KG COLLEGE OF ARTS AND SCIENCE
Autonomous Institution | Affiliated to Bharathiar University
Accredited with A++ Grade by NAAC
ISO 9001:2015 Certified Institution
KGiSL Campus, Saravanampatti, Coimbatore – 641 035

Regulations 2025 -26 for Undergraduate Programme

Programme : B.Sc. Computer Science (B.Sc. CS)

Programme Code : BCS

Semester 1

Syllabi

KGCAS
co-Kreate your Genius

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Learning Outcomes Based Curriculum Framework- (LOCF) model with Choice Based Credit System (CBCS)

Programme: B.Sc. Computer Science (B.Sc. CS)

Programme Code: BCS

(Applicable for the Students admitted during the Academic Year 2025 - 26 onwards)

Eligibility

The student should have passed Higher Secondary Examination and wherever the students have not studied mathematics knowledge be imparted through Residential/Bridge Course.
(As per the eligibility condition given Ref. BU/R/B3-B4/Eligibility Condition/7960/2025 dated 08/05/2025).

Program Learning Outcomes (PLOs)
The successful completion of B.Sc. CS Programme shall enable the students to:

PLO1	Develop an ability to analyze a given problem statement, identify and define the computing requirements for finding the appropriate solution.
PLO2	Prepare students to equip themselves involving problem solving skills using computer science and technologies to become software developer.
PLO3	Develop the ability to pursue advanced studies and to excel in research in the field of Computer Science.
PLO4	Inspire the students to become entrepreneurs or technopreneurs to innovate and create.
PLO5	Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

B.Sc. Computer Science

Distribution of Credits and Hours for all the Semesters

Part	Course Category	No. of. Courses	Hrs.		Credits	Total		Semester
I	Language – I : Tamil	4	4 X 4	16	3	12	12	1-4
II	Language - II : English	4	4 X 4	16	3	12	12	1-4
III	Core Theory (6 hrs. / week)	4	4 X 6	24	4	16	100	3,6
	Core Theory (5 hrs. / week)	9	9 X 5	45	4	36		1,2,4,5
	Core Lab (4 hrs. / week)	4	4 X 4	16	2	8		1-4
	Core Lab (5 hrs. /week)	3	3 X 5	15	3	9		5,6
	Allied (4 hrs. / week)	4	4 X 4	16	3	12		1-4
	Electives (5 hrs./week)	2	2 X 5	10	3	6		5,6
	Project	1	1 X 6	6	5	5		6
	SEC: Internship	1	-	-	2	2		5
	Skill Enhancement (SEC)	3	3 X 2	6	2	6		3, 4, 6
IV	Foundation Course (FC)	2	2 X 2	4	2	4	14	1,2
	Foundation Course (FC)	1	-	-	2	2		3
	Ability Enhancement Compulsory Course (AECC)	3	3 X 2	6	2	6		1,2,4
	Ability Enhancement Compulsory Course (AECC) – MOOC	1	-	-	2	2		3
V	Liberal Arts (Extra-curricular and Co-curricular)	-	-	-	2	2	2	4
	Total	**46**		**180**		**140**	**140**	

Consolidated Semester wise and Component wise Hours and Credits distribution

Semester	Part I		Part II		Part III		Part IV		Part V		Total	
	Hrs.	Credits	Hrs.	Credits	Hrs.	Credits	Hrs.	Credits	Hrs.	Credits	**Hrs.**	**Credits**
1	4	3	4	3	18	13	4	4	-	-	**30**	**23**
2	4	3	4	3	18	13	4	4	-	-	**30**	**23**
3	4	3	4	3	22	15	-	4	-	-	**30**	**25**
4	4	3	4	3	20	15	2	2	-	2	**30**	**25**
5	-	-	-	-	30	23	-	-	-	-	**30**	**23**
6	-	-	-	-	30	21	-	-	-	-	**30**	**21**
Total	**16**	**12**	**16**	**12**	**138**	**100**	**10**	**14**	**-**	**2**	**180**	**140**

Semester – 1

Curriculum
B.Sc. Computer Science

Semester – 1									
Course Code	**Part**	**Course Category**	**Course Name**	**Hrs./ week**	**Examination**				**Credits**
					Duration in hrs.	**Max Marks**			
						CIA	**ESE**	**Total**	
25TAM11L	I	Language- I	Tamil – I	4	3	25	75	100	3
25HIN11L	I		Hindi – I						
25MAL11L	I		Malayalam – I						
25FRE11L	I		French – I						
25ENG12L	II	Language- II	English – I	4	3	25	75	100	3
25BCS13C	III	Core – I	Python Programming	5	3	25	75	100	4
25BCS14P	III	Core Lab – I	**Lab:** Python Programming	4	3	40	60	100	2
25BCS15C	III	Core – II	Foundations of Computing	5	3	25	75	100	4
25BCS16A	III	Allied – I	Numerical Methods and Statistics	4	3	25	75	100	3
25ENV1FC	IV	FC – I	Environmental Studies	2	2	50	-	50	2
25SOF1AE	IV	AECC – I	Soft Skills	2	2	-	50	50	2
Total				**30**				**700**	**23**

Part – I : Language I –Tamil I

Course Code	Course Name	Category	Hours / Week	Credits
25TAM11L	Tamil - I	Language – I	4	3

Course Objectives

- இலக்கிய வளர்ச்சியை அறிந்து கொள்ளுதல்
- இலக்கியம் படைக்கும் திறன்
- இலக்கிய இலக்கண உரைசெய்தல்
- திறனாய்வு முறையினைக் கற்றுத்தேர்தல்

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	புதுக்கவிதையின் மூலம் வாழ்வியல் விழுமியங்களை உணர்ந்து கொள்ளுதல்.	K1, K2
CLO2	சிறந்த மற்றும் வாழும் கவிஞர்களை அறிந்து கொள்ளுதல்.	K2, K3
CLO3	சிறந்த படைப்பாளர்களின் சிறுகதையில் வெளிப்படும் சமூகச் சிந்தனைகளை அறிந்து விழிப்புணர்வைப் பெறுதல்.	K3
CLO4	தற்கால இலக்கியங்களான புதுக்கவிதை, சிறுகதை தோன்றி வளர்ந்த பின்புலத்தை அறிதல்.	K1, K3
CLO5	மொழியைப் பிழையின்றி பேச எழுத கற்கத் தேவையானதமிழ் இலக்கணத்தின் இன்றியமையாமையை உணர்தல். நடைமுறை வாழ்வியலுக்குத் தேவைப்படும் ஆங்கிலக் கடிதத்தைத் தமிழாக்கம் செய்தலுக்கான பயிற்சி அடைதல்.	K2, K3
K1 - Remember; **K2** - Understand; **K3** - Apply		

Part – I: Language I - Tamil – I

Unit	Content	No. of Hours
I	**நாட்டுப்பற்று** 1. உலகத்தைநோக்கிவினவுதல் - பாரதியார் 2. பாரதிதாசன்கவிதைகள் - பாரதிதாசன் • தமிழ்ப்பேறு 3. ஒற்றுமையேஉயிர்நிலை - நாமக்கல்கவிஞர் 4. தேவதேவன்கவிதைகள் - தேவதேவன் • சாலையும்மரங்களும்செருப்பும் • புதியவீடு 5. ஆலாபனை - கவிக்கோஅப்துல்ரகுமான் • போட்டி • பாதை 6. புத்தகச்சந்தை - கவிஞர்வாலி	14
II	**சமூகம்** 1. எட்டாவதுசீர்..... - ஈரோடு தமிழன்பன் 2. தொலைந்துபோனேன் - கவிஞர்தாமரை 3. திருநங்கைகள் காகிதப் பூக்கள் - நா. காமராசன் 4. மரங்களைப் பாடுவேன் - வைரமுத்து 5. புள்ளிப் பூக்கள் (ஹைக்கூ) - அமுத பாரதி 6. நாட்டுப்புறப் பாடல்கள் (தாலாட்டுப் பாடல் , தெம்மாங்குப் பாடல், உழவுத்தொழில்)	14
III	**சிறுகதை** 1. காஞ்சனை - புதுமைப்பித்தன் 2. சுமைதாங்கி - ஜெயகாந்தன் 3. சோற்றுக் கணக்கு - ஜெயமோகன் 4. ஆறு யானைகள் - எஸ்.ராமகிருஷ்ணன் 5. மரத்தைக்கர்ப்பம்சுமந்தவள் - ஆண்டாள்பிரியதர்சினி	12

Unit	Content	No. of Hours
IV	**இலக்கியவரலாறு** 1. மரபுக்கவிதையின்தோற்றமும்வளர்ச்சியும் 2. புதுக்கவிதையின்தோற்றமும்வளர்ச்சியும் 3. ஹைக்கூகவிதையின்தோற்றமும்வளர்ச்சியும் 4. சிறுகதையின்தோற்றமும்வளர்ச்சியும்	10
V	**இலக்கணம்** 1. எழுத்துகள் (முதல்எழுத்துகள், சார்பெழுத்துகள்) 2. எழுத்துக்களின்பிறப்பு 3. மாத்திரைகள் 4. பயிற்சிக்குரியன - மொழிபெயர்ப்பு (ஆங்கிலத்திலிருந்துதமிழுக்குமொழிபெயர்த்தல்)	10
	Total Hours	**60**

Reference Books

1	பேரா. குருசாமி, ம.ரா.போ. (2014), பாரதிபாடல்கள், ஆய்வுப்பாதிப்பு, ,தமிழ்ப்பல்கலைக்கழகம், தஞ்சாவூர்.
2	அப்துல்ரகுமான்,(2000), ஆலாபனை, கவிக்கோபதிப்பகம்
3	தாமரைகவிதைகள், (2012), நியூசெஞ்சுரிபுக்ஹவுஸ்
4	வரதராசனார் மு, (2021), தமிழ் இலக்கிய வரலாறு, சாகித்ய அகாடமி பதிப்பு.
5	முனைவர் பஞ்சாங்கம் கா, (2017), தமிழ் இலக்கிய வரலாறு, காவ்யா பதிப்பகம்.
6	முனைவர் வேங்கடராமன் கா. கோ (2008), தமிழ் இலக்கிய வரலாறு, கலையக வெளியீடு.
7	பரந்தாமனார் அ.கி. (2002), நல்ல தமிழ் எழுத வேண்டுமா?,அல்லி நிலையம்.
8	ராமகிருஷ்ணன் எஸ் (2006), 100 சிறந்த சிறுகதைகள் (தொகுதி 1 & 2) பதிப்பகம்: தேசாந்திரி பதிப்பகம்
9	குமரன்கோ (2010), தமிழ்இலக்கணம்எளியஅறிமுகம் , சந்தியாபதிப்பகம்
10	சக்திவேல்சு,(2012), நாட்டுப்புறவியல், மணிவாசகர்பதிப்பகம்

Course Code	Course Name	Category	Hours/Week	Credits
25HIN11L	Hindi-I	Language–I	4	3

Course Objectives

- Improves grammatical knowledge.
- Will continue to read and learn about articles and think about them.
- It is possible to read and understand short stories and understand the thoughts and life of the people of this state.
- Translation knowledge and the ability to read and analyze a message are also available.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Understand the text styles and grammatical elements	K1,K2
CLO2	Discuss the content of a reading passage	K2,K3
CLO3	Develop an interest in the appreciation of short stories	K3
CLO4	Comprehend the grammatical structures and sentence making	K1,K3
CLO5	Understand the language and developing English to Hindi translation skill	K2,K3
K1-Remember; **K2** -Understand; **K3** –Apply		

Part–I: Language I - Hindi–I

Unit	Content	Hours
I	**Prose: Nuthan Gadya Sangrah** Lesson 1 – Bharathiya Sanskurthi - Dr.RajendraPrsad Lesson Lesson 3 – Razia - RamavikshaBenipuri Lesson 4 – Makreal - Yespal Lesson 5 – Bahtha Pani Nirmala - 'Ageya' Lesson 6 – Rashtrapitha Mahathma Gandhi - Mukthibodh Lesson 9 – Ninda Ras - Harishankar Parsayi.	14
II	**Non Detailed Text Short Stories: Kahani Kunj** Pareksha - Premchand Mamtha - Jayashankar Prasad Apnaparaya - Jaynendrakumar Admikabachcha - Yespal Bolaramkajeev - Harishankar Parsayi Vapasi - MannuBhandari	14
III	**Grammar: Shabdha Vichar Only** (Noun, Pronoun, Adjective, Verb, Tense, Case, Endings) Theoretical & Applied.	12
IV	**Translation: English –Hindi Only.** Anuvadh Abhyas – III (1 - 15 Lessons Only)	10
V	**Comprehension**: 1 Passage From Anuvadh Abhyas – III (16 - 30)	10
	Total Hours	**60**

Text Books	
1	Jayaprakash, (2009), Nuthan Gadya Sangrah, Publisher: Sumitra Prakashan Sumitravas, 16/4, Hastings Road, Allahabad – 211001.
2	Amithab.V.P.(2011), Kahani Kunj, Publisher: Govind Prakashan Sadhar Bagaar, Mathura, UttarPradesh,–281 001

Course Code	Course Name	Category	Hours/Week	Credits
25MAL11L	Malayalam-I	Language–I	4	3

Course Objectives

- Improves grammatical knowledge
- Will continue to read and learn about articles and think about them
- It is possible to read and understand short stories and understand the thoughts and life of the people of this state
- Translation knowledge and the ability to read and analyze a message are also available
- Translation knowledge and the ability to read and analyze a message are also

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Understand the text styles and grammatical elements	K1
CLO2	Discuss the content of a reading passage	K1
CLO3	Develop an interest in the appreciation of short stories	K2
CLO4	Comprehend the grammatical structures and sentence making	K3
CLO5	Understand the language and developing English to Malayalam translation skill	K4
K1-Remember; **K2**-Understand; **K3** –Apply; **K4**-Analyse		

Part–I: Language I - Malayalam–I

Unit	Content	Hours
I	Novel – Pathummayude Aadu-Vaikam Muhammed Basheer	14
II	Novel - Pathummayude Aadu-Vaikam Muhammed Basheer	14
III	Short Story – Ente Priyappeta Kadhakal – Akbar Kakkattil)	12
IV	Short Story – Ente Priyappeta Kadhakal – Akbar Kakkattil)	10
V	Composition & Translation (English to Malayalam)	10
	Total Hours	**60**

Text Books	
1	Vaikam Muhammed Basheer, (2012), Novel – Pathummayude Aadu, D.C. Books, Kottayam, Kerala
2	Akbar Kakkattil, (2009), Short Story – Ente Priyappeta Kadhakal
Reference Books	
1	Tharakan K.M, (2016), Malayala Novel Sahithya Charitram, N.B.S.Kottayam.
2	Achuyuthan M, (2014), Cherukatha Innale Innu - M.Achuyuthan D.C Books,Kottayam.
3	Dr.George K.M, (2011) Sahithya Charitram Prasthanangalilude, D.C.Books,Kottayam.
4	Sukumar Azheekode, (2015), Malayala Sahithyavimarsam, D.C.Books

Course Code	Course Name	Category	Hours/ Week	Credits
25FRE11L	French–I	Language–I	4	3

Course Objectives

To understand, speak, read and write simple, standard speech which is very slow and is carefully articulated and can recognize familiar words and very basic phrases concerning themselves, their family and immediate concrete surroundings when people speak slowly and clearly.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	Course Outcome	Knowledge Level
CLO1	Comprehend basic vocabulary	K1
CLO2	Understand basic syntax and grammar patterns	K2
CLO3	Converse slowly in known situations	K2
CLO4	Translate small basic sentences	K3
K1-Remember; **K2**-Understand; **K3** –Apply		

Part–I: French–I

Unit	Content	No. of Hours
I	Etape0 Etape1(Lecons1- 3)	14
II	Etape2(Lecons1- 3)	14
III	Etape3 -Leçons1–2	12
IV	Etape3–Leçon3 Etape4–Leçon1	10
V	Etape4 –Leçons2–3	10
	Total Hours	**60**

Text Book	
1	Céline Himber,Corina Brillant, Sophie Erlich, (2008), Adomania1–Methodede francais, Publisher-Hachette Fle
Reference Book	
1.	Yves Loiseau, Régine, (2014), Latitudes1, Merieux Publisher: French and European Publications Inc.

Course Code	Course Name	Category	Hours/Week	Credits
25ENG12L	English-I	Language II	4	3

Course Objectives

The course intends to cover

- Various genres of literature.
- Active and passive vocabulary.
- Usage of Grammar and Communication.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Identify aesthetic sense and appreciate poetry, enhancing creativity and understanding relevant to professional environments.	K1
CLO2	Understand diverse styles of prose, facilitating versatility in writing and inculcating interpersonal skills.	K2
CLO3	Apply the characters and the narrative techniques in creative writing and content creation ethically.	K3
CLO4	Employ vocabulary and grammatical proficiency in communication to enhance clarity in workplace interactions.	K3
CLO5	Enhance overall communication competence. Practicing these skills In combination reinforces learning and provides students with opportunities to use the language in authentic contexts.	K3
K1-Remember; **K2**-Understand; **K3**–Apply		

Part-II: English–I

Unit	Content	No. of Hours
I	**Poetry**: Nature 1. I Wandered Lonelyasa Cloud – William Wordsworth 2. The Sparrow – Paul Laurence Dunbar 3. Stopping by woods on a snowy Evening – Robert Frost	12
II	**Prose**: Friendship 1. The Man in Black – Oliver Goldsmith 2. Of Friendship – Francis Bacon 3. The Blessing of Friends – Sir John Lubbock	12
III	**Short Stories:** Morality 1. The Necklace – Guyde Maupassant 2. The Lottery - Shirley Jackson 3. The Monkey's Paw - W.W.Jacobs	12
IV	**Language Competency** 1. Vocabulary: Synonyms, Antonyms,Word Formation 2. Parts of Speech 3. Error correction	12
V	**English for Communication** 1. Listening for General and Specific Information. 2. Self-Introduction, Introducing others, Greetings. 3. Reading a prose passage, Reading a poem and Reading a short story 4. Descriptive writing – Writing a short descriptive essay of two to three paragraphs.	12
	Total Hours	**60**

Text Books

1.	Zama,M. (2004). Poetry Down the Ages. Orient Blackswan.
2.	Goldsmith,O. (1869). The Works of Oliver Goldsmith. J. Dicks
3.	Bacon,F., & Montagu,B. (1857). The Works of Francis Bacon (Vol. 1). Parry & McMillan.

Reference Books

1.	Kumar,V.T. Bhavani, Durga.K. Srinivas.YL.(2018). English in use –A text book for College Students. (English, Paperback).
2.	Swan,M.(2005).Practical English usage (Vol.7). Oxford: Oxford university press.

Web Resources (Swayam/NPTEL)

1.	https://nptel.ac.in/courses/109105205

Course Code	Course Name	Category	Hours / Week	Credits
25BCS13C	Python Programming	Core – I	5	4

Course Objectives

This Course intends to cover:

- Core syntax and semantics of Python programming language.
- Process of structuring the data using lists, dictionaries, tuples and sets.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Remember the fundamentals of solving problems with computers and execute simple Python programs.	K1
CLO2	Learn the Basic Programming constructs in Python.	K2
CLO3	Understand the basic functions in Python Programming.	K2
CLO4	Apply Software Objects and databases in Python.	K3
CLO5	Apply OOPs concepts in Python programs.	K3
K1- Remember; **K2** - Understand; **K3** – Apply		

CLO – PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	3	3	1	1	1
CLO2	3	3	1	1	1
CLO3	3	2	1	1	1
CLO4	3	2	2	2	1
CLO5	3	2	2	2	1
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Core - I: Python Programming

Unit	Content	No. of Hours
I	**Introduction:** The essence of computational problem solving – Limits of computational problem solving - Computer Algorithms - Computer Hardware - Computer Software - process of computational problem solving - Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types, Input / Output.	15
II	**Control Structures:** Boolean Expressions - Selection Control - If Statement Indentation in Python - Multi-Way Selection - Iterative Control - While Statement- Infinite loops - Definite vs. Indefinite Loops - Boolean Flag. String, List, Tuple, Manipulations. Building blocks of Python programs, Understanding and using range-Slicing.	15
III	**Functions:** Program Routines- Defining Functions- More on Functions : Calling Value - Returning Functions - Calling Non-Value – Returning Functions- Parameter Passing - Keyword Arguments in Python – Default Arguments in Python-Variable Scope. **Recursion:** Recursive Functions. Decorators. **Modular Design:** Modules - Top-Down Design - Python Modules.	15
IV	**Objects and their use:** Software Objects - Turtle Graphics – Turtle Attributes. **Text Files:** Opening, reading and writing text files. **Database Programming:** Connecting to a database, **C**reating Tables, **R**ead, **U**pdate, **D**elete (CRUD) and Insert operations, Transaction Control, Disconnecting from a database, String Processing – Exception Handling.	15
V	**Dictionaries and Sets:** Dictionary type in Python - Set Data type. **Object Oriented Programming using Python:** Encapsulation - Inheritance – Polymorphism. **Python packages:** Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc.	15
	Total Hours	**75**
Text Books		
1.	Charles Dierbach (2022), Introduction to Computer Science using Python - A Computational Problem solving Focus, Wiley India Edition. (Unit – I, II, III, IV)	
2	Wesley J. Chun (2016), Core Python Applications Programming, 3rd Edition, Pearson Education. (Unit – V)	
Reference Books		
1.	R. Nageswara Rao (2021), Core Python Programming, Dream tech Press, 3rd Edition	
2.	Y. Daniel Liang(2021), Introduction to Programming Using Python, Pearson,1st Edition	
3.	Mark Lutz (2018), Learning Python Powerful Object-Oriented Programming, O‟Reilly Media, 5th Edition.	
Web Resources (Swayam / NPTEL)		
1.	https://onlinecourses.swayam2.ac.in/cec24_cs01/course	
2.	https://onlinecourses.nptel.ac.in/noc24_cs57/preview	

Course Code	Course Name	Category	Hours / Week	Credit
25BCS14P	Lab: Python Programming	Core Lab-I	4	2

S. No.	Programs
1.	Sample Programs using Lists, Tuples, Dictionaries, Decorators, and others.
	Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2.	Program to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
3.	Write a Python script that prints prime numbers less than 20.
4.	Program to find factorial of the given number using recursive function.
5.	Write a Python Program to count the number of even and odd numbers from array of N numbers.
6.	Write a Python class to reverse a string word by word.
7.	Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input : tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output : 3).
8.	Create a Savings Account class that behaves just like a Bank Account, but also has an interest rate and a method that increases the balance by the appropriate amount of interest (Hint: use Inheritance).
9.	Write a Python Program to construct the following pattern, using a nested loop * ** *** **** ***** **** *** ** *

S.No.	Programs
10.	Read a file content and copy only the contents at odd lines into a new file.
11.	Create a Turtle graphics window with specific size.
12.	Write a Python Program for Towers of Hanoi using recursion.
13.	Create a menu driven Python program with a dictionary for words and their meanings.
14.	Devise a Python program to implement the Hangman Game.
15.	Program to create student database and calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria: Grade A: Percentage >=80 Grade B: Percentage >=70 and <80 Grade C: Percentage >=60 and <70 Grade D: Percentage >=40 and <60 Grade E: Percentage < 40.
	Capstone Project: "Weather Data Analysis and Visualization" (Using Python libraries like matplotlib, numpy, and pandas to process and visualize weather data).
	Total Hours **60**
Text Books	
1.	Charles Dierbach (2022), Introduction to Computer Science using Python - A Computational Problem Solving Focus, Wiley India Edition.
2.	Wesley J. Chun (2016), Core Python Applications Programming, 3rd Edition, Pearson Education.
Reference Books	
1.	R. Nageswara Rao (2021), Core Python Programming, Dream tech Press, 3rd Edition
2.	Y. Daniel Liang(2021), Introduction to Programming Using Python, Pearson,1st Edition
3.	Mark Lutz (2018), Learning Python Powerful Object-Oriented Programming, O"Reilly Media, 5th Edition.
Web Resources (Swayam / NPTEL)	
1.	https://onlinecourses.swayam2.ac.in/cec24_cs01/course
2.	https://onlinecourses.nptel.ac.in/noc24_cs57/preview

Course code	Course Name	Category	Hours / Week	Credits
25BCS15C	Foundations of Computing	Core-II	5	4

Course Objectives

The Course intends to cover:

- To understand the Basics of Computers.
- To impart the knowledge of C programming language.
- To have an in-depth understanding of Branching and Looping Statement.
- To provide an exposure to Functions, Recursion and Strings in C Language.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Recall and understand the basics of Computers.	K1, K2
CLO2	Build C programs using the concepts of Input/Output operations and operators.	K3
CLO3	Develop C programs using control and looping statements.	K2-K4
CLO4	Construct C programs using functions and recursion.	K2-K4
CLO5	Analyze the concepts of pointers, structures and unions.	K4
K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** – Analyze		

CLO – PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	3	2	3	2	2
CLO2	3	2	3	2	2
CLO3	3	3	3	2	2
CLO4	2	3	1	1	1
CLO5	2	3	1	1	1
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Core - II: Foundations of Computing

Unit	Content	No. of Hours
I	**Computer Basics:** Basics of Computer-Input Devices-Output Devices-Computer Memory-Central Processing Unit-Motherboard. Computer Generations & Classifications- Evolution of Computers - Types of Microcomputers - Distributed Computer. Types of Software- Overview of Operating System- Programming Languages- Problem Solving Techniques.	15
II	**Introduction to C & Environment Setup:** History & features of C - Structure of a C program - Compilation and Execution - Data types, variables, constants. **Input/Output and Operators:** scanf, printf - Arithmetic, relational, logical, bitwise, assignment, and conditional operators - Type casting - operator precedence & associativity. Reading & Writing a character - Formatted input and output. Hands-on Exercises: 1. Basic Input/Output and Arithmetic operations using scanf and printf 2. Calculating a Final Grade (Arithmetic, Relational, and Conditional Operators) 3. Input/Output operations using getchar() and putchar()	15
III	**Branching and Looping Statements:** Introduction - if, if…. else, nesting of if …else statements- else if ladder – The switch statement, The ?: Operator - The goto statement. Decision Making and Looping: Introduction- The while statement- the do statement – the for statement-jumps in loops. Hands-on Exercises: 1. Program to find whether the given number is even or odd. 2. Program to enter the marks of a student in four subjects. Then calculate the total, aggregate, and display the grades obtained by the student. 3. Program to check if a given number is a palindrome using a while loop.. 4. Program to calculate sum of first 10 Natural numbers using do while. 5. Menu-Driven Program Demonstrating Control Statements and Loops	15
IV	**Functions & Recursion:** Function declaration and definition - Call by value vs reference - Recursion basics (factorial, Fibonacci, GCD). **Arrays (1D and 2D):** Declaration, initialization, traversal - Basic operations: insert, delete, search - Matrix representation. **Strings in C:** String functions (strlen, strcpy, strcmp, etc.) - Manual string manipulation - String algorithms: palindrome, anagram. Hands-on Exercises: 1. Functions and Recursion: Factorial, Fibonacci, and GCD Calculation 2. Array Operations: Insert, Delete, and Search in 1D Array 3. String Manipulation: Palindrome Check and Anagram Detection	15

Unit	Content	No. of Hours
V	**Pointers & Dynamic Memory Allocation:** Pointer basics - malloc, calloc, free. **Structures and Unions:** Defining and using structures - Nested structures and arrays of structures - Difference between structures and unions. **File Handling:** Opening, reading, writing, and closing files - Modes: read, write, append - File pointer manipulation. Hands-on Exercises: 1. Implement Dynamic Memory Allocation using malloc and Traverse It 2. Create a Student Record System Using Structures and Write/Read to a File	15
	Total Hours	**75**
Text Books		
1.	Norton P. (2018), Introduction to Computers (8th ed.). McGraw-Hill Education.	
2.	Balagurusamy E. (2018), Programming in ANSI C (7th ed.). McGraw Hill Education.	
3.	Horowitz E., Sahni S., & Anderson-Freed S. (2011), *Fundamentals of Data Structures in C* (2nd ed.). University Press.	
Reference Books		
1.	Ashok N. Kamthane (2002), Programming with ANSI and Turbo C, Pearson.	
2.	Kernighan B. W., & Ritchie D. M. (1988), The C Programming Language (2nd ed.), Prentice Hall.	
Web Resources (Swayam / NPTEL)		
1.	**NPTEL - Introduction to C Programming** https://nptel.ac.in/courses/106104128	

Part – III: Allied Course

(B.Sc. Computer Science / BCA / B.Sc. Information Technology / B.Sc. Computer Technology/M.Sc. Software Systems)

Course Code	Course Name	Category	Hours / Week	Credits
25BCS16A/ 25BCA16A/ 25BIT16A/ 25BCT16A/ 25MSS17A	**Numerical Methods and Statistics**	**Allied**	**4**	**3**

Course Objectives

The course intends to cover

- A set of strategies and approaches used to generate approximate solutions to mathematical problems that cannot be solved analytically.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Obtain numerical solutions of algebraic and transcendental equations.	K1
CLO2	Understand the numerical solutions of simultaneous linear equations using different methods.	K2
CLO3	Understand the concept of numerical solutions in differentiation and integration of functions.	K2
CLO4	Apply measures of central tendency and measures of variation to find grouped and ungrouped data.	K3
CLO5	Apply the results of correlation and regression analysis.	K3
K1 - Remember; **K2** - Understand; **K3** – Apply;		

CLO – PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	3	1	1	1	1
CLO2	2	2	2	1	2
CLO3	2	2	2	1	2
CLO4	2	2	2	1	2
CLO5	1	2	2	2	1
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Allied - I: Numerical Methods and Statistics

Unit	Content	No. of Hours
I	**The Solution of Numerical Algebraic and Transcendental Equations:**Bisection Method – Iteration Method – Convergence Condition – Regula Falsi Method – Newton - Raphson Method	12
II	**Solution of Simultaneous Linear Algebraic Equations:** Gauss Elimination Method - Gauss Jordan Method- Gauss Jacobi Method - Gauss Seidel Method**.**	12
III	**Numerical Differentiation:** Newton's Forward Difference - Newton's Backward Difference - Derivative using Stirling's formula. **Numerical Integration:** Trapezoidal rule -Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.	12
IV	**Measures of Central Tendency:** Mean- Median-Mode. **Measures of Dispersion:** Range- Standard Deviation- Co-efficient of Variation.	12
V	**Correlation:** Meaning and Definition- Scatter Diagram-Karl Pearson's Co-efficient of correlation-Spearman's Rank Correlation. **Regression:** Meaning and Uses of Regression -Two Regression Lines-Methods of Forming the Regression Equations.	12
	Total Hours.	**60**
Text Books		
1	P. Kandasamy, K.Thilagavathy & K. Gunavathi (2007)" Numerical methods", S. Chand and Company Ltd, New Delhi. Unit I : Chapter 3 : Section 3.1 – 3.4 Unit II : Chapter 4 : Section 4.1, 4.2, 4.8, 4.9 Unit III: Chapter 9 : Section 9.1 – 9.4	
II	P.A.Navanitham (2023). "Business Mathematics and Statistics", Jai Publishers. Part II Unit IV: Chapter 7 : Pg. No. 159 – 250 Chapter 8 : Pg. No. 301 – 307, 325 – 368 Unit V: Chapter 12 : Pg. No. 503 – 522, 540 – 578	
Reference Books		
1.	M.K. Venkataraman (1999), "Numerical Methods in Science and Engineering", National Publishing Chapter 12 Pg. No. 503 – 522 company.	
2.	K. Sankara Rao (2018), "Numerical Methods for Scientists and Engineers", Prentice Hall India.	
3	P.R.Vittal (2003), "Business Mathematics", Margham publications 2^{nd} edition.	
Web Resources (Swayam / NPTEL)		
1.	https://archive.nptel.ac.in/courses/111/107/111107105/	

Part – IV: Foundation Courses

(All the Undergraduate Programmes)

Course Code	Course Name	Category	Hours / Week	Credits
25ENV1FC	Environmental Studies	FC- I	2	2

Unit	Content
I	The Multidisciplinary nature of environmental studies Definition; Scope and importance, Need for public awareness.
II	**Natural Resources:** Renewable and non-renewable resources: Natural resources and associated problems. - Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people. - Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems. - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies. - Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.
III	**Ecosystems** - Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem. - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem: - a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit	Content
IV	**Biodiversity and its Conservation** - Introduction-Definition: genetic, species and ecosystem diversity. - Bio geographical classification of India. - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. - Biodiversity at global, National and local levels. - India as a mega-diversity nation. - Hot-spots of biodiversity. - Threats to biodiversity: habital loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India. - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
V	**Environmental Pollution Definition** - Causes, effects and control measures of : - a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards - Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.
VI	**Social Issues and the Environment** - From Unsustainable to Sustainable development. - Urban problems related to energy. - Water conservation, rain water harvesting, watershed management. - Resettlement and rehabilitation of people; its problems and concerns. Case studies. - Environmental ethics: Issues and possible solutions. - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. - Wasteland reclamation. - Consumerism and waste products. - Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and Control of Pollution) Act. - Wildlife Protection Act. - Forest Conservation Act. - Issues involved in enforcement of environmental legislation. - Public awareness.

Unit	Content
VII	**Human Population and the Environment** - Population growth, variation among nations. - Population explosion-Family welfare Programme. - Environment and human health. - Human Rights. - Value Education. - HIV/AIDS. - Women and Child Welfare. - Role of information Technology in Environment and human health. - Case Studies. **Biosafety and Biosecurity** The basic principles of biosafety. - Biological hazards and assess risk in laboratory settings. - Biosafety protocols to minimize risks associated with biological agents. - Role of biosafety in the protection of public health, environment, and nationalsecurity. The theoretical knowledge as well as practical applications to prepare learners for real-world biosafety challenges. 1. Introduction to Biosafety - Definition and importance of biosafety. - Historical perspective on biosafety incidents. - Biosafety vs. biosecurity: Key differences. 2. Biological Hazards and Risk Assessment - Classification of biological agents (e.g., bacteria, viruses, fungi, parasites). - Risk assessment methodology: Identifying hazards, evaluating risks, and control measures. 3. Biological Waste Management - Types of biological waste: Solid, liquid, sharps, etc. - Waste disposal techniques: Autoclaving, incineration, chemical disinfection. - Environmental impact and regulations surrounding waste management. 4. Standard Operating Procedures (SOPs) and Safety Practices - Developing and implementing SOPs for laboratory safety. - Practices for handling, storing, and disposing of biological materials.
VIII	**Field Work (Practical).** - Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain. - Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. - Study of common plants, insects, birds. - Study of simple ecosystems-pond, river, hill slopes, etc.
	Total Hours. 30
Web Resources	
1.	https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf
2.	Biosafety in Microbiological and Biomedical Laboratories (CDC, NIH). (BMBL) 6th Edition
3.	Sateesh, M. K. (2010). Bioethics and Biosafety. New Delhi: I. K. International Pvt Ltd.
4.	Additional Readings:Relevant journal articles, government publications, and guidelines (e.g., WHO, CDC, European Union, etc.). https://www.iberdrola.com/innovation/what-is-biosafety

Part – IV: Ability Enhancement Compulsory Courses(AECC)

(All the Undergraduate Programmes)

Course Code	Course Name	Category	Hours / Week	Credits
25SOF1AE	Soft Skills	AECC - I	2	2

Course Objective

The course intends to cover

- The essential soft skills that is crucial for success in today's dynamic and interconnected workplace.

Course Learning Outcomes

On the successful completion of the course, students will be able to,

CLO	CLO Statements	Knowledge Level
CLO1	Understand the comprehensive skills to participate actively in conversation, writing short texts with expression	K1, K2, K3
CLO2	Infer the cohesive devices to describe and discuss any objects, pictures using compound, complex sentence forms.	K2, K3
CLO3	Comprehend the logic in the given situation to organize the ideas to write formal and informal letters.	K2, K3
CLO4	Understand the given material to organize it in a logical sequence to present a paragraph with main and supporting ideas with concluding sentences.	K3
CLO5	Present valuable ideas in conversation to emulate the main ideas and key points in short essays.	K3
K1 - Remember; **K2** - Understand; **K3** - Apply;		

Ability Enhancement Compulsory Course – I : Soft Skills

Module	Unit	Details	No. of Hours
I		**Presentation Skills**	
	1	**Getting to Know You:** Grammar: Introduction to Tenses, Everyday English, Role-Play. Reading Activity: Different ways of communication. *Activities*: Fill in the blanks (Listening), Self Introduction (Speaking).	6
	2	**My Day:** Grammar: Present simple positive & negative/Adverbs of Frequency, Vocabulary & Speaking about Daily Activities. Listening: Observe and Answer/ Telling the time. *Activities:* Reading & Writing: Describe where you live.	
	3	**Your World:** Grammar: Possessive determiners. Listening: Positive & negative contractions. Reading & Writing: Personal profile. *Activities:* Talk about countries, nationalities (Vocabulary & Speaking).	
	4	**The World of Work:** Grammar: Yes/No & Wh Questions. Vocabulary & Speaking: Jobs. Listening: Recognize the schwa sound. *Activities:* Opening and closing an email (Reading & Writing).	
	5	**Places and Things:** Grammar: There is / there are, articles. Vocabulary & Speaking: Talk about rooms & furniture. Listening: Directions. Reading & Writing: Imperatives.	
	6	**24 Hours:** Grammar: Likes & Dislikes. Vocabulary & Speaking: Speak about hobbies and interests. Reading: Match the photos with descriptions. Writing: Write complete sentence using prompt. *Activities:* Observe & answer *(*Listening)	
		Practice: Listening & Speaking Presentations - Talking about how you learn – Understanding key information in a presentation – Writing sentences about you.	
II		**Confidence**	
	1	**Clothes and Shopping:** Grammar: Modal verbs/Adverbs of Frequency/Adjectives and Adverbs. Vocabulary & Speaking: Shopping. Reading & Writing: Product Review. *Activities:* Observe & answer *(*Listening).	6
	2	**Travel & Transport:** Grammar: Past simple questions. Vocabulary & Speaking: Talk about holidays. Listening: At the train station. *Activities:* Email - A perfect holiday (Reading & Writing).	
	3	**Health & Fitness:** Grammar: Past simple irregular verbs; Listening: Listen & Answer; Reading & Writing: Time sequencers; *Activities:* Talk about a healthy lifestyle (Vocabulary & Speaking)	
	4	**Music:** Grammar: Present perfect simple; Vocabulary & Speaking: Survey about music; Listening: Listen two people talk about music; *Activities:* Use adjectives and create sentences (Reading)	
	5	**Let's go shopping:** Vocabulary & Speaking: Town Survey; Listening: Listen and answer; Reading & Writing: Read and match; Activities: Countable & Uncountable **(**Grammar)	
		Practice: Writing a personal statement.	

III	**Creativity**		
	1	**Cooking & Eating:** Grammar: Some & Any, Quantifiers. Vocabulary & Speaking about Food & Drink. *Activities* Kitchen conversation (Listening). Reading an article & answering.	6
	2	**Survival:** Grammar: Comparison of adjectives. *Activities* Describing people (Speaking and Vocabulary). Listening to an audio & Answering. Reading & Writing: Read and Answer.	
	3	**Working Together:** Grammar: Verb + Noun phrases. *Activities* Technology (Vocabulary & Speaking). Listening: Listen & Answer. Reading & Writing: Notice.	
	4	**Music:** Grammar: Present perfect simple. *Activities* Survey about music (Vocabulary & Speaking). Listen to two people talking about music (Listening). Reading: Use adjectives and create sentences.	
	5	**Culture and Arts:** Grammar: Present perfect.Vocabulary & Speaking activity: Speak on the phone. *Activities:* Listen and answer. Reading & Writing activity: Review.	
		Practice: Writing comparison sentences & paragraphs.	
IV	**Problem-Solving**		
	1	**Do's and Don'ts:** Grammar, Modal Verbs. *Activities* Roleplay (Speaking). Holidays in January (Listening). Reading an article & answering.	6
	2	**Body:** Grammar: First conditional. Vocabulary & Speaking about Personality & Appearance. *Activities* Conversations about personality (Listening), Reading & Writing: Read and Answer about your skills.	
	3	**Speed:** Grammar: Present simple passive. Vocabulary & Speaking about relationships. Listening: Listen & Answer. Reading and Error spotting.	
	4	**Work:** Grammar: Adverbs of manner. Vocabulary & Speaking about work advice. Listening: Observe & Answer; Reading: Read & check your ideas.	
		Practice: Writing argumentative and descriptive essays.	
V	**Critical Thinking**		
	1	**Influence:** Grammar: would / past habits. Listening: Sentence Correction. *Activities* Your inspiration (Speaking). Picture description (Reading).Rewrite the sentences (Writing).	6
	2	**Money:** Grammar: Second conditional. *Activities:* Radio programme (Listening). Talk about games (Speaking). Reading & Writing: Fill in the blanks.	
	3	**Things that changed the world:** Grammar: articles. *Activities* :Talk about chewing gum (Speaking & Listening). Reading & Writing: Read and write a book review.	
		Practice: Writing Emails, reports and proposals.	
		Total Hours	**30**

Components for Internal Assessment and Distribution of Marks for CIA and ESE (Theory)

Max Marks	Marks for		Components for CIA						
100	CIA	ESE	CIA		Model		Attendance	Active Engagement	Total
	25	75	Actual	Weightage	Actual	Weightage	5	5	25
			50	**5**	75	**10**			

Question Paper Pattern

Component	Duration in Hours	Section A			Section B			Section C			Total
		Type of Question	No. of Questions	Marks	Type of Question	No. of Questions	Marks	Type of Question	No. of Questions	Marks	
CIA	2	MCQ	8	8x1=8	Either or	3	3x6=18	Either or	3	3x8=24	50
Model Exam / **ESE**	3	MCQ	10	10x1=10	Either or	5	5x5=25	Either or	5	5x8=40	75

Components for Internal Assessment and Distribution of Marks for CIA (Lab)

Max Marks	Marks for		Components for CIA						
	CIA	ESE	Test		Model		Experiments / Programs	Observation	Total
100	40	60	Actual	Weightage	Actual	Weightage	Marks	5	40
			50	**10**	60	**15**	**10**		

Examination Pattern

Component	Duration in Hours	Marks			Total Marks
		Practical Exam	Record	Weightage	
Test	2	50	-	**10**	50
Model	3	60	-	**15**	60
Experiments	-	-	-	**10**	10
Observation	-	-	-	**05**	05
Total Marks - CIA				**40**	**40**
ESE	3	50	10	-	**60**

Components for Internal Assessment and Distribution of Marks for CIA (Foundation Course -Theory)

Max Marks	Marks for		Components for CIA				
	CIA	ESE	CIA		Model		Total
			Actual	Weightage	Actual	Weightage	
50	50	-	50	25	50	25	50

Question Paper Pattern

Duration in Hours	Mode of Exam	Type of Questions	No. of Questions	Marks
2	Offline	Open Choice	5 (Out of 8)	5 x 10=50

Components for and Distribution of Marks for ESE (Theory) Ability Enhancement Compulsory Courses (AECC) & Question Paper Pattern

Duration in Hours	Mode of Exam	Type of Questions	No. of Questions	Marks
2	Online	MCQ	50	50x1=50