

**K.L.E Society's  
Raja Lakhamagouda Science Institute (Autonomous), Belagavi**

**(PO's/PSO's/CO's)**

**Program: B. Sc. Chemistry & Mathematics (UG01C03)**

**Programme Outcome**

- PO1: Disciplinary knowledge and skills: Capable of demonstrating comprehensive knowledge and understanding of major concepts, theoretical principles and experimental findings in Chemistry & Mathematics and its different subfields.
- PO2: Critical thinker and problem solver: Ability to employ critical thinking and efficient problem-solving skills in the four basic areas of Chemistry & Mathematics.
- PO3: Sense of inquiry: Capability for asking relevant/appropriate questions relating to issues and problems in the field of Chemistry & Mathematics, and planning, executing and reporting the results of an experiment or investigation.
- PO4: Lifelong learners: Capable of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling.

**Programme Specific Outcomes**

- PSO1: Students will realize and develop an understanding of the impact of Chemistry & Mathematics on society and apply conceptual understanding of the Chemistry & Mathematics in real life.
- PSO2: Perform effectively with professional ethics in analytical, scientific and technical domains.
- PSO3: Demonstrate subject-related and transferable skills that are relevant to Chemistry & Mathematics related job trades and employment opportunities.

## Course Outcomes

### Semester I

Course Type	Course Code	Course Title	Course Outcome
AECC	21EN101	Generic English-I	<b>CO1:</b> Learn to appreciate literary texts. <b>CO2:</b> Obtain the knowledge of literary devices and genres. <b>CO3:</b> Acquire the skills of creativity to express one's experiences. <b>CO4:</b> Be aware of their social responsibilities. <b>CO5:</b> Develop the critical thinking skills. <b>CO6:</b> Develop gender sensitivity. <b>CO7:</b> Increase reading speed, analytical skills and develop presentation skills. <b>CO8:</b> Become employable with requisite professional skills, ethics and values.
AECC	21KA101	Kannada	<b>CO 1:</b> Create appreciation for Kannada language and culture through Kannada literature <b>CO 2:</b> Creating environmental awareness. <b>CO 3:</b> Developing scientific perspective through science literature. <b>CO 4:</b> Know the importance and various forms of Kannada Language
AECC	21HI101	Hindi	<b>CO1:</b> Create interest among the students by reading story. <b>CO2:</b> Will be familiar with the development sequence of modern Hindi story. <b>CO3:</b> Interest towards linguistic correctness will be created. <b>CO4:</b> Will be able to acquire writing skills. <b>CO5:</b> Know the importance and various forms of Hindi Language.
SEC	21CS111	Digital fluency	<b>CO1:</b> Have an intelligent conversation on the key concepts and applications of artificial intelligence (AI), Big data analytics (BDA), internet of things (IOT), Cloud computing, and cyber security. <b>CO2:</b> Develop holistically by learning essential skills such as effective communication, problem solving, design thinking, and team work. <b>CO3:</b> Build his or her personal brand has an agile and expensive learner- one who is interested in horizontal and vertical growth?

DSC	21CH101	Fundamentals of chemistry	<p><b>CO1:</b> Analyze the analytical methods, Errors and treatment of analytical data and gain knowledge about balance in redox equations, titration curves, theory of redox in metal-ion indicators and applications</p> <p><b>CO2:</b> Describe the dual nature of radiation and matter, Quantum mechanics, Orbital shapes, electronic configurations of the atoms and periodicity.</p> <p><b>CO3:</b> Explain bond properties, electron displacement effects, organic reaction mechanism, configurationally and conformational isomers.</p> <p><b>CO4:</b> Explain the existence of different states of matter, laws of ideal gases and real gases and understand cooling effect of gas.</p>
OEC	21CH111	Chemistry in Daily life-1	<p><b>CO1:</b> Understand the chemical constituents in various day to day materials using by a common man.</p> <p><b>CO2:</b> Understand the chemical Composition and analysis of milk and milk products, beverages, food preservatives and analysis of pesticides residue in food.</p> <p><b>CO3:</b> Understand the chemical constituents in chemical fuels and polymers.</p>
DSC	21CH102	Chemistry Lab-1	<p><b>CO1:</b> Understand principles of different type's titrations. Titration curves for all types of acids-base titrations.</p> <p><b>CO2:</b> Gain knowledge about balance in redox equations, titration curves, theory of redox indicators and applications.</p> <p><b>CO3:</b> Gain knowledge about estimation of some organic compounds such as Aniline and Amide</p>
DSC	21MA101	Algebra-I and Calculus-I	<p><b>CO1:</b> Learn to solve system of linear equations and Solve the system of homogeneous and non-homogeneous linear of <math>m</math> equation <math>n</math>. And Variables by using concept of rank of matrix, finding eigen values and eigen vectors.</p> <p><b>CO2:</b> Sketch curves in Cartesian, polar and pedal equations.</p> <p><b>CO3:</b> Students will be familiar with the techniques of integration and differentiation of function with real variables.</p> <p><b>CO4:</b> Identify and apply the intermediate value theorems and L'Hospital rule.</p>

OECC	21MA111	<b>Algebra and Partial derivatives</b>	<p><b>CO1:</b> Link the fundamental concepts of groups and symmetries of geometrical objects.</p> <p><b>CO2:</b> Recognize the mathematical objects called Groups. Explain the significance of the notions of Cosets, normal subgroups and factor groups.</p> <p><b>CO3:</b> Understand the concept of differentiation and fundamental theorem in differentiation and various rules. Find the extreme values of functions of two variables.</p>
DSC	21MA102	<b>Practicals on Algebra-I and Calculus-I</b>	<p><b>CO1:</b> Learn Free and Open-Source Software (FOSS) tools for computer programming</p> <p><b>CO2:</b> Solve problem on algebra and calculus theory studied in 21MA101 by using FOSS software's.</p> <p><b>CO3:</b> Acquire knowledge of applications of algebra and calculus through FOSS</p>

## Semester II

Course Type	Course Code	Course Title	Course Outcome
AECC	21EN201	Generic English-II	<p><b>CO1:</b> Learn to appreciate literary texts.</p> <p><b>CO2:</b> Obtain the knowledge of literary devices and genres.</p> <p><b>CO3:</b> Acquire the skills of creativity to express one's experiences.</p> <p><b>CO4:</b> Be aware of their social responsibilities.</p>
AECC	21BO311	Environmental Studies	<p><b>CO1:</b> define environmental study and ecology with basic principles.</p> <p><b>CO2:</b> To examine the natural resources their types and utility.</p> <p><b>CO3:</b> To identify the environmental usages, types of pollutions and their impact.</p> <p><b>CO4:</b> To outline the diversity and explain the conservations and its significance.</p>
AECC	21KA201	Kannada-II	<p><b>CO 1:</b> A good personality is formed by literature based on life values.</p> <p><b>CO 2:</b> Students become ambitious to build a better life by achieving specific goals.</p> <p><b>CO 3:</b> Inspiring to always be enthusiastic in life.</p> <p><b>CO 4:</b> You will get complete knowledge of modern Kannada poetry.</p>

AECC	21HI201	Hindi-II	<p><b>CO1:</b> Create interest among the students by reading story.</p> <p><b>CO2:</b> Will be familiar with the development sequence of modern Hindi story.</p> <p><b>CO3:</b> Interest towards linguistic correctness will be created.</p> <p><b>CO4:</b> Will be able to acquire writing skills.</p> <p><b>CO5:</b> Know the importance and various forms of Hindi Language.</p>
DSC	21CH201	Fundamentals of chemistry - 2	<p><b>CO1:</b> Understand the chemical bonding, molecular structure &amp; periodicity of elements.</p> <p><b>CO2:</b> Explain the concepts of acidic strengths of organic compounds and stereochemistry.</p> <p><b>CO3:</b> Describe the solids &amp; liquid crystals-Forms of solids and classification of Liquid Crystals.</p> <p><b>CO4:</b> Understand the Chemical Kinetics, Liquid State, Surface tension, Viscosity and Refractive index</p>
OEC	21CH211	Molecules of life	<p><b>CO1:</b> Acquire knowledge about different types of sugars and their chemical structures and Identify different types of amino acids and determine the structure of peptides.</p> <p><b>CO2:</b> Explain the actions of enzymes in our body and interpret enzyme inhibition, Predict action of drugs. Depict the biological importance of oils and fats.</p> <p><b>CO3:</b> Understand the importance of lipids in the metabolism Differentiate RNA and DNA and their replication. Explain production of energy in our body.</p>
DSC	21CH202	Content of Chemistry Lab-2	<p><b>CO1:</b> Understand the different type's titrimetric experiments</p> <p><b>CO2:</b> Gain the knowledge about determination of <math>Ba^{2+}</math> and <math>Cu^{2+}</math> by gravimetric methods.</p> <p><b>CO2:</b> Gain the knowledge about determination of Density, Viscosity and Surface tension.</p>
DSC	21MA201	Algebra-II and Calculus-II	<p><b>CO1:</b> Link the fundamental concepts of groups and symmetries of geometrical objects.</p> <p><b>CO2:</b> Recognize the mathematical objects called Groups. Explain the significance of the notions of Cosets, normal subgroups and factor groups.</p> <p><b>CO3:</b> Understand the concept of differentiation and fundamental theorems in differentiation and various rules.</p>

			<b>CO4:</b> Find the extreme values of functions of two variables.
OEC	21MA211	Algebra and Partial derivatives	<b>CO1:</b> Link the fundamental concepts of groups and symmetries of geometrical objects. <b>CO2:</b> Recognize the mathematical objects called Groups. Explain the significance of the notions of Cosets, normal subgroups and factor groups. <b>CO3:</b> Understand the concept of differentiation and fundamental theorem in differentiation and various rules. Find the extreme values of functions of two variables.
DSC	21MA202	Algebra-II and Calculus-II	<b>CO1:</b> Learn Free and Open-Source Software (FOSS)tools for computer programming <b>CO2:</b> Solve problem on algebra and calculus by using FOSS software's. <b>CO3:</b> Acquire knowledge of applications of algebra and calculus through FOSS

### Semester III

Course Type	Course Code	Course Title	Course Outcome
AECC	21EN301	Generic English-III	<b>CO1:</b> Acquired enhanced LSRW (Listening, Speaking, Reading, Writing) skills <b>CO2:</b> Equipped themselves with interpersonal communication skills <b>CO3:</b> Augmented presentation and analytical skills <b>CO4:</b> Ability to critically analyses, interpret and appreciate literary texts <b>CO5:</b> An awareness of social, cultural, religious and ethnic diversities
AECC	21KA301	Kannada-III	<b>CO1:</b> By knowing about Bhakti Sahitya, you will have the quality of humanity. <b>CO 2:</b> Through travel literature, people will learn about the life and culture of different regions <b>CO3:</b> The study of ideological literature will lead to revolution. <b>CO 4:</b> Know the importance and various forms of Kannada Language.
AECC	21HI301	Hindi-III	<b>CO1:</b> Able to understand One Act plays <b>CO2:</b> Learn to write various types of Letters
SEC-2		<b>Constitution of India</b>	<b>CO1:</b> To realise the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.

			<p><b>CO2:</b> To identify the importance of fundamental rights &amp; fundamental duties.</p> <p><b>CO3:</b> To understand the functioning of Union, State &amp; Local Governments in Indian federal system.</p>
DSC	21CH301	Fundamentals of chemistry - 2	<p><b>CO1:</b> Understand the importance of fundamental law and validation parameters in chemical analysis to know how different analytes in different matrices (water and real samples) can be determined by spectrophotometric methods.</p> <p><b>CO2:</b> Suggest the plausible structures and geometries of molecules using Radius Ratio Rules, VSEPR theory</p> <p><b>CO3:</b> To understand the concept of mechanism for a given reaction and also to know the importance of reaction intermediates.</p>
OEC	21CH311	Fuel Chemistry and Environmental Chemistry	<p><b>CO1:</b> Understand the concept of fuels, and their classifications.</p> <p><b>CO2:</b> Learn the different types of fuels and their applications.</p> <p><b>CO3:</b> Know the different types of pollution and their prevention.</p>
DSC	21CH302	Content of Chemistry Lab-2	<p><b>CO1:</b> Understand the importance of instrumental methods for quantitative applications Apply colorimetric methods for accurate determination of metal ions and anions in water or real samples</p> <p><b>CO2:</b> Able to evaluate acid- base titrations and generates the titration curves for strong acid and bases and also explain the reference and indicator electrodes.</p> <p><b>CO3:</b> Understand how functional groups in a compound is responsible for its characteristic property</p> <p><b>CO4:</b> Learn the importance of qualitative tests in identifying functional groups.</p> <p><b>CO5:</b> Learn how to prepare a derivative for particular functional groups and how to purify it.</p>
DSC	21MA301	Ordinary Differential Equations and Real Analysis – I	<p><b>CO1:</b> Solve first-order non-linear differential equations and linear differential equations.</p> <p><b>CO2:</b> To model problems in nature using Ordinary Differential Equations.</p> <p><b>CO3:</b> Formulate differential equations for various mathematical models</p>

			<p><b>CO4:</b> Apply these techniques to solve and analyze various mathematical models.</p> <p><b>CO5:</b> Understand the fundamental properties of the real numbers that lead to define sequence and series, the formal development of real analysis.</p>
OEC	21MA311	Ordinary Differential Equations	<p><b>CO1:</b> Understand the concept of the differential equation and their classification</p> <p><b>CO2:</b> Know the meaning of the solution of a differential equation.</p> <p><b>CO3:</b> Solve first-order ordinary differential equations.</p> <p><b>CO4:</b> Solve exact differential equations and convert to separable and homogeneous equations to exact differential equations by integrating factors.</p> <p><b>CO5:</b> Solve Bernoulli differential equations.</p> <p><b>CO6:</b> Find the solution to higher-order linear differential equations.</p>
DSC	21MA302	<b>Practical's: Ordinary Differential Equations and Real Analysis – I</b>	<p><b>CO1:</b> Free and Open-Source software (FOSS) tools or computer programming.</p> <p><b>CO2:</b> Solving exact differential equations</p> <p><b>CO3:</b> Plotting orthogonal trajectories.</p> <p><b>CO4:</b> Finding complementary function and particular integral of linear and homogeneous differential equations.</p>

#### Semester IV

Course Type	Course Code	Course Title	Course Outcome
AECC	21EN401	Generic English-IV	<p><b>CO1:</b> Acquired creative, interpretative and critical thinking</p> <p><b>CO2:</b> Skills to communicate confidently and effectively</p> <p><b>CO3:</b> Obtained persuasive and creative social media writing skills</p> <p><b>CO4:</b> Developed analytical and evaluative skills</p> <p><b>CO5:</b> Learnt to identify and understand social contexts and ethical frameworks in the texts</p>
AECC	21KA401	Kannada-IV	<p><b>CO 1:</b> Learn to live in harmony by learning about the oppressed race.</p> <p><b>CO 2:</b> students will live in tolerance with each other.</p> <p><b>CO 3:</b> By understanding the life of common people, one will know the essence of simple life</p>

			CO 4: Know the importance and various forms of Kannada Language
AECC	21HI401	Hindi-III	CO1: Able to understand Hindi Novels CO2: Able to understand the importance of Mass Media and Communication
SEC-2		<b>Artificial Intelligence</b>	CO1: To get introduced to artificial intelligence and machine learning. CO2: Understanding data analysis process CO3: To learn about the robotics and applications
DSC	21CH401	Fundamentals of chemistry - IV	CO 1: Able to define chromatography and also know the steps involved in a chromatography investigation. CO 2: Predict the nature of the bond formed between different elements. Identify the possible type of arrangements of ions in ionic compounds. Know about Born-Haber Cycle CO 3: To understand the concept of mechanism for a given reaction and also to know the importance of reaction intermediates, CO 4: Understand the concept of rate of a chemical reaction, integrated rate equations, energy of activation and determination of order of a reaction based on experimental data and to know the different types of electrolytes,
OEC	21CH411	Electrochemistry, Corrosion and Metallurgy	CO1: Understand the concept of conductance in electrolytic solutions, electrolysis and redox reactions involved in electrode reactions. CO2: Able to understand the Different types of Batteries their principle construction and working, lead-acid storage and lithium-ion battery. Study of Fuels cells. CO 3: Gain the knowledge of ores and minerals, extraction of metals from their ores, and purification.
DSC	21CH402	Content of Chemistry Lab-IV	CO1: Understand the chemical reactions involved in the detection of cations and anions. CO2: Explain basic principles involved in classification of ions into groups in semi-micro qualitative analysis of salt mixture CO1: Understand the use of instruments like conductivity meter to obtain various physicochemical parameters and also know the theory about chemical kinetics CO 3: Learn to fit experimental data with theoretical models & interpret the data

DSC	21MA401	Partial Differential Equations and Integral Transforms	<p><b>CO1:</b> Solve the Partial Differential Equations of the first order &amp; second order.</p> <p><b>CO2:</b> Formulate, classify and transform partial differential equations into canonical form.</p> <p><b>CO3:</b> Solve linear and non-linear partial differential equations using various methods. and apply these methods to solving some physical problems.</p> <p><b>CO4:</b> Able to take more courses on wave equation, heat equation, and Laplace equation.</p> <p><b>CO5:</b> Solve PDE by Laplace Transforms and Fourier Transforms.</p>
OEC	21MAT411	Partial Differential Equation	<p><b>CO1:</b> Explain the concept of the differential equation.</p> <p><b>CO2:</b> Classifies the differential equations concerning their order and linearity.</p> <p><b>CO3:</b> Explains the meaning of the solution of a differential equation.</p> <p><b>CO4:</b> Solve first-order ordinary differential equations.</p>
DSC	21MA402	Practicals: <b>Complex Analysis, Improper integrals and Beta and Gamma Function</b>	<p><b>CO1:</b> Free and Open-Source software (FOSS) tools or computer programming.</p> <p><b>CO2:</b> Acquire knowledge about Fundamentals of Complex analysis using Sci-Lab.</p> <p><b>CO3:</b> Plot the Complex functions by their images over concentric circles.</p> <p><b>CO4:</b> Able to write the programs to find the analytic function using C-R equation.</p>