecture", 1st edition
2. M. Morris Mano, "Computer System Architecture", 3rd edition.
3. William Stallings, "Computer Organization and Architecture", 6th edition.
4. Hennessy, J. L., and D. A. Patterson, "Computer Architecture: A Quantitative Approach", 3rd edition.
5. Patterson, D. A., and J. L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", 3rd edition.
6. Dr Rob Williams, "Computer Systems Architecture: A Networking Approach"
7. Jerome H. Saltzer, M. Frans Kaashoek, "Principles of Computer System Design: An Introduction"

COURSE NAME: COE 4281: Simulation and Modelling

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class &
3hours of Laboratory class per week

PRE-REQUISITE: CSC 3217: Artificial Intelligence and Expert Systems
COE 4172: Advanced Computer Networks

COURSE DESCRIPTION:

- Introduction to simulation modelling of dynamic systems that will include theoretical studies and hands-on modelling workshops.
- System analysis and modelling with applications and case studies drawn primarily from ecology and economics; modelling software packages including Stella, Madonna, StarLogo, etc;
- Different modelling strategies and way to formulate, build and analyze models; Investigation of alternative modelling software packages.

REFERENCE BOOK LIST:

1. Simulation Modeling and Analysis (3rd Edition) by Law and Kelton
2. Computer Simulation and Modelling by Francis Neelamkavil
3. Discrete-Event System Simulation (5th edition) by Jerry Banks, John Carson, Barry L. Nelson, David Nicol
4. Woods, R. L., and Lawrence, K. L., Modeling and simulation of dynamic systems, Prentice-Hall, Upper

Saddle River, NJ.
5. Ahrweiler, Petra, Gilbert Nigel, and F. Ahrweiler editors. Computer Simulations in Science and Technology Studies, Springer Verlag, ISBN# 3540648712

COURSE NAME: COE 4282: Network Security

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: COE 4172: Advanced Computer Network

COURSE DESCRIPTION:

- Introduction to the Basic Network Security, Generic Classification of Intrusion Types,
- Hacking tools and techniques, Different phase of attacks, Virus, DOS attack and some DOS attack methods, Brute force attack, TCP SYN attack, Smurf attack, Ping of death attack etc.
- Basic Cryptography, Introduction with Public and Private key, Stream Cipher (Substitution Ciphers (Playfair Cipher, Transposition Cipher, Caesar Cipher, Vigenere Cipher), Block Cipher(DES, AES).
- Firewalls, Packet Filtering Router Concepts, Gateway Firewall, Network Address Translation (NAT), Digital Signatures in Authentication Systems, Virtual Private Network (VPN).

REFERENCE BOOK LIST:

1. Cryptography and Network Security Principles and Practices (4th Edition) by William Stallings.
2. Security of the Internet (The Froehlich/Kent Encyclopedia of Telecommunications vol. 15. Marcel Dekker, New York, 1997, pp. 231–255.)
3. Introduction to Network Security, Matt Curtin.
4. Security Monitoring with Cisco Security MARS, Gary Halleen/Greg Kellogg, Cisco Press, Jul. 6, 2007.
5. Self-Defending Networks: The Next Generation of Network Security, Duane DeCapite, Cisco Press, Sep. 8, 2006.
6. Security Threat Mitigation and Response: Understanding CS-MARS, Dale Tesch/Greg Abelar, Cisco Press, Sep. 26, 2006.
7. Securing Your Business with Cisco ASA and PIX Firewalls, Greg Abelar, Cisco Press, May 27, 2005.
8. Deploying Zone-Based Firewalls, Ivan Pepelnjak, Cisco Press, Oct. 5, 2006.

COURSE NAME: COE 4283: Wireless Sensor Network

CREDIT HOUR(S): 3/Lab **CONDUCT HOURS:** 2 hours of Theory class &
3hours of Laboratory class per week

PRE-REQUISITE: COE 4172: Advanced Computer Network

COURSE DESCRIPTION:

- Introduction to Wireless Sensor Network - Sensing and Sensors, components and construction of sensor network.
- Challenges and Constraints in WSN – Energy, Self-Management, Design Constraints, Decentralized Management etc.
- Overview of sensor networks' protocols, issues, and applications.
- Node Architectural- The Sensing Subsystem (Analog-to-Digital Converter), Processor Subsystem (Architectural Overview, Microcontroller, Digital Signal Processor)
- Medium Access Control - MAC-layer issues, S-MAC Protocol, IEEE 802.15.4 and ZigBee
- Multiple Access with Collision Avoidance (MACA) and MACAW
- Network Layer Protocols: Multi-hop (Directed diffusion: a data dissemination network layer protocol); Cluster-based: (LEACH protocol, cluster head rotation)
- Security issues in Sensor Networks: Fundamentals of Network Security, Challenges of Security in Wireless

Sensor Networks, Security attacks in Sensor Networks (SPINS protocol, Secure Information Aggregation)

REFERENCE BOOK LIST:

1. "Fundamentals of Wireless Sensor Networks: Theory and Practice" by Waltenegus Dargie, Christian Poellabauer
2. "Wireless Sensor Networks: Technology, Protocols, and Applications" by Kazem Sohraby Daniel Minoli, Taieb Znati
3. "Protocols And Architectures For Wireless Sensor Networks" by Holger Karl, Andreas Willig

COURSE NAME: COE 4295: Engineering Project

CREDIT HOUR(S): 3 **CONDUCT HOURS:** Students will meet the supervisor every week

PRE-REQUISITE: 100 Credits

COURSE DESCRIPTION:

- Development of significant engineering system, employing knowledge gained from courses throughout the program. Includes development of requirements, design, implementation, and quality assurance.
- Students may follow any suitable process model, must pay attention to quality issues, and must manage the project themselves, following all appropriate project management techniques. Success of the project is determined in large part by whether students have adequately solved their customer's problem.

REFERENCE BOOK LIST:

1. Books referred by the supervisor based on the project outcome
2. AIUB Engineering Project Guidelines and documentation

ELECTIVE COURSES FOR MAJOR AREA: INFORMATION SYSTEMS

COURSE NAME: MIS 3101 Management Information Systems

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 3112: Software Engineering

COURSE DESCRIPTION:

- Foundations of Information Systems in Business.
- Competing with Information Technology; Computer Hardware and Computer Software; Data Resource Management; Telecommunications and Networks; Electronic Business Systems and Enterprise Business Systems; Electronic Commerce Systems; Decision Support Systems.
- Planning Fundamentals for Developing Business/IT Strategies; Implementation Challenge of Developing Business/IT Strategies and Developing Business/IT Solutions; Security and Ethical Challenges; Enterprise and Global Management of Information Technology.
- The students are exposed to various practical exercises for mastery of MIS knowledge and skills

REFERENCE BOOK LIST:

1. Laudon & Laudon: Management Information Systems: Managing the Digital Firm, 15th Edition, Pearson publications.
2. James A. O'Brien, George M. Marakas : Management Information Systems, 10th edition, McGraw-Hill Education.

COURSE NAME: MIS 4001: Computer Utilization in Business

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MIS 3101: Management Information Systems

COURSE DESCRIPTION:

- This course is designed to provide a technical background for understanding the use of computers in the real-world business environment.
- The course will cover both hardware and software and their applications in the business organizations.
- One of the highest-rated commercially available applications software packages will be used to gain necessary skills.

REFERENCE BOOK LIST:

1. Access 2019 Bible, Michael Alexander, Richard Kusleika, Wiley.
2. Excel 2019 Bible, 1st Edition, Michael Alexander, Richard Kusleika , John Walkenbach :, Wiley. USA
3. Craig Zacker: Microsoft Official Academic Course Microsoft Word 2016, 1st Edition, Wiley. USA

COURSE NAME: MIS 4007: Web Based Marketing

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MIS 3101: Management Information Systems
CSC 3215: Web Technologies

COURSE DESCRIPTION:

- This course investigates how the Internet and related changes in the technological environment affect the marketing of goods and services.
- With an emphasis on traditional marketing concepts, theories, and frameworks, this course explores factors that affect the adoption of digital technologies, changes in customer behavior across digital platforms.
- B2B, B2C, C2B and C2C E-businesses;
- Resulting opportunities and challenges for firms' marketing strategies.
- Tools including mobile and location marketing, crowd sourcing and user generated content, and social media communication.

REFERENCE BOOK LIST:

1. E-Business Marketing, Albert & Sanders. Prentice Hall, 2010.
2. Chaffey, Ellis-Chadwick, Johnston and Mayer (2006) Internet Marketing (3rd edition), Prentice Hall.
3. Strauss, J., & Frost, R. (2014). *E-Marketing* (7th ed.). Upper Saddle River, NJ: Pearson Prentice Hall. ISBN 9780132953443

COURSE NAME: MIS 4011: Enterprise Resource Planning

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MIS 3101: Management Information Systems
CSC 3112: Software Engineering

COURSE DESCRIPTION:

- This course provides an-introduction to enterprise-level system development concepts, principles and practices.
- Evaluate and set up comprehensive system development projects for enterprises.

- Student teams will analyze, design and plan systems of moderate complexity, using current technologies and the appropriate project management methods in the solution.

REFERENCE BOOK LIST:

1. Bret Wagner and Ellen Monk: Concepts in Enterprise Resource Planning, 4th Edition, Cengage Learning
2. Bret Wagner, Ellen Monk: Concepts in Enterprise Resource Planning, 4th ed., Course Technology, Cengage Learning, 2013.

COURSE NAME: MIS 4012: E-governance

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 3215: Web Technologies

COURSE DESCRIPTION:

- This course will introduce students to the ways in which internet technologies are affecting how people interact with government, and how governments, in turn, are using and managing these technologies to (hopefully) better provide information and services to the public.
- Course content is divided into three main themes and begins with an overview of development techniques and assessment methods for public web sites and on-line applications;
- Examine the key policy issues relevant to implementation of e-government programs, as well as to the broader use of information technology in democratic societies;
- Explore the skills and concepts needed to effectively manage e-government projects and programs.
- Given the nature of the class, a variety of internet tools will be used to help accomplish this, including blogs, RSS feeds, and virtual technologies, such as Second Life.

REFERENCE BOOK LIST:

1. Public Information Technology and e-Governance: Managing the Virtual State, G. David Garson, Jones & Bartlett Learning, 1st Edition, 2006
2. Strategic Planning and Implementation of E-Governance, Sushil, P K/Suri, P K, SPRINGER
3. Patrick Dunleavy, Helen Margetts, Simon Bastow, and Jane Tinkler : Digital Era Governance, Oxford university Press.
4. Concepts in IT Management for Governments and Non-profits Organizational structures in e-government State & federal e-government plans/strategies
5. Guidelines and Best Practices for Social Media Use in Washington State, 2010, Governor's Office et.al

---

COURSE NAME: MIS 4014: Business Intelligence and Decision Support System

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MIS 4011: Enterprise Resource Planning

COURSE DESCRIPTION:

- This unit aims to generate an awareness of the importance of information to decision-making through business intelligence tools and techniques and how to provide such information to decision support mechanism to ensure its usefulness to the decision makers.
- This course introduces business intelligence and analytics, defined as the extensive use of data, statistical and quantitative analysis, exploratory and predictive models, and fact-based management to drive decisions and actions. The development and use of data warehouses and data marts, and the application of selected data (including text and web) mining techniques to business decision making is illustrated. Students actively participate in the delivery of the course through case and project presentations. In addition to this, this course provides the student with the skills necessary to conceptualize, build, and implement decision support systems in organizations.

REFERENCE BOOK LIST:

1. Decision Support Systems and Business Intelligence 8th Edition Prentice-Hall, USA
2. Decision Support Systems and Intelligent Systems, Efraim Turban and Jay E. Aronson Prentice Hall, USA.

COURSE NAME: MIS 4023: Network Resource Management

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: MIS 3101: Management Information Systems

COURSE DESCRIPTION:

- This course provides the in-depth knowledge of applying advanced approaches of management information tools such as: transformation of global business using IT tools; business process automations; the changing trends in e-commerce; ERP implications in enterprises; web-based learning and resource sharing; cloud computing and global workforce; IT project management
- Networked enterprise environment- The students are exposed to various practical exercises for mastery of networked MIS knowledge and skills-

REFERENCE BOOK LIST:

1. Information Technology for Management by Turban at al. (10th Edition)
2. Information Technology for Management by Henry C. at al. (7th Edition)

COURSE NAME: CSC 4239: Cyber Laws & Information Security

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

PRE-REQUISITE: CSC 3215: Web Technologies

COURSE DESCRIPTION:

- Overview of Cyber World and the scope of cyber laws. Regulatory Framework of Cyber Law in International and national (in Bangladesh) regime.
- Computer crime and Cyber Crime; Classification of Cyber Crimes; Cyber Forensic; Cyber Criminals and their Objectives; Kinds of cyber-crimes – cyber stalking; cyber pornography; forgery and fraud; crime related to IPRs; Cyber terrorism; computer vandalism etc.
- Introduction to Intellectual Property (IP) Law; Origin, Development, Sources, Principles, and Classification of IP Law. E-commerce practices, online contracts, IPRs (Copyright, trademarks, & software patenting). Electronic Signatures, Intellectual Property Issues, Cyber Crimes, Jurisdictional issues,
- Data Protection and privacy. Security services, mechanisms, threats and attacks, model for network security and access security model. Authentication: Message authentication and entity authentication, message authentication code, hash functions, MD5, Secure Hash Algorithm, RSA digital signature, Digital Signature Standard, biometrics

REFERENCE BOOK LIST:

1. WIPO Intellectual Property Handbook: Policy, Law and Use (2nd ed., WIPO, 2004).
2. Cyber Law in Bangladesh, Dr. Zulfiquar Ahmed, Hasan Law Books, 1st edition, 2017
3. Murray, Information Technology Law: The Law and Society (Oxford University Press, 2013).

COURSE NAME: CSC 4290: Advanced Topics in Information Systems

CREDIT HOUR(S): 3 **CONDUCT HOURS:** 3 hours of Theory classes per week

Bachelor of Science in Computer Science & Engineering (CSE)
Course Description

PRE-REQUISITE: CSC 4118: Introduction to Data Science

COURSE DESCRIPTION:

Topics will be of an advanced information System in nature and will be selected by the Department.

REFERENCE BOOK LIST:

Based on the Topics Selected