CAUVERY COLLEGE FOR WOMEN
(AUTONOMOUS)
Nationally Accredited with 'A' Grade by NAAC
ISO 9001:2015 Certified
TIRUCHIRAPPALLI

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

B.SC. COMPUTER SCIENCE

SYLLABUS

2022 -2023 and Onwards

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

<u>VISION</u>

To create an ambience for a quality academic erudition which drives technologically adept, innovative and globally competent graduates with ethical values

<u>MISSION</u>

- To have a breath of knowledge across the subject areas of Computer Science

- To professionally enrich the students for successful career in Academia, Industry and Research

- To promote and inculcate ethics and code of professional practice among students

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.

PROGRAMME OUTCOMES FOR B.Sc Computer Science,
B.Sc Computer Science with Cognitive Systems , BCA,
B.Sc Information Technology

PO NO.	On completion of B. Sc Computer Science / B. Sc Computer Science with Cognitive Systems / BCA/ B. Sc Information Technology Programme, the students will be able to
PO 1	**ACADEMIC SKILLS & SOCIAL RESPONSIBILITY** Apply Computing, Mathematical and Scientific Knowledge in Various disciplines by understanding the concerns of the society.
PO 2	**CRITICAL THINKING AND INNOVATIVE PROGRESS** Design the software applications with varying intricacies using programming languages for innovative learning in techno world to meet the changing demands.
PO 3	**PERSONALITY DEVELOPMENT** Perceive Leadership skills to accomplish a common goal with effective communication and understanding of professional, ethical, and social responsibilities.
PO 4	**LIFELONG LEARNING** Identify resources for professional development and apply the skills and tools necessary for computing practice to gain real life experiences.
PO 5	**CREATIVITY AND HOLISTIC APPROACH** Create a scientific temperament and novelties of ideas to support research and development in Computer Science to uphold scientific integrity and objectivity.

PROGRAMME SPECIFIC OUTCOMES FOR B.Sc COMPUTER SCIENCE

PSO NO.	The students of B.Sc Computer Science will be able to	POs Addressed
PSO 1	Identify, analyze, design an optimized solution using appropriate algorithms of varying complexity using cutting edge technologies	PO 1 PO 2 PO 5
PSO 2	Attain a solid foundation in the Programming languages and to formulate computational solutions to real life problems	PO 1 PO 2 PO 4 PO 5
PSO 3	Equip the skills to utilize tools and technologies in computer science to meet the industrial needs and to communicate effectively among peers	PO 3 PO 4
PSO 4	Develop skills in software and hardware so as to enable them to establish a productive career in industry, research, academia and also as an entrepreneur	PO 1 PO 4 PO 5
PSO 5	Implement independent projects of their own choice using latest tools and also work as an effective team member to attain the predefined goals.	PO 3 PO 4 PO 5

Cauvery College for Women (Autonomous), Trichy

B.Sc Computer Science

(For the candidates admitted from the Academic year 2022-2023 and onwards)

Semester	Part	Course	Title	Course Code	Inst. Hrs. / week	Credits	Exam Hrs.	Exam Marks Int.	Exam Marks Ext.	Total
I	I	Language Course-I (LC)	Ikkala Ilakiyam	22ULT1	6	3	3	25	75	100
			Hindi Literature & Grammar - 1	22ULH1						
			History of popular tales, Literature and Sanskrit story	22ULS1						
			Basic French – I	22ULF1						
	II	English Language Course-I(ELC)	Functional English for Effective Communication -I	22UE1	6	3	3	25	75	100
	III	Core Course – I(CC)	Programming in C	22UCS1CC1	5	5	3	25	75	100
		Core Practical - I (CP)	Programming in C Practical	22UCS1CC1P	3	3	3	40	60	100
		First Allied I	Essential Mathematics	22UCS1AC1	4	3	3	25	75	100
		First Allied II	Numerical Analysis and Statistics	22UCS1AC2	4	3	3	25	75	100
	IV	Ability Enhancement Compulsory Course-I (AECC)	UGC Jeevan Kaushal-Universal Human Values	22UGVE	2	2	-	100		100
		Total			**30**	**22**				**700**

Semester I	Internal Mark: 25		External Mark: 75	
COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
22UCS1CC1/ 22UCA1CC1/ 22UIT1CC1	PROGRAMMING IN C	CORE	5	5

Course Objectives
- To understand the basics of C language
- To get the deep knowledge of programming using C language
- To develop logics which will help them to create programs and applications in C
- Enhance skill on problem solving by constructing algorithms

Course Outcomes and Cognitive Level Mapping
On the successful completion of the course, the students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Define the basic concepts of C Programming	K1
CO2	Illustrate the components of C programming	K2
CO3	Build algorithms and data structures swiftly and faster computation using programs	K3
CO4	Apply the knowledge of programming concepts to develop programs	K4
CO5	Solve real time problems using C	K5

Mapping of CO with PO and PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	2	2	2	2	2	3	2
CO2	3	3	3	2	2	3	3	2	3	2
CO3	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	2	2	2	3	3
CO5	3	3	3	3	3	3	3	2	2	3

"1" – Slight (Low) Correlation   "2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation   "-" indicates there is no Correlation.

UNIT I   **(15 Hours)**
Developing a program in C: Algorithm-Pseudocode-Flowchart- Planning a C program-Writing a C program- Compile and Run a C Program-**Overview of C:** – Structure of C program – Character set- Tokens – Data types – Variables – Declaration of variables - Symbolic constant – Operators and Expressions

UNIT II   **(15 Hours)**
Managing Input and Output Operations: Reading and Writing a character -Formatted Input and Output. **Decision Making and Branching:** If, Switch, The ? : operator - The GoTo Instruction – **Decision Making and Looping:** Introduction – While, DO, For Statements –Jumps in Loops.

UNIT III   **(15 Hours)**
Array – One dimensional array – Two and multidimensional array – Character array – String functions – **User-Defined Functions:** Need for User -Defined Functions –A Multi-Function Program- Elements of User-Defined Functions-Definition of Functions –Return values and Their Types-Function Calls- Function Declaration- Category of Functions – Nesting of Functions - Recursion - Storage Class- The scope and lifetime of variables in functions.

UNIT IV   **(15 Hours)**
Structures and Unions: Structure definition – Structure Initialization – Array of structure – Array within structure –Structure within Structure-Union– **Pointers:** Understanding pointers - Accessing the address of a variable - Declaring and Initializing pointers - Accessing a variable through its pointers - Pointer Expressions - Pointers and Arrays - Pointers and Character strings.

UNIT V   **(15 Hours)**
File Management: Defining and Opening File –Closing a File – I/O operations on Files – Error handling during I/O operations – Random Access to Files- Command Line Arguments.

UNIT VI - Self Study for Enrichment (Not to be included for External Examination)
Develop algorithms for real time scenario - Area calculations, Conversion programs, swapping numbers (with and without using temporary variable).
Programs for checking eligibility, Triangle formation, Sum of numbers, Sum of series, Array manipulations (Sorting, searching, insert, delete and merging), String handling programs, Dynamic memory management using pointers, Employee pay bill preparation using Files.

Text Books
1.   Byron Gottfried. (2018). Programming with C, 4th Edition, Tata McGraw Hill.**(Unit – I)**

2.   Balagurusamy.E. (2017). Programming in ANSI C, 7thEdition, Mc Graw Hill Education,

      New Delhi. (**Unit I -V**)

Reference Books

1. Yashavant Kanetkar, (2020). Let Us C, 16thEdition, BPB Publications, New Delhi.

2. Ashok N. Kamthane, Amit Ashok Kamthane (2015). Programming in C, 3rd Edition, Pearson India   Education Services Pvt. Ltd.

Web References

1. https://www.learn-c.org/
2. https://www.cprogramming.com/
3. https://www.tutorialspoint.com/cprogramming/index.htm

Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

Course Designers

1. Dr. M. Anandhi, Associate Professor, Department of Information Technology.

2. Ms. R. Sridevi, Assistant Professor, Department of Computer Applications.

Semester I	Internal Marks: 40		External Marks:60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HRS./WEEK**	**CREDITS**
22UCS1CC1P	**PROGRAMMING IN C PRACTICAL**	**CORE**	**3**	**3**

Course Objective

- To provide the hands on experience on C Programming and improve the practical skill set
- The learner will be able to develop the logic for the given problem, recognize and understand the syntax and construction of C code
- To know the steps involved in compiling, linking and debugging C code, feel more confident about writing the C functions, write some complex program

Course Outcomes and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Understand and Implement the fundamentals of C Programming	K2, K3
CO2	Analyze the problem and develop skills on identifying appropriate programming constructs for problem solving	K3, K4
CO3	Examine the problem and provide solution using control structures and Looping statements	K4, K6
CO4	Analyze the problem and create program using arrays and functions	K4, K6
CO5	Assess and solve the problems using structures and pointers	K5, K6

Mapping of CO with PO and PSO

Cos	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	2	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	2	3	2	3	3
CO3	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	3	3	3	3	2	3	3

"1"–Slight (Low) Correlation   "2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation   "-"indicates there is no Correlation.

List of Exercises

1. Data types & Operators
2. Control Statements
3. Looping Statements
4. Functions

5. Arrays
6. String Handling Functions
7. Pointers
8. Structures
9. Command line Arguments
10. Reading data from file
11. Writing data into file

Web References:
1. https://beginnersbook.com/2015/02/simple-c-programs/
2. https://www.javatpoint.com/c-programs
3. http://www.tutorialspoint.com/cprogramming/index.htm
4. http://www.w3schools.in/c
5. http://fresh2refresh.com/c-tutorial-for-beginners

Pedagogy:

PowerPoint Presentations, Demo by e-Contents

Course Designers :

Ms.S.Saranya , Ms.N.Agalya

ESSENTIAL MATHEMATICS
(For B.Sc Computer Science , B.Sc Information Technology & BCA)
(2022-2023 and Onwards)

Semester I	Internal Marks:25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
22UCS1AC1/ 22UCA1AC1/ 22UIT1AC1	**ESSENTIAL MATHEMATICS**	**ALLIED**	**4**	**3**

Course Objective

- **Apply** the basic concepts of Differentiation, Integration and their applications.
- **Compute** mathematical quantities using ordinary and partial differential equations.
- **Explore** fundamental concepts in graph theory.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Remember and recall the basic concept of essential mathematics.	**K1**
CO2	Illustrate the various notions in the respective streams .	**K2**
CO3	Apply the different terminologies of essential mathematics.	**K3**
CO4	Classify the solution of mathematical problems using various techniques.	**K4**
CO5	Examine the solution of mathematical problems.	**K4**

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	3	3	3	3	2	3
CO2	3	3	3	3	3	3	3	3	3	2
CO3	3	2	3	3	3	3	3	3	2	2
CO4	3	2	2	3	3	3	3	3	3	2
CO5	3	2	3	3	3	3	3	3	2	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬
"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

UNIT I **(12 HOURS)**

Matrices:

Matrix – Special types of matrices – Scalar multiplication of a matrix – Equality of matrices – Addition of matrices – Subtraction – Multiplication of Matrices – Inverse matrix– Relation between adjoint and inverse matrices – Solution of simultaneous equations – Rank of a matrix – A system of m homogeneous linear equations in n unknowns – System of non-homogeneous linear equations – Eigen values and Eigenvectors – Similar matrices – Cayley-Hamilton Theorem (proof not needed) – Simple applications only.

UNIT II **(12 HOURS)**

Differentiation:

Maxima and Minima (Problems Only) – Points of inflexion.

Partial differentiation:

Functions of function rule – Total Differential Coefficient – A Special case – Implicit Functions – Homogeneous functions – Euler's Theorem (proof not needed) – Simple problems only.

UNIT III **(12 HOURS)**

Integration:

Integration of Rational algebraic functions – Rule (a) – Rule (b): Type i:$\int \frac{dx}{ax^2+bx+c}$, Type ii: $\int \frac{lx+m}{ax^2+bx+c}\, dx$ – Integration of Irrational functions : Case (ii) Integration of the form $\int \frac{px+q}{\sqrt{ax^2+bx+c}}$ – Type $\int \frac{dx}{a+b\cos x}$ – Properties of definite integrals.

UNIT IV **(12 HOURS)**

Differential Equations:

Linear Differential Equation with constant coefficients – The Operators D and D^{-1} – Particular Integral – Special methods of finding P.I.: X is of the form (a) $e^{\alpha x}$ (b) $\cos\alpha x$ or $\sin\alpha x$, where α is a constant (c) x^m (a power of x), m being a positive integer (d) $e^{\alpha x}V$, where V is any function of x.

UNIT V **(12 HOURS)**

Graph Theory:

Introduction – Definition of Graphs – Applications of Graphs – Finite and infinite graphs – Incidence and Degree – Isolated Vertex, Pendant Vertex, and Null Graph.

Path and Circuits:

Isomorphism – Subgraphs – Walks, Paths, and Circuits – Connected Graphs, Disconnected Graphs, and Components – Euler graphs.

UNIT VI   Self-Study for Enrichment: (Not to be included for External Examination)

Symmetric matrix – Skew symmetric matrix – Hermitian and skew Hermitian matrices Concavity and Convexity– Integration by parts – Linear equation – Hamiltonian Paths and Circuits.

Text Books

1. T.K.Manicavachagom Pillay, T.Natarajan, K.S.Ganapathy.(2015). *Algebra, Volume II* S. Viswanathan (Printers & Publishers) Pvt., Ltd.

2. S.Narayanan, T.K.Manicavachagom Pillay.(2015*).Calculus,Volume I*. S. Viswanathan (Printers & Publishers) Pvt., Ltd.

3. S.Narayanan, T.K.Manicavachagom Pillay.(2015*).Calculus,Volume II*. S. Viswanathan (Printers & Publishers) Pvt., Ltd.

4. S.Narayanan, T.K.Manicavachagom Pillay.(2015*).Calculus,Volume III*. S. Viswanathan (Printers & Publishers) Pvt., Ltd.

5. Narsingh Deo. (2003). *Graph Theory with applications to Engineering and Computer*. Prentice Hall of India Private Limited

UNIT-I   Chapter 2: Section 1 to 5, 7, 8, 10 to 16[1]

UNIT-II   Chapter V: Section 1.1 to 1.5[2]

                Chapter VIII: Section 1.2 to 1.6[2]

UNIT-III   Chapter 1: Section 7.1 to 7.3, 8 (CASE II), 9, 11[3]

UNIT-IV   Chapter 2: Section 1 to 4[4]

UNIT-V   Chapter 1: Section 1.1 to 1.5[5]

                Chapter 2: Section 2.1, 2.2, 2.4 to 2.6[5]

Reference Books

1. A.Singaravelu. (2003). *Allied Mathematics*. A.R.Publications

2. P.R.Vittal. (2014). *Allied Mathematics*. Margham Publications, Chennai.

3. S.Arumugam and S.Ramachandran.(2006*). Invitation to Graph Theory*. Sci Tech Publications (India) Pvt Ltd., Chennai

Weblinks
   1.   **https://youtu.be/rowWM-MijXU**
   2.   **https://youtu.be/TQvxWaQnrqI**
   3.   **https://youtu.be/pvLj1s7SOtk**

4. https://youtu.be/Gxr3AT4NY_Q
5. https://youtu.be/xlbbefbYLzg
6. https://youtu.be/b0RJkIBhfEM
7. https://youtu.be/s5KZw1EpBEo

Pedagogy

Assignment, Seminar, Lecture, Quiz, Group discussion, Brain storming, e-content.

Course Designers

1. Dr. V. Geetha
2. Dr. S. Sasikala

FIRST ALLIED COURSE-II (AC)

NUMERICAL ANALYSIS AND STATISTICS

(For B.Sc Computer Science , B.Sc Information Technology & BCA)

(2022-2023 and Onwards)

Semester I	Internal Marks: 25			External Marks:75
COURSE CODE	COURSE TITLE	CATEGORY	Hrs / Week	CREDITS
22UCS1AC2/ 22UCA1AC2/ 22UIT1AC2	NUMERICAL ANALYSIS AND STATISTICS	ALLIED	4	3

Course Objective

- **Understand** the implementation of various methods of Numerical Analysis.
- **Organize** and **summarize** the statistical data.
- **Analyze** and **evaluate** the strengths of the conclusions based on data.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Understand the list of basic ideas of Numerical Methods and Statistics.	K1,K2
CO2	Solve the problems using various methods and also classify the given datas.	K2,K3
CO3	Identify the conceptual collection and classification of variables.	K3
CO4	Analyze the accuracy and graphical representation of statistical datas.	K4
CO5	Support the implementation of numerical methods and statistical datas.	K4

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	2	3	2
CO2	3	3	2	2	2	3	2	3	2	3
CO3	2	3	3	2	2	2	3	3	2	3
CO4	3	2	3	2	2	3	3	2	3	2
CO5	3	3	2	3	3	3	2	2	3	3

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"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

Syllabus

UNIT I (12 HOURS)

Solution of Algebraic & Transcendental Equations:

Introduction – The Bisection Method – The Iteration Method – Newton-Raphson Method (Problems Only)

Interpolation:

Finite Differences: Forward Differences, Backward Differences – Newton's Formulae for Interpolation – Interpolation with unevenly spaced Points: Lagrange's Interpolation formula

UNIT II (12 HOURS)

Numerical Integration:

Numerical Integration: Simpson's 1/3-Rule – Simpson's 3/8-Rule (proof not needed).

Linear Systems of Equations:

Solution of Linear Systems–Direct Methods: Gaussian Elimination Method – Solutions of Linear Systems – Iterative Methods (Problems Only)

UNIT III (12 HOURS)

Numerical solution of Ordinary Differential Equations:

Introduction – Euler's Method – Modified Euler's Method – Runge-Kutta Methods – Predictor - Corrector Methods : Adams-Moulton Method

UNIT IV (12 HOURS)

Measures of Central Tendency:

Arithmetic Mean – Median – Mode – Geometric Mean – Harmonic Mean.

Measures of Dispersion:

Mean Deviation – Standard Deviation (Simple Problems Only)

UNIT V   **(12 HOURS)**

Correlation:

Introduction – Meaning of Correlation – Scatter Diagram – Karl Pearson's co-efficient of Correlation – Rank Correlation: Spearman's Rank Correlation Coefficient (Derivation not needed and Simple Problems Only).

Linear Regression:

Introduction – Linear Regression (Derivation not needed and Simple Problems Only)

UNIT VI   Self-study for Enrichment   (Not to be included for External examination)

The method of False Position & Central Differences - Trapezoidal rule - Solution by Taylor's Series and Milne's Method - Range – Quartile Deviation - Rank Correlation (Repeated Ranks).

Text Books

1. Sastry S. S. (1998). Introductory methods of Numerical Analysis, Third Edition. Prentice Hall of India Private Limited.

2. Gupta. S.C & Kapoor, V.K (2007). Fundamentals of Mathematical Statistics. Sultan Chand & sons, New Delhi.

UNIT – I   Chapter 2: Sections 2.1 - 2.3(Omit 2.3.1), 2.5(Omit 2.5.1) [1]

Chapter 3: Sections 3.3 (Omit 3.3.4), 3.6, 3.9(3.9.1only) [1]

UNIT – II   Chapter 5: Sections 5.4(5.4.2 & 5.4.3 only) [1]

Chapter 6: Sections 6.3(6.3.2 only) & 6.4 [1]

UNIT – III   Chapter 7: Sections 7.1, 7.4- 7.6 (Omit 7.4.1 & 7.6.2) [1]

UNIT – IV   Chapter 2: Sections 2.5 - 2.9, 2.13 (Omit 2.13.1 & 2.13.2) [2]

UNIT –V   Chapter 10: Sections 10.1 - 10.4, 10.7(10.7.1 Only) [2]

Chapter 11: Sections 11.1 & 11.2 [2]

Reference Books

1. Jain M. K, Iyengar S. R.K. and Jain R.K. (1999). Numerical Analysis Numerical Methods for Scientific and Engineering Computations. New Age International Private Limited.

2. Froberg C.E. (1979). Introduction to Numerical Analysis. II Edition. Addison Wesley

Web Links

1. **https://youtu.be/qCzUXav5Nk**
2. **https://youtu.be/r6MTvrI8SQ4**
3. **https://youtu.be/s05dONL4xAs**

4. **https://youtu.be/XaHFNhHfXwQ**
5. **https://youtu.be/zPG4NjIkCjc**

Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

Course Designers

1. Dr.R.Buvaneswari
2. Ms.A.Gowri Shankari