Programme Matrix: Bachelor of Science- Computer Science, Mathematics, Statistics [2019 Batch]

Kristu Jayanti College
AUTONOMOUS Bengaluru
Reaccredited 'A' Grade by NAAC | Affiliated to Bengaluru North University

FACULTY OF SCIENCE

B.Sc. Computer Science, Mathematics, Statistics

Programme Educational Objectives

PEO1: To empower the students with current trends in computational sciences.

PEO2: To familiarize the students with mathematical concepts and tools.

PEO3: To equip the students with knowledge and skills in statistical analysis and inferences.

PEO4: To nurture the students with employability skills and professional ethics.

Programme Outcome

After the successful completion of three year B.Sc. CSMS Programme, the graduate will be able to:

PO1: Apply professional and social skills to cater to the needs of the industry, society and global scientific community.

Programme Specific Outcomes

After the successful completion of three year B.Sc. CSMS Programme, the graduate will be able to:

PSO1: Apply logical reasoning and algorithmic solutions to national and global computational problems.

PSO2: Appraise mathematical concepts and reasoning, and infer statistical conclusions.

PSO3: perform effectively with professional ethics in analytic, scientific and technical domains.

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I Semester

Course Type	Course Code	Course Title	Course Outcome
AECC	**AEN103A11**	**Additional English I**	1. Describe and differentiate between ballads and sonnets 2. Analyze critically the writing style of prose writers 3. Develop interest to appreciate one act plays 4. Apply the rules of punctuation to write concisely 5. Demonstrate proficiency in creating leaflets and brochures
AECC	**HIN103B11**	**Hindi I**	• हिन्दी साहित्य के गद्य विधाओं का विश्लेषण करने की क्षमता का विकास • विद्यार्थियों में सामाजिक यथार्थ का मूल्यांकन करने का ज्ञान • सृजनात्मक कौशल्य में परिपूर्णता • गद्य विधाओं के अध्ययन करने के बाद सामाजिक मूल्यों का ज्ञान प्राप्त • अनुवाद कला और भाषा में परिशुद्धता
AECC	**KAN103B11**	**Kannada I**	• ಜಾನಪದ& ಶಿಷ್ಟ ಸಾಹಿತ್ಯದ ವ್ಯತ್ಯಾಸಚರ್ಚೆ ಮಾಡುವರು • ಸಾಮಾಜಿಕ ಸಮಾನತೆ ಮತ್ತು ಜೀವನಮೌಲ್ಯಗಳ ಪುನರಾವಲೋಕನ ಮಾಡುವರು • ಗ್ರಾಮೀಣ ಸಂಸ್ಕೃತಿಯನ್ನು ವಿವರಿಸುವರು • ಕನ್ನಡ ಭಾಷಾಪ್ರೇಮವನ್ನುಇತರೆ ಭಾಷೆಗಳೊಂದಿಗೆ ಹೋಲಿಕೆ ಮಾಡುವರು
AECC	**ENG103A11**	**English I**	1. To attune young minds to concerns and issues which have a broad and wide scope of use and application to life. 2. To cut across the history of creative expression in focusing primarily on the core values that governs human lives.
DSCC	**CSC203A11**	**Computer Science I [Programming in C]**	1. Design flowchart and algorithms for C program. 2. Construct sequential, iterative problems and input/output operations on text files. 3. Differentiate between decision control structures and loop control structures. 4. Distinguish between data representation through arrays, functions, function using pointers, structures and unions.
DSCL	**CSC2L1A11**	**Computer Science Practical I**	1. Trace sequential, decision making and iterative C programs. 2. Design user defined data types and functions in C language.
DSCC	**UMT204B11**	**Mathematics I [Calculus and Analytical Geometry]**	1. Construct nth derivative of f(z)=uv using Leibnitz's Theorem. 2. Evaluate partial derivatives of algebraic and transcendental functions. 3. Evaluate integral using reduction formula. 4. Use the equations of line, plane, sphere, cone and cylinder.
DSCC	**STS203B11**	**Statistics I [Basic Statistics I]**	1. Distinguish nominal, ordinal, ratio and interval data types. 2. Analyze uni-variate data using measures of central tendency, measures of dispersion, skewness and kurtosis. 3. Analyze bivariate and tri-variate data sets using correlation and regression. 4. Apply addition, multiplication and conditional probability law.
DSCL	**STS2L1B11**	**Statistics Practical I**	1. Construct histogram and ogives. 2. Formulate discrete and continuous frequency distribution tables. 3. Calibrate correlation and regression statistical analysis.

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II Semester

Course Type	Course Code	Course Title	Course Outcome
AECC	**AEN103A21**	**Additional English II**	1. To provide the young learners an introduction to new ideas and issues that bear relevance to our life today. 2. To give the students an opportunity to develop values that will help them adapt to the changing world.
AECC	**HIN103B21**	**Hindi II**	• काव्य अध्ययन मे संगीतात्मक शैली को समझा लेता है • काव्य विशलेषण करने की क्षमता • काव्य में निहित विचारों का मूल्यांकन • काव्य सृजन करने का कौशल्य • व्याकरणिक भाषा का ज्ञान एवं स्पष्टता
AECC	**KAN103B21**	**Kannada II**	• ಕನ್ನಡ ಸಾಹಿತ್ಯದಲ್ಲಿನ ಭಾಷಾ ಮಡಿವಂತಿಕೆಯ ವಿವರಣೆ ತಿಳಿಯುವರು • ಪುರಾಣ ಕಾವ್ಯಗಳಲ್ಲಿನ ಸಾಂಸ್ಕೃತಿಕ ಮುಖಾಮುಖಿಯ ವಿಶ್ಲೇಷಣೆ ಮಾಡುವರು • ನಾಟಕಗಳಲ್ಲಿನ ಪರಿಸರ ವರ್ಣನೆಯ ಪುನರಾವಲೋಕನ ಕೈಗೊಳ್ಳುವರು • ವೃತ್ತಿಆಧಾರಿತ ವ್ಯವಸ್ಥೆ ಬಗ್ಗೆ ಚರ್ಚಿಸುವರು
AECC	**ENG103A21**	**English II**	1. Discuss the use of animal imagery and hypersensitive characters in the twentieth century writings 2. Describe poetic style and its devices in the English verses of the Victorian age 3. Analyze poems and sonnets regarding existentialist and metaphysical themes 4. Discover and implement new strategies of grammar in speaking English language 5. Integrate the prominence of media and the elements of advertising by creating media awareness
AECC	**NES102A01**	**Environmental Science**	1. Discuss the overexploitation of natural resources. 2. Appraise the components of the ecosystem. 3. Assess the conservation of biodiversity. 4. Criticize the mitigation process of natural disasters. 5. Survey the effects of pollution in the environment. 6. Recommend the various policies for the betterment of the environment.
DSCC	**CSC203A21**	**Computer Science II [Data Structures]**	1. Explain data structures, dynamic memory management and usage of pointer variables. 2. Differentiate operations associated with arrays, linked lists, stacks, queues and trees. 3. Design recursive procedures, sorting and searching algorithms for data structure applications.
DSCL	**CSC2L1A21**	**Computer Science Practical II**	1. Write programs explaining the data structures operations. 2. Develop programs for searching and sorting techniques. 3. Execute recursive functions for tower of Hanoi and binomial coefficient.
DSCC	**UMT204B21**	**Mathematics II [Algebra and Differential Calculus]**	1. Identify algebraic structures as groups. Construct pedal equation, radius of curvature and evaluate. 2. Explain singular point, asymptote and envelope. 3. Solve first order linear and homogeneous differential equations.
DSCC	**STS203B21**	**Statistics II [Basic Statistics II]**	1. Relate to univariate and bivariate random variables in terms of p.m.f/ p.d.f , c.d.f and their properties. 2. Discriminate probability distributions as discrete -binomial, poisson, negative binomial, geometric, hyper geometric; and continuous- uniform, exponential, normal gamma, beta. 3. Apply the properties of expectation and variance of random variables. 4. Interpret wlln and chebychev's inequality.
DSCL	**STS2L1B21**	**Statistics Practical II**	1. Calibrate univariate and bivariate random variables. 2. Formulate discrete distributions- binomial, poisson, negative binomial, geometric, hyper geometric; and

			continuous distributions- uniform, exponential, normal. 3. Demonstrate wlln and chebychev's inequality.

III Semester

Course Type	Course Code	Course Title	Course Outcome
AECC	**AEN103A31**	**Additional English III**	1. Appreciate the theme of love and suspense in the works of Alfred Noyes, Robert Southey, Sir Arthur Conan Doyle and Shakespeare 2. Discover the sufferings of human being in the works of Tagore, Mary Fisher, Charley Chaplin, John Stainbeck and Philip Larkin 3. Analyses the dramatic techniques in the prescribed one act play 4. Outline the difference between essay writings and precis writing 5. Develop the interest on poem and prose
AECC	**HIN103B31**	**Hindi III**	• हिन्दी कविता और खण्ड़काव्य के भेद को समझालेता है • पौराणिक कथा का विश्लेषण • पौराणिक आदर्श विचारों का अनुकरण करता है • आधुनिक और पौराणिक विचारों का मुल्यांकन • काव्य सृजन शैली का विकास
AECC	**KAN103B31**	**Kannada III**	• ಕನ್ನಡ ಸಾಹಿತ್ಯದ ವಿವಿಧ ಪ್ರಕಾರಗಳನ್ನು ಪರಿಚಯಿಸುತ್ತದೆ • ಮಧ್ಯಕಾಲೀನಯುಗದ ಭಕ್ತಿ ಪರಂಪರೆಯೊಂದಿಗೆ ಬದುಕಿನ ವಾಸ್ತವತೆಯನ್ನು ಹೋಲಿಸಿ ಚರ್ಚಿಸುವರು • ಭಾಷೆಯ ಕೌಶಲ್ಯಗಳೊಂದಿಗೆ ವಿಜ್ಞಾನ ಹಾಗೂ ತಾಂತ್ರಿಕ ಚಿಂತನೆಗಳನ್ನು ಗ್ರಹಿಸಲು ಅಗತ್ಯ ಕ್ರಮಗಳನ್ನು ಅರಿಯುವರು • ಯುವಜನಾಂಗವುಅಭಿವೃದ್ಧಿಯಜಗತ್ತಿನಲ್ಲಿ ಹೊಂದಾಣಿಕೆಯಾಗಲು ಸಂವಹನ ಕೌಶಲ್ಯಗಳ ಅಗತ್ಯತೆಯನ್ನುಚರ್ಚಿಸುವರು • ಧರ್ಮ ಮತ್ತು ಪರಂಪರೆಗಳ ಕುರಿತು ಪುನರಾವಲೋಕನ ಮಾಡುವರು
Compulsory Courses			
AECC	**ENG103A31**	**English III**	1. State the problems of a man and the significance of parental affection in real life 2. Review the historical background of true events in roman history 3. Extrapolate the reflections on the lives of writers in literary genres 4. Interpret the significance of english literature in the forms of movies and serials in media 5. Formulate the structure of oral and written presentations and develop speaking skills
DSCC	**CSC203A31**	**Computer Science III [Java Programming]**	1. Compare Procedural and Object-oriented Programming Paradigms. 2. Construct windows and frame based GUI applications using control fundamentals. 3. Construct windows and AWT based applications using control fundamentals.
DSCL	**CSC2L1A31**	**Computer Science Practical III**	1. Build sequential, decision making and iterative Java programs. 2. Design GUI based applications using applets and frames.
DSCC	**UMT204B31**	**Mathematics III [Algebra, Differential Calculus, Improper Integrals and Linear Programming]**	1. Explain cyclic group and Lagrange's theorem. 2. Evaluate limit of algebraic and transcendental function using L' Hospital's Rule. 3. Evaluate integral using beta and gamma functions.

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			4. Formulate a given simplified definition as a linear programming problem and solve using graphical or simplex methods.
DSCC	**STS203A31**	**Statistics III [Statistical Inference I]**	1. Compare point estimators based on the properties of unbiasedness, consistency, efficiency and sufficiency. 2. Construct confidence intervals for means, difference of mean, proportions, difference of proportions, variance, and ratio of variances. 3. Create random samples for uniform, Poisson, binomial and normal distributions.
DSCL	**STS2L1A31**	**Statistics Practical III**	1. Develop confidence intervals for means, difference of mean, proportions, difference of proportions, variance, and ratio of variances. 2. Construct random samples for uniform, Poisson, binomial and normal distributions.
SEC	**SSP4L2A01**	**Soft Skills Practices**	1. Build verbal/oral communication, leadership and listening skills. 2. Perform group discussion, presentations and personal interview.

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IV Semester

Course Type	Course Code	Course Title	Course Outcome
AECC	**AEN103A41**	**Additional English IV**	1. Interpret select poems of Robert Frost, Sarojini Naidu and William Blake 2. Explain the style and significant features of prose writings of R. K Narayan, Willa Cather, Doris Lessing, O. Henry, and Booker. T. Washington 3. Compare the ethical and cultural differences in Wole Soyinka's play 'The Lion and the Jewel' and learn the unique native culture of Nigeria 4. Assess the issues related to marriage, education, moral code of conduct, the concept of sublime, modernity, tradition, and the mindsets of human beings in life 5. Appraise the literary devices and techniques used in poetry and prose 6. Formulate grammatically correct sentences using proper punctuations 7. Create citations of books, articles and journals using MLA format 8th edition
AECC	**HIN103B41**	**Hindi IV**	• हिन्दी व्यंग्य अध्ययन करने की शैली को समझलेता है • व्यंग्य में निहित विचारों का विश्लेषण • व्यंग्य कथाओं में अभिव्यक्त विचारों का मूल्यांकन • निबंधों में निहित आदर्श विचारों का अनुकरण करता है • व्यंग्य सृजन कौशल्य का विकास
AECC	**KAN103B41**	**Kannada IV**	• ನಮ್ಮ ನಾಡು–ಸಮಾಜ–ಕುಟುಂಬ ಪರಂಪರೆಯಕುರಿತುಅರಿವು ಹಾಗೂ ಕಾಳಜಿಯನ್ನು ಅಧ್ಯಯನಮಾಡುವರು • ಮಹಿಳಾ ಹಕ್ಕುಗಳು ಹಾಗೂ ರಕ್ಷಣೆಯಜವಾಬ್ದಾರಿಯನ್ನು ಸ್ಪಷ್ಟವಾಗಿ ತಿಳಿಯುವರು • ಅರಣ್ಯ ಹಾಗೂ ನೈಸರ್ಗಿಕ ಸಂಪನ್ಮೂಲಗಳನ್ನು ವಿವಿಧ ವಿಷಯಗಳ ಅಧ್ಯಯನದೊಂದಿಗೆಚರ್ಚಿಸುವರು • ಭಕ್ತಿಯಅರ್ಥ, ಗ್ರಹಿಕೆಗಳು, ವಿವಿಧ ನೆಲೆಗಳು ಕುರಿತುಕಾಲಘಟ್ಟದ ಹಿನ್ನಲೆಯಲ್ಲಿ ಹೋಲಿಸುವರು • ಆದರ್ಶಗಳು, ಸಮಾಜಿಕ ಸೇವೆ ಈ ಕುರಿತು ಮೌಲ್ಯಾಧಾರಿತ ಬದುಕನ್ನುಕುರಿತು ಪುನರಾವಲೋಕನ ಮಾಡುವರು
Compulsory Courses			
AECC	**ENG103A41**	**English IV**	1. Recognize, define, and identify poetic terms and genres 2. Examine novels analytically and interpretively, to identify literary elements of plot, character, setting, tone, point of view, theme, style, symbol, metaphor, and image 3. Analyze the characters and themes of one act plays 4. Acquire vital employability skills and employment opportunities with in-depth knowledge of cv, cover letter, report writing and paragraph writing
DSCC	**CSC203A41**	**Computer Science IV [Internet Technology]**	1. Explain TCP/IP, HTTP protocols and directory services rendered by the internet. 2. Analyze the elements and attributes in HTML tags. 3. Develop webpages using HTML, JavaScript, XML and CSS.
DSCL	**CSC2L1A41**	**Computer Science Practical IV**	1. Design webpages using HTML, JavaScript and CSS. 2. Manage web pages using XML tags.
DSCC	**UMT204B41**	**Mathematics IV [Algebra, Differential Equations, Laplace Transforms and Fourier Series]**	1. Analyze homomorphism and isomorphism of a group. 2. Solve second and higher order differential equations. 3. Evaluate Laplace transforms and inverse Laplace transforms. 4. Estimate Fourier series for even and odd functions.

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DSCC	**STS203A41**	**Statistics IV [Statistical Inference II]**	1. Analyze type I error, type II error and power of test 2. Relate to tests of significance for means, difference of mean, proportions, difference of proportions, variance, ratio of variances, correlation coefficients. 3. Discriminate chi-square test for goodness of fit and independence of attributes. 4. Apply non-parametric tests and Wald's sequential tests.
DSCL	**STS2L1A41**	**Statistics Practical IV**	1. Calibrate type I error, type II error and power of test. 2. Design MP test for mean of normal distribution, parameters of binomial and Poisson distributions. 3. Develop a test of significance for means, difference of mean, proportions, difference of proportions, variance, ratio of variances, correlation coefficients. 4. Formulate chi square test for goodness of fit and independence of attributes.
NCCC	**LSE5A2A41**	**Life Skills Education**	1. Develop self-competency and confidence in their day to day life 2. Evaluate the problems and find the sustainable solutions in their daily life 3. Enhance interpersonal relationship effectively in the community 4. Develop coping mechanisms to manage their stress effectively in their environment

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V Semester

Course Type	Course Code	Course Title	Course Outcome
DSCC	**CSC204A51**	**Computer Science V [DBMS and Visual Programming]**	1. Explain the concepts of relational data model, Normalization, database design, relational algebra and transaction processing. 2. Construct ER model for data tables and formulate SQL queries on data. 3. Design graphical user interface using arrays, functions and VB.Net controls. 4. Integrate connectivity between user interface and the database.
DSCL	**CSC2L2A51**	**Computer Science Practical V**	1. Design primary key, foreign key constraints and joins in the database. 2. Manage connectivity between user interface and the database.
DSCC	**CSC204A52**	**Computer Science VI [Operating System Concepts and LINUX]**	1. Compare batch, time sharing, and real time and distributed operating systems. 2. Explain system calls and operating system services. 3. Demonstrate CPU scheduling, disk scheduling, page replacement algorithms and process synchronization. 4. Analyze the critical section problems, deadlocks and storage management. 5. Design shell scripts using UNIX tools and utility commands.
DSCC	**UMT204A51**	**Mathematics V [Real and Complex Analysis]**	1. Categorize sequences and series to convergent, divergent or oscillatory. 2. Construct analytic functions from complex functions. 3. Evaluate integrals using Cauchy's integral theorem and formula. 4. Compare circles and lines in z-plane and w-plane.
DSCC	**UMT204A52**	**Mathematics VI [Total and Partial Differential Equations, Algebra and Numerical Analysis]**	1. Solve the partial differential equation of first order using Charpit's method and second order using complementary function and particular integral. 2. Identify rings, integral domain and field. 3. Apply numerical methods to perform interpolation and integration. 4. Solve algebraic and transcendental equations using bisection method, newton's method and secant method.
DSCL	**UMT2L2B51**	**Mathematics Practical I**	1. Create programs for sequences and series using the Maxima tool. 2. Develop solutions for algebraic, transcendental and partial differential equations using the Maxima tool.
DSCC	**STS203A51**	**Statistics V [Sampling Theory and Statistical Quality Control]**	1. Distinguish between probability and non-probability sampling techniques. 2. Demonstrate the estimation of population mean for simple random, stratified and systematic samplings. 3. Construct the confidence intervals for population mean and population proportion in simple random samplings. 4. Differentiate the theoretical basis, background and utility of xbar, r, s, sigma, p, d, u and c control charts. 5. Relate to single and double sampling plans by attribute.
DSCL	**STS2L2A51**	**Statistics Practical V**	1. Develop the confidence intervals for population mean and population proportion in simple random samplings. 2. Manage stratified random sampling and systematic sampling.

			3. Design $\underline{X}$, r, s, σ, p, d, u and c control charts. 4. Create single and double sampling plans by attribute.
DSCC	**STS203A52**	**Statistics VI [Design and Analysis of Experiments]**	1. Classify one-way and two-way ANOVA. 2. Construct CRD, RBD and LSD. 3. Relate to 2^2 and 2^3 factorial experiments. 4. Analyze complete and partial confounding in a 2^3 factorial experiment with RBD layout.
DSCL	**STS2L2A52**	**Statistics Practical VI**	1. Calibrate one-way and two-way ANOVA. 2. Formulate CRD, RBD and LSD. 3. Develop 2^2 and 2^3 factorial experiments.

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VI Semester

Course Type	Course Code	Course Title	Course Outcome
DSCC	**CSC204A61**	**Computer Science VII [Software Engineering]**	1. Analyze software components and process models in software development life cycle. 2. Prepare the plan, design, schedule and assessing the risks in project management. 3. Categorize software metrics, testing and maintenance of a project.
DSCL	**CSC2L2A61**	**Computer Science Practical VII**	1. Design project development phases using waterfall, prototyping, spiral and agile model. 2. Manage the workflow of the project using Gantt chart.
DSCP	**CSC2P4A61**	**Enterprise Computing Project**	1. Design a web-based application using .NET platform. 2. Create data flow and entity relationship diagrams. 3. Connect client application with database server.
DSCC	**UMT204A61**	**Mathematics VII [Vector Calculus and Integral Calculus]**	1. Use curl, divergence and gradient. Solve problems on line and multiple integrals. 2. Evaluate length, area and volume of curves using multiple integrals.
DSCC	**UMT204A62**	**Mathematics VIII [Matrices, Linear Algebra and Calculus of Variations]**	1. Evaluate rank, inverse, Eigen values and Eigen vectors of a matrix and solve system of linear equations. 2. Explain vector space, subspace, linear span, basis and dimension. 3. Interpret linear transformation and fundamental concepts of rank nullity theorem. 4. Evaluate the extreme value of a functional.
DSCL	**UMT2L2B61**	**Mathematics Practical II**	1. Create programs for matrices and linear transformations using Maxima tool. 2. Design Maxima programs to evaluate line and multiple integral.
DSCC	**STS203A61**	**Statistics VII [Applied Statistics]**	1. Construct time series by method of moving averages, least square technique. 2. Design seasonal indices by simple averages and ratio to moving averages. 3. Develop price and quantitative index numbers, consumer price index number. 4. Measure demography in terms of mortality rates, fertility rates, reproduction rates, life table. 5. Categorize clinical trials in terms of observational, cross-sectional, prospective, retrospective and randomized control studies. 6. Explain official statistics in terms of GNP, GDP, NNP, NDP, per capita income, real national income
DSCL	**STS2L2A61**	**Statistics Practical VII**	1. Calibrate linear and nonlinear trends; seasonal variation using simple averages and ratio to moving averages method. 2. Create price and quantity index numbers, consumer price index number. 3. Formulate mortality rates, fertility rates, reproduction rates, life table. 4. Demonstrate odds ratio, relative risk, sensitivity, specificity, roc curve.
DSCC	**STS203A62**	**Statistics VIII[Operations Research]**	1. Evaluate LPP using graphical, simplex and big M method. 2. Illustrate TP using NWCR, MMM, VAM, MODI and AP using Hungarian method. 3. Explain M/M/1 queuing theory in terms of arrival pattern, customer behavior, queue discipline, service pattern. 4. Interpret decision making under uncertainty and risk. 5. Evaluate game theory using maximin -minimax principle, dominance rule, and graphical method. 6. Prepare project network using CPM and PERT.
DSCL	**STS2L2A62**	**Statistics Practical VIII**	1. Formulate LPP using graphical, simplex and big M method. 2. Calibrate TP using NWCR, MMM, VAM, MODI and AP using Hungarian method. 3. Design decision problem using EMV and EOL 4. Formulate game theory using maximin-minimax principle, dominance rule, and graphical method. 5. Create a project network using CPM and PERT.