Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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-: પરિપત્ર :-

કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખા હેઠળની તમામ બી.એસસી.(કોમ્પ્યુટર સાયન્સ) ચલાવતી સંલગ્ન કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૩–૨૪ થી અમલમાં આવનાર F.Y.B.Sc. (Computer Science) Semester-1 & 2 ના અભ્યાસક્રમ અંગે કોમ્પ્યુટર સાયન્સ અભ્યાસસમિતિની તા.૧૩/૦૫/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંકઃ૩ થી કરેલ ભલામણ કોમ્પ્યુટર સાયન્સ એન્ડ આઈ.ટી. વિદ્યાશાખાની તા.૨૭/૦૫/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંકઃ૩ અન્વયે કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૦૭/૦૬/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૪ થી સ્વીકારી મંજૂર કરેલ છે. જેની આથી જાણ કરવામાં આવે છે.

Computer Science Study Committee Dt. 13-05-2023 Meeting Resolution No. 3

:: It is hereby resolved that, The Syllabus of B.Sc.(Computer Science), prepared by the subcommittee was discussed by the members of BOS and unanimously resolved to approve it after making following suggestions :

(a) Restructuring the structure of B.Sc. (Computer Science) to accommodate multiple entry and multiple exit.

(b) In paper **No. 202** topic **4** subtopic **4.6** the title to be changed from 'Data visualization with data frame' to " Data visualization "
Further, the board recommends to Present the revised syllabus for further process.

કોમ્પ્યુટર સાયન્સ એન્ડ આઈ.ટી. વિદ્યાશાખાની તા.૨૭/૦૫/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંકઃ ૩

:: આથી ઠરાવવામાં આવે છે કે, કોમ્પ્યુટર સાયન્સ અભ્યાસ સમિતિની તા.૧૩/૦૫/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંકઃ૩ અન્વયે કરેલ ભલામણ સ્વીકારી શૈક્ષણિક વર્ષ ૨૦૨૩–૨૪ થી અમલમાં આવનાર Forth Year Under Graduate Program માં મલ્ટી લેવલ એન્ટ્રી અને મલ્ટી લેવલ એકઝીટની વ્યવસ્થા ધરાવતા બી.એસસી.(કોમ્પ્યુટર સાયન્સ)સેમે.૧ અને સેમ. ૨ ના NEP-2020 મુજબ નવા અભ્યાસક્રમ (Curriculum) અને Framework માં બોર્ડ દ્વારા મલ્ટી લેવલ એન્ટ્રી અને મલ્ટી લેવલ એકઝીટની વ્યવસ્થા તથા સૂચવેલ અન્ય ફેરફારને આમેજ કર્યા બાદ રજૂ થયેલ નવા અભ્યાસક્રમ (Curriculum) અને Framework નો યથાવત સ્વીકારી કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૦૭/૦૬/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૪

:: આથી ઠરાવવામાં આવે છે કે, કોમ્પ્યુટર સાયન્સ એન્ડ આઈ.ટી. વિદ્યાશાખાની તા.૨૭/૦૫/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંકઃ ૩ અન્વયે કરેલ ભલામણ સ્વીકારી મંજુર કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./સિલેબસ/પરિપત્ર/૧૪૪૮૦/૨૦૨૩
તા.૧૪/૦૬/૨૦૨૨

કુલસચિવ વતી

પ્રતિ,

૧) બી.એસસી.(કોમ્પ્યુટર સાયન્સ)નો અભ્યાસક્રમ ચલાવતી સંલગ્ન કોલેજોના આચાર્યશ્રીઓ.
.....આપશ્રીની કોલેજ/વિભાગના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારૂ.

૨) ડીનશ્રી, કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખા.

૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત. .....તરફ જાણ સારૂ.

Veer Narmad South Gujarat University, Surat
Bachelor of Computer Application (B.Sc.(Computer Science)(Honours))
Under the Faculty of
Computer Science, Application and Information Technology

Name of Program:	Bachelor of Science in Computer Science (Honours)
Abbreviation:	B.Sc.(Computer Science): Four-year Integrated Program. With Multi-Level Entry and Exit option
Multi-level Exit Criteria:	i) Under Graduate Certificate in Computer Science: If the student wish to exit after completion of First year (Semester-1 and Semeter-2) without any back-log and secure additional 4 credits from work based skill oriented university approved courses /vocational courses / summer internship / Apprenticeship in addition to 6 credits from skill-based courses earned during first and second semester. ii) Diploma in Computer Science: If the student wish to exit after completion of Second year (Semester-1 to Semeter-4) without any back-log and secure additional 4 credits from work based skill oriented university approved courses /vocational courses / summer internship / Apprenticeship offered at end of first or second year in addition to 6 credits from skill-based courses earned during first four semesters. iii) B.Sc. (Bachelor's of Science in Computer Science): If the student wish to exit after completion of Third year (Semeste-1 to semester-6) without any back-log and secure additional 4 credits from work based skill oriented university approved courses /vocational courses / summer internship / Apprenticeship offered at end of first or second year in addition to 6 credits from skill-based courses earned during first four semesters.
Multi-Level Entry Criteria:	As per the norms of the Veer Narmad South Gujarat University.
Duration:	4 year of B.Sc.(Computer Science)(Honors) degree program with multi level exit options at 1st, 2nd and 3rd Year to obtain Certificate, Diploma, Degree and Honours Degree in Computer Application respectively.
Eligibility:	As per the norms of Veer Narmad South Gujarat University), Surat.
Objective of the Program:	Bachelor of Science in Computer Science (B.Sc.)(Computer Science)(Honours) is undergraduate degree program in computer application area. Objective of the program is to open a channel of admission for courses in the field of Computer Science, Applications and all relevant fields of information technologies to build career for students who have completed standard 12th (H.S.C.) and are interested in taking computing/computer Application and Information Technology as a career. Main objective is to equip the students with strong foundation in computer programming languages, coding, database handling, software application developments, problem-solving skills and development of analytical and

	logical skills. The focus is to introduce various programming languages on different platforms and operating systems, interaction with databases available on various platforms, software testing, development and deployment techniques. It also aim to provide knowledge in latest trends and advancements in field of computer technologies. The program caters to the needs of the students aspiring to excel in the field of computer science, applications and technologies. The program is designed to develop computer professionals versatile in almost all field of computer application. It also aim to enhance communication and interpersonal skills.
Program Outcome:	**PO1:** Ability to analyze a problem, identify and define the Computing requirements appropriate to its solution. **PO2:** Enhancing the Understanding related to core ideas of computer, analytical thinking, logical abilities and computational fundamentals. **PO3:** To generate Understanding regarding the core and fundamental ideas about the computer platforms, operating systems, software design concepts, networking concepts and advanced and emerging technologies. **PO4:** Foster critical thinking and innovation: The program encourages students to think critically and creatively in the context of computer science. They are challenged to explore innovative approaches to problem-solving, evaluate alternative solutions, and apply logical reasoning to make informed decisions. **PO5:** Develop technical proficiency: The objective is to equip students with practical skills in software development, programming languages, databases, networking, and other relevant technologies. They gain hands-on experience in designing, implementing, and testing software systems using industry-standard tools and techniques. **PO6:** Promote collaboration and communication skills: The program emphasizes the importance of teamwork and effective communication in the field of computer science. Students are encouraged to collaborate with peers on projects, participate in group discussions, and present their ideas clearly and professionally. These program objectives collectively aim to prepare students for diverse career paths in the field of computer science, including software development, systems analysis, data analysis, cybersecurity, and research.
Program Specific Outcome:	It will open field for the aspiring students to opt further career or masters' level study in the fields of Research, Design, Architecture and software development. **PSO 1 :** Develop and Strengthen the fundamental core computer science concepts that are required to solve complex problems. **PSO 2 :** Develop the professional skills that need independent logical and analytical thinking, teamwork for successful computer professionals.

	PSO 3 : Nurture the students for design and development of workable computer application solution for real world problems. **PSO 4 :** Develop students for self-learning and practicing computer science application problem solutions. **PSO 5 :** Develop ability to service and excel in fulfilling the modern day demands with their knowledge and skills. **PSO 6 :** Develop technical project and present them among the users.
PO and PSO mapping:	
Medium of Instruction:	English
Program Structure:	Semester-wise Breakup of the course is given as follows :

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
PO1						
PO2						
PO3						
PO4						
PO5						
PO6						

Veer Narmad South Gujarat University, Surat

Program Structure: F.Y.B.Sc.(Computer Science) (SEM – 1 and SEM – 2)

(w.e.f. Academic Year June, 2023-2024)

B.Sc.(Computer Science) – Three Year Program

B.Sc.(Computer Science)(Honours)) – Four Year Integrated Program

Program Structure	Semester-wise break up for the courses :

SEMESTER – 1

Course Code	**Course Title**	**Course Category**	**Level of Course**	**Course Credits**	**Teaching Hours/week**	
				Th.+Pra.	Theory	Practical/ Fieldwork /Project/ Internship
CS-101	Communication Skills **(AEC-01)** [Modern Indian Language (MIL) & English language focused on language and communication skills.]	Ability Enhancement Course	100-199 Foundation/ Introductory	2	2	0
CS-102	Multi-Disciplinary Course-01 (Student will opt any one course of multi-disciplinary nature from other than the computer Science and Application faculty). [Preferably: Mathematics/Statistics/Physics/Electronics]	Multi-Disciplinary	100-199 Foundation/ Introductory	3	3	0
CS-103	Fundamentals of Computer	Minor Course	100-199 Foundation/ Introductory	3	3	0
CS-104	Programming in C	Major Course	200-299 Intermediate Level Course	4	4	0
CS-105	Web Designing-I	Major Course	200-299 Intermediate Level Course	4	4	0
CS-106	Practical (Based on CS-104 and CS-105)	Major Course	200-299 Intermediate Level Course	3	0	06
CS-107	**Skill Enhancement Course-I (SEC-01)** [The student will undergo field training/ internship training OR Select minimum one University approved and recognized 3 credit certificate course from the skill based courses list offered by the respective institute/department.] (The student need to enrol separately and pay the fees as decided by the respective institute/department)	Skill Enhancement Course (Audit Course)	100-199 Foundation / Introductory	3	-	3
CS-108	**Value Addition Course – I (VAC-01)** [The student will select minimum one University approved and recognized 2 credits certificate course from the Value Addition courses list offered by the respective institute/department.] (The student need to enrol separately and pay the fees as decided by the respective institute/department)	Value Addition Course (Audit Course)	100-199 Foundation/ Introductory	2	-	2
Other Activities	The student is expected to participate in activities related to National Service Scheme (NCC), National Cadet Corps (NCC), adult education/literacy initiatives, mentoring school students, Elderly literacy program/ Environment preservation activities and other similar activities.			-	-	-
Total				24	16	11

Course Code	Course Title	Course Credit	University Exam Type	Exam Duration	External Marks	Internal Marks	Total Marks
CS-101	Communication Skills (AEC-01)	2	Theory/ Written	3 Hours	70	30	100
CS-102	Multi Disciplinary Course-02	3	Theory/ Written	3 Hours	70	30	100
CS-103	Fundamentals of Computer	3	Theory/ Written	3 Hours	70	30	100
CS-104	Programming in C	4	Theory/ Written	3 Hours	70	30	100
CS-105	Web Designing-I	4	Theory/Written	3 Hours	70	30	100
CS-106	Practical : Based on Course Code:CS-104 & CS-105)	3	Practical	5 Hours	140	60	200
CS-107	Skill Enhancement Course-I (SEC-01)	3	Audit Course*	-	-	-	50#
CS-108	Value Addition Course-I (VAC-01)	2	Audit Course*	-	-	-	50#
Total		24			490	210	700

For Practical and Project:

- Batch Size – 30 Maximum (Desirable). Maximum 40 students can be accommodated in a batch. Separate batch should be considered if the student strength exceed 40 numbers.
- Practical Course-106 includes Practical sessions for course-CS-104 and course-CS-105.
- The journal must be certified by the concerned faculty and by the Head of the Department, failing which the student will not be allowed to appear for External Practical Examination. Student will submit softcopy of Minor Project duly certified by the internal guide.

Internship: A student who wish to exit after successfully completion of first year (Semester-1 and Semester-2) without any backlog is required to obtain Four credits at the end of the year either through the summer internship or university approved skill based certificate courses(two courses of 2-credits each or one 4-credit course). Student is required to enrol for the certificate courses separately by paying the course fees as decided by the college/institute. For summer training, the Institute/college will grant the permission and evaluate the training outcomes. Based on satisfactory completion of the summer training, the Institute head will recommend to the university to grant four credits for summer training. The Internship/summer training/skill based certificate courses will be an audit course.[The internship cost/fees will be bear by the student.]

Skill Enhancement Course : As per NEP(National Education Policy-2020), it is mandatory for students to select a 3 credit skill enhancement course out of the choices given by the college/institute. It will be mandatory for the student to opt minimum one 3-credit Skill enhancement course out of offered courses recognised by University during semester-1 to semester-3. This course will be an Audit course*.

Value Addition Course: As per NEP(National Education Policy-2020), it is mandatory for students to select minimum one 2-credit Value Addition Course out of offered courses recognised by the University during semester-1 to semester-4. This course will be an Audit course*.

***Audit Course :** For Audit courses, the students will enrol for the course from the given university approved list of certificate courses offered by the respective college/department. The student will select and enrol separately for any of the offered list of courses at college/department/institute and obtain respective credits. The institute will evaluate the performance (preferably continuous evolution) as per the SOP of certificate courses and on successfully completion of the course, the student will be eligible to obtain respective credits for the course. These credits will be considered and reflect in student's mark-sheet as well as in ABC(Academic Bank of Credit). However, these courses are Audit courses, hence they will not be considered in calculating the SGPA and CGPA. Moreover, these courses are mandatory and student is required to obtain the specified credits in process to acquire the certificate/diploma/degree.

[The student is required to pay separately for these courses as prescribed by the college. The college will decide the fees for audit courses based on the norms of University certificate course per credit fees.]

 # Marks: The scale on which the students will be evaluated for the Audit course. The evaluation methodology will be continuous evaluation and the score obtained will reflect in mark-sheet but not considered for SGPA or CGPA.

Program Passing Rules:	As per University rules.
Program Fees : (Per Semester) (One time fees and exam fees are additional as prescribed by the university) (w.e.f. Academic Year : 2023-24)	Semester Tuition Fees : As per University norms. Semester Laboratory Utilization fees : (For Govt. and GIA colleges) : As per University norms. (For Self Finance Institutes) : Rs.1500/- [Other one time /affiliation /exam fees, will be as per the norms of the University] [The fees for all certificate courses, Skill Enhancement Courses and Value Addition Courses; fees will be as per the prescribed limit for per credit as per the SOP of certificate courses decided by the university.]

SEMESTER – 2

Course Code	Course Title	Course Category	Level of Course	Course Credits	Teaching per week	
					Theory	Practical/ Fieldwork/ Project/ Internship
CS-201	**Ability Enhancement Course-II (AEC-02)** [Modern Indian Language (MIL) & English language focused on language and communication skills.]	Ability Enhancement Course	100-199 Foundation/ Introductory	2	2	0
CS-202	Multi-Disciplinary Course-02 (Student will opt any one course of multi-disciplinary nature from other than the computer Science and Application faculty). [Preferably: Mathematics/ Statistics/ Physics/ Electronics]	Multi-Disciplinary	100-199 Foundation/ Introductory	3	3	0
CS-203	E-Commerce and Cyber Security	Minor Course	100-199 Foundation/ Introductory	3	3	0
CS-204	Python Programming	Major Course	200-299 Intermediate Level Course	4	4	0
CS-205	Object Oriented Programming Using C++	Major Course	200-299 Intermediate Level Course	4	4	0
CS-206	Practical (Based on Course Code: 204 & 205 : Equally Divided)	Major Course	200-299 Intermediate Level Course	3	0	6
CS-207	**Skill Enhancement Course-II (SEC-02)** [The student will undergo field training/ internship training OR Select minimum one University approved and recognized 3 credit certificate course from the skill based courses list offered by the respective institute/department.] (The student need to enrol separately and pay the fees as decided by the respective institute/department)	Skill Enhancement Course (Audit Course)	100-199 Foundation / Introductory	3	0	3
CS-208	**Value Addition Course – II (VAC-02)** [To be selected minimum one University approved and recognized 2 credit certificate course from the Value Addition Courses list offered by the respective institute/department.] (The student can select and enrol separately for the course offered by the respective institute/department and need to pay separately as decided by the institute as per norms of university for certificate courses.)	Value Addition Course	100-199 Foundation / Introductory	2	2	-
Other Activities	The student is expected to participate in activities related to National Service Scheme (NCC), National Cadet Corps (NCC), adult education/literacy initiatives, mentoring school students, Elderly literacy program / Environment preservation activities and other similar activities.			-	-	-
Total				24	16	11

Course Code	Course Title	Course Credit	University Exam Type	Exam Duration	External Marks	Internal Marks	Total Marks
CS-201	Ability Enhancement Course (AEC -02)[%]	2	Theory/ Written	3 Hours	70	30	100
CS-202	Multi-Disciplinary Course-02	3	Theory/ Written	3 Hours	70	30	100
CS-203	E-commerce and cyber Security	3	Theory/ Written	3 Hours	70	30	100
CS-204	Object oriented Programming Using C++	4	Theory/ Written	3 Hours	70	30	100
CS-205	Python Programming-1	4	Theory/ Written	3 Hours	70	30	100
CS-206	Practical Based on Course Code:204 & 205	3	Practical	5 Hours	140	60	200
CS-207	Skill Enhancement Course – II (SEC-02)	3	Audit Courses	-	-	-	50[#]
CS-208	Value Added Course – II (VAC-02)	2	Audit Course	-	-	-	50[#]
Total		24			490	210	700

For Practical and Project:

- Batch Size – 30 Maximum (Desirable). Maximum 40 students can be accommodated in a batch. Separate batch should be considered if the student strength exceed 40 numbers.
- Practical Course-106 includes Practical sessions for course-CS-104 and course-CS-105.
- The journal must be certified by the concerned faculty and by the Head of the Department, failing which the student will not be allowed to appear for External Practical Examination. Student will submit softcopy of Minor Project duly certified by the internal guide.

Internship: A student who wish to exit after successfully completion of first year (Semester-1 and Semester-2) without any backlog is required to obtain Four credits at the end of the year either through the summer internship or university approved skill based certificate courses(two courses of 2-credits each or one 4-credit course). Student is required to enrol for the certificate courses separately by paying the course fees as decided by the college/institute. For summer training, the Institute/college will grant the permission and evaluate the training outcomes. Based on satisfactory completion of the summer training, the Institute head will recommend to the university to grant four credits for summer training. The Internship/summer training/skill based certificate courses will be an audit course.[The internship cost/fees will be bear by the student.]

Skill Enhancement Course : As per NEP(National Education Policy-2020), it is mandatory for students to select a 3 credit skill enhancement course out of the choices given by the college/institute. It will be mandatory for the student to opt minimum one 3-credit Skill enhancement course out of offered courses recognised by University during semester-1 to semester-3. This course will be an Audit course[*].

Value Addition Course: As per NEP(National Education Policy-2020), it is mandatory for students to select minimum one 2-credit Value Addition Course out of offered courses recognised by the University during semester-1 to semester-4. This course will be an Audit course[*].

***Audit Course :** For Audit courses, the students will enrol for the course from the given university approved list of certificate courses offered by the respective college/department. The student will select and enrol separately for any of the offered list of courses at college/department/institute and obtain respective credits. The institute will evaluate the performance (preferably continuous evolution) as per the SOP of certificate courses and on successfully completion of the course, the student will be eligible to obtain respective credits for the course. These credits will be considered and reflect in student's mark-sheet as well as in ABC(Academic Bank of Credit). However, these courses are Audit courses, hence they will not be considered in calculating the SGPA and CGPA. Moreover, these courses are mandatory and student is required to obtain the specified credits in process to acquire the certificate/diploma/degree.

[The student is required to pay separately for these courses as prescribed by the college. The college will decide the fees for audit courses based on the norms of University certificate course per credit fees.]

 # Marks: The scale on which the students will be evaluated for the Audit course. The evaluation methodology will be continuous evaluation and the score obtained will reflect in mark-sheet but not considered for SGPA or CGPA.

% : Institute/College will offer any one course from given list of Ability Enhancement Courses approved by the University.

Program Passing Rules:	As per University rules.
Program Fees : (Per Semester) (One time fees and exam fees are additional as prescribed by the university) (w.e.f. Academic Year : 2023-24)	Semester Tuition Fees : As per University norms. Semester Laboratory Utilization fees : (For Govt. and GIA colleges) : As per University norms. (For Self Finance Institutes) : Rs.1500/- [Other one time /affiliation /exam fees, will be as per the norms of the University] [The fees for all certificate courses, Skill Enhancement Courses and Value Addition Courses; fees will be as per the prescribed limit for per credit as per the SOP of certificate courses decided by the university.]

Semester - 1

Course Code: CS-101

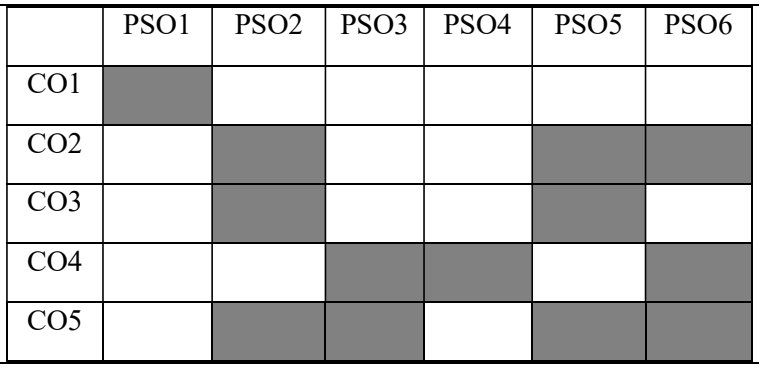
Course Title: Ability Enhancement Course – 01 (AEC-01)

Course Code	CS-101
Course Title	Communication Skill
Credits	2
Course Category	Ability Enhancement Course (AEC-01) [Modern Indian Language (MIL) & English language focused on language and communication skills.]
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	The course will be selected by the institute by selecting any one of the course offered under the AEC (Ability Enhancement Course) offered by the university. [Modern Indian Language (MIL) & English language focused on language and communication skills.]
Pre-requisite	Knowledge of English at H.Sc.(12^{th}) Level
Evaluation Method	30% Internal assessment. 70% External assessment.

Course Code: CS-102
Course Title: Multi-Disciplinary Course - 01

Course Code	CS-102
Course Title	Multi Disciplinary Course – 01
Credits	3
Course Category	Multidisciplinary Course (MC-01)
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	3 Hrs.
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	Student will opt any one course of multi-disciplinary nature from other than the computer Science and Application faculty. The course will be offered by the institute/college passed by the Board of Studies of University faculties other than the computer science and application faculty. [Preferably: Mathematics/ Statistics/ Physics/ Electronics]
Evaluation Method	30% Internal assessment. 70% External assessment.

Course Code: CS-103
Course Title: Introduction to Computers

Course Code	CS-103
Course Title	Fundamentals of Computer
Credits	3
Course Category	Minor Course
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	3 Hrs.
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	This course imparts the knowledge of Fundamentals of computers. The concepts of related features of internal devices, input and output devices, introduction to internet browser understanding with required function to work with.
Course Objective	To make student understand: ➢ Architecture ,Application and types of Computer ➢ Computer peripherals input, output, network devices ➢ Operating system concept ➢ Internet ,web browser and network related hardware equipment
Pre-requisite	None
Course Outcomes	**CO1:** To Understand the fundamental aspects of the application, types and architecture of computers. **CO2:** To explain basic internal components of computers and concepts of operating systems. **CO3:** To learn latest input and output devices with architecture and use. **CO4:** To generate understanding regarding cloud and internet technology **CO5:** Hands on knowledge about using and implementing browsers, URLs and relevant uses.
Mapping between Course Outcomes(CO) with Program Outcomes(PSO)	
Course Outcome	On completion of this course, students will get knowledge about functional units, number System, devices and memory and storage.
Course Content	**UNIT-1: Introduction** 1.1 Introduction of Computer 1.2 Applications of Computer 1.3 Types of Computers – Super Computers, Mainframes, Mini Computers, Micro computers(Desktop, Laptop, Notebook, Tablet, Smart Phones) 1.4 Block Diagram and functional units of computer **UNIT-2: Basic Computer Architecture** 2.1 Concepts of Address Bus and Data Bus 2.2 Concept of virtual memory and cache memory 2.3. Hardware Components

	2.3.1. Motherboard 2.3.2. Types of Processor (CPU and GPU) 2.3.3. Understanding processor speed 2.3.4. Memory – RAM(SRAM,DRAM, SDRAM), ROM, EPROM, EEPROM 2.3.5. Storage Devices – Hard Disk, CD, DVD, USB flash memory 2.4. Introduction to Software 2.4.1. Purpose and significance of Operating System 2.4.2. Concept of System Software and Application Software **Unit – 3: Input & Output Devices** 3.1. Introduction of Input Devices (use, architecture and application) 3.1.1. Pointing Devices – Mouse, Trackball, Joystick, Touch Screen, Light Pen 3.1.2. Keyboard (3.1.3. RFID concepts and application in FastTag 3.2. Introduction and purpose of Scanning Devices (use, architecture and application) 3.2.1. Optical Scanner 3.2.2. Bar Code Reader 3.2.3. Web Camera 3.3. Introduction and comparisons of Output Devices (use, architecture and application) 3.3.1. Monitors – LED, LCD,TFT, OLED, TouchScreen Monitor 3.3.2. Printers – Dot Matrix Printer, Laser Printer, Inkjet Printer **Unit - 4: Concepts of Internet** 4.1. Concepts of Internet and WWW 4.1.1 Types of Internet Services 4.1.2 Hardware – Modem, Router, Bluetooth, Fire-Stick 4.1.3 Internet connections using Hotspot, WiFi, cable 4.2 Introduction of Cloud 4.2.1 Concepts of cloud 4.2.2 Purpose and application of Cloud (Example of GoogleDoc) 4.2.3 Concepts of Online Data Backup (Example Google Drive) 4.3 Introduction of Web Browser and relevant terminologies : 4.3.1 URL, Address bar, Domain, Links, Navigation Buttons 4.3.2 Tabbed browsing, Bookmarks, History
Reference Books	1. How computer work: Ron White – Tech media 2. Introduction to computers: 4th Edition – Peter Norton 3. Fundamentals of Computers: V. Rajaraman 4. Computer Fundamentals: Pradeep K. Sinha & Priti Sinha (BPB) 5. Introduction to Networking Richard McMahon Tata McGraw Hill Publication 6. HTML Black Book – Steven Holzner – Dreamtech Press 7. Computer Network Fundamentals and application – R S Rajesh Vikas Publication 8. HTML for the World Wide Web, Fifth Edition, with XHTML and CSS-Peachpit Press
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course Code: CS-104
Course Title: C Programming

Course Code	CS-104
Course Title	Computer Programming & Programming Methodology (CPPM)
Credits	4
Course Category	Major Course
Level of Course	200-299 (Intermediate Level)
Teaching per Week	4 Hrs.
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	- Computer programming is a process that leads from an original formulation of a computing problem to executable computer programs. - Programming involves activities such as analysis, developing, understanding, generating algorithms, verification of requirements of algorithms including their correctness, and implementation (commonly referred to as coding) of algorithms in a target programming language. - To emphasis on concepts of Compiler based programming language, structure of code, algorithms, flow-charts, problem solving attitude, concepts of variables and declaration mechanism of different datatypes, simple I/O statements, conditional statements, loops, compound iterations, strings and certain inbuilt functions, header files, concepts of arrays and one dimensional numeric array operations, numeric inbuilt functions and concepts of pointers
Course Objective	• To understand the use of problem solving tools • Paradigm of programming • To understand Structured Programming approach to problem solving using C language. • To Learn Various constructs of the C programming language.
Pre-requisite	Concepts of Algorithms, flowcharts and basic Logical ability.
Course Outcomes	CO1: Explain students the fundamental aspects of the "c" programming CO2: Explain students Problem Solving techniques using Algorithms, Computer, Programming Paradigm. CO3: Train students to develop "C" programs for the real-world objects using composite data types CO4: Train students to understand various "c" In-built functions and its working. CO5: Train students to implement Files I/O handling in "C" program.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	

	PSO1	PSO2	PSO3	PSO4	PsSO5	PSO6
CO1						
CO2						
CO3						
CO4						
CO5						

Course Content	

1. Fundamentals of Programming and Basics of "C"

1.1 Algorithm & Flowchart

1.2 Programming Languages & Structured Programming

1.2.1 Structured Programming

1.2.2 Levels of Programming languages

1.2.3 Concepts of Compiler / Interpreter, Editor

1.3 Fundamentals of "C"

1.3.1. The Basics of "C": Identifiers, key words, data types, declaration, reserved, words

1.3.2. concept of expression, statement and block

1.3.3. Arithmetic Operators

1.3.4. Unary Operators

1.3.5. Relational Operators

1.3.6. Assignment Operators

1.3.7 Logical Operator

1.3.8. Conditional Operators

1.3.9. Control Structure

1.3.9.1 branching statement (simple if ,if ..else,nested if ,else if ladder)

1.3.9.2 Looping statement (*while* Loop,*do-while* Loop, *for* Loop)

1.3.9.3 *switch* Statement

1.3.9.4 goto statement

1.3.9.5 *break* and *continue* Statements

2. Arrays ,structure, union and Pointers

2.1 Arrays

2.1.1 Array introduction, definition, fundamental of array

2.1.2. Processing an array

2.1.3. Passing array to function

2.1.4 Multidimensional array

2.2 structure

2.2.1 Defining Structure

2.2.2 working with Structure

2.2.3 User Defined Data Type (typedef)

2.3 Union

2.3.1 Defining union

2.3.2 Working with union

2.4 Pointers

2.4.1 Pointer Fundamentals

2.4.2 Pointer Declaration

2.4.3 Pointers and One Dimensional Array

2.4.4 Pointers and Multidimensional Array

2.4.5 Array of Pointer

2.4.6 Structure and Pointer

2.4.7 pointer to function

3. Functions

3.1. Library Functions

3.1.1 Arithmetic Functions

3.1.2 String handling Functions

3.1.3 Conversion Functions

3.2. User Defined Functions (UDFs)

3.2.1 function declaration(Function Prototype)

3.2.2 Defining and Calling a Function

	3.2.3 UDFs- With and without parameters and return values 3.2.3 Passing Arguments to a Function 3.2.4 Passing Pointers to a Function 3.3 Recursion **4. Files Handling and Miscellaneous** 4.1 Opening a file & Closing a file 4.2 Reading from a file & Writing to a file 4.3 Various inbuilt functions related for file handling 4.4 Random Accessing a file 4.5 Command line arguments
Reference Books	1. "C Language Programming", By Gottfried, Tata McGraw Hill 2. Let Us C - Yashwant Kenetkar 3. C Programming Language – Kernighan & Ritchie - TMH 4. 'C' Odyssey (6 volumes) – Vijay Mukhi – PHI 5. C: How to Program, 6th Edition, Deitel & Deitel, PHI 6. Magnifying C, Arpita Gopal – PHI 7. Problem Solving with C, Somashekara - PHI 8. Programming in 'C' --- Stephan Kochan - CBS 9. Mastering Turbo C --- Kelly & Bootle - BPB 10. Mastering Turbo C --- Stan Kelly – BPB ford
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course Code: CS-105

Course Title: Web Designing through HTML, CSS & JavaScript

<table>
<tr><td>Course Code</td><td>CS-105</td></tr>
<tr><td>Course Title</td><td>Web Designing through HTML, CSS & JavaScript</td></tr>
<tr><td>Credits</td><td>4</td></tr>
<tr><td>Course Category</td><td>Major Course</td></tr>
<tr><td>Level of Course</td><td>200-299 (Intermediate Level)</td></tr>
<tr><td>Teaching per Week</td><td>4 Hrs.</td></tr>
<tr><td>Minimum weeks per Semester</td><td>15 (Including class work, examination, preparation etc.)</td></tr>
<tr><td>Review / Revision</td><td>2022-2023</td></tr>
<tr><td>Implementation Year:</td><td>A.Y. 2023-2024</td></tr>
<tr><td>Purpose of Course</td><td>This course imparts the knowledge of HTML page development. Course offers concepts related to various tags of HTML 5.0. The course is aimed to give inner depth of java script for client side programming to make web pages more interactive.</td></tr>
<tr><td>Course Objective</td><td>● To make students understand the fundamentals of developing websites using HTML Technology.
● Students will be able to make web pages more interactive using Java Script</td></tr>
<tr><td>Pre-requisite</td><td>Basic knowledge of Internet and web browsers</td></tr>
<tr><td>Course Outcomes</td><td>CO1: Explain students the fundamental concepts of HTML
CO2: Explain students to use various tags to make simple websites
CO3: Train students to use CSS to make web pages effective and maintain consistent design through web pages.
CO4: Explain students to use java script to do interactive programming for certain client side validations and business roles.</td></tr>
<tr><td>Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)</td><td>
<table>
<tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PsSO5</td><td>PSO6</td></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Course Content</td><td>UNIT-1: HTML & Structure Web Page
1.1 Introduction to HTML
1.1.1 Design and develop web pages using HTML tags (HTML5)
1.1.2 Structure of HTML page
1.1.3 HTML Comments
1.2 HTML Elements (<h1>…<h6>, <p>,
, <a>, <img>)
1.3 HTML Attributes (alt, href, src, width, height, style, title, id)
1.4 HTML Headings (<head>)
1.5 Text Formatting Tags(<b>, <strong>,<i>,<em>,<mark>, <small>, <del>,<ins>,<sub>,<sup>)
1.6 Tables
1.6.1 Table height and width</td></tr>
</table>

1.6.2 Table Caption
1.6.3 Cell padding and Cell Spacing
1.6.4 Column Span Rowspan
1.6.5 Links and bookmarks
1.7 List tags and its types
1.8 Frames and its uses

Unit 2. Working with HTML5 and CSS:
2.1 concepts of CSS:
2.1.1 Adding CSS (Inline, Internal, External)
2.1.2 HTML Links and attribute.(_self, _blank, _parent, _top)
2.1.3 Absolute URL and Relative URL in <href>
2.1.4 <img> tag and its attributes (src, alt, style,width,height)
2.2 HTML forms :
2.2.1 form Elements and their attributes :
2.2.1.1 form (action, method, validate, autocomplete, target)
2.2.1.2 label, input (text, radio button, Checkboxes, submit/reset button)
2.2.1.3 select(id, name,<option>),
2.2.1.4 textarea (name, rows, cols),
2.2.1.5 button(type, onclick())
2.2.1.6 datalist
2.2.2 Media : Audio & Video Tags

Unit 3. Overview of Java Script
3.1 Overview of Client & Server-Side Scripting
3.2 Structure of Java Script
3.3 Data types and Variables
3.4 Operators (Arithmetic, Assignment, Comparison, Logical and Conditional Operator)
3.5 Control Structure
3.5.1 If…Else, switch..case
3.5.2 While, Do…While, For Loop
3.5.3 break, continue

3.6 Java Script String and Events
3.6.1 Javascript Strings types
3.6.2 String functions:
concat(), split(), indexOf(), lastIndexOf(),substring(), trim(), slice(), replace(), charAt()
3.6.3 Javascript Events :
3.6.3.1 Mouse Events : (click, mouseover, mouseremove, mouseout, mouseup)
3.6.3.2 keyboard Events : (keyup, keydown)
3.6.3.3 Form Event : (focus, submit, blur, change)

	3.7 Creating object : (By object literal, By creating instance of Object, By using an object constructor) 3.7.1 Date object : 3.7.2 Date constructor: Date(), Date(milliseconds), Date(dateString), Date(year, month, day, hours, minutes, seconds, milliseconds) 3.7.3 Date Methods: getDate(), getDay(),getMonth(), getHours(), setDate, setMonth(),setDay(), toString() 3.8 Document Object Model (DOM): 3.8.1 DOM concepts 3.8.2 DOM properties 3.8.3 DOM methods : write(), writeln(),getElementById(),getElementsByName() **Unit-4: JavaScript Functions:** 4.1 JavaScript Functions: 4.1.1 Defining function (with and without parameters) 4.1.2 calling function 4.1.3 return statement 4.1.4 Page redirection 4.2 Dialog boxes : Alert, confirm, prompt 4.3 Form validation : 4.3.1 Basic validation (All form details are filled) 4.3.2 Data format validation (email, number, string, mobile number, name)
Reference Books	1. HTML & CSS: The Complete Reference - Thomas Powell - McGraw Hill Education 2. HTML Unleashed, Darnell Rick –Techmedia 3. HTML, XHTML, and CSS Bible - Steven M. Schafe - Wiley Publications 4. Cascading Style Sheets- The Definitive Guide, E. A Meyer –O'Reilly 5. Java Scripting Programming for Absolute Beginner, Harris -PHI 6. JavaScript Step by Step, Suehring -PHI 7. Bootstrap in 24 Hours, Sams Teach Yourself - JenniferKyrnin 8. Learning Bootstrap 4 - Matt Lambert – Packt Publishing 9. Bootstrap Responsive Web Development - Jake Spurlock - O'Reilly Media. 10. JavaScript and JQuery (Interactive Front-End Web Development) by Jon Duckett 11. JavaScript and JQuery (The missing manual) by David Sawyer MCFarland
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course Code: CS-106
Course Title: Practical

Course Code	CS-106
Course Title	Practical
Credits	3
Course Category	Major Course
Level of Course	200-299 (Intermediate Level)
Teaching per Week	6 Hrs. (Supervised mode)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	- Practical implementation of technologies covered as part of syllabus using required software and learning application areas. - Understanding and learning programming concepts, data types and variables using c programming language. - Learning concepts of compiler based programming language and its conditional and iteration structures. - Working on web designing using various technologies like HTML, CSS, Javascript.
Course Objective	Objective of this course is to introduce essentials of computer programming language, introduction of compiler based programming language, concepts of user friendly and user interface using web designing technologies.
Pre-requisite	Concepts of flowchart and algorithms.
Course Content	1. Practical work based on Course code-104 & 105. 2. Practical implementation of interactive web pages using web technologies.
Teaching Methodology	- Practical work - Lab sessions and hands on experience, Discussion, Self-Study - Students will design and prepare front end web pages.
Evaluation Method	30% Internal assessment. 70% External assessment.

Course code: CS-107:
Course Title: Skill Enhancement Course (SEC-01)

Course Code	CS-107
Course Title	Skill Enhancement Course - I (SEC – 01)
Credit	3
Category of Course	Skill Enhancement Course
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	3 Hrs (Any or Combination of Theory/Practical/Fieldwork/Internship/Project)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2023-2024
Implementation Year:	A.Y. 2023-2024
Purpose of Course	As per NEP(National Education Policy-2020), it is mandatory for students to select a 3 credit Skill Enhancement Course out of the choices given by the college/institute. It will be mandatory for the student to opt minimum one 3-credit Skill Enhancement Course out of the list of offered courses recognised by the University during semester-1 to semester-3. This course will be an Audit course. The student can start an alternative career in the field by obtaining higher degree of knowledge in the area.
Course Objective	Obtaining skill in particular field along with the regular curriculum of the selected program is essential. It not only enhance the skill but also provide an opportunity to develop skill in particular area where one can pursue career in future. Skill enhancement provides the opportunity and knowledge for an individual to develop and strengthen the necessary skills to gain, maintain, and advance in a chosen area. Skill enhancement programs are focused around training that combines the best practices from varieties of areas. Skill enhancement or training typically uses a combination of cognitive and behaviour problem solving approaches, both of which are used to strengthen a person's positive skill develop.
Pre-requisite	No prior knowledge in the field is essential.
Course outcome	CO1: Student select the area of skill as per his/her interest. The choices will be given by the institute/department. CO2: The student acquire basic and fundamental level of knowledge in the field that the student opted. CO3: Understand the insight of the area and possibility of to explore more in the field. CO4: Understand effective representation of problems in terms addressing the problems. CO5: Learn to upskill and upgrade the knowledge in the area of selected subject.
Course Content and Implementation road-map.	(i) The university has categorised and prepared the list of the courses that can be offered as Skill Enhancement Course. (ii) The institute/college/department can design and implement skill enhancement course by getting approval from the relevant apex body of the university considering the SOP of the certificate course policies of the University. (iii) The institutes/college/departments can select more than one course out of the given sets of courses and offer them to their students. (iv) The students can select any of the courses offered by the institute/college/department from the given choices and enrol for the course. (v) The institute/college/department will arrange appropriate resource person(s) for the course. (vi) This is an audit course, hence the evaluation will be taken place at the college/institute/department based on the nature of the course.

	(vii) The institute/college/department will assess the student based on the nature of the course. The student will be granted the credits on successful completion of the course.
Reference Books	- The reference materials and books will be decided by the Institutes/Colleges/Departments based on the selected Courses. - Minimum five copies of relevant topics are recommended to keep in the library.
Teaching Methodology	Class Work/ Discussion/ Self-Study/ Seminars/ field works/ practical training/ field work and/or Assignments.
Evaluation Method	30% Internal assessment. 70% External assessment. 30% Internal assessment. 70% External assessment. Maximum Marks: 50 (The course is Audit course. Evaluation and Assessment will be carried out at institute level. On successful completion of the course, the student will be granted 3 credits. The obtained score will not consider to calculate S.G.P.A./C.G.P.A.)

Course code: 108
Course Title: Value Addition Course-I (VAC-01)

Course Code	CS-108
Course Title	Value Addition Course - I (VAC – 01)
Credit	2
Category of Course	Value Addition Course
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	2 Hrs (Any or Combination of Theory/Practical/Fieldwork/Internship/Project)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2023-2024
Implementation Year:	A.Y. 2023-2024
Purpose of Course	As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit Value Addition Course out of the choices given by the college/institute. It will be mandatory for the student to opt minimum one 2-credit Value Addition Course out of the list of offered courses recognised by the University during semester-1 to semester-4. This course will be an Audit course. The student can enhance the start an alternative career in the field by obtaining higher degree of knowledge in the area.
Course Objective	Obtaining knowledge in all or any of the components/fields like (i) Understanding India (ii) Environmental Science/Education (iii) Digital/Technological solutions (iv) Health & Wellness, Yoga education, sports, and fitness are essential for holistic development (v) Indian Knowledge system. The course components should be among these five categories/fields and as per the Curriculum and Credit Framework for Undergraduate Programmes of the UGC (Page-22 of the document). The purpose is to impart knowledge and understand the necessities of these aspects in life to make the healthy society and nation. It help in development of a dedicated and responsible citizen of the country by adding value to the life.
Pre-requisite	No prior knowledge in the field is essential.
Course outcome	CO1: Student select the area of Value addition as per his/her interest. The choices will be given by the institute/department. CO2: The student acquire basic and fundamental level of knowledge in the field that the student opted. CO3: Understand the insight of the area and possibility of to explore more in the field. CO4: Understand effective representation of problems, solutions and insights of the challenges and problems of the peer subject relevant to value addition. CO5: Learn to upskill and upgrade the knowledge in the area of selected subject.
Course Content and Implementation road-map.	(i) The university has categorised and prepared the list of the courses that can be offered as Value Addition Course. (ii) The institute/college/department can design and implement skill enhancement course by getting approval from the relevant apex body of the university considering the SOP of the certificate course policies of the University. (iii) The institutes/college/departments can select more than one course out of the given sets of courses and offer them to their students. (iv) The students can select any of the courses offered by the institute/college/department from the given choices and enrol for the course. (v) The institute/college/department will arrange appropriate resource person(s) for the course. (vi) This is an audit course, hence the evaluation will be taken place at the college/institute/department based on the nature of the course.

	(vii) The institute/college/department will assess the student based on the nature of the course. The student will be granted the credits on successful completion of the course.
Reference Books	- The reference materials and books will be decided by the Institutes/Colleges/Departments or as per the university guidelines based on the selected Courses. - Minimum five copies of relevant topics are recommended to keep in the library.
Teaching Methodology	Class Work/ Discussion/ Self-Study/ Seminars/ field works/ practical training/ field work and/or Assignments.
Evaluation Method	30% Internal assessment. 70% External assessment. Maximum Marks: 50 (The course is Audit course. Evaluation and Assessment will be carried out at institute level. On successful completion of the course, the student will be granted 2 credits. However, the obtained score will not be considered for S.G.P.A./C.G.P.A.)

Internship: Student willing to exit the program at the end of the two semesters and to avail the Certificate in Computer Application or exit the program at the end of the first four semesters and to avail the Diploma in Computer Application, it is essential to acquire four credits from internship. A key aspect of the internship is induction into actual work situations. Internships involve working with local industry, government or private organizations, business organizations, artists, crafts persons, and similar entities to provide opportunities for students to actively engage in on-site experiential learning. In option to these internships, the student can avail such four credits by availing two 2-credit university approved courses during any of these semesters. The student is required to enroll and avail these 4-credits and produce the evidence in process to opt the multi-level exit option after successfully completion of first year (two semester) or second year(four semesters).

Semester - 2

Course Code: CS-201

Course Title: Ability Enhancement Course-02

Course Code	CS-201
Course Title	Ability Enhancement Course – 02
Credits	2
Course Category	Ability Enhancement Course (AEC-02)
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	This will be an elective course. Can be selected from the list of elective options available under the basket of Ability Enhancement certificate Courses offered by the University.
Course Objective	The course aim at enabling the students to acquire and demonstrate the core linguistic skills, including critical reading and expository and academic writing skills that help students articulate their arguments and present their thinking clearly and coherently and recognize the importance of language as a mediator of knowledge and identity. They would also enable students to acquaint themselves with the cultural and intellectual heritage of the chosen MIL and English language, as well as to provide a reflective understanding of the structure and complexity of the language/literature related to both the MIL and English language. The courses will also emphasize the development and enhancement of skills such as communication, and the ability to participate/conduct discussion and debate.
Pre-requisite	Knowledge of English at H.Sc.(12th) Level
Course Outcomes	The list of Electives are showing individual course's Course Outcomes.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	The list of Ability Enhancement Elective courses are showing mapping between Course Outcomes(CO) with Program Specific Outcomes (PSO) for individual courses.
Course Content	The list of Electives are showing individual course's Course Contents.
Reference Books	- The list of reference books will be decided by the Institutes/Colleges/Departments or as per the university guidelines based on the selected Courses. - Minimum five copies of five different titles relevant topics are recommended to keep in the library. Electives are showing individual course's reference books.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course Code: CS-202
Course Title: Multi-Disciplinary Course - 02

Course Code	CS-202
Course Title	Multi Disciplinary Course – 02
Credits	3
Course Category	Multidisciplinary Course (MC-02)
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	3 Hrs.
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	Student will opt any one course of multi-disciplinary nature from other than the computer Science and Application faculty. The course will be offered by the institute/college passed by the Board of Studies of University faculties other than the computer science and application faculty. [Preferably: Mathematics/ Statistics/ Physics/ Electronics]
Evaluation Method	30% Internal assessment. 70% External assessment.

Course Code: CS-203

Course Title: E-Commerce and Cyber Security

<table>
<tr><td>Course Code</td><td>CS-203</td></tr>
<tr><td>Course Title</td><td>Operating System</td></tr>
<tr><td>Credits</td><td>3</td></tr>
<tr><td>Course Category</td><td>Minor Course</td></tr>
<tr><td>Level of Course</td><td>100-199 (Foundation / Introductory)</td></tr>
<tr><td>Teaching per Week</td><td>3 Hrs.</td></tr>
<tr><td>Minimum weeks per Semester</td><td>15 (Including class work, examination, preparation etc.)</td></tr>
<tr><td>Review / Revision</td><td>2022-2023</td></tr>
<tr><td>Implementation Year:</td><td>A.Y. 2023-2024</td></tr>
<tr><td>Purpose of Course</td><td>This course imparts the knowledge of Electronic commerce, online order processing concepts and related threats. The concepts of electronic transactions, e-commerce framework, related security issues and threats are covered in this course. It also highlights the issues related to cyber crime, types of possible cyber crimes and related issues. The course is aimed to give e-commerce related issues and concepts.</td></tr>
<tr><td>Course Objective</td><td>CO1: To make students understand concepts of e-commerce framework.

CO2: To make students understand concepts of types of online transactions.

CO3: To make students understand the basic concepts of security issues pertaining to e-commerce.
CO4: To make students understand various possible cyber crimes and its related laws.</td></tr>
<tr><td>Pre-requisite</td><td>Basic knowledge of computer fundamentals.</td></tr>
<tr><td>Course Outcomes</td><td>At the end of the course, students are expected to have clear concepts about e-commerce, types of e-commerce, e-commerce framework, security issues pertaining to e-commerce, cyber crimes and related cyber laws.</td></tr>
<tr><td>Mapping between Course Outcomes(CO) with Program Outcomes(PSO)</td><td>
<table>
<tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PsSO5</td><td>PSO6</td></tr>
<tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>CO4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Course Content</td><td>Unit-1:
1. Introduction to E-commerce
1. What is E-commerce
1.1.2 E-commerce framework
1.2. E-commerce consumer applications
1.2.1 E-commerce organization applications
1.2.2 Network for E-commerce
1.2.3 what is information way
Unit-2:E-commerce and World wide web
2.1 E-commerce application services
2.2 Consumer to Business Transaction
2.3 Business to Business Transaction
2.4 Security on the web</td></tr>
</table>

	2.5 Categories of Internet data and transactions **Unit-3: E-commerce security Issues** 3.1 Secure Socket layer 3.2 Types of Electronic payment systems 3.2.1 E-cash 3.2.2 Electronic checks 3.2.3 Smart cards and electronic payment systems 3.2.4 Credit card and debit cards payment and their authentication **Unit-4: Introduction to Cyber Crimes** 4.1 Category of cyber crimes 4.2 Technical aspects of cyber crimes 4.2.1 Unauthorized access & Hacking 4.2.2 Trojan , virus and Worm attacks 4.3 E-mail & IRC related crimes 4.3.1 Email spoofing and Spamming 4.3.2 Email bombing 4.3.2.1 Sending threatening emails 4.3.2.2 Defamatory emails 4..3.2.3 Email frauds , IRC related 4.3.2.4 Denial of Service attacks 4.3.2.5 A distributed denial of service attack **Unit-5: Prohibited actions on Cyber** 5.1 Pornography 5.2 IPR violation , software piracy , copyright infringement, trademarks violation, theft of computer source code, patent violations 5.3 Cybersquatting 5.4 Cyber terrorism 5.5 Banking/Credit card related crimes 5.6 E-commerce/Investment Frauds- Sales and investment frauds 5.7 Sales of Illegal articles 5.8 Defamation(Cyber smearing) 5.9 Cyber stalking
Reference Books	1.)E-commerce Strategies --- Charle s Trepper 2.)E- Commerce an Indian Perspective—Joseph- PHI 3.)Electronics Commerce : A Managerial Perspective – Efraim Turban, Jae Lee 4.)Cyber Crime in India ---- Dr M Dasgupta 5.)Cyber Law and Crimes – BarkhaU, Rama Mohan 6.)Cyber Laws Law---Dr Sarla Gupta 7.)Email Hacking - Ankit Fadia Ethical hacking Guide to Corporate Security—Ankit Fadia
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course Code: CS-204

Course Title: Object Oriented Programming using C++

Course Code	CS-204
Course Title	Object Oriented Programming using C++
Credits	4
Course Category	Major Course
Level of Course	200-299 (Intermediate Level)
Teaching per Week	4 Hrs.
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	This course imparts the knowledge of Object Oriented Programming Language. The concepts of class, objects and related features of OOPs are covered in this course. The course is aimed to give the inner depth of Object oriented programming language concepts
Course Objective	To make student understand: • Use of problem solving tools • Paradigm of programming • Structured Programming approach to problem solving using C ++ language. Various constructs of C++ programming language
Pre-requisite	Concepts of C programming Language.
Course Outcomes	CO1: Articulate the principal of object oriented program solving and programming. CO2: To determine the difference between traditional imperative design and object oriented design. CO3: Outline the essential features and elements of c++ programming language. CO4: To grasp and apply the concept of class , method, constructor , abstraction , inheritance and static polymorphism. CO5: To understand and apply dynamic polymorphism in real world application. CO6: To implement genericity through the usage of templates.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1						
CO2						
CO3						
CO4						
CO5						
CO6						

Course Content	**Unit 1: Introduction to OOP** 1.1Introduction to OOP, Features of OOP, Advantages of OOP 1.2Difference between OOP and Procedural programming 1.3Class, Object, Data member, member function 1.4Access specifier - private, public, protected 1.5Constructor and destructor, parameterized constructor, copy constructor, default constructor 1. 6. Nested classes. 1.7 Inline function, default arguments 1.8 Friend functions, friend classes 1.9 Array of objects 1.10 new, delete operators and this pointer **Unit 2: Inheritance** 2.1 Base and derived class 2.2 Single inheritance 2.3 Multilevel and Multiple inheritance 2.4 Hybrid inheritance 2.5 Using constructor in inheritance 2.6 Abstract base class **Unit: 3 Polymorphism** 3.1 Overloading and overriding 3.2 Function overloading 3.3 Operator overloading rules and implementation 3.4 Virtual function 3.5 Early binding and late binding, runtime polymorphism 3.6 pure virtual function and its benefits **Unit 4: File handling and Template** 4.1 File - input and output - file opening modes 4.2 text and binary files 4.3 read, write operations 4.4 Benefits of text and binary files. 4.5 template
Reference Books	1. Complete reference C++ : Herbert Schildt, TMH. 2. Obj Object Oriented Programming in C++ : Robert Lafore - Galgotia Publication. 3. C+ Effective Object Oriented Software Construction - Kayshav Dattari. 4. Obj Object Oriented Programming using C++ - Addison Wesley. 5. Obj Object Oriented Programming in C++ - Balaguruswamy
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course Code: CS-205
Course Title: Python Programming-1

Course Code	CS-205
Course Title	Python Programming-I
Credits	4
Course Category	Major Course
Level of Course	200-299 (Intermediate Level)
Teaching per Week	4 Hrs.
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	• Implementing Basic concepts, methods • Use Tools/IDE of python programming. • Use Python Object Types and Operations(String, list, dictionary, matrices, set etc.) • Implementing Python Programming Basics like variable, loops, branching, function and modules • Implementing various inbuilt functions of Python Libraries like numpy, pandas etc. • Interaction with text and CSV • Data Visualization using data frame
Course Objective	To make students learn of python programming skill for high level Computational programming.
Pre-requisite	The basic knowledge of C and C++ and object oriented programming is Required.
Course Outcomes	C01: Understand and aware about Various IDEs of Python. C02: Understand the concepts of Basic Python Programming C03: Learn to handle list, set, dictionary and array C04: Understand the use of loops ,branches ,functions, modules, libraries etc. C05: Learn pandas library C06: Learn file handling C07: Learn the concepts of leader and leadership style C08: Learn data visualization.

Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	■		■		■	
CO2	■					
CO3	■				■	
CO4		■	■		■	
CO5			■			
CO6			■	■	■	
CO7				■	■	■
C08				■	■	■

Course Content	**Unit 1 Introduction to Python** 1.1 Python History and Usability 1.1.1 Application areas of Python 1.1.2 Technical Strengths of Python 1.2 Program Execution in Python - Program Execution, Python Virtual Machine (PVM) 1.3 IDLE of Python, Jupyter Notebook **Unit 2 Python Object Types and Operations** 2.1 String : Indexing, Slicing, Text Parsing 2.2 List : Indexing, Slicing and Merging List 2.3 Dictionaries : Add, Update, Remove and Sort 2.4 Arrays and Matrices : Sorting and Searching **Unit 3 Python Programming Statements** 3.1 Comments, Indentations, Exception Handling 3.2 Assignment, Expressions, and print 3.3 Branching and Looping - if , while and For loops 3.4 List and Dictionary Traversal 3.5 Function Basics 3.5.1 Definition, Call, Passing Arguments 3.5.2 Lambda Functions 3.6 Modules 3.6.1 Python program structure 3.6.2 Import and Attributes 3.6.3 Module Creation and Usage **Unit 4 : Useful Python Libraries and interaction with text and CSV** 4.1 Introduction to NumPy Creating Arrays, Array Slicing, Copy, Shape, Reshape, Array Iterating, Array Join, Array Split, Array Search, Array Sort, Array Filter 4.2 Introduction to pandas Slicing the data frame, Merging & Joining. Concatenation. Changing the index. Change Column headers, Data mugging. 4.3 Data frame Handling using Panda and Numpy 4.3.1 csv and excel file extract and write using Data frame 4.3.2 Extracting specific attributes and rows from Data frame. 4.3.3 Central Tendency measures : 4.3.3.1 mean, median, mode, variance, Standard Deviation 4.3.4 Data frame functions: head, tail, loc, iloc, value, to_numpy(), describe() 4.4 File handling (text and CSV files) using CSV module : 4.4.1 CSV module , File modes: Read , write, append 4.5 Important Classes and Functions of CSV modules:

	4.5.1 Open(), reader(), writer(), writerows(), DictReader(), DictWrite( ). 4.6 Data Visualization : 4.6.1 Importing matplotlib.pyplot and plotting: (only two dimensional Plots) 4.6.1.1 range() , subplot() , legend(), columns(), len() functions. 4.6.2 Scatter plot: concept of Scatter plot, set title, xlabel and ylabel 4.6.3 Line chart : concept of line plot: plot(), set_title(), legend() 4.6.4 Histogram chart : Concepts of histogram hist(), set title, xlabel,ylabel 4.6.5 Bar Chart : Concepts of Bar chart, bar(),set title, xlabel and ylabel.
Reference Books	1. Learning Python -Mark Lutz : O'Reilly Media 2. Core Python Programming – by Wesley J Chun ISBN-13: 978-0132269933 3. Python for Everybody: Exploring Data in Python 3, by Charles Severance (Author), Aimee Andiron (Illustrator), Elliott Hauser (Editor), Sue Blumenberg (Editor) 4. An Introduction to Python - by van Rossum Guido ISBN: 9780954161767, 0954161769 5. Core Python Application Programming – by Wesley J Chun Prentice Hall
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course Code: CS-206
Course Title: Practical

Course Code	CS-206
Course Title	Practical
Credits	3
Course Category	Major Course
Level of Course	200-299 (Intermediate Level)
Teaching per Week	6 Hrs. (Supervised mode)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	- Practical implementation of technologies covered as part of syllabus using required software and learning application areas. - Understanding and learning concepts of object oriented programming. - Learning concepts of Python and data visualization. - Practical implementation of data interaction using python codes.
Course Objective	Objective of this course is to introduce essentials of Object oriented programming languages, introduction of compiler and interpreter based programming languages and implementation of data handling using python code.
Pre-requisite	Concepts of procedural programming language and data files.
Course Content	1. Practical work based on Course code-CS-204 & CS-205.
Teaching Methodology	- Practical work - Lab sessions and hands on experience, Discussion, Self-Study - Students will design and prepare front end web pages.
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: CS-207
Course Title: Skill Enhancement Course (SEC-02)

Course Code	CS-207
Course Title	Skill Enhancement Course - II (SEC – 02)
Credit	3
Category of Course	Skill Enhancement Course
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	3 Hrs (Any or Combination of Theory/Practical/Fieldwork/Internship/Project)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2023-2024
Implementation Year:	A.Y. 2023-2024
Purpose of Course	As per NEP(National Education Policy-2020), it is mandatory for students to select a 3 credit Skill Enhancement Course out of the choices given by the college/institute. It will be mandatory for the student to opt minimum one 3-credit Skill Enhancement Course out of the list of offered courses recognised by the University during semester-1 to semester-3. This course will be an Audit course. The student can start an alternative career in the field by obtaining higher degree of knowledge in the area.
Course Objective	Obtaining skill in particular field along with the regular curriculum of the selected program is essential. It not only enhance the skill but also provide an opportunity to develop skill in particular area where one can pursue career in future. Skill enhancement provides the opportunity and knowledge for an individual to develop and strengthen the necessary skills to gain, maintain, and advance in a chosen area. Skill enhancement programs are focused around training that combines the best practices from varieties of areas. Skill enhancement or training typically uses a combination of cognitive and behaviour problem solving approaches, both of which are used to strengthen a person's positive skill develop.
Pre-requisite	No prior knowledge in the field is essential.
Course outcome	**CO1:** Student choose skill of interest from available list of electives offered by the institute/department. **CO2:** The student acquire basic and fundamental level of knowledge in the field that the student opted. **CO3:** Understand the insight of the area and possibility of to explore more in the field. **CO4:** Understand effective representation of problems in terms addressing the problems. **CO5:** Learn to upskill and upgrade the knowledge in the area of selected subject.
Course Content and Implementation road-map.	(i) The university has categorised and prepared the list of the courses that can be offered as Skill Enhancement Course. (ii) The institute/college/department can design and implement skill enhancement course by getting approval from the relevant apex body of the university considering the SOP of the certificate course policies of the University. (iii) The institutes/college/departments can select more than one course out of the given sets of courses and offer them to their students. (iv) The students can select any of the courses offered by the institute/college/department from the given choices and enrol for the course. (v) The institute/college/department will arrange appropriate resource person(s) for the course. (vi) This is an audit course, hence the evaluation will be taken place at the college/institute/department based on the nature of the course.

	(vii) The institute/college/department will assess the student based on the nature of the course. The student will be granted the credits on successful completion of the course.
Reference Books	- The reference materials and books will be decided by the Institutes/Colleges/Departments based on the selected Courses. - Minimum five copies of relevant topics are recommended to keep in the library.
Teaching Methodology	Class Work/ Discussion/ Self-Study/ Seminars/ field works/ practical training/ field work and/or Assignments.
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: CS-208:
Course Title: Value Addition Course (VAC-02)

Course Code	CS-208
Course Title	Value Addition Course - I (VAL – 02)
Credit	2
Category of Course	Value Addition Course
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	2 Hrs (Any or Combination of Theory/Practical/Fieldwork/Internship/Project)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2023-2024
Implementation Year:	A.Y. 2023-2024
Purpose of Course	As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit Value Addition Course out of the choices given by the college/institute. It will be mandatory for the student to opt minimum one 2-credit Value Addition Course out of the list of offered courses recognised by the University during semester-1 to semester-4. This course will be an Audit course. The student can enhance the start an alternative career in the field by obtaining higher degree of knowledge in the area.
Course Objective	Obtaining knowledge in all or any of the components/fields like (i) Understanding India (ii) Environmental Science/Education (iii) Digital/Technological solutions (iv) Health & Wellness, Yoga education, sports, and fitness are essential for holistic development and (v) Indian Knowledge System. The course components should be among these five categories/fields and as per the Curriculum and Credit Framework for Undergraduate Programmes of the UGC (Page-22 of the document). The purpose is to impart knowledge and understand the necessities of these aspects in life to make the healthy society and nation. It help in development of a dedicated and responsible citizen of the country by adding value to the life.
Pre-requisite	No prior knowledge in the field is essential.
Course outcome	CO1: Student select the area of Value addition as per his/her interest. The choices will be given by the institute/department. CO2: The student acquire basic and fundamental level of knowledge in the field that the student opted. CO3: Understand the insight of the area and possibility of to explore more in the field. CO4: Understand effective representation of problems, solutions and insights of the challenges and problems of the peer subject relevant to value addition. CO5: Learn to upskill and upgrade the knowledge in the area of selected subject.
Course Content and Implementation road-map.	(i) The university has categorised and prepared the list of the courses that can be offered as Value Addition Course. (ii) The institute/college/department can design and implement skill enhancement course by getting approval from the relevant apex body of the university considering the SOP of the certificate course policies of the University. (iii) The institutes/college/departments can select more than one course out of the given sets of courses and offer them to their students. (iv) The students can select any of the courses offered by the institute/college/department from the given choices and enrol for the course. (v) The institute/college/department will arrange appropriate resource person(s) for the course. (vi) This is an audit course, hence the evaluation will be taken place at the college/institute/department based on the nature of the course.

	(vii) The institute/college/department will assess the student based on the nature of the course. The student will be granted the credits on successful completion of the course.
Reference Books	- The reference materials and books will be decided by the Institutes/Colleges/Departments based on the selected Courses. - Minimum five copies of relevant topics are recommended to keep in the library.
Teaching Methodology	Class Work/ Discussion/ Self-Study/ Seminars/ field works/ practical training/ field work and/or Assignments.
Evaluation Method	30% Internal assessment. 70% External assessment.

Internship: Student willing to exit the program at the end of the two semesters and to avail the Certificate in Computer Application or exit the program at the end of the first four semesters and to avail the Diploma in Computer Application, it is essential to acquire four credits from internship. A key aspect of the internship is induction into actual work situations. Internships involve working with local industry, government or private organizations, business organizations, artists, crafts persons, and similar entities to provide opportunities for students to actively engage in on-site experiential learning. In option to these internships, the student can avail such four credits by availing two 2-credit university approved courses during any of these semesters. The student is required to enroll and avail these 4-credits and produce the evidence in process to opt the multi-level exit option after successfully completion of first year (two semester) or second year(four semesters).