

**SIES College of Arts, Science and Commerce,
Sion (W)
Autonomous College**



**Syllabus for
Program: First Year Bachelor of Science
(NEP) Course: Computer Science
Semester: I & II**

With effect from
Academic Year 2023 -24

Preamble

Information and Communication Technology (ICT) has today become an integral part of all industry domains as well as fields of academics and research. The industry requirements and technologies have been steadily and rapidly advancing. Organizations are increasingly opting for open source systems. The students too these days are thinking beyond careers in the industry and aiming for research opportunities.

The B.Sc. Computer Science course structure therefore needed a fresh outlook and complete overhaul. A real genuine attempt has been made while designing the new syllabus for this 3 year graduate course. Not only does it prepare the students for a career in the Software industry, it also motivates them towards further studies and research opportunities.

The core philosophy of overall syllabus is to -

- a. Form strong foundation of Computer science,
- b. Introduce emerging trends to the students in gradual way,
- c. Groom the students for the challenges of ICT industry

In the first year i.e. for semester I & II, the basic foundation of important skills required for software development is laid. The syllabus proposes to have 2 core subjects of Computer science and 2 core courses of Mathematics-Statistics. In Semester II the students would also be given industrial exposure via field projects/industrial visit. All core subjects are proposed to have theory as well as practical tracks. While the Computer Science courses will form fundamental skills for solving computational problems, the Mathematics & Statistics course will inculcate research oriented acumen.

The syllabus design for further semesters encompasses more advanced and specialized courses of Computer Science.

We sincerely believe that any student taking this course will get a very strong foundation and exposure to basics, advanced and emerging trends of the subject. We hope that the students' community and teachers' fraternity will appreciate the treatment given to the courses in the syllabus.

We wholeheartedly thank all experts who shared their valuable feedback and suggestions in order to improvise the contents, we have sincerely attempted to incorporate each of them. We further thank the Chairperson and members of the Board of Studies for their confidence in us. Special thanks to the Department of Computer Science and colleagues from various colleges, who volunteered or have indirectly helped design certain specialized courses and the syllabus as a whole.

Program Outcomes and Program Specific Outcomes

B.Sc. Computer Science

SR.NO	Details
PO 1	Recall and explain acquired scientific knowledge in a comprehensive manner and apply the skills acquired in their chosen discipline. Interpret scientific ideas and relate its interconnectedness to various fields in science.
PO 2	Evaluate scientific ideas critically, analyse problems, explore options for practical demonstrations, illustrate work plans and execute them, organize data and draw inferences.
PO 3	Explore and evaluate digital information and use it for knowledge upgradation. Apply relevant information so gathered for analysis and communication using appropriate digital tools.
PO 4	Ask relevant questions, understand scientific relevance, hypothesize a scientific problem, construct and execute a project plan and analyze results.
PO 5	Take complex challenges; work responsibly and independently, as well as in cohesion with a team for completion of a task. Communicate effectively, convincingly and in an articulate manner.
PO 6	Apply scientific information with sensitivity to values of different cultural groups. Disseminate scientific knowledge effectively for upliftment of the society.
PO 7	Follow ethical practices at the workplace and be unbiased and critical in interpretation of scientific data. Understand the environmental issues and explore sustainable solutions for it.
PO 8	Keep abreast with current scientific developments in the specific discipline and adapt to technological advancements for better application of scientific knowledge as a lifelong learner.

SR.NO	Details
PSO 1	Apply knowledge of computational mathematics, statistics and programming acquired in the field of Computer Science.
PSO 2	Identify, analyze complex problems in the real world and formulate innovative solutions to those problems.
PSO 3	Compare and apply hardware and software technologies for implementing reliable optimized solutions catering to need and available resources.
PSO 4	Apply software development, managerial, Professional, and soft skills in industry
PSO 5	Understand the global needs and prepare themselves for the changing needs worldwide adapting an ability to engage in life-long learning.
PSO 6	Become a responsible, ethical citizen and explore environmental issues to develop sustainable solutions for it.

F.Y.B.Sc. Computer Science Skill Enhancement Course Syllabus
Credit Based System and Grading System
Academic year 2023-2024

Semester – I						
Course Code	Course Type	Course Title	Credits	Lectures/Week		
				Theory	Practical (2 lectures)	Total
Skill Enhancement Course						
SIUCSSE111	Skill Enhancement Course (SEC)	Beginning MySQL	1	1		1
SIUCSSE111	Skill Enhancement Course (SEC)	Practical of SIUCSSE111	1		1	1
Semester – II						
Course Code	Course Type	Course Title	Credits	Lectures/Week		
				Theory	Practical (2 lectures)	Total
Skill Enhancement Course						
SIUCSSE121	Skill Enhancement Course (SEC)	Digital Electronics	1	1		1
SIUCSSE121	Skill Enhancement Course (SEC)	Practical of SIUCSSE121	1		1	1

Semester I – Theory

Course	Title	Lectures	Credits
SIUCSSE111	Beginning MySQL	1 per week (60 min per lec)	1
<p>Objectives: The objective of this course is to introduce the concept of the DBMS with respect to the relational model, to specify the functional and data requirements for a typical database application and to understand creation, manipulation and querying of data in databases .</p> <p>Expected Learning Outcomes</p> <ul style="list-style-type: none"> • CO1: Gain familiarity with the MySQL development environment • CO2: Understand basic concepts of database development: • CO3: SQL, Database design, Administration, and Security • CO4: Design and code a database solution 			
Unit I	<p>Introduction to DBMS – Database, DBMS –Definition, Overview of DBMS, Advantages of DBMS, Levels of abstraction, Data independence, DBMS Architecture</p> <p>DDL Statements - Creating Databases, Using Databases, data types Creating Tables (with integrity constraints – primary key, default, check, not null), Altering Tables, Renaming Tables, Dropping Tables, Truncating Tables, Backing Up and Restoring databases</p> <p>DML Statements – Viewing the structure of a table insert, update, delete, Select all columns, specific columns, unique records, conditional select, in clause, between clause, limit, aggregate function (count, min, max, avg, sum), group by clause, having clause</p> <p>Functions – String Functions (concat, instr, left, right, mid, length, lcase/lower, ucase/upper, replace, strcmp, trim, ltrim, rtrim), Math Functions (abs, ceil, floor, mod, pow, sqrt, round, truncate) Date Functions (adddate, datediff, day, month, year, hour, min, sec, now, reverse)</p> <p>Joining Tables – inner join, outer join (left outer, right outer, full outer)</p> <p>Subqueries – subqueries with IN, EXISTS, subqueries restrictions, Nested subqueries, ANY/ALL clause, correlated subqueries</p> <p>Views (creating, altering dropping, renaming and manipulating views)</p> <p>DCL Statements (creating/dropping users, privileges introduction, granting/revoking privileges, viewing privileges)</p>		15L

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Text books:

1. Ramez Elmasri & Shamkant B.Navathe, Fundamentals of Database Systems, Pearson Education, Sixth Edition, 2010
2. Ramakrishnam, Gehrke, Database Management Systems, McGraw-Hill, 2007
3. Joel Murach,Murach's MySQL, Murach, 2012

Additional References:

1. Robert Sheldon, Geoff Moes, Begning MySQL, Wrox Press, 2005.

Course	Title	Lectures	Credits
SIUCSSE111	Practicals on Beginning MySQL	2 per week (60 min per lec)	1
1	<p>For given scenario Perform the following:</p> <ul style="list-style-type: none"> • Viewing all databases • Creating a Database • Viewing all Tables in a Database • Creating Tables (With and Without Constraints) • Inserting/Updating/Deleting Records in a Table • Saving (Commit) and Undoing (rollback) 		
2	<p>For given scenario Perform the following:</p> <ul style="list-style-type: none"> • Altering a Table • Dropping/Truncating/Renaming Tables • Backing up / Restoring a Database <p>Perform the following:</p> <ul style="list-style-type: none"> • Simple Queries • Simple Queries with Aggregate functions • Queries with Aggregate functions (group by and having clause) 		
3	<p>For given scenario Queries involving</p> <ul style="list-style-type: none"> • Date Functions • String Functions • Math Functions 		
4	<p>For given scenario Join Queries</p> <ul style="list-style-type: none"> • Inner Join • Outer Join <p>Subqueries</p> <ul style="list-style-type: none"> • With IN clause • With EXISTS clause 		
5	<p>For given scenario Views</p> <ul style="list-style-type: none"> • Creating Views (with and without check option) • Dropping views • Selecting from a view <p>DCL statements</p> <ul style="list-style-type: none"> • Granting and revoking permissions 		

Semester II - Theory

Course	Title	Lectures	Credits
SIUCSSE121	Digital Electronics	1 per week (60 min per lec)	1
<p>Objectives: The objective of this course is to provide a comprehensive study of the C programming language, stressing strengths of C, which provide the students with the means of writing modular, efficient, and portable code.</p> <p>Course Outcomes:</p> <ul style="list-style-type: none"> • CO1: Apply concepts of Digital Binary System and implementation of Gates. • CO2: Analyze and design of Combinational logic circuits. • CO3: Analyze and design of Sequential logic circuits with their applications. • CO4: Implement the Design procedure of Synchronous & Asynchronous Sequential Circuits. • CO5: Apply the concept of Digital Logic Families with circuit implementation. 			
Unit I	<p>Computer Abstractions and Technology: Basic structure and operation of a computer, functional units and their interaction.</p> <p>Number Systems: Binary, Decimal, Octal and Hexadecimal.</p> <p>Logic circuits and functions: Combinational circuits and functions: Basic logic gates and functions, truth tables; logic circuits and functions. Minimization with Karnaugh maps. Synthesis of logic functions with and-or-not gates, nand gates, nor gates. Fan-in and fan-out requirements; tristate buffers. Half adder, full adder, ripple carry adder. (Flip flops) Gated S-R and D latches, edge-triggered D latch. Shift registers and registers. Decoders, multiplexers. Sequential circuits and functions: State diagram and state table</p> <p>Instruction set architectures: Memory organization, addressing and operations; word size, big-endian and little endian arrangements. Instructions, sequencing. Instruction sets for RISC and CISC (examples Altera NIOS II and Freescale ColdFire). Operand addressing modes; pointers; indexing for arrays. Machine language, assembly language, assembler directives. Function calls, processor runtime stack, stack frame.</p> <p>Types of machine instructions: arithmetic, logic, shift, etc. Instruction sets, RISC and CISC examples.</p> <p>Basic Processor Unit: Main components of a processor: registers and register files, ALU, control unit, instruction fetch unit, interfaces to instruction and data memories. Datapath. Instruction fetch and execute;</p>	15L	

	<p>executing arithmetic/logic, memory access and branch instructions; hardwired and microprogrammed control for RISC and CISC.</p> <p>Basic I/O: Accessing I/O devices, data transfers between processor and I/O devices. Interrupts and exceptions: interrupt requests and processing.</p>	
<p>Text book:</p> <p>1. Carl Hamacher et al., Computer Organization and Embedded Systems, 6 ed., McGraw-Hill 2012</p> <p>Additional References:</p> <p>1. Patterson and Hennessy, Computer Organization and Design, Morgan Kaufmann, ARM Edition, 2011</p> <p>2. R P Jain, Modern Digital Electronics, Tata McGraw Hill Education Pvt. Ltd. , 4th Edition, 2010</p>		

Course	Title	Lectures	Credits
SIUCSSE121	Practical on Digital Electronics	2 per week (60 min per lec)	1
1	Study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX-OR, and EX-NOR).		
2	Simplify given Boolean expression and realize it		
3	Design and verify a half/full adder		
4	Design and verify half/full subtractor		
5	Verify the operation of a UP and DOWN Counter.		
6	Verify the operation of a 4 bit shift register		
7	Design and verify the operation of flip-flops (SR, D and T) using logic gates.		
8	Using SPIM, write and test an adding machine program that repeatedly reads in integers and adds them into a running sum. The program should stop when it gets an input that is 0, printing out the sum at that point		
9	Using SPIM, write and test a program that reads in a number from the user and prints if it is prime or not prime		
