Four Year Undergraduate Programme (FYUGP)

Syllabus

B.Sc. Chemistry

(Honours with Research)

Fatima Mata National College (Autonomous), Kollam

The following institutions are offering their facilities for doing Internship/Project for students of Dept of Chemistry, FMN College, Kollam	
1	Kerala Minerals and Metals Ltd. Chavara
2	Central Institute of Plastics Engineering and Technology, Govt of India, Palaghat
3	Common Facility Service Centre, Govt. of Kerala, Changanaserry
4	Centre for Earth Science Studies, Govt of India, Thiruvananthapuram
5	Cochin University of Science and Technology, Cochin
6	NIIST, CSIR, Thiruvananthapuram
7	PSG Institute of Technology, Coimbatore

PREAMBLE

The Four-Year Undergraduate Programme in Chemistry (FYUGP CHEMISTRY-HONOURS WITH RESEARCH) offered by Fatima Mata National College has a student centric approach in which the student can choose their own pathway for learning. The syllabus has been revised and the revised syllabus is to be effective from 2024 admission. On successful attainment of 133 credits in a three-year period, a student shall be awarded an Undergraduate Degree. In a four-year period, the student can successfully attain 177 credits and shall be awarded with either Undergraduate Honours Degree or Undergraduate Honours with Research Degree. The students can acquire credits through the following categories of subjects.

1. Discipline Specific Core (DSC) Courses

2. Discipline Specific Elective (DSE) Courses

3. General Foundation Courses

a) Multi-Disciplinary (MDC) Courses

b) Ability Enhancement Courses

c) Value Addition Courses

d) Skill Enhancement Courses

Discipline Specific Core (DSC) courses are the core credit courses in a particular discipline. Students may choose DSC courses as their major or minor course of study. Discipline Specific Elective (DSE) Courses are a pool of credit courses in a particular discipline. These courses offer specialisation to students in a particular discipline. It can be a major or minor course of study. Multi-Disciplinary Courses (MDC) are Generic Elective courses meant to ensure multi-disciplinary/interdisciplinary education to students. Every Discipline has to offer MDCs. Ability Enhancement Courses (AEC) are courses offered by language and Literature Disciplines to ensure enhancement of language proficiency among students.

Students who secure at least 75 % of marks in all the six semesters can choose Undergraduate Honours with Research stream in the fourth year. Value Addition Courses (VAC) are meant to inculcate ethics, constitutional values, soft skills, sports and such similar values to students. Every discipline may offer VACs. Skill Enhancement Courses (SEC) are skill-based courses in all disciplines which may inculcate skill, competencies and hands on training. In the first three semesters of the FYUGP, the student should learn one Multi-Disciplinary Course (MDC) each from a discipline other than the Major and Minor disciplines already chosen. The first and second MDC (MDC1 and MDC2), respectively in the first and second semesters, can be offered by all departments. The third MDC (MDC3) in the third semester is common to all the students, with Kerala-specific content (KS), and offered by English (E) and Other Language (OL) departments. Each MDC has 3 credits. Total 9 credits shall be earned from MDC. The four Ability Enhancement Courses (AEC) are to be offered by English and Other language departments. Out of the total 4 Courses, the student has to Choose two from English department and another two from any of the other languages department. VAC and SEC shall be offered by all Disciplines.

Exit Points and Credit Requirements

On Completion of 3 Years (6 Semesters) the student has an option to exit the programme with 133 credits and shall be awarded with a bachelor's degree. The Maximum credit a student can acquire in three-year period is limited to 150. On Completion of 4 years of study (8 Semesters) by acquiring 177 credit the student shall be awarded with a Bachelors (Honours) Degree or Bachelors (Honours with Research) Degree.

One semester is defined as 90 working days and an academic year is divided into two semesters and an optional summer fast track semester. In addition to the 90 working days, 10

working days in a semester shall be used for co-curricular activities. ·An academic year shall consist of 200 working days. ·One semester consisting of 18 weeks with 5 working days per week. In each semester 15 days (3week) should be kept a side for examinations including internal examination evaluation and other academic activities. The maximum available weeks for curriculum transactions should be fixed as15 in each semester. Minimum of 5 teaching / tutorial hours could be made available for a day in a 5-day week. A 4 - year Degree with (Honours/Research) program shall have a minimum credit requirement of 177. A 3-year exit option (Bachelor's Degree) is given to a student completing 133 credits.

Course outline

Semester	Course Code	Course Title	Type of Course	Academic Level	Instructional hrs/Week			Credit
					T	P	Total	
I	24UCH-DSC111	General Chemistry	**DSC**	100-199	3	2	5	4
	24UCH-DSC112	Fundamentals of Physical Chemistry	**DSC**	100-199	3	2	5	4
	24UCH-DSC113	Fundamentals of Chemistry	**DSC**	100-199	3	2	5	4
	24UCH-DSC114	Foundations of Inorganic & Polymer Chemistry	**DSC**	100-199	3	2	5	4
	24UCH-MDC111	Chemistry in Everyday Life	**MDC**	100 - 199	3	0	3	3
II	24UCH-DSC211	Methodology and Perspectives of Chemistry	**DSC**	100-199	3	2	5	4
	24UCH-DSC212	Essentials of Physical and Analytical Chemistry	**DSC**	100-199	3	2	5	4
	24UCH-DSC213	Inorganic and Bioinorganic Chemistry	**DSC**	100-199	3	2	5	4
	24UCH-DSC214	Bio-organic Chemistry	**DSC**	100-199	3	2	5	4
	24UCH-MDC211	Food Chemistry	**MDC**	100 - 199	3	0	3	3
III	24UCH-DSC321	Inorganic Chemistry - I	**DSC**	200-299	3	2	5	4
	24UCH-DSC322	States of Matter, Chemical Kinetics and Electrochemistry	**DSC**	200-299	3	2	5	4
	24UCH-DSC323	Aspects of Physical Chemistry	**DSC**	200-299	3	2	5	4
	24UCH-DSC324	Essentials of Inorganic Chemistry	**DSC**	200-299	3	2	5	4
	24UCH-DSE321	Biochemistry	**DSE**	200-299	4	0	4	4
	24UCH-VAC321	Sustainable Chemistry	**VAC**	200-299	3	0	3	3

IV	24UCH-DSC421	Organic Chemistry-I	**DSC**	200-299	2	4	6	4
	24UCH-DSC422	Physical Chemistry-I	**DSC**	200-299	3	2	5	4
	24UCH-DSE421	Environmental Chemistry	**DSE**	200-299	3	2	5	4
	24UCH-SEC421	Preparation and formulation of herbal products	**SEC**	200-299	3	0	3	3
	24UCH-VAC421	Forensic Chemistry	**VAC**	200-299	3	0	3	3
	24UCH-VAC422	Scientific Communication and Ethics	**VAC**	200-299	3	0	3	3
SUMMER INTERNSHIP (2credits)								
V	24UCH-DSC531	Inorganic Chemistry-II	**DSC**	300-399	4	0	4	4
	24UCH-DSC532	Organic Chemistry-II	**DSC**	300-399	4	0	4	4
	24UCH-DSC533	Physical Chemistry-II	**DSC**	300-399	3	2	5	4
	24UCH-DSE531	Analytical Chemistry-I	**DSE**	300-399	4	0	4	4
	24UCH-DSE532	Analytical Chemistry-II	**DSE**	300-399	3	2	5	4
	24UCH-SEC531	Water Quality Analysis	**SEC**	300-399	3	0	3	3
VI	24UCH-DSC631	Inorganic Chemistry-III	**DSC**	300-399	3	2	5	4
	24UCH-DSC632	Organic Chemistry-III	**DSC**	300-399	4	0	4	4
	24UCH-DSC633	Physical Chemistry-III	**DSC**	300-399	4	0	4	4
	24UCH-DSE631	Analytical Chemistry: III-	**DSE**	300-399	4	0	4	4
	24UCH-DSE632	Analytical Chemistry-IV	**DSE**	300-399	3	2	5	4
VII	24UCH-DSC534	Spectroscopy and Material Chemistry	**DSC**	300-399	3	2	5	4
	24UCH-DSC535	Analytical Techniques and Biomolecules	**DSC**	300-399	3	2	5	4
	24UCH-DSC536	Physical Chemistry and Instrumental Methods of Analysis	**DSC**	300-399	3	2	5	4
	24UCH-DSC741	*Advanced Inorganic Chemistry	**DSC**	400-499	4	0	4	4

	24UCH-DSC742	*Advanced Organic Chemistry	**DSC**	400-499	4	0	4	4
	24UCH-DSC743	#Advanced Physical Chemistry	**DSC**	400-499	3	2	5	4
	24UCH-DSC744	*Chemistry of Advanced Materials	**DSC**	400-499	4	0	4	4
	24UCH-DSE741	#Research Methodology for Chemistry	**DSE**	400-499	4	0	4	4
VIII	24UCH-DSC841	Online/Distance learning mode- A List of courses approved by BoS	**DSC**	400-499	-	-	-	4
	24UCH-DSC842		**DSC**	400-499	-	-	-	4
	Mandatory Research Project for UG Honours with Research or Internship Project for UG Honours.							12
# Compulsory courses :24UCH-DSC743, 24UCH-DSE741 * Any one course of the following: 24UCH-DSC741, 24UCH-DSC742, 24UCH-DSC744								

Discipline	CHEMISTRY				
Course Code	24UCH-DSC111				
Course Title	**General Chemistry**				
Type of Course	**DSC**				
Semester	I				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Chemistry at +2 or equivalent level 2.				
Course Summary	Atomic structure and periodicity, Acids, bases, amphoteric substances, Non aqueous solvents, Laboratory safety, Bio-molecules and Petrochemicals. Practical module includes basic laboratory techniques such as crystallization, simple distillation, paper chromatography, and introduction to volumetric analysis				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC112				
Course Title	Fundamentals of Physical Chemistry				
Type of Course	**DSC** / DSE / MDC / SEC / VAC / AEC				
Semester	1				
Academic Level	100 - 199.				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week

	4	3 hours	-	2 hours	5
Pre-requisites	1. Basics of Chemistry 2.				
Course Summary	The course gives students a thorough understanding of the fundamentals of physical chemistry and how they are applied in real-world situations. Topics include physical chemistry experiments and analyzing experimental data through practical activities that help them build important laboratory skills.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC113				
Course Title	**FUNDAMENTALS OF CHEMISTRY**				
Type of Course	**DSC** / DSE / MDC / SEC / VAC / AEC				
Semester	1				
Academic Level	100 - 199.				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Mathematics, Physics and Chemistry at Class XII.				
Course Summary	Atomic structure, chemical bonding, analytical principles, radioactivity				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC114				
Course Title	**FOUNDATIONS OF INORGANIC & POLYMER CHEMISTRY**				
Type of Course	**DSC** / DSE / MDC / SEC / VAC / AEC				
Semester	1				
Academic Level	100 - 199.				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Mathematics, Physics and Chemistry at Class XII.				
Course Summary	Atomic structure, chemical bonding, analytical principles, radioactivity				

Discipline	CHEMISTRY				
Course Code	24UCH-MDC111				
Course Title	**Chemistry in Everyday Life**				
Type of Course	DSC / DSE / **MDC** / SEC / VAC / AEC				
Semester	I				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	3 hours	-	-	3
Pre-requisites	1. Basic knowledge of Chemistry				

Course Summary	Chemistry in Everyday Life provides a comprehensive understanding of how chemistry permeates various aspects of our daily life.

Discipline	CHEMISTRY				
Course Code	24UCH-DSC211				
Course Title	**Methodology and Perspectives of Chemistry**				
Type of Course	DSC				
Semester	II				
Academic Level	100 - 199.				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Basic idea of Chemistry and Physics at the higher secondary level.				
Course Summary	Introductory Research methodology, Information technology, Cheminformatics, Environmental Chemistry. Lab course includes inorganic qualitative analysis and volumetric analysis.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC212				
Course Title	**Essentials of Physical and Analytical Chemistry**				
Type of Course	**DSC** / DSE / MDC / SEC / VAC / AEC				
Semester	2				
Academic Level	100 - 199.				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Basics of mathematics including differentiation and integration. 2. 24UCH-DSC112				
Course Summary	Thermodynamics, chemical equilibrium, Analytical principles and complexometric titrations.				

Discipline	CHEMISTRY
Course Code	24UCH-DSC213
Course Title	**Inorganic and Bioinorganic Chemistry**
Type of Course	**DSC** / DSE / MDC / SEC / VAC / AEC
Semester	2
Academic Level	100 - 199.

Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Mathematics, Physics and Chemistry at Class XII 2. Completion of 24UCH-DSC113				
Course Summary	Organometallics, Nuclear Chemistry, Coordination chemistry, Bio-inorganic Chemistry and practical module in TLC and colorimetry.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC214				
Course Title	**BIO-ORGANIC CHEMISTY**				
Type of Course	**DSC** / DSE / MDC / SEC / VAC / AEC				
Semester	2				
Academic Level	100 - 199.				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Mathematics, Physics and Chemistry at Class XII 2. Completion of 24UCH-DSC114				
Course Summary	Organometallics, Nuclear Chemistry, Coordination chemistry, Bio-inorganic Chemistry and practical module in TLC and colorimetry.				

Discipline	CHEMISTRY				
Course Code	24UCH-MDC211				
Course Title	**Food Chemistry**				
Type of Course	MDC				
Semester	II				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	3 hours	-	-	3
Pre-requisites	1. Basic understanding of Chemistry.				
Course Summary	This course provides a comprehensive understanding of the composition of food and a brief idea of food processing and packaging.				

Discipline	CHEMISTRY
Course Code	24UCH-DSC321
Course Title	**Inorganic Chemistry - I**
Type of Course	DSC
Semester	III

Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Basic idea of periodic table and classification of elements in the periodic table				
Course Summary	s-block and p-block elements, Chemical bonding, Analytical Chemistry and Nanomaterials. Lab course involves experiments in permanganometry, dichrometry and complexometric titrations.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC322				
Course Title	**States of Matter, Chemical Kinetics and Electrochemistry**				
Type of Course	**DSC** / DSE / MDC / SEC / VAC / AEC				
Semester	3				
Academic Level	200 - 299.				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Basic mathematics including differentiation and integration				
Course Summary	This includes gaseous state, crystalline state, catalysis, kinetics and cation analysis and volumetric titrations.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC323				
Course Title	**Aspects of Physical Chemistry**				
Type of Course	**DSC** / DSE / MDC / SEC / VAC / AEC				
Semester	3				
Academic Level	200 - 299.				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Basics in Physics and Mathematics at Class XII 2. Completion of 24UCH-DSC113 and 24UCH-DSC213				
Course Summary	Chemical Kinetics, Ionic equilibrium, Spectroscopy, Dilute solutions and Colloids. Practical module includes simple Physical Chemistry Experiments				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC324				
Course Title	**ESSENTIALS OF INORGANIC CHEMISTRY**				
Type of Course	**DSC** / DSE / MDC / SEC / VAC / AEC				
Semester	3				
Academic Level	200 - 299.				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Basics of Organic Chemistry 2. Completion of level 100-199 course in Chemistry				
Course Summary	Mechanism of Organic Reactions, Biomolecules and Polymers. Practical module includes qualitative analysis of organic functional groups and quantitative analysis by gravimetry.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSE321				
Course Title	**BIOCHEMISTRY**				
Type of Course	**DSE**				
Semester	III				
Academic Level	200 - 299				
	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4	-	-	4
Pre-requisites	1. Basic knowledge of biological systems in human body and its functions				
Course Summary	course includes evolution of biochemistry, human health and nutrition, various components of blood, the mechanism of functioning of blood, respiration, kidney function, food utilization and life style diseases. Course Summary This course includes evolution of biochemistry, human health and nutrition, various components of blood, the mechanism of functioning of blood, respiration, kidney function, food utilization and life style diseases. Course Summary This course includes evolution of biochemistry, human health and nutrition, various components of blood, the mechanism of functioning of blood, respiration, kidney function, food utilization and life style diseases.				

Discipline	CHEMISTRY				
Course Code	24UCH-VAC321				
Course Title	**Sustainable Chemistry**				
Type of Course	VAC				
Semester	III				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial	Practical	Total Hours/Week

			per week	per week	
	3	3 hours	-	-	3
Pre-requisites	1. Basic understanding of Environmental chemistry.				
Course Summary	The course covers biomass assessment, techniques, waste management, biofuel, bio hydrogen production, polymers from biomass, corrosion management and renewable energy resources.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC421				
Course Title	**Organic Chemistry-I**				
Type of Course	DSC				
Semester	IV				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	2 hours	-	4 hours	6
Pre-requisites	1. Basic knowledge of organic reaction mechanism and reactive intermediates. 2.				
Course Summary	Organic reaction mechanism, stereochemistry, photochemistry and pericyclic reactions. Lab course includes qualitative analysis of organic functional groups and preparations of organic compounds.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC422				
Course Title	**Physical Chemistry-I**				
Type of Course	DSC				
Semester	IV				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Basic knowledge of Physics and Mathematics at Class XII				
Course Summary	Thermodynamics, Kinetics, Chemical and Ionic equilibrium, Electrochemistry. Laboratory course includes physical chemistry experiments				

Discipline	CHEMISTRY
Course Code	24UCH-DSE421
Course Title	**Environmental Chemistry**
Type of Course	DSE
Semester	IV
Academic Level	200 - 299

Discipline	CHEMISTRY					
Course Code	24UCH-VAC421					
Course Title	**Forensic Chemistry**					
Type of Course	VAC					
Semester	IV					
Academic Level	200 - 299					
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week	
	3	3 hours	-	-	3	
Pre-requisites	1. Basic understanding of chemistry.					
Course Summary	The course covers biomass assessment, techniques, waste management, biofuel, bio hydrogen production, polymers from biomass, corrosion management and renewable energy resources.					

	Credit	Lecture per week	Tutorial	Credit	Lecture per week
	4	3	-	-	3
Pre-requisites	1. Fundamental concept of Environmental Chemistry 2. Terminology associated with Environment				
Course Summary	This course provides students with the knowledge of ecosystem and the different types of pollution caused by human activities. This course enlighten the students about the need to protect and conserve our environment for future generation. The course also highlights the green protocols and methodology being adopted for preserving the Environment				

Discipline	CHEMISTRY				
Course Code	24UCH-SEC421				
Course Title	**Chemistry of herbal products**				
Type of Course	SEC				
Semester	IV				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	3 hours	-		3
Pre-requisites	1. Basic understanding of Chemistry				
Course Summary	The course covers different types of herbal formulations, herbal products, analytical techniques in herbal products, different medicines extracted from herbs, identification and separation of phytochemicals from herbs.				

Discipline	CHEMISTRY
Course Code	24UCH-VAC422
Course Title	**Scientific Communication and Ethics**
Type of Course	**VAC**
Semester	IV
Academic Level	200 - 299

Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	3 hours	-	-	3
Pre-requisites	1. Basic understanding of Chemistry.				
Course Summary	The course covers scientific communication methods, data bases, intellectual property rights, ethics for publication and metrices for journal.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC531				
Course Title	**Inorganic Chemistry-II**				
Type of Course	DSC				
Semester	V				
Academic Level	300 - 399				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-	-	4
Pre-requisites	1. Basic Knowledge of Periodic table and classification of elements. 2.				
Course Summary	Chemistry of d and f block elements, coordination chemistry, organometallic compounds, bio-inorganic chemistry and instrumental method of analysis.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC532				
Course Title	**Organic Chemistry-II**				
Type of Course	DSC				
Semester	V				
Academic Level	300 - 399				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-	-	4
Pre-requisites	1. Theory of various spectroscopic techniques. 2. 2. Basic reactions including preparations and properties of functional groups.				
Course Summary	Organic spectroscopy, reactions of functional groups, heterocyclic compounds, phytochemistry and introduction to Physical Organic Chemistry.				

Discipline	CHEMISTRY
Course Code	24UCH-DSC533
Course Title	**Physical Chemistry-II**
Type of Course	DSC
Semester	V

Discipline	CHEMISTRY				
Course Code	24UCH-DSE531				
Course Title	**Analytical Chemistry-I**				
Type of Course	DSC / **DSE** / MDC / SEC / VAC / AEC				
Semester	V				
Academic Level	300 - 399				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-		4
Pre-requisites	1. Basic Chemistry 2. Basic Mathematics				
Course Summary	This course provides students with the knowledge and skills necessary to understand the principles and practices of analytical chemistry, including the scope, function, and analytical perspective of the field. Students will learn about various analytical techniques, methods for sample preparation and analysis, and the interpretation of analytical data.				
Academic Level	300 - 399				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Basic Knowledge of Physics and Mathematics at Class XII				
Course Summary	Gaseous state, Liquid state and dilute solutions, solid state, thermodynamics and statistical thermodynamics, group theory and liquid crystals. Practical module includes Physical chemistry practical and the use of software programmes in Physical Chemistry experiments.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSE532				
Course Title	**Analytical Chemistry II**				
Type of Course	DSC / **DSE** / MDC / SEC / VAC / AEC				
Semester	V				
Academic Level	300 - 399				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3hours	-	2	5
Pre-requisites	1. Prior knowledge of basic analytical chemistry principles, such as the interaction of analytes with different separation methods 2. Prior knowledge of electrochemical cells, electrode potentials, and the Nernst equation is necessary. 3. Understanding voltaic cells, anodes, cathodes, and cell voltages.				
Course Summary	In-depth understanding of various analytical Separation techniques and electrochemical methods used in analytical chemistry				

Discipline	CHEMISTRY				
Course Code	24UCH-SEC531				
Course Title	**Water Quality Analysis**				
Type of Course	SEC				
Semester	V				
Academic Level	300-399				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	3hours	-	-	3
Pre-requisites	1. Basic understanding of Chemistry				
Course Summary	The course cover water quality parameters, different types of water, removal of hardness of water, qualitative and quantitative analysis of different contaminant of water, different types of contaminants of water and real sample analysis f water and its application in environment.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC631				
Course Title	**Inorganic Chemistry-III**				
Type of Course	DSC				
Semester	VI				
Academic Level	300 - 399				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. General Principles of metallurgy, Elementary idea of MO theory and VB theory 2. Basic concepts of nuclear chemistry				
Course Summary	General principles of isolation of elements, chemical bonding, coordination chemistry, nuclear chemistry and spectral methods in				

	inorganic chemistry. Lab course includes inorganic spectral analysis, cerimetry, iodometry and gravimetry.

Discipline	CHEMISTRY				
Course Code	24UCH-DSC632				
Course Title	**Organic Chemistry-III**				
Type of Course	DSC				
Semester	VI				
Academic Level	300 - 399				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-	-	4
Pre-requisites	1. Theory of spectroscopy 2. Basic idea of functional groups including preparation and properties				
Course Summary	Organic spectroscopy, functional groups, molecular rearrangements, organometallics and active methylene compounds and polymers				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC633				
Course Title	**Physical Chemistry-III**				
Type of Course	DSC				
Semester	VI				
Academic Level	300 - 399				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	-	3
Pre-requisites	1. Basic Knowledge of Physics and Mathematics at Class XII 2. Fundamentals of Quantum mechanical model of atom				
Course Summary	Quantum mechanics, spectroscopy, Phase equilibria, Binary liquid systems and adsorption, electrical conductance.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSE631				
Course Title	**Analytical Chemistry III**				
Type of Course	DSC / **DSE** / MDC / SEC / VAC / AEC				
Semester	VI				
Academic Level	300 - 399				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-	0	4
Pre-requisites	1.Prior knowledge of analytical chemistry principles, such as spectroscopy, interaction of Electromagnetic radiation with Molecules and materials, and titration techniques 2. Familiarity with Blood fluids, Chemical reactions and Kinetics 3. Understanding of electromagnetic radiation and microscopy principles.				
Course Summary	The course delves into various advanced topics in analytical chemistry, covering both traditional and modern techniques. Students explore electroanalytical methods, spectroscopic analysis, material characterization techniques, and experimental procedures using spectroscopic techniques.				

Course Code	24UCH-DSE632				
Course Title	Analytical Chemistry IV				
Type of Course	DSC / **DSE** / MDC / SEC / VAC / AEC				
Semester	VI				
Academic Level	300 - 399				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2	5
Pre-requisites	1. Basic knowledge of chemistry, including chemical reactions and analytical techniques. 2. Understanding of laboratory safety protocols and hazardous chemical handling. 3. Familiarity with environmental science concepts, including pollution sources and regulations				
Course Summary	This course provides a comprehensive overview of analytical chemistry techniques, safety protocols essential for laboratory work and environmental analysis.				

Discipline	CHEMISTRY
Course Code	24UCH-DSC534
Course Title	**Spectroscopy and Material Chemistry**
Type of Course	**DSC** / DSE / MDC / SEC / VAC / AEC

Semester	VII				
Academic Level	300 - 399.				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-	-	4
Pre-requisites	1. Basic mathematics including differentiation and integration 2. Successful completion of DSC with level 200-299.				
Course summary	This course includes Spectroscopy, metallurgy, chemistry of nano materials and advanced materials.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC535				
Course Title	**Analytical Techniques and Biomolecules**				
Type of Course	**DSC** / DSE / MDC / SEC / VAC / AEC				
Semester	VII				
Academic Level	300 - 399.				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-	-	4
Pre-requisites	1. Basics of Organic Chemistry 2. Successful completion of DSC with level 200-299.				
Course Summary	This course contains Chromatography, Spectroscopy, Lipids, Alkaloids, and Terpenes, Enzymes and vitamins, Nucleic acids and Hormones.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC536				
Course Title	Physical Chemistry and Instrumental Methods of Analysis				
Type of Course	**DSC** / DSE / MDC / SEC / VAC / AEC				
Semester	VII				
Academic Level	300 - 399.				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-	-	-
Pre-requisites	1. Basics of Physical Chemistry 2. Basic Mathematics and Physics of Std XII 3. Successful completion of DSC with level 200-299.				
Course Summary	Chemical Kinetics, Ionic Equilibrium, Colloids, Spectroscopy and Instrumental method of analysis.				

Discipline	CHEMISTRY
Course Code	**24UCH-DSC741**
Course Title	**ADVANCED INORGANIC CHEMISTRY**

Type of Course	**DSC**				
Semester	7				
Academic Level	400 - 499				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-	-	4
Pre-requisites	1. Completion of 300-399 level courses.				
Course Summary	The course includes frontiers in inorganic chemistry, solid state chemistry, isopoly & heteropoly acids, silicon-oxygen & xenon compounds, selected topics in bioinorganic chemistry and nuclear chemistry.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC742				
Course Title	**Advanced Organic chemistry**				
Type of Course	DSC				
Semester	VII				
Academic Level	400 - 499				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-	-	4
Pre-requisites	1. Basics of Organic Chemistry 2. Knowledge of Organic Chemistry topics at level 300-399				
Course Summary	This course includes methods in organic synthesis, symmetrycontrolled reactions, organic spectroscopy and its applications, molecular recognition and green chemistry. The practical module includes spectral analysis of organic compounds, separation of organic compounds by TLC method and two stage organic preparations.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSC743				
Course Title	**Advanced Physical chemistry**				
Type of Course	DSC				
Semester	VII				
Academic Level	400 - 499				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites	1. Basic Physics and Mathematics at Class XII 2. Understanding of Physical Chemistry at level 300-399.				

Course Summary	This course includes introductory idea of Computational chemistry, group theory and its applications, resonance spectroscopy, chemical kinetics and electrochemistry. The practical module includes advanced physical chemistry experiments.

Discipline	CHEMISTRY				
Course Code	24UCH-DSC744				
Course Title	**Chemistry of Advanced Materials**				
Type of Course	DSC				
Semester	VII				
Academic Level	400 - 499				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4hours	-	-	4
Pre-requisites	1. Completion of 300-399 level courses.				
Course Summary	This course includes Nanostructured Materials, Conducting polymers, Smart materials, Engineering & specialty plastics and Special materials.				

Discipline	CHEMISTRY				
Course Code	24UCH-DSE741				
Course Title	**Research Methodology for Chemistry**				
Type of Course	**DSE**				
Semester	V				
Academic Level	400 - 499				
	Credit		Credit		Credit
	4		4		4
Pre-requisites	1.Basic understanding of research methodology 2. Successful completion of 24UCH-DSC211				
Course Summary	This course includes detailed study of literature survey, methods of scientific research and writing research papers, Chemical Safety and Ethical Handling of Chemicals and Data Analysis. The practical module includes a review writing of a recent article on research area of interest.				