

Syllabus for Undergraduate Program

Session 2019-20

First Year : Semester I			
Course No	Course Title	Hours/Week Theory + Lab	Credits
SWE 121	Structured Programming Language	3 + 0	3
SWE 122	Structured Programming Language Lab	0 + 3	1.5
SWE 123	Discrete Mathematics	3 + 0	3
EEE 101W	Basic Electrical and Electronic Circuits	3 + 0	3
EEE 102W	Basic Electrical and Electronic Circuits Lab	0 + 3	1.5
MAT 105W	Coordinate Geometry and Calculus	3 + 0	3
PHY 103W	Mechanics, Wave, Heat & Thermodynamics	3 + 0	3
ENG 101W	Effective Communication in English	2 + 0	2
ENG 102W	English Language Lab 1	0 + 2	1
	Total	17 + 08 = 25	21

Course Description

First Year First Semester

SWE 121 STRUCTURED PROGRAMMING LANGUAGE

3 Hours/Week, 3 Credits

Programming Language: Basic concept, Overview of programming languages, Problem Solving Techniques and Data Flow Diagram. **C-Language:** Preliminaries, Program constructs, variables and data types in C. Input and output. Character and formatted I/O; Arithmetic Expressions and Assignment statements; Control statement, Loops and Nested loops; break, continue, goto, Decision making; Arrays, Functions; Arguments and local variables, Calling Functions and arrays. Recursion and Recursive functions; Structures within structure. Automatic, external, static variable, Files; File functions for sequential and Random I/O. Pointers; Pointers and structures, union; Pointer and functions; Pointer and arrays; Operation and Pointer; Pointer and memory addresses; Operations on Bits; Bit Operation; Bit field; Advanced features; Preprocessor and Macros, enumeration, Standard library

Recursion: Basic idea of recursion (3 laws-base case, call itself, move towards base case by state change), tracing output of a recursive function, applications: factorial, fibonacci, tower of Hanoi, merge sort, permutation, combination.

Sorting: Insertion sort, selection sort, bubble sort, merge sort, quick sort, distribution sort(counting sort, radix sort, bucket sort)

Searching: Linear search, binary Search, application of Binary Search-finding element in a sorted array, finding nth root of a real number, solving equations.

Stack and Queue: Basic stack operations (push/pop/peek), stack-class implementation using Array and linked list, in-fix to post-fix expressions conversion and evaluation, balancing parentheses using stack, basic queue operations (enqueue, dequeue), circular queue/ dequeue, queue-class implementation using array and linked list, application-Josephus problem, palindrome checker using stack and queue.

Textbook:

1. Schaum's Outline of Programming with C by Byron S. Gottfried
2. C: The Complete Reference by Herbert Schildt

SWE 122 STRUCTURED PROGRAMMING LANGUAGE LAB

3 Hours /week, 1.5 Credits

Students should be able to solve different easy problems with their analysis using pen and papers and then doing code on computers just like expressing their speech using a language; they should also be able to calculate outputs for different inputs on papers before running the code that will prove their understanding of the logics behind the code.

Introduction: Introductory outputs using C. **Data Types and Operator:** Declaring variables of different data types and doing different types of operations on them, facing problems when internal result of calculation crosses the boundary of a data type. **Data Input/Output:** Variation and formats of getting input and giving output. **Control Statement:** Implementation of all types of control statement structures, odd/even test, find max/min from 2/3 numbers, generate grades from marks, floor, ceiling, absolute value, sum of n numbers using loop and calculate average, test prime, generate Fibonacci sequence. **Array, String and Nested Looping:** Finding the number of students getting marks above average, finding vowel and consonant from a given string, detecting palindrome, counting words of a string, reversing each words of a sentence, using different functions of string.h library, bubble sort, matrix multiplication, Using **Library Functions:** Functions from stdio.h, math.h, stdlib.h and ctype.h library. **Functions:** Doing some previous problems using function, implement call by value and call by reference, prime factorization. **Recursion:** Find Greatest Common Divisor, Fibonacci, Factorial, Tower of Hanoi. **Program Structure:** Use static and global variable. **Pointers:** Passing pointer to a function, dynamic memory allocation, arrays of pointers. **Structure and Union:** Sorting points (first according to x, then according to y), using line segment structure (point structure inside line), using union. **File:** Opening, closing, creating and processing data files.

Number Theory: Prime Generation, Sieve and How to Optimize, Prime

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SWE 123 DISCRETE MATHEMATICS

3 Hours/Week, 3 credits

Set, relations Functions: Set, Function, Representing Relations, Equivalence Relations **Propositional Calculus:** Propositions, Predicate and Quantifier **Algorithms:** Complexity, Divisions, Algorithm, Application of Number Theory **Recursion:** Sequences and summations, Recursive Definition and algorithm **Combinatorial Analysis:** Permutation and Combination, Divide and Conquer Algorithms, Generating Functions- **Graphs:** Representation, Isomorphism, Connectivity, Euler and Hamilton path, Shortest path, Planer, Coloring, Trees. **Boolean Algebra:** Number System, Boolean Function, Representing Boolean Function, Logic gate, Minimization of Circuits.

Text:

1. Discrete Mathematics and Its Applications- Kenneth H. Rosen.

Reference:

1. Discrete Mathematics and Its Applications- Susanna S.Epp .

EEE 101/EEE 101W BASIC ELECTRICAL AND ELECTRONIC CIRCUITS

3 Hours/Week, 3.0 Credits

Voltage, Current, Power, Energy, Dependent and Independent Sources, Ohm's Law, Series/Parallel Circuits, Voltage and Current Division, KVL, KCL, Mesh analysis, Nodal Analysis, Thevenins Theorem, Nortons Theorem, Maximum Power Transfer Theorem, Capacitors, Inductors, RC, RL Transients, Sinusoidal Wave form, Phasors, RC, RL, RLC Circuits. Diodes, Transistors, FET Simple Biasing, Op-amps and Basic Operations, Logic Gates, Logic Circuits, Mux, DMux. Flipflops, SR, K, D, Shift Registers, Counters, Memories.

Text:

1. Fundamentals of Electric Circuits – Charles K. Alexander and Matthew N.O. Sadiku

Reference:

1. Introductory Circuit Analysis–Robert L. Boylestad
2. Microelectronic Circuits–Sedra/Smith
3. Electronic Devices and Circuit Theory–Robert L. Boylestad and Louis Nashelsky
4. Digital Logic and Computer Design–M. Morris Mano
5. Digital Fundamentals–Floyd

EEE 102/ EEE 102W BASIC ELECTRICAL AND ELECTRONIC CIRCUITS LAB

3 Hours/Week, 1.5 Credits

DC Circuits, Rectifying Circuits using Diodes, Clipping Circuit using Diodes, Transistors in Switching Circuit, Transients in RC and RL, AC Circuits, LC Resonance, Op amp: Inverted Gain, Differentiation and Integration, Logic Circuits, SR Flipflops, Project using Shift register and Counter

MAT 102 CALCULUS AND DIFFERENTIAL EQUATIONS

3 Hours/Week, 3.0 Credits

X Differential Calculus: Function of a real variable and their graphs; limit, continuity and derivatives; physical meaning of derivative of a function; successive derivatives; Leibnitz's theorem; Rolle's theorem; mean value theorem and Taylor's theorem(statement only); Taylor's and Maclaurin's series and expansion of functions; maximum and minimum values of functions; functions of two and three variables; partial and total derivatives. **X Integral Calculus:** Physical meaning of integration; integration as an inverse process of differentiation; definite integral as the limit of a sum and as an area; definition of Riemann integral; fundamental theorem of integral calculus and its application to definite integrals; reduction formula; improper integrals; double integration; evaluation of areas and volumes by integration. **Differential Equations:** Definition and solution of ordinary differential equations; first order ordinary differential equations; second order ordinary linear differential equations with constant coefficients; solutions by the method of undetermined coefficient and variation of parameter; initial value problems.

Text:

1. Calculus with Analytic Geometry – Thomas and Finney

Reference:

1. Differential Equations– S. L. Ross

MAT 105W COORDINATE GEOMETRY AND CALCULUS

3 Hours/Week, 3.0 Credits

Coordinate geometry: Equations for straight lines, circles, parabola, ellipse and hyperbola, pair of straight lines; general equations of second degree. **Coordinates in three dimensions:** equations for straight lines and planes in space; spheres, cylinders and cones.

Differential Calculus: Function of a real variable and their graphs; limit, continuity and derivatives; physical meaning of derivative of a function; successive derivatives; Leibnitz's theorem; Rolle's theorem; mean value theorem and Taylor's theorem(statement only); Taylor's and Maclaurin's series and expansion of functions; maximum and minimum values of functions; functions of two and three variables; partial and total derivatives.

Integral Calculus: Integration as an inverse process of differentiation; definite integral as the limit of a sum and as an area; fundamental theorem of integral calculus and its application to definite integrals; reduction formula; improper integrals; double integration; evaluation of areas and volumes by integration.

Books Recommended:

1. Calculus with Analytic Geometry – Thomas and Finney

PHY 103/ PHY 103W MECHANICS, WAVES, HEAT AND THERMODYNAMICS

3 Hours/Week, 3 Credits

Mechanics: Motion in two dimensions; projectile motion; Newton's laws of motion; conservation theorems (momentum and energy); collisions; circular motion; rotational dynamics of rigid bodies; central forces and gravitation; Kepler's laws. Waves: Simple harmonic motion; damped and forced vibrations; waves in elastic media; sound waves; Doppler effect; Fourier's theorem and its applications. Heat and thermodynamics: Principles of thermometry; measurement of high and low temperature; zeroeth law of thermodynamics, kinetic theory of ideal gas; first and second laws of thermodynamics; entropy; black body radiation. Wein's law and Planck's law.

Text:

- ✓ 1. Physics (Vol. I)–Halliday, D. and Resnick, R.

Reference:

- ✓ 1. Fundamentals of Vibrations and Waves– Puri, S. P.
2. A Treatise of Heat–Saha and Srivastava:

ENG 101W EFFECTIVE COMMUNICATION IN ENGLISH

2 Hours/Week, 2.0 Credits

Objectives:

1. Developing oral and written communication with grammatical accuracy.
2. Practicing reading to facilitate communication

Contents:

Reading a selection of texts (story, essay, newspaper article. etc)

Forms and functions of different word categories (e.g. noun, verb, adjective, adverb, etc.

Aspects and use of tense

Subject-verb agreement

Use of infinitive, gerund, present participle, past participle, modals, causatives, conditionals, subjunctives

Use of sentence connectors/cohesion markers (e.g. moreover, in addition, in contrast, similarly, as a result, though, although, etc)

Effective combination of sentences (e.g. simple, complex, compound, etc)

Writing composition (To demonstrate grammatical competence)

Books recommended

1. Books and resources recommended by course instructors
2. Books recommended by teachers
3. Headway- Upper Intermediate (Work book and student's book)
 - Liz and John Soars
4. Cliff's TOEFL

ENG 102* ENGLISH LANGUAGE LAB I

2 Hours/Week, 1.0 Credits

Objectives:

1. To develop students awareness of standard English pronunciation
2. To develop students understanding of the variations in pronunciation
3. To develop students ability to use conversational English

Contents:

English phonemes

Varieties of English

English stress and intonation

Dialogue, debate, extempore speech, interview, role-play, presentation