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.

Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Digital Helpline No.- 0261 2388888
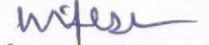E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

–: પરિપત્ર :–

કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખા હેઠળની સંલગ્ન તમામ બીસીએ કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૪–૨૫ થી અમલમાં આવનાર B.C.A.(Artificial Intelligence and Data Analytics)(Honours) સેમે.–૧ અને સેમે.–૨ નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ અભ્યાસ સમિતિનાં ચેરમેનશ્રીએ અભ્યાસ સમિતિ વતી તથા કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખા વતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણને એકેડેમિક કાઉન્સિલની તા.૦૧/૩/૨૦૨૪ ની સભામાં ઠરાવ ક્રમાંક:૧૦૪ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત માનનીય ઈ.ચા.કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણ: ઉપર મુજબ)

ક્રમાંક : એસ./પરિપત્ર/૧૦૯૯૫/૨૦૨૪
તા.૨૯/૦૫/૨૦૨૪

ઈ.ચા.કુલસચિવ

પ્રતિ,
૧. યુનિવર્સિટી સંલગ્ન તમામ બીસીએ કોલેજોના આચાર્યશ્રીઓ.
.....આપશ્રીની કોલેજના 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.
૪) એકેડેમિક વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
૫) જોડાણ વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.........તરફ જાણ સારૂ.

Veer Narmad South Gujarat University, Surat

Computer Science and Information Technology Faculty

Syllabus for (Semester-I and Semester-II) of

B.C.A. (Artificial Intelligence and Data Analytics)(Honours)

As per NEP-2020

To be implemented from

Academic Year: June, 2024-2025

(Including Winter Session)

Veer Narmad South Gujarat University, Surat
Bachelor of Computer Application (A.I. and Data Analytics) (Honours))
Under the Faculty of
Computer Science and Information Technology

Name of Program:	Bachelor of Computer Application (A.I. and Data Analytics) (Honours)
Abbreviation:	B.C.A. (A.I. and Data Analytics) (Honours): Four-year Integrated Program. With Multi-Level Entry and Exit option
Multi-level Exit Criteria:	iv) Under Graduate Certificate in Compupter Application: 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. v) Diploma in A.I. and Data Analytics : 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. vi) B.C.A. (Bachelor's in Computer Application) (A.I. and Data Analytics) : 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.C.A. (A.I. and Data Analytics) (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:	Candidate must have passed standard 12th (H.S.C.) Examination in Science (Any Group) / Commerce / vocational / General stream from Gujarat Higher Secondary Board (G.H.S.E.B.) or any other equivalent board (C.B.S.E. / I.C.S.E. etc. which must be approved and possess equivalence certificate from Veer Narmad South Gujarat University) with English as one of the subject. In case of candidates passed out from 12th Board from General Stream; Statistics/Economics/Business Mathematics/Accountancy/Computer must be one of the subjects. In case of Students passed out with 12th (H.S.C.) vocational stream, Computer and English must be one of the subject.
Objective of the Program:	he objective of the "B.C.A. Specialization in A.I. and Data Analytics" program is to equip students with comprehensive knowledge and practical skills in artificial intelligence and data analytics. The program aims to

	develop a deep understanding of AI algorithms, machine learning techniques, and statistical methods for data analysis. Students will learn to design, implement, and evaluate AI-driven solutions to real-world problems, leveraging big data technologies and advanced analytical tools. The curriculum is designed to foster critical thinking, problem-solving, and innovation, preparing graduates to tackle complex challenges in various industries. Emphasis is placed on hands-on experience through projects, internships, and collaborative research. By the end of the program, students will be proficient in programming languages, data management, and AI frameworks, ready to pursue careers as data scientists, AI specialists, and analytics professionals in a rapidly evolving technological landscape.
Program Outcome:	**PO1:** Master AI Algorithms and Techniques: Equip students with a deep understanding of AI algorithms, including machine learning, neural networks, and natural language processing. **PO2:** Develop Data Analytics Proficiency: Teach students advanced data analytics methods, such as statistical analysis, data mining, and predictive modeling. **PO3:** Implement Big Data Technologies: Provide hands-on experience with big data tools and platforms, including Hadoop, Spark, and NoSQL databases. **PO4:** Enhance Programming Skills: Strengthen students' programming abilities in languages commonly used in AI and data analytics, such as Python, R, and SQL. **PO5:** Apply AI and Data Analytics in Real-World Scenarios: Enable students to design, develop, and evaluate AI-driven solutions through practical projects and case studies, addressing real-world problems.
Program Specific Outcome:	**PSO1:** Understand Core AI Concepts: Develop a comprehensive understanding of artificial intelligence principles, including machine learning, deep learning, and computer vision. **PSO2:** Analyze Large Data Sets: Equip students with skills to collect, process, and analyze large and complex data sets using advanced data analytics techniques. **PSO3:** Design Intelligent Systems: Teach students to design and implement intelligent systems capable of solving real-world problems using AI methodologies. **PSO4:** Data Visualization: Enable students to effectively visualize data and communicate insights using modern visualization tools and techniques. **PSO5:** Develop Proficiency in AI Tools: Provide hands-on experience with AI tools and frameworks. **PSO6:** Integrate AI and Big Data Technologies: Train students to integrate AI solutions with big data technologies for enhanced data processing and analysis capabilities.

| PO and PSO mapping: | **PSO7:** Enhance Problem-Solving Skills: Foster the ability to apply AI and data analytics to innovative problem-solving in diverse domains such as healthcare, finance, and marketing.

PSO8: Prepare for Industry Challenges: Prepare students to address industry-specific challenges by understanding ethical considerations, data privacy, and the societal impact of AI and data analytics solutions. |

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1	■	■						
PO2	■	■		■		■		
PO3	■	■	■		■		■	
PO4			■	■	■	■	■	■
PO5						■	■	■
PO6			■	■	■	■		■

Medium of Instruction:	English
Program Structure:	Semester-wise Breakup of the course is given as follows :

Veer Narmad South Gujarat University, Surat
Program Structure: F.Y.B.C.A. (A.I. and Data Protection) (Honours)
(SEM – 1 and SEM – 2)
(w.e.f. Academic Year June, 2024-2025)
Bachelor of Computer Application (B.C.A.) (A.I. and Data Protection) : Three Year Program
Bachelor of Computer Application (B.C.A.(Hon.) (A.I. and Data Protection)) : 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
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
102	Mathematics (Student will opt any one course of multi-disciplinary nature from other than the computer Science and Application faculty).	Multi-Disciplinary/ Inter-Disciplinary	100-199 Foundation/ Introductory	4	4	0
103-02	Introduction to Artificial Intelligence	Minor Course	100-199 Foundation/ Introductory	4	4	0
104	Computer Programming and Programming Methodology (CPPM)	Major Course	200-299 Intermediate Level Course	4	2	4
105-02	Data Processing and Analysis (DPA)	Major Course	200-299 Intermediate Level Course	4	2	4
	Practical (Based on Course Code:104)	No separate credits allocated for practical. The Practical exam/viva-voce will be based on Course 104.				
106	**Skill Enhancement Course-I (SEC-01)** [The student will undergo field training/ internship training OR Select minimum one University approved and recognized 2 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	100-199 Foundation / Introductory	2	-	2
107	**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	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				22	18	06

Course Code	Course Title	Course Credit	University Exam Type	Exam Duration	External Marks	Internal Marks	Total Marks
101	Communication Skills (AEC-01)	2	Theory/ Written	1 Hours	25	25	50
102	Mathematics	4	Theory/ Written	2 Hours	50	50	100
103-02	Introduction to Artificial Intelligence	4	Theory/ Written	2 Hours	50	50	100
104	Computer Programming and Programming Methodology (CPPM)**	4	Theory/ Written : Practical :	1 Hours 2 Hours	25 25	25 25	100
105-02	Data Processing and Analysis (DPA)	4	Theory/ Written : Practical:	1 Hours 2 Hours	25 25	25 25	100
106	Skill Enhancement Course-I# (SEC-01)	2	-	-	25	25	50#
107	Value Addition Course-I# (VAC-01)	2	-	-	25	25	50#
Total		22			275	275	550

For Practical and Project:
- Batch Size – 40 Maximum (Desirable). Maximum 45 students can be accommodated in a batch. Separate batch should be considered if the student strength exceed 45 numbers.
- Practical includes Practical sessions for course-104. **Minimum** Four Practical hours (for course-104) per week should be allocated per batch. Out of which 4 hours will be in supervised mode and 2 hours of practical are recommended in un-supervised mode.
- 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 2 credit skill enhancement course out of the choices given by the college/institute (From available basket of courses as per University norms). It will be mandatory for the student to opt minimum one 2-credit Skill enhancement course out of offered courses recognised by University during semester-1 to semester-5.
(The student need to enrol separately and pay the fees as decided by the respective institute/department)

Value Addition 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 (From available basket of courses as per University norms). It will be mandatory for the student to opt minimum one 2-credit Value Addition Course out of offered courses recognised by the University during semester-1 to semester-4.
(The student need to enrol separately and pay the fees as decided by the respective institute/department)

 # Marks: : 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). 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 these courses based on the University norms certificate course per credit fees.]

** Major Practical based Subjects: Course 104 and 105 are major courses carrying 4 credits (2 Hours of theory and 4 hours of practical per week). These subject carry 100 marks of exam weightage (50 theory and 50 practical). External and Internal distribution of marks are in ratio of 50:50 respectively. Students are required to acquire minimum passing marks from theory and practical collectively. Practical exams for course-104 (2 Hours) and course-105 (2 hours duration) will be conducted on same day.

External exam marks : (Course-104 : 25 marks and Course-105 : 25 marks)

Division of marks are: Exam evaluation: 20 marks + Viva-voce: 5 Marks.

Students are required to pass in combined head (Theory + Practical) for each course.

It is mandatory to remain present in internal and external theory and practical exams for course code – 104 and 105.

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 : 2024-25)	Semester Tuition Fees : Rs. 19,000/- Semester Laboratory Utilization Fees : As per B.C.A. program Semester University Exam Fees : Rs. 1200/- [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/P roject/ Internship
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
202-01 202-02	Computerized Financial Accounting **OR** Organizational Structure & Behaviour (Student will opt any one course of multi-disciplinary nature from other than the computer Science and Application faculty)	Multi-Disciplinary	100-199 Foundation/ Introductory	4	4	0
203	Operating System	Minor Course	100-199 Foundation/ Introductory	4	4	0
204-02	Programming Skills using Python	Major Course	200-299 Intermediate Level Course	4	2	4
205-02	Data Retrieval and Analysis (DRA)	Major Course	200-299 Intermediate Level Course	4	2	4
	Practical (Based on Course Code: 204)	No separate credits allocated for practical. The Practical exam/viva-voce will be based on Course CS-204				
206	**Skill Enhancement Course-II (SEC-02)** [The student will undergo field training/ internship training OR Select minimum one University approved and recognized 2 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	100-199 Foundation / Introductory	2	-	2
207	**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				22	18	06

Course Code	Course Title	Course Credit	University Exam Type	Exam Duration	External Marks	Internal Marks	Total Marks
201	Ability Enhancement Course (AEC -02)[%]	2	Theory/Written	1 Hours	25	25	50
202-01 202-02	Computerized Financial Accounting **OR** Organizational Structure & Behaviour	4	Theory/Written	2 Hours	50	50	100
203	Operating Systems	4	Theory/ Written	2 Hours	50	50	100
204-02	Programming Skills using Python	4	Theory/Written : Practical :	1 Hours 2 Hours	25 25	25 25	100
205-02	Data Retrieval and Analysis (DRA)	4	Theory/ Written Practical	1 Hours 2 Hours	25 25	25 25	100
206	Skill Enhancement Course – II (SEC-02)#	2	-	-	25	25	50#
207	Value Added Course – II (VAC-02)#	2	-	-	25	25	50#
Total		22			275	275	550

For Practical and Project:
- Batch Size – 40 Maximum (Desirable). Maximum 45 students can be accommodated in a batch. Separate batch should be considered if the student strength exceed 45 numbers.
- Practical includes Practical sessions for course-204 and course-205-02. **Minimum** Eight Practical hours(4 hours for course-204 and course-205-02) per week should be allocated per batch. Out of which 8 hours will be in supervised mode and balance hours in un-supervised mode.
- The journal should be certified by the concerned faculty and by the Head of the Department, failing which the student should not be allowed to appear for External Practical Examination. Student will submit softcopy of Minor Project duly certified by the internal guide.

Major Course : Major discipline is the main focus (Core) dominant subject and the degree will be awarded in that discipline. Students must secure a prescribed number of credits (50% of total credits) through core courses in the major discipline. Students can choose the courses from the pool of courses. The number of courses (subjects) in Major may vary from semester to semester.

Minor Course : Minor discipline is the broader understanding course beyond the major discipline course. It contains generic-electives for students to choose from the pool of courses. It helps students to gain broader knowledge in addition to relevant major disciplines courses as per their choices. Minor subjects may be from same or different disciplines. Student may make choices according to their interest/need, from ODL courses also.

Interdisciplinary/Multidisciplinary/Allied Courses: This is constituent discipline of the major courses and it helps learners to acquire core competence in relevant or any other independent courses of their choices. This course may be major specific or other discipline specific. Learner shall have option to choose the course from available basket of approved courses provided by the university or from any other institutions as the learner's choice. The Credit allocated for these courses is 12 credits of total credits for 3 years' bachelor's degree and four years' bachelor's degree programme.

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.]

Ability Enhancement Course (AEC): To be offered to students to achieve competency in a Modern Indian Language and English Language focused on language and communication skills. It may be a major specific course. The Credit allocated for these courses is 10 credits of total credits for 3 years' bachelor's degree and four years' bachelor's degree programme. The courses can be selected by the college/institute from available basket of approved 2-credit certificate courses provided by the university.

Skill Enhancement Course : As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit skill enhancement course out of the choices given by the college/institute (From available basket of courses as per University norms). It will be mandatory for the student to opt minimum one 2-credit Skill enhancement course out of offered courses recognised by University during semester-1 to semester-5.
(The student need to enrol separately and pay the fees as decided by the respective institute/department)

Value Addition 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 (From available basket of courses as per University norms). It will be mandatory for the student to opt minimum one 2-credit Value Addition Course out of offered courses recognised by the University during semester-1 to semester-4.
(The student need to enrol separately and pay the fees as decided by the respective institute/department)

 # Marks: : 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). 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 these courses based on the University norms certificate course per credit fees.]

** Major Practical based Subjects: Course 204 and 205-02 are major courses carrying 4 credits (2 Hours of theory and 4 hours of practical per week). These subject carry 100 marks of exam weightage (50 theory and 50 practical). External and Internal distribution of marks are in ratio of 50:50 respectively. Students are required to acquire minimum passing marks from theory and practical collectively. Practical exams for course-104 (2 Hours) and course-205-02 (2 hours duration) will be conducted on same day.

External exam marks : (Course-204 : 25 marks and Course-205-02 : 25 marks)

Division of marks are: Exam evaluation: 20 marks + Viva-voce: 5 Marks.

Students are required to pass in combined head (Theory + Practical) for each course.

It is mandatory to remain present in internal and external theory and practical exams for course code-204 and 205-02

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 : 2024-25)	Semester Tuition Fees : Rs. 19,000/- Semester Laboratory Utilization Fees : As per B.C.A. Semester University Exam Fees : Rs. 1200/- [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: 101
Course Title: COMMUNICATION SKILLS

Course Code	101
Course Title	Communication Skills
	[Title of the course will be the one selected by the student from courses offered by college/institute out of the course basket offered by the University under the Ability Enhancement courses (AEC) basket.]
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	Effective communication is vital for the success in various situations. This course will help students develop and improve English Communication skills. To be offered to students to achieve competency in a Modern Indian Language and English Language focused on language and communication skills. The course will be selected by the institute from basket of courses under category AEC (Ability Enhancement Course) offered by the university. [Modern Indian Language (MIL) & English language focused on language and communication skills.]
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	CO1 : To make students understand the importance of effective communication skills in personal and professional life. CO2 : student's will be able to enhance their ability in reading ,writing ,listening and speaking as per the demand of corporate world. CO3 : To develop students individual as well as team work efficiency CO4; To enhance the inquisitiveness in students for updating knowledge to solve problems, and lead to build a successful professional career. CO5; Students will be able to understand the importance of digital communication.

		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	CO1	■				■			
	CO2	■			■	■		■	■
	CO3			■					
	C04	■	■		■		■		
	CO5	■			■	■			

Course Outcome	After studying the course, students will be able to Implement their skills at their workplace on varied roles such as computeroperator and programmer.

Course Content	**Unit : 1 : Fundamentals of Communication**

Unit : 1 : Fundamentals of Communication
1.8   Definition and Meaning, Overview
1.9   Process of Communication
1.10   Features and Process of Professional communication
1.11   Role of creative and critical thinking in communication
1.12   Different forms of communication
1.13   Communication Network in an Organization
1.14   Barriers to communication

Unit : 2 :Developing Listening skills
2.6   Listening Vs Hearing
2.7   Effective Listening
2.8   Process of Listening
2.9   Types of Listening
2.10   Barriers to effective listening

Unit : 3 : Speaking Skills
3.6   Non-verbal Communication
3.7   Group –discussions- Conducting G.D on giventopics(Oral Practical)
3.8   Dynamics of Professional presentation/DraftingPresentation on given topics
3.9   Public speaking
3.10   Conversations and Dialogue writing

Unit : 4 Reading Skills
4.6   Need for Developing Efficient Reading
4.7   Benefits of Effective Reading
4.8   Basic steps To Effective Reading
4.9   Types of Reading
4.10   Reading Comprehension

Unit : 5 Writing Skills
5.6   Resume writing
5.7   The art of Condensation
5.8   Business Reports
5.9   E-mail writing
5.10   Blog Writing.

Reference Books	1.Handbook of practical Communication skills – Chrisle W. JAICO 2.Basic Managerial Skills for all – S. J. McGrath - PHI 3.Reading to learn – Sheila Smith & Thomas M. Methuen (London) 4.Communication conversation Practice _ Tata McGraw Hill 5. Communication in English – R. P. Bhatnagar & R. T. Bell – Orient Longman

	6. Good English – G. H. Vallins – Rups & Co 7. Let's talk English – M. I. Joshi 8. Essentials of Business Communications – Pat & Sons, S. Chand
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.

Course Code	102
Course Title	Mathematics (Multi-Disciplinary Course – 01) [Title of the course will be the one selected by the student from courses offered by college/institute out of the course basket offered by the University under the Multi-Disciplinary courses or Inter-disciplinary courses.]
Credits	4
Course Category	Multidisciplinary Course (MC-01)
Level of Course	100-199 (Foundation / Introductory)
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	To impart fundamental knowledge and develop mathematical abilities relevant to applications relevant to Computer Applications. [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.]
Course Objective	To Provide a foundation in mathematical concepts and methods that are relevant to Computer Applications and develop the ability to apply mathematical knowledge and techniques to solve problems in computing.
Pre-requisite	Knowledge of Fundamentals of Mathematics of 10th Grade Level
Course Outcomes	**CO1:** Define and explain the fundamental concepts of Mathematical Abilities in organizations. **CO2:** Students can apply set theory concepts to real-world scenario, such as analyzing survey data. **CO3:** Enhance student's logical reasoning to solve problems in various contexts, such as puzzles or legal arguments by learning Truth table. **CO4:** Course aims to equip students with the knowledge and skills to define and operate matrices, compute solutions to business problems through the use of mathematical concepts and techniques. **CO5:** Course aims to develop students' ability to think logically and critically, as well as to apply mathematical concepts and techniques to real-world problems. **CO6:** Develop independent learning skills, including the ability to research and explore mathematical concept.

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

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■							
CO2		■		■				
CO3	■						■	
CO4	■	■	■		■			
CO5					■	■	■	
CO6	■				■			■

Course Outcome	After studying the course, students will be able to Implement acquired skills in writing codes using programming languages.

Course Content	**Unit 1. Set Theory**
	   1.1.Introduction
	   1.2.Representation
	   1.3.Operation and its properties
	   1.4.Venn Diagram
	   1.5.Cartesian product and graph
	Unit 2. Functions
	   2.1.Definition
	   2.2.Types – Domain and Range
	   2.3.Construction and functions
	Unit 3. Mathematical Logic
	   3.1.Introduction to logic
	   3.2.Truth Table
	Unit 4. Boolean Algebra
	   4.1Definition & Examples of Boolean Algebra
	   4.2Boolean Functions
	   4.3Representation and minimization of Boolean Functions
	   4.4Design example using Boolean algebra
	Unit 5. Matrices and Determinants
	   5.1.Matrices of order M * N
	   5.2.Row and Column transformation
	   5.3.Addition, Subtraction and multiplication of Matrices
	   5.4.Computation of Inverse
	   5.5.Cramer's Rule
	   5.6.Business Application of Matrices

Reference Books	1. Co-ordinate Geometry – Shanti Narayan 2. Linear Algebra – SushomaVerma 3. Advanced Mathematics – B.S. Shah & Co. 4. Schaum's Outline of Boolean algebra and switching circuits – Elliot Mendelson 5. Digital Computer Fundamentals - Tata McGraw Hill, 6th Edition, Thomas C. Bartee 6. Business Mathematics - QaziZameeruddin, V. K. Khanna and S. K. Bhambri, Vikas Publishing House Pvt. Ltd.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.

Course Code: 103-02
Course Title: Introduction to Artificial Intelligence

Course Code	103
Course Title	Introduction to Artificial Intelligence
Credits	4
Course Category	Minor Course
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	4 Hrs.
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2024-2025
Purpose of Course	The purpose of the "Introduction to A.I." course is to provide students with a foundational understanding of artificial intelligence and data science, including key concepts, terminologies, and technologies. The course aims to equip novices with the essential knowledge needed to comprehend and appreciate the basics of AI, data analytics, business intelligence, machine learning, and deep learning. It serves as a primer for students aspiring to specialize in AI and Data Analytics at the graduate level, preparing them to tackle more advanced coursework and real-world applications in these rapidly evolving fields.
Course Objective	Provide foundational understanding of AI and data science concepts, terminologies, and applications. Equip students with essential data analytics skills and introduce them to machine learning and deep learning basics.
Pre-requisite	-
Course Outcomes	**CO1:** Students will gain a fundamental understanding of AI and data science terminologies, principles, and their real-world applications. **CO2:** Students will be able to perform basic data analytics tasks, including data collection, cleaning, analysis, and visualization using popular tools. **CO3:** Students will learn the basics of machine learning, including different types of algorithms, model building, and evaluation techniques. **CO4:** Students will understand the basic concepts of Machine learning, and relevant terminologies. **CO5:** Students will be introduced to business intelligence concepts, tools, and how BI integrates with data analytics to drive decision-making. **CO6:** Students will develop an awareness of the ethical, privacy, and societal implications of AI and data science technologies. **CO7:** Students will be prepared for advanced studies in AI and data science, with a clear understanding of the skills and knowledge required for careers in these fields.

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

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	▓	▓						
CO2	▓			▓	▓			
CO3					▓	▓	▓	
CO4			▓	▓		▓		
CO5		▓		▓				
CO6						▓	▓	▓
CO7				▓	▓	▓	▓	▓

| Course Content | **Unit 1: Fundamentals of Artificial Intelligence and Data Science**
1.1 Introduction to Artificial Intelligence (AI)
  1.1.1 Definition and history of AI
  1.1.2 Key concepts and terminologies
  1.1.3 Applications of AI in various fields
1.2 Introduction to Data Science
  1.2.1 Definition and scope of Data Science
  1.2.2 Data Science vs. AI
  1.2.3 Role of a Data Scientist
  1.2.4 Basic Terminologies
    1.2.4.1 Data, Information, and Knowledge
    1.2.4.2 Structured Data, Unstructured Data

Unit 2: Data Analytics and Business Intelligence
2.1 Introduction to Data Analytics
  2.1.1 Types of Data Analytics:
    2.1.1.1 Descriptive, Diagnostic, Predictive, and Prescriptive
  2.1.2 Data Analytics Process and Life Cycle
  2.1.3 Tools and Technologies for Data Analytics
  2.1.4 Business Intelligence (BI)
    2.1.4.1 Definition and Importance of BI
    2.1.4.2 Components of BI Systems
    2.1.4.3 BI vs. Data Analytics
2.2 Data Visualization
  2.2.1 Importance of Data Visualization
  2.2.2 Tools for Data Visualization (e.g., Tableau, Power BI)
  2.2.3 Principles of Effective Data Visualization

Unit 3: Machine Learning and A.I. Technique Basics
3.1 Introduction to Machine Learning (ML)
3.2 Definition and types of Machine Learning
  3.2.1 Supervised, Unsupervised, and Reinforcement Learning
3.3 Advanced AI Techniques Terminologies
  3.3.1 Natural Language Processing (NLP)
  3.3.2 Computer Vision
  3.3.3 AI in Robotics

Unit 4 : Emerging Technologies and Ethical Considerations
4.1 Emerging Technologies in AI and Data Science
4.2 Overview of Big Data technologies (e.g., Hadoop, Spark)
4.3 Internet of Things (IoT) and its connection with AI
4.4 Cloud Computing in AI and Data Science

Unit 5 : Ethical and Societal Implications of A.I.
5.1 Ethical issues in AI and Data Science (bias, privacy, and security)
5.2 Responsible AI practices
5.3 Impact of AI on jobs and society
5.4 Future Trends and Career Opportunities
5.5 Current trends and future directions in AI and Data Science
5.6 Skills and competencies required for careers in AI and Data Analytics
5.7 Job roles and career paths in the field |

Reference Books	1. "Artificial Intelligence: A Modern Approach" by Stuart Russell, Peter Norvig, Pearson, ISBN: 978-9332582387 2. "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost, Tom Fawcett, O'Reilly Media, ISBN: 978-1449361327 3. "Python for Data Analysis" by Wes McKinney, O'Reilly Media, ISBN: 978-1491957660 4. "Data Mining: Concepts and Techniques" by Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann, ISBN: 978-0123814791 5. "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy, The MIT Press, ISBN: 978-0262018029 6. "Artificial Intelligence: Foundations of Computational Agents" by David L. Poole, Alan K. Mackworth, Cambridge University Press, ISBN: 978-1107195394 (Indian Edition) 7. "Data Science for Dummies" by Lillian Pierson, John Wiley & Sons, ISBN: 978-1119327639 (Indian Edition) 8. "Python Data Science Handbook" by Jake VanderPlas, O'Reilly Media, ISBN: 978-1491912058 (Indian Edition) 9. "Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management" by Gordon S. Linoff, Michael J. A. Berry, Wiley India Pvt Ltd, ISBN: 978-8126514366 10. "Introduction to Machine Learning with Python: A Guide for Data Scientists" by Andreas C. Müller, Sarah Guido, O'Reilly Media, ISBN: 978-1449369415 (Indian Edition)
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.

Course Code	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. (2 Hours Theory + 4 Hours Practical work)
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 introduce students the essentials of computer Programming and programming methodology using C Programming language.
Pre-requisite	-
Course Outcomes	**CO1:** Students will be able to learn advanced programming concept of compiler based programming language. **CO2:** Students will be proficient working on conditional statements, iterative Statements and fundamentals of programming concepts using C and Python. **CO3:** Students will be able to represent compound data using lists, tuples and dictionaries in Python programs. **CO4:** Students will be able to develop real world application. **CO5:** Students will learn important libraries like Numpy, Pandas which are useful in Data analysis, Machine Learning.

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

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	▓		▓			▓		
CO2	▓	▓			▓			
CO3	▓			▓			▓	
CO4			▓			▓		▓
CO5	▓			▓		▓		▓

Course Content

UNIT-1: Introduction
1.1 Concepts of Programming Language
   1.1.1 Introduction of Source Code, Object Code and executable code
   1.1.2 Algorithm and Flowchart
   1.1.3 Concepts of Structured Programming Language
1.2 Concepts of Editor, Interpreter and Compiler
   1.2.1 Introduction of C program body structure
   1.2.2 Character Set, concepts of variables and constants
   1.2.3 Identifiers, literals, Key words

1.2.4 Data types (signed and unsigned) (Numeric : int, short int, long, float, double) , (Character type: char, string) and void.

1.2.5 Concepts of source code, object code and executable code.

UNIT-2: Input/Output Statements and Operators:

2.1 Input/Output statements:

  2.1.1 Concepts of Header files (STDIO,CONIO)

    2.1.1.1 Concepts of pre-compiler directives.

    2.1.1.2 Use of #inlcude and #define

2.2 Input/Output Statements:

  2.2.1 Input statements : scanf(), getc(), getch(), gets(), getchar()

  2.2.2 Output Statements: printf(), putc(),puts(), putchar()

  2.2.3 Type specifiers (formatting strings) : %d, %ld, %f, %c, %s, %lf

2.3 Operators :

  2.3.1 Arithmetic operators (+, -, *, /, %, ++, --,)

  2.3.2 Logical Operators (&&, ||, !)

  2.3.3 Relational Operators (>, =, <=, !=)

  2.3.4 Bit-wise operators (&, |, ^ , <>)

  2.3.5 Assignment operators (=, +=, -=, *=, /=, %=)

  2.3.6 Ternary Operator and use of sizeof() function.

2.4 Important Built-in functions:

  2.4.1 Use of : (strlen, strcmp, strcpy, strcat,strrev)

  2.4.2 Use of : (abs(), floor(), round(), ceil(), sqrt(), exp(), log(), sin(), cos(), tan(), pow() and trunc())

UNIT-3: Decision Making statements :

3.1 if statements :

  3.1.1 simple if statements

  3.1.2 if…else statements

  3.1.3 if…else if….else statements

  3.1.4 Nested if statements.

3.2 Switch..case statements

  3.2.1 Use of break and default

  3.2.2 Difference between switch and if statements.

UNIT-4: Iterative statements :

4.1 Use of goto statement for iteration

4.2 while loop

4.3 do..while loop

4.4 for loop

4.5 Nested while, do..while and for loops

4.6 Jumping statement: (break and continue)

UNIT-5: Concepts of Arrays and pointer

5.1 Concepts of Single-dimensional Array

  5.1.1 Numeric single dimensional Array

  5.1.2 Numeric single dimensional array operations:

    5.1.2.1 Sorting array in ascending or descending. (Bubble and selection)

    5.1.2.2 Searching element from array (Linear Search)

  5.1.3 Character Single dimensional Array

    5.1.3.1 Character Single dimensional array operations:

    5.1.3.2 Use of \0, \n and \t

5.2 Pointers:

  5.2.1 Concepts of Pointers

  5.2.2 Declaring and initializing int, float, char and void pointers

  5.2.3 Pointer to single dimensional numeric array.

Reference Books	1. Programming in C, Balaguruswami – TMH 2. C: How to Program, Deitel & Deitel - PHI 3. C Programming Language, Kernigham & Ritchie - TMH 4. Programming in C, Stephan Kochan - CBS 5. Mastering Turbo C, Kelly & Bootle - BPB 6. C Language Programming – Byron Gottfried - TMH 7. Let us C, Yashwant Kanetkar - BPB Publication 8. Magnifying C, Arpita Gopal - PHI 9. Problem Solving with C, Somashekara - PHI 10. Programming in C, Pradip Dey & Manas Ghosh – Oxford
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.

Course Code	105-02
Course Title	Data Processing and Analysis (DPA)
Credits	4
Course Category	Major Course
Level of Course	200-299 (Intermediate Level)
Teaching per Week	4 Hrs. (2 Hours Theory + 4 Hours Practical)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	Understand concepts of Data and storage of data. This course is aimed to impart knowledge about storing data, concepts of database, retrieval of data and manipulation of data. It is aimed to cover effective storage of data, statistical analysis of data and graphical presentation of data. It also covers concepts of database and fundamental of query languages to insert, access, and manipulate data. This course is not spreadsheet or database specific. The course is not software specific. Any open source software can be used for practical.
Course Objective	To learn and obtain the skills related to i) Concepts of data, data storage and statistical manipulation of data. ii) Introduction of spreadsheet and data manipulation using spreadsheet. iii) Concepts of database, storage and manipulation of data using query language.
Pre-requisite	Basics of Data
Course Outcomes	**CO1:** Students will learn the concept of data and storage of data **CO2:** Learn the Concept of Spreadsheet, Using the spreadsheet students will able to learn data manipulation, Statistical analysis of data and graphical presentation of data. **CO3:** Learn the concept of database and data storage in database **CO4:** To understand the concept of data storage through the concept of fundamental of query language by learning DDL and DML Statements. **CO5:** To Learn the concept of Queries to manipulate data and handling of database using SQL.

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

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■	■		■	■			
CO2	■	■					■	
CO3	■				■			■
CO4	■	■		■				
CO5		■		■	■	■	■	■

| Course Content | **UNIT-1: Concepts of worksheet:** (Max.Weightage: 15%)
1.1 Fundamentals of Worksheet:
  1.1.1 Concepts of workbook, adding worksheet, cell address, formula bar, column, rows, cells, Insert, delete, format cells , cell size (row-height, column weight), rename sheet, protect sheet, lock cell.
  1.1.2 Cut, copy, paste, paste special, format painter, font size, font face, fill color, font color, font alignment
1.2 Alignment, indent, Number format, percent style, coma style, increase/decrease decimal
  1.2.1 Insert picture, shapes
  1.2.2 Insert Textbox, Header & Footer, Symbols |

	1.2.3 Save, save as, save file as csv, spell check, protect sheet and Workbook, Linking spread sheets.
	1.2.4 Print, Quick print, Print preview
	1.2.5 Split, Hide and freeze panes in worksheet.

UNIT-2: Formulas, Chart and Data: (Max.Weightage: 15%)

2.1 Charts :

  2.1.1 Creating 2D and 3D charts (Columns, Line, Pie, Bar, Scatter)

  2.1.2 Difference among columns, Line and bar charts.

2.2 Formulas:

  2.2.1 sum, average, count, max, min, sumif, pmt, stddev

  2.2.2 Logical (if, AND, OR, NOT, TRUE, FALSE)

  2.2.3 Date and Day function : Date, day, time, now, Hour, Minute, Second, Month, Days360, weekday

2.3 Data :

  2.3.1 Sort Data, Filter Data

  2.3.2 Text to columns, Remove Duplication

  2.3.3 Consolidated Data (sum, count, max, min, average)

UNIT-3: Concepts of Database: (Max.Weightage: 25%)

3.1 Database characteristics:

  3.1.1 Data Independence (Logical and Physical)

  3.1.2 Components of Database (User, Application , DBMS, Database)

  3.1.3 Database Architecture (1-tier, 2-tier, 3-tier)

    3.1.3.1 Comparison, advantages and disadvantages.

3.2 Database Models (Hierarchical, Network, E/R, Relational)

  3.2.1 E/R model : Entity, Relationship, Attribute

  3.2.2 E/R Diagram : One to one, one to many , many to one, many to many

  3.2.3 Strong entity, weak entity

  3.2.4 key attribute, derived attribute, Multi-valued attribute

3.3 Types of keys :

  3.3.1 Super key, candidate key, Primary key, Composite key, Foreign key, Unique key.

UNIT-4: Normalization and Concepts of SQL: (Max.Weightage: 25%)

4.1 Why normalization (Insertion, Updating, Deletion anomalies)

4.2 Normalization Rules:

  4.2.1 Concepts of Dependency, Transitive Dependency

  4.2.2 Armstrong Axioms

  4.2.3 1st Normal Form, 2nd Normal Form, 3rd Normal Form, B.C.N.F.

4.3 Concepts of Structure Query Language (SQL)

  4.3.1 SQL datatypes : int, float, double, char, varchar, number, varchar2, Text, date

4.4 DDL Statements :

  4.4.1 Create , Drop, Truncate, Rename, Alter

4.5 DML and DQL(Data Query Language) Statements :

  4.5.1 Insert, Update, Delete

  4.5.2 select

UNIT-5: Queries (Single Table only) (Max.Weightage: 20%)

5.1 Using where clause and operators with where clause:

  5.1.1 In, between , like, not in, =, !=, >, =, <=, wildcard operators

  5.1.2 Order by, Group by, Distinct

  5.1.3 AND, OR operators, Exists and not Exists

  5.1.4 Use of Alias

5.2 Constraints (Table level and Attribute Level)

  5.2.1 NOT NULL, CHECK, DEFAULT

  5.2.2 UNIQUE, Primary Key, Foreign Key

  5.2.3 On Delete Cascade

	5.3 SQL Functions :
	    5.3.1 Aggregate Functions: avg(), max(), min(), sum(), count(), first(), last().
	    5.3.2 Scalar Functions: ucase(), lcase(), round(), mid().
	5.4 Creating sequence
	5.5 Views :
	    5.5.1 Creating simple view, updating view, dropping view.
	    5.5.2 Difference between View and Table.

Reference Books	1. OpenOffice.org For Dummies - Gurdy Leete, Ellen Finkelstein, Mary Leete - Wiley Pub. 2. Beginning OpenOffice 3: From Novice to Professional - Andy Channellle - Apress Pub. 3. The OpenOffice.org 2 Guidebook - Solveig Haugland 4. Taming Apache OpenOffice: Getting Started - Jean Hollis Weber - Friends of OpenDocument Inc. 5. Open Office Basic: An Introduction - James Steinberg - Gold Turtle Pub. 6. Database System Concepts: – Henry F. Korth & Abrahim Silberschatz – McGraw Hill Education 7. Introduction to Database Management System– Bipin C. Desai – Galgotia Publication 8. Principles of database systems – Jeffery Ullman – Galgotia Publication 9. An introduction to Database Systems – C. J. Date – Addison Wesley 10. Introduction to database Management – Navin Prakash -TMH 11. Learn Open Office 3.1 Base – AZIMUTH 12. OpenOffice 3.4 Volume III: Base-Christopher N. Cain, Riley W. Walker-Quantum Scientific Publishing 13. Discovering SQL-A Hands-on Guide for Beginner-Alex KriegelWrox Publication 14. A Conceptual Guide to OpenOffice.org 3-R. Gabriel Gurley (Free E-book)
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.

Course code: 106
Course Title: Skill Enhancement Course (SEC-01)

Course Code	106
Course Title	Skill Enhancement Course - I (SEC – 01)
Credit	2
Category of Course	Skill Enhancement 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	2022-2023
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 Skill Enhancement Course out of the choices given by the college/institute. - It will be mandatory for the student to opt minimum one 2-credit Skill Enhancement Course out of the list of offered courses recognised by the University during semester-1 to semester-5. - The student can start an alternative career in the field by obtaining higher degree of knowledge in the area. - It's aimed at imparting practical skills, embedded internship, hands-on training, soft skills, life skills, such approved online courses etc. to enhance the employability of students. This may also include courses as per the need of new evolving technology.
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	-
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) University has categorised and prepared the basket of the courses including approved online 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) The course evaluation will be taken place at the college/institute/department level 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	50% Internal assessment. 50% External assessment. Maximum Marks: 50 (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.)

Course code: 107
Course Title: Value Addition Course-I (VAC-01)

Course Code	107
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	2022-2023
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. The student can 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(IKS). 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	-
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 enroll for the course. (v) The institute/college/department will arrange appropriate resource person(s) for the course. (vi) 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	50% Internal assessment. 50% External assessment. Maximum Marks: 50 (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: 201
Course Title: Ability Enhancement Course-02

Course Code	201
Course Title	Ability Enhancement Course – 02 [Title of the course will be the one selected by the student from courses offered by college/institute out of the course basket offered by the University under the Ability Enhancement courses
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	To be offered to students to achieve competency in a Modern Indian Language and English Language focused on language and communication skills. 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	50% Internal assessment. 50% External assessment.

Course Code: 202-01
Course Title: Computerized Financial Accounting

Course Code	202-01
Course Title	Computerized Financial Accounting [Title of the course will be the one selected by the student from courses offered by college/institute out of the course basket offered by the University under the Multi-Disciplinary courses or Inter-disciplinary courses.]
Credit	4
Course Category	Multi Disciplinary Course – 02
Level of Course	100-199 (Foundation / Introductory)
Teaching Per Week	4 Hours
Review/Revision	2022-2023
Implementation Year	A.Y.2023-24
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Purpose of Course	- To impart knowledge about accounting and how the accounts can be maintained using computer software. - This will give an idea to understand the Financial accounting terminologies and the model which is computerized. - [This is constituent discipline of the major courses and it helps learners to acquire core competence in relevant or any other independent courses of their choices. This course may be major specific or other discipline specific. Learner shall have option to choose the course from available pool of courses or from any other institutions as the learner's choice. - Interdisciplinary course can help to gain the skills needed to adapt to a rapidly changing workplace, combining theory with practice to help students develop valuable transferable skills. - Multi-disciplinary course allows the students to understand the power of new ideas. It helps them to develop a pragmatic attitude by allowing them to decide what subjects they will opt for and what could be their possible benefits. They get time to make a decision by calculating the risks & advantages. - Student can 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.]
Course Objective	The course will give fundamental ideas about the accounting software and as a course study, the students can understand how the accounting software works. It also give an idea about various terminologies related to the computerized financial accounting. - Integration of Knowledge and Skills: One objective of a multidisciplinary course is to foster the integration of knowledge and skills from different disciplines. By combining various areas of study, students can gain a holistic understanding of a particular topic or problem. This objective aims to break down the traditional boundaries between subjects and encourage students to see connections and relationships across different fields. - Promoting Critical Thinking and Problem Solving: Another objective is to enhance students' critical thinking and problem-solving abilities. Multidisciplinary courses often involve complex real-world issues that require a multifaceted approach. By engaging with diverse perspectives and methodologies, students develop the capacity to analyze problems from multiple angles, think creatively, and propose innovative

		solutions.		

	- Enhancing Collaboration and Communication Skills: Collaboration and effective communication are essential skills in today's interconnected world. Multidisciplinary courses aim to cultivate these skills by providing opportunities for students to work collaboratively with peers from different disciplines. Through group projects, discussions, and presentations, students learn how to articulate their ideas, listen actively to others, and collaborate effectively to achieve common goals. This objective prepares students for interdisciplinary work environments and encourages the exchange of ideas across disciplinary boundaries.
Course Outcome	**CO1**- After learning this subject student will be able to know the basic concepts of Financial Accounting & use of a good Financial Accounting Software **CO2**- Student will able to learn basic about financial accounting and its concepts **CO3**- Students will able to learn about transaction and types of accounts **CO4**- Student will able to learn the book-keeping concept **CO5**- Student will able to know about the journal and other related details **CO6**- Student will learn about the ledger and trail balance

Mapping Between Cos with PSOs

	PS01	PS02	PS03	PS04	PS05	PS06	PS07	PS08
CO1	▇						▇	
CO2	▇							
CO3							▇	
CO4		▇			▇		▇	▇
CO5				▇				
CO6	▇	▇		▇	▇	▇	▇	▇

Course Content

Unit 1: Introduction to Accounting System
1.7 Meaning & Definition of Accounting
1.8 Objectives of Accounting
1.9 Concepts and Features of Book Keeping
1.10   Branches of Accounting (Financial Management, Cust)
1.11   Basis of Accounting (Accrual Bases, Cash Bases)
1.12   Accounting Concepts
Unit 2: Accounting Equation & Transaction Analysis
2.4 Introduction to Assets, Liabilities, Equities
2.5 Concepts of Transaction Analysis
2.6 Classification of Accounts (Real Account, Personal Account, Nominal Account)
Unit 3: Concepts of Book-Keeping
5.4 Introduction of Single Entry System and advantages/disadvantages
5.5 Introduction of Double Entry System and its advantages
5.6 Types of Business Transaction
5.7 Concepts of important Terminologies : Opening Stock, Closing Stock, Goods, Inventory, Assets, Liabilities, Capital, Debit, Debtors, Creditors, Income, Expenses, Loss, Profit, Credit, Debit.
Unit 4: Journal & Subsidiary Books (With Preliminary examples)
6.1 Meaning of Journal
6.2 Format of Journal

	6.3 Concept of format of cash Book 6.4 Concept and format of Petty cash Book 6.5 Concept of format of Purchase Sale, Purchase Return and Sale Return Book **Unit 5: Concepts of Accounting Mechanism** 7.1 Meaning and Definition of Ledger 7.2 Types of Ledger 7.3 Trial Balance and its objectives
Reference Books	7. Accounting for Management – By Dr. Jawaharlal 8. Financial Management – By Dr. S. N. Maheshwari 9. Accounting for Management – By S. K. Bhattacharya & John Dearden 10. Advanced Accountancy – By S. P. Jain & K. I. Narang 11. Implementing Tally 6.3 – By K. K. Nathani – BPB Publication 12. Implementing Tally 7.2 – By A. K. Nathani & K. K. Nathani BPB Publication
Teaching Methodology	Classwork, Discussion, Self Study, Seminars and/or Assignment
Evaluation Method	50% Internal assessment 50% External assessment

Course Code: 202-02
Course Title: Organizational Structure and Behaviour

Course Code	202-02
Course Title	Organization Structure & Behaviour (Multidisciplinary Course) [Title of the course will be the one selected by the student from courses offered by college/institute out of the course basket offered by the University under the Multi-Disciplinary courses or Inter-disciplinary courses.]
Credit	4
Course Category	Multidisciplinary Course (MC-02)
Level of Course	100-199 (Foundation / Introductory)
Teaching Per Week	4 Hours
Review/Revision	2022-2023
Implementation Year	A.Y. 2023-2024
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)
Purpose of Course	Computer Science professionals work at different levels in the hierarchy of various jobs in IT. So it is essential to understand the Organization Structure and behavior. - Integration of Knowledge and Skills: One objective of a multidisciplinary course is to foster the integration of knowledge and skills from different disciplines. By combining various areas of study, students can gain a holistic understanding of a particular topic or problem. This objective aims to break down the traditional boundaries between subjects and encourage students to see connections and relationships across different fields. - Promoting Critical Thinking and Problem Solving: Another objective is to enhance students' critical thinking and problem-solving abilities. Multidisciplinary courses often involve complex real-world issues that require a multifaceted approach. By engaging with diverse perspectives and methodologies, students develop the capacity to analyze problems from multiple angles, think creatively, and propose innovative solutions. - Enhancing Collaboration and Communication Skills: Collaboration and effective communication are essential skills in today's interconnected world. Multidisciplinary courses aim to cultivate these skills by providing opportunities for students to work collaboratively with peers from different disciplines. Through group projects, discussions, and presentations, students learn how to articulate their ideas, listen actively to others, and collaborate effectively to achieve common goals. This objective prepares students for interdisciplinary work environments and encourages the exchange of ideas across disciplinary boundaries.
Course Objective	The objective of this course is to make students aware about the Structure of an Organization and provide them concepts that leads to better understanding of human behavior in an organization.
Course Outcome	CO1- After completion of the course the student will be aware about the Structure of an organization CO2- Also, will have better understanding of human behaviour in an organization CO3- Students will understand and develop their attitude CO4- Students will learn the importance of motivation

		PS01	PS02	PS03	PS04	PS05	PS06	PS07	PS08
Mapping Between Cos with PSOs	CO1	✓		✓					
	CO2	✓							
	CO3					✓			
	CO4	✓		✓	✓				✓
	CO5	✓		✓	✓	✓	✓		
	CO6		✓		✓		✓		✓

CO5- Students will be able to understand the leader, skills of leader and leadership styles
CO6- students will have idea about BPO and call centers

Course Content

Unit 1: Introduction to Organization and Management
5.5 What makes an organization
5.6 Structure of organization
5.7 What is Management
5.8 Scope of Management
5.9 Role of Management
5.10 Manager's Role (Interpersonal Role, Information Role and Decisional Role)
5.11 Managerial Skills (Technical Skills, Human Skills, Conceptual Skills)

Unit 2: Attitude
6.1 Meaning of Attitude
6.2 Characteristic of Attitude

Unit 3: Motivation
7.1 What is motivation?
7.2 Nature and Characteristics of Motivation
7.3 Importance & Benefits of Motivation

Unit 4: Leadership
8.1 What is Leadership?
8.2 Characteristics of Leadership
8.3 Leadership Styles
8.4 Leadership Skills (Technical Skills, Conceptual Skills, Personal Skills)

Unit 5: BPO and Call Centre
9.1 What is B.P.O?
9.2 What is out-sourcing? Benefits of outsourcing
9.3 What is Call Centre?
9.4 Call Centre setup & functions

Reference Books

9. Management & Organization Development – By Ahmed Abod Rachana Prakashan, New Delhi
10. Organization Behaviour – By Applewhite Philip, Prentice hall
11. Management & Organization Development – By Argyris Chris McGraw Hill
12. Human Behaviour at work – By Devis Keith, Tata MacGraw Hill
13. Organization Behaviour – By L. M. Prasad
14. Principles and Practices of Management – By L. M. Prasad
15. Managing People at work – By Harris O Jeff, John Wiley & Sons Publication
16. Call Centres – By S. Pankaj (APII Publication)

Teaching Methodology

Classwork, Discussion, Self Study, Seminars and/or Assignment

Evaluation Method

50% Internal assessment
50% External assessment

Course Code	203
Course Title	Operating System
Credits	4
Course Category	Minor Course
Level of Course	100-199 (Foundation / Introductory)
Teaching per Week	4 Hours
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	2022-2023
Implementation Year:	A.Y. 2023-2024
Purpose of Course	An Operating System (OS) is a software that manages computer hardware and software resources and provides common services for computer programs. The operating system is an essential component of the system software in a computer system. Application programs usually require an operating system to function. The course is based on open source operating systems like Linux.
Course Objective	4. To understand functionality provided by an Operating System. 5. To make aware with basic concepts of Windows O. S. Management. 6. To learn about device management.
Pre-requisite	Basic knowledge of computers.
Course Outcomes	**CO1:** Students will learn how operating system is important for computer system and what is the role of an OS, and also learn different types of operating system and their services. **CO2:** Students will be able to understand the structure and organization of file system. **CO3:** To differentiate between windows and linux OS **CO4:** To install and maintain linux workstation and also able to manage user accounts. **CO5:** To understand devices, usage of devices, scheduling algorithms and decide which is the best one. **CO6:** Students will be able to develop application the coordinate with respective OS in a much better way which is an essential.

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

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■	■	■	■				
CO2	■	■	■	■	■			
CO3				■	■	■		
CO4				■	■	■	■	
CO5	■	■		■	■	■	■	■
CO6					■	■	■	■

Course Content

Unit 1. Operating System Concepts

1.1. Evolution of Operating System & History

1.2. Need of an Operating System

1.3. Single User & Multi User Operating System

    1.3.1 Types of OS and their advantages and dis-advantages

    1.3.2 Batch OS, Distributed OS, Multi-Tasking OS

    1.3.3 Rea-time OS, Mobile OS

	1.4.Elements of an Operating System
	1.5.Operating System as a Resource Manager
	Unit 2. Introduction to File System and File Management
	2.1. File Concept
	2.2. Operations on File
	2.7. File Access Methods (Sequential Access and Direct Access)
	2.8. Directory Systems File Management Functions.
	2.9. File System and Directory Structure organization.
	2.10.File Protection.
	Unit 3. Introduction of Linux
	3.1.Introduction of Linux versions
	3.2.Components of Linux
	3.3.Comparison of Windows and Linux
	Unit 4. Linux Administration
	4.3. Installing Linux
	4.4. Installation of Open Source Software
	4.3.Maintaining User Accounts
	4.4.System Config Services (Package)
	Unit 5. Device Management
	5.1.Device Management Function
	5.2.Device Characteristics
	5.3.Disk space Management
	5.4.Allocation and Disk Scheduling Methods
Reference Books	11. Operating System Concepts: – James Peterson: – McGraw Hill 12. Operating System: – Stallings - PHI 13. Operating System Principles: – Silberschatz, Galvin, Gagne - Willey, India 14. Operating Systems – A. S. Godbole – Tata McGraw Hill 15. Linux – The Complete Reference – Richard Petersen – Tata McGraw Hill 16. "Operating System Concepts" Author: Abraham Silberschatz, Greg Gagne, Peter B. Galvin ISBN: 978-1118063330 Publisher: Wiley 17. "Linux System Programming: Talking Directly to the Kernel and C Library" Author: Robert Love ISBN: 978-1449339531 Publisher: O'Reilly Media 18. "Linux Bible" Author: Christopher Negus ISBN: 978-1118999875 Publisher: Wiley 19. "Understanding the Linux Kernel" Author: Daniel P. Bovet, Marco Cesati ISBN: 978-0596005658 Publisher: O'Reilly Media 20. "Linux Command Line and Shell Scripting Bible" Author: Richard Blum ISBN: 978-1118983843 Publisher: Wiley
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.

<div align="center">

Course Code: 204-02
Course Title: Programming Skills using Python

</div>

Course Code	204-02
Course Title	Programming Skills using Python
Credits	4
Course Category	Major Course
Level of Course	200-299 (Intermediate Level)
Teaching per Week	4 Hours (2 Hours Theory + 4 Hours Practical)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2024-2025
Purpose of Course	The purpose of the "Programming Language in Python" course is to equip students with a solid foundation in Python programming. This course will cover fundamental programming concepts, data structures, and algorithms, while also introducing advanced topics such as object-oriented programming, file handling, and libraries for data manipulation. By the end of the course, students will be proficient in writing efficient, scalable, and maintainable Python code, preparing them for further studies or careers in software development, data analysis, and related fields. [Python codes can be executed using any open source IDE. This is not IDE specific course.]
Course Objective	iii) Understand and apply fundamental programming concepts using Python, including variables, control structures, and functions. iv) Develop proficiency in Python's data structures, such as lists, dictionaries, and sets, to solve complex problems. v) Implement object-oriented programming principles and utilize Python libraries for file handling, data manipulation, and web development.
Pre-requisite	Fundamental knowledge of computer programming using 'C' and Python language. Knowledge of Python IDE installation is recommended.
Course Outcomes	CO1: Students will be able to learn advanced programming concept of compiler based programming language. CO2: Students will be proficient working on conditional statements, iterative Statements and fundamentals of programming concepts using C and Python. CO3: Students will be able to represent compound data using lists, tuples and dictionaries in Python programs. CO4: Students will be able to develop real world application. CO5: Students will learn important libraries like Numpy, Pandas which are useful in Data analysis, Machine Learning.

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

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	▓		▓			▓		
CO2	▓	▓			▓			
CO3	▓			▓			▓	
CO4			▓			▓		▓
CO5	▓			▓		▓	▓	

Course Content

UNIT-1: Python Fundamentals

2.5 Concepts of Interpreter based programming language
    2.5.1 Structure of Python Programming language.
    2.5.2 Python code Indention and execution
2.6 Python Variables

2.6.1 Naming of variables and Dynamic declaration of variables

2.6.2 Comments in Python

2.6.3 Assigning values to multiple variables

2.6.4 Global variables

2.7 Python Data types

2.7.1 Text(str), Numeric Type(int, float, complex),Boolean(bool)

2.7.2 Setting Data types

2.7.3 Type conversion(int, float, complex),casting(int, float, str)

2.8 User defined function.

2.8.1 Defining function, Function with Parameters

2.8.2 Parameter with default value, Function with return value

UNIT-2: Python Strings and Operators

3.3 Python Strings

3.3.1 Multiline string, String as character array, triple quotes

3.3.2 Slicing string, negative indexing, string length, concatenation

3.3.3 String Methods: (centre, count, join, len, max, min, replace, lower, upper, replace, split)

3.4 Operators

3.4.1 Arithmetic Operators(+,-,*,/,%,**,//)

3.4.2 Assignment Operators(=,+=,-=,/=,*=,//=)

3.4.3 Comparison Operators (==,!=,>,<,>=,<=)

3.4.4 Logical Operators(and, or, not)

3.4.5 Identity and member operators(is, is not, in, not in)

UNIT-3: Python conditional and iterative statements

4.4 If statement, if..elif statement, if..elif…else statements, nested if

4.5 Iterative statements

4.5.1 While loop, nested while loop, break, continue statements.

4.5.2 for loop, range, break, continue, pass and Else with for loop, nested for loop.

4.6 List: creating list, indexing, accessing list members, range in list, List methods (append, clear, copy, count, index, insert, pop, remove, reverse, sort).

UNIT-4: Python Collections and Library

5.3 Python Collections

5.3.1 Tuples: Declaring tuple, indexing tuple, changing tuple values, adding and removing data from tuple, Use of tuple() method to create tuple, count() and index() methods.

5.3.2 Sets: declaring set, access set data, set methods (add, clear, copy, discard, pop, remove, union, update).

5.3.3 Dictionary

5.1.3.3 Creating Dictionary, Adding, Accessing and Removing element

5.1.3.4 Dictionary methods: get(),pop(), popitem(),clear(),copy()

5.4 Introduction to Numpy and Pandas

5.2.3 Overview of numpy

5.2.3.1 Numpy methods (Mean, Median, Mode, Standard Deviation and Variance)

5.2.3.2 Implementation of Numpy methods on numeric data set

	created using list.
	UNIT- 5: Handling CSV files using Python.
	5.1 Pandas Dataframe
	5.1.1 Creating dataframe using list
	5.1.2 Creating dataframe using dict of equal length list
	5.1.2.1 Introduction to Python's 'csv' module
	5.1.2.2 Reading data using csv file(read_csv())
	5.1.2.3 Read and write using 'csv.reader()' and 'csv.writer()'
	5.1.2.4 Retrieving rows and columns from data frame using index
	5.1.2.3 Retrieving rows and columns using loc and iloc functions.
	5.1.2.4 Handling CSV files with different delimiters
	5.2 Data Analysis and Visualization with CSV Files
	5.2.1 Basic data analysis with Pandas:
	5.2.1.1 Descriptive statistics, group by operations
	5.2.2 Merging and joining CSV files
	5.2.3 Data visualization with Matplotlib
	5.2.4 Creating basic plots (line, bar, scatter)
	5.2.5 Customizing plots (titles, labels, legends, colors)
	5.2.6 Saving plots to files
Reference Books	1. "Python Crash Course" by Eric Matthes, No Starch Press, ISBN: 978-1593279288 2. "Automate the Boring Stuff with Python" by Al Sweigart, No Starch Press, ISBN: 978-1593275990 3. "Learning Python" by Mark Lutz, O'Reilly Media, ISBN: 978-1449355739 4. "Python for Data Analysis" by Wes McKinney, O'Reilly Media, ISBN: 978-1491957660 5. "Fluent Python" by Luciano Ramalho, O'Reilly Media, ISBN: 978-1491946008 6. "Core Python Programming" by R. Nageswara Rao, Dreamtech Press, ISBN: 978-9389510650 7. "Python Programming: A Modern Approach" by Vamsi Kurama, Pearson Education, ISBN: 978-9332556591 8. "Programming with Python" by T R Padmanabhan, Springer, ISBN: 978-8132236713 9. "Introduction to Computing and Problem Solving with Python" by Jeeva Jose and P. Sojan Lal, Khanna Publishing, ISBN: 978-9382609818 10. "Python: The Complete Reference" by Martin C. Brown, McGraw-Hill Education, ISBN: 978-0072127188
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.

Course Code: 205-02
Course Title: Data Retrieval and Analysis (D.R.A.)

Course Code	205-01
Course Title	Data Retrieval and Analysis (D.R.A.)
Credits	4
Course Category	Major Course
Level of Course	200-299 (Intermediate Level)
Teaching per Week	4 Hours
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2024-2025
Purpose of Course	This syllabus covers essential SQL commands and techniques for statistical analysis of data, integrating Python for data manipulation and interaction with SQL databases. It also covers executing SQL commands using Python, converting CSV into SQL tables and SQL tables into CSV using python libraries.
Course Objective	1. To Learn fundamental SQL commands such as SELECT, INSERT, UPDATE, DELETE, and JOIN. Understand database creation, modification, and management techniques. 2. To Perform Statistical Analysis with SQL. Utilize SQL aggregate functions for statistical analysis. Execute complex queries to summarize and report data. 3. To Integrate Python with SQL Databases. Use Python libraries like `sqlite3`, `pandas`, and `SQLAlchemy` for database interaction. Execute SQL commands within Python scripts for seamless data manipulation. 4. Convert CSV files to SQL tables and vice versa using Python. 5. Develop Practical knowledge about Data Analysis: Apply SQL and Python skills to real-world data scenarios through hands-on practical experience. Design and implement efficient databases and perform insightful data analysis.
Pre-requisite	Basic knowledge of data, python, sql and csv.
Course Outcomes	**CO1:** Demonstrate proficiency in using SQL to create, modify, and query databases, including performing complex joins and aggregations for data analysis. **CO2:** Apply Python programming skills to manipulate data, including reading and writing data from various file formats like CSV and xls. **CO3:** Utilize Python libraries such as pandas and NumPy for advanced data manipulation and transformation tasks, ensuring data is in the required format for analysis. **CO4:** Integrate Python with SQL databases using libraries like SQLAlchemy and sqlite3, executing SQL commands within Python scripts for seamless data handling. **CO5:** Develop and implement complete data analysis processes using Python, automating the workflow from data extraction to transformation and loading into databases or files.

Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)		PSO 1	PSO2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
	CO1	▓	▓	▓	▓	▓			
	CO2	▓	▓		▓	▓			
	CO3	▓	▓		▓		▓		
	CO4	▓	▓		▓	▓			
	CO5		▓	▓		▓		▓	
	CO6		▓	▓		▓			▓

Course Content	**Unit 1: Introduction to SQL and Data Storage**
	1.1 Basic SQL Commands (Create, Read, Update, Delete)
	1.2 Data Storage and Management
	1.2.1 Creating and Dropping Tables
	1.2.2 Understanding Data Types
	1.2.3 ALTER , MODIFY, DROP
	1.2.4 ROWID, ROWNUM
	1.3 Concepts of NULL, NOT NULL
	1.4 Aggregate Functions (COUNT, SUM, AVG, MAX, MIN)
	1.5 Statistical Functions
	1.5.1 STDDEV (Standard Deviation), VARIANCE, MEDIAN
	1.5.2 PERCENTILE_CONT (Continuous Percentile)
	1.5.3 PERCENTILE_DISC (Discrete Percentile)
	1.5.4 CORR (Correlation)
	Unit 2: Data Retrieval and Basic Analysis
	2.1 Exporting and Importing Data using Python (Pandas, Numpy Libraries)
	2.1.1 Converting SQL Tables to CSV
	2.1.2 Importing CSV Files into SQL
	2.2 Using SQL with Python
	2.2.1 Setting up SQL Database Connections in Python
	2.2.2 Executing SQL Commands using Python (SQLite, MySQL, PostgreSQL)
	2.2.3 Retrieving and Manipulating Data with Pandas and SQLAlchemy
	UNIT 3: Working with multiple tables:
	3.1 Filtering Data : (WHERE Clause, IN, BETWEEN, LIKE)
	3.2 Joining Tables
	3.2.1 INNER JOIN
	3.2.2 LEFT JOIN , RIGHT JOIN, FULL JOIN, SELF JOIN
	3.3 Sorting Data :
	3.3.1 ORDER BY Clause
	3.3.2 Sorting by Multiple Columns
	3.4 Grouping Data
	3.4.1 GROUP BY Clause
	3.4.2 HAVING Clause
	3.5 SET operations (UNION, INTERSECT, EXCEPT)
	Unit 4: Advanced Data Retrieval and Manipulation :
	4.1 Subqueries
	4.1.1 Nested SELECT Statements
	4.1.2 Correlated Subqueries
	4.2 Common Table Expressions (CTEs)
	4.2.1 Writing Recursive and Non-Recursive CTEs
	4.2.2 Simplifying Complex Queries with CTEs
	4.2.3 Cumulative Sums
	Unit 5: Performance Optimization and Practical Applications:
	5.1 Query Optimization
	5.1.1 Strategies for Optimizing SQL Queries
	5.1.2 Identifying Performance Bottlenecks
	5.2 Using EXPLAIN or EXPLAIN PLAN
	5.2.1 Analyzing Query Execution Plans
	5.2.2 Improving Query Performance Based on Execution Plans
	5.3 Indexing
	5.3.1 Creating and Managing Indexes
	5.3.2 Impact of Indexes on Query Performance
	5.4 Advanced Data Manipulation
	- INSERT INTO ... SELECT
	- UPDATE ... FROM, - DELETE with Conditions

Reference Books	1. Learning SQL by Alan Beaulieu, O'Reilly Media, ISBN: 978-0596520830 2. Python for Data Analysis by Wes McKinney, O'Reilly Media, ISBN: 978-1491957660 3. SQL for Data Scientists: A Beginner's Guide for Building Datasets for Analysis by Renee M. P. Teate, Wiley, ISBN: 978-1119669363 4. Python Data Science Handbook by Jake VanderPlas, O'Reilly Media, ISBN: 978-1491912058 5. SQL in 10 Minutes, Sams Teach Yourself by Ben Forta, Sams Publishing, ISBN: 978-0672336072 6. SQL, PL/SQL: The Programming Language of Oracle by Ivan Bayross, BPB Publications, ISBN: 978-8183331168 7. Python Programming: A Modern Approach by Vamsi Kurama, Pearson India, ISBN: 978-9332585342 8. Data Science and Analytics (with Python, R and SPSS Programming) by V.K. Jain, Khanna Publishing, ISBN: 978-9382609800 9. Mastering Python for Data Science by Samir Madhavan, Packt Publishing (India), ISBN: 978-1783553358 10. Database Management Systems by Raghu Ramakrishnan and Gehrke, McGraw Hill Education (India), ISBN: 978-0071231510
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.

Course code: 206
Course Title: Skill Enhancement Course (SEC-02)

Course Code	206
Course Title	Skill Enhancement Course - II (SEC – 02)
Credit	2
Category of Course	Skill Enhancement 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	2022-2023
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 Skill Enhancement Course out of the choices given by the college/institute. - It will be mandatory for the student to opt minimum one 2-credit Skill Enhancement Course out of the list of offered courses recognised by the University during semester-1 to semester-5. - The student can start an alternative career in the field by obtaining higher degree of knowledge in the area. - It's aimed at imparting practical skills, embedded internship, hands-on training, soft skills, life skills, such approved online courses etc. to enhance the employability of students. This may also include courses as per the need of new evolving technology.
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	-
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)University has categorised and prepared the basket of the courses including approved online 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)The course evaluation will be taken place at the college/institute/department level 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	50% Internal assessment. 50% External assessment. Maximum Marks: 50 (Evaluation and Assessment will be carried out at institute level. On successful completion of the course, the student will be granted 2 credits.

Course code: 207
Course Title: Value Addition Course-II (VAC-02)

Course Code	207
Course Title	Value Addition Course - II (VAC – 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	2022-2023
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. The student can 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(IKS). 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	-
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) 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	50% Internal assessment. 50% External assessment. Maximum Marks: 50 (Evaluation and Assessment will be carried out at institute level. On successful completion of the course, the student will be granted 2 credits.)

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).

Guidelines for Question paper style

9) Ideally each unit of the course should carry equal weightage of marks. However, it will vary upon the content of the units of the course.
10) The objective of the written/theory exams for all courses are to analyze the student's understanding about the course contents, assessing the conceptual knowledge about the course contents and ability to explain the concepts in written forms.
11) As the practical exams are conducted separately and viva-voce is also a part of the practical exam, the concepts and practical knowledge can be analyzed through the practical exams.
12) Since the subjects/courses are technical in nature, the major objective is to evaluate conceptual and technical knowledge for major and minor courses instead of expecting student's ability to write lengthy literature writing skills and abilities.
13) 20% of questions are recommended to ask from objective/short questions types having weightage of 1 to 2 marks per question. Purpose of such question is to analyze precise understanding for the topics/points/concepts.
14) 30% of questions are expected to ask from short questions to answer in few lines having weightage of 3 to 4 marks. Purpose of such questions are to analyze conceptual understanding for the topics/points/concepts that can be describe in short.
15) 50% of questions are expected to ask from long/descriptive/Short-notes questions to answer using charts/graphs/block diagrams/flowcharts/models having weightage of 5 to 7 marks. Purpose of such questions are to analyze the depth knowledge and ability to explain in detail emphasizing technical knowledge.
16) The evaluation by the examiner is expected to evaluate overall technical understanding of the student, ability to express the technical and conceptual knowledge, clarity of thoughts and understanding of the subject and concepts.