Academic Council AC/27.06.23/RS1
Item No: _____

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 Vocational Skill Courses 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**
Vocational Skill Courses						
SIUCSVS111	Vocational Skill Course (VSC)	Basic Web Programming	1	1		1
SIUCSVS111	Vocational Skill Course practical	Practical of SIUSCS13	1		1	1

Semester – II						
Course Code	**Course Type**	**Course Title**	**Credits**	**Lectures/Week**		
				Theory	**Practical (2 lectures)**	**Total**
Vocational Skill Courses						
SIUCSVS121	Vocational Skill Course (VSC)	Programming with C	1	1		1
SIUCSVS121	Vocational Skill Course practical	Practical of SIUSCS23	1		1	1

Semester I – Theory

<table>
<tr><th>Course</th><th>Title</th><th>Lectures</th><th>Credits</th></tr>
<tr><td>SIUCSVS111</td><td>Basic Web Programming</td><td>1 per week
(60 min per lec)</td><td>1</td></tr>
<tr><td colspan="4">Objectives:
The course has been designed to provide the basic knowledge for developing of the web pages using HTML,CSS and JavaScript programming language.

Expected Learning Outcomes:
● CO1: Learn the fundamental technology used to define the structure of a webpage.
● CO2: Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites
● CO3: To develop and implement client-side and server-side scripting language programs</td></tr>
<tr><td>Unit I</td><td colspan="2">HTML5: Fundamental Elements of HTML, Formatting Text in HTML, Organizing Text in HTML, Links and URLs in HTML, Tables in HTML, Images on a Web Page, Image Formats, Image Maps, Colors, FORMs in HTML, Interactive Elements, Working with Multimedia - Audio and Video File Formats, HTML elements for inserting Audio / Video on a web page

CSS: Understanding the Syntax of CSS, CSS Selectors, Inserting CSS in an HTML Document, CSS properties to work with background of a Page, CSS properties to work with Fonts and Text Styles, CSS properties for positioning an element

JavaScript: Using JavaScript in an HTML Document, Programming Fundamentals of JavaScript – Variables, Operators, Control Flow Statements, Popup Boxes, Functions – Defining and Invoking a Function, Defining Function arguments, Defining a Return Statement, Calling Functions with Timer, JavaScript Objects - String, RegExp, Math, Date, Browser Objects - Window,
Navigator, History, Location, Document, Cookies, Document Object Model, Form Validation using JavaScript</td><td>15L</td></tr>
<tr><td colspan="4">Text Book(s):
1) HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed, Dreamtech Press
2) Web Programming and Interactive Technologies, scriptDemics, StarEdu Solutions India. 3) PHP: A Beginners Guide, Vikram Vaswani, TMH

Additional Reference(s):
1) HTML, XHTML, and CSS Bible Fifth Edition, Steven M. Schafer, WILEY
2) Learn to Master HTML 5, scriptDemics, StarEdu Solutions Pvt Ltd.</td></tr>
</table>

Course	Title	Lectures	Credits
SIUCSVS111	**Practicals on Basic Web Programming**	**2 per week (60 min per lec)**	**1**
1	A. Design a web page which displays data in a table B. Design a registration form web page		
2	Design a web page which contains three hyperlinks (audio,video, and gif image). ● When a user clicks on an audio link, the web-page should open in the same tab with some audio content. ● When a user clicks on a video web page should open in the same tab with some video content. ● When a user clicks on a gif image web-page should open in the same tab with some gif content. ● Every hyperlink web page should contain hyperlink (home). So that when user click on home it go back to home page(main page)		
3	Design a webpage that makes use of Cascading Style Sheets with (Background, fonts, Text styles).		
4	A. Create a web page which takes a number from the user through the input box. onclick of button it should display the factorial of that number. B. Create a web page which takes series length from the user through the input box Onclick of button it should display Fibonacci series of that length. C. Create a web page which takes a number from the user through input box Onclick of button it should display the reverse of that number.		
5	Write a javascript program which contain following buttons i) browser window size (height and width), ii) current page details(hostname, protocol and port of the page), iii) browser details like(appversion, appname, language) . iv) Back v) Forward On click of first three buttons it should display the information.And onclick of back and forward button it should load the previous and next URL respectively.		
6	Write a javascript program to take firstname, last name ,age , contact-no, address for registration. Validate all the fields using Regular expression (RegExp object) such that i) firstname should contain only characters ii) lastname should contain only characters iii) age should contain only number iv) contact-no should contain only number v) address should not contain $ sign		

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Semester II - Theory

Course	Title	Lectures	Credits
SIUCSVS121	**Programming with C**	**1 per week (60 min per lec)**	**1**

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.

Course Outcome:

- **CO1**: Students should be able to write, compile and debug programs in C language.
- **CO2:** Students should be able to use different data types in a computer program.
- **CO3**: Students should be able to design programs involving decision structures, loops and functions.
- **CO4**: Students should be able to explain the difference between call by value and call by reference.
- **CO5**: Students should be able to understand the dynamics of memory by the use of pointers.

Unit I	**Structure of C program**: Header and body, Use of comments. Interpreters vs compilers, Python vs C. Compilation of a program. Formatted I/O: printf(), scanf(). **Data**: Variables, Constants, data types like: int, float char, double and void, short and long size qualifiers, signed and unsigned qualifiers. **Variables**: Declaring variables, scope of the variables according to block, hierarchy of data types. **Iterations**: Control statements for decision making: (i) **Branching**: if statement, else.. if statement, switch statement. (ii) **Looping**: while loop, do.. while, for loop. (iii) **Jump statements**: break, continue and goto. **Arrays**: (One and two dimensional), declaring array variables, initialization of arrays, accessing array elements. **Functions**: Function declaration, function definition, Global and local variables, return statement, Calling a function by passing values. **Recursion**: Definition, Recursive functions. **Pointer**: Fundamentals, Pointer variables, Referencing and dereferencing, Pointer Arithmetic, Using Pointers with Arrays, Using	15L

	Pointers with Strings, Array of Pointers, Pointers as function arguments, Functions returning pointers. **Dynamic Memory Allocation:** malloc(), calloc(), realloc(), free() and sizeof operator. **Structure**: Declaration of structure, reading and assignment of structure variables, Array of structures, arrays within structures, structures within structures. Compare C structures with Python tuples.	

Text books:

1. Programming in ANSI C (Third Edition) : E Balagurusamy, TMH

Additional References:

1. Pradip Dey, Manas Ghosh, “Programming in C”, second edition, Oxford University Press
2. Yashavant P. Kanetkar. “ Let Us C”, BPB Publications

Course	Title	Lectures	Credits
SIUCSVS121	**Practicals Of Programming with C**	**2 per week (60 min per week)**	**1**
1	**Basic Programs(Variables, Operators):** A. Write a program to find the addition, subtraction, multiplication and division of two numbers. B. Write a program to find the area of rectangle, square and circle. C. Write a program to find the volume of a cube, sphere, and cylinder.		
2	A. Programs to demonstrate data input and output functions B. Programs to manipulate strings		
3	**Conditional statements and loops** A. Write a program to check whether the number is even or odd. B. Write a program to check whether the number is positive, negative or zero. C. Write a program to find the sum of squares of digits of a number. D. Write a program to reverse the digits of an integer.		
4	Programs on Functions.		
5	**Recursive functions** 1. Write a program to find the factorial of a number using a recursive function. 2. Write a program to find the sum of natural numbers using a recursive function.		
6	**Arrays** A. Write a program to find the largest value that is stored in the array. B. Write a program using pointers to compute the sum of all elements stored in an array. C. Write a program to arrange the ‘n’ numbers stored in the array in ascending and descending order.		
7	**Pointers** A. Write a program to demonstrate the use of pointers. B. Write a program to perform addition and subtraction of two pointer variables.		
8	Programs on structures.		
9	Programs on unions.		
10	**Programs on File Handling** A. Write a program to Create a File, Write in it, And Close the File. B. Write a program to Open a File, Read from it, And Close the File C. Write a program to read the name and marks of ‘n’ number of students and store them in a file.		

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