MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA

A College with Potential for Excellence

NAAC Accredited & ISO 9001: 2015 Certified

PROGRAMME REGISTER

2020-2023

DEPARTMENT OF CHEMISTRY

INDEX

UG PROGRAMMES OFFERED

S.No.	Programme	Combination offered	Programme Code
1	B.Sc.	Mathematics, Physics, Chemistry (MPC)	301
2		Chemistry, Botany, Zoology (CBZ)	305
3		Food Technology, Microbiology, Chemistry (FMC)	308

PROGRAMME OUTCOMES (POs)

2020-23

At the end of the programme, students will have:

PO1: Essential Knowledge:

Comprehensive discipline knowledge and understanding, the ability to engage with different schools of thought and to apply their knowledge in practice including in multi-disciplinary or multi- professional contexts.

PO2: Creative and critical thinking and problem solving abilities:

Be effective problem solvers, able to apply critical and evidence-based thinking to conceive innovative responses to future challenges.

PO3: Teamwork and communication skills:

Be able to convey ideas and information effectively to a range of audiences for a variety of purposes and contribute in a positive and collaborative manner to achieving common goals.

PO4: Motivation and preparation in life-long learning:

Exhibit life-long skills; broad based multiple career oriented general skills; self and field based learning skills; digital skills; social responsibility and compassionate commitment; preparedness for living, learning and working in any environment

PO5: Professionalism and leadership readiness:

Be able to engage in professional behaviour and have the potential to be entrepreneurial and take leadership roles in their chosen occupations and communities.

PO6: Intercultural and ethical competency:

Be responsible and effective global citizens whose personal values and practices are consistent with their roles as responsible members of society.

PO7: Self-awareness and emotional intelligence:

Be self-aware and reflective, flexible and resilient and act with integrity and take responsibility for their actions as empowered women.

PO8: Social responsibility:

Be sensitive to and demonstrate agency in matters of environment, gender and other social issues to promote an equitable society.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

2020-23

At the end of the programme students will be able to:

PSO1: Interpret principles, classifications, concepts, theories and mechanisms.

PSO2: Analyze hypothesis, procedures, properties, experimental facts and draw conclusions.

PSO3: Apply techniques in solving problems, sample analysis and production.

PSO4: Develop communicative competence, creative and critical thinking, practical, technical and employability skills, social sensibility and responsibility.

Course Outcomes

(COs) 2020-23

S.No.	Sem	Course Code	Course Title	Course Outcomes (COs)
1	I	20CHCCIP13	Inorganic & Physical chemistry	**CO1:** Describe the basic concepts of p-, d-, and f- block elements
				CO2: Summarize the theories of bonding in metals
				CO3: Explain laws, relations, concepts relevant to solid, liquid and gaseous states
				CO4: Outline the behavior of different liquid systems and explain colligative properties
				CO5: Solve concept-based problems
2	I	20CHP1SM12	Analysis of Salt Mixture - Practical	**CO1:** Analyze inorganic Mixture by adapting systematic procedure
				CO2: Apply the concepts of common ion effect and solubility product in mixture analysis
				CO3: Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
3	II	20CHCCOG23	Organic & General Chemistry	**CO1:** Describe the preparations, properties of cycloalkanes, halogenated hydrocarbons, alkenes and alkynes.
				CO2: Outline the mechanisms pertinent to addition, substitution, elimination reactions.
				CO3: Explain the concepts of aromaticity, orientation and stereoisomerism.
				CO4: Describe colloidal systems, isotherms and different types of volumetric titrations.
				CO5: Solve concept-based problems
4	II	20CHP2VA22	Volumetric Analysis - Practical	**CO1:** Estimate the amount of substances by volumetric analysis.
				CO2: Explain principle of volumetric titrations, functionality of indicators
				CO3: Prepare standard solutions and solutions of different concentrations.
5	II	20SDCFA2	Food Adulteration	**CO1:** Summarize how common foods are adulterated and the impact on health.
				CO2: Test and Identify the different adulterants in food.

				CO3: Describe the laws for prevention of food adulteration and consumer protection.
6	III	20CHCCOS33	Organic Chemistry & Spectroscopy	**CO1:** Elaborate synthesis and characteristic properties of alcohols, phenols, carbonyl compounds, active methylene compounds, carboxylic acids and their derivatives.
				CO2: Outline the mechanisms of certain chemical reactions.
				CO3: Apply spectroscopy to analyze molecular structure.
				CO4: Solve concept based problems.
7	III	20CHP3OS32	Organic Preparations & IR Spectral Analysis - Practical	**CO1:** Perform common laboratory techniques including reflux, distillation, re-crystallization, vacuum filtration.
				CO2: Handle reflux apparatus, M.P apparatus, Vacuum pump for filtration, electronic balance etc.
				CO3: Apply concepts of spectroscopy to analyze spectra ldata of different functional groups.
8	IV	20CHCCIO43	Inorganic, Organic & Physical Chemistry	**CO1:** Classify the organometallic compounds, summarize the concepts of metal carbonyls and elaborate the photo processes & their applications.
				CO2: Discuss the molecular structure, physical and chemical properties of carbohydrates, and heterocyclic compounds.
				CO3: Elucidate the preparations, properties of amino acids, nitro compounds and amines with relevant chemical equations, mechanisms.
				CO4: Deduce relations between the fundamental terms in thermodynamics and discuss the laws of thermodynamics.
				CO5: Solve concept-based problems
9	IV	20CHP4OA42	Organic Qualitative Analysis - Practical	**CO1:** Adapt systematic procedure and perform organic compound analysis to identify the organic functional group and name of the compound.
				CO2: Determine the boiling/melting point of the given organic compound
10	IV	20CHCCIP43	Inorganic & Physical Chemistry	**CO1:** Summarize the terminology, nomenclature, stereochemistry, theories of bonding and stability of complex compounds.
				CO2: Elucidate the inorganic reaction mechanism pathways and outline the role of essential elements in biological processes.
				CO3: Apply phase rule to different systems mentioned.
				CO4: Describe the electrochemical concepts and their applications in electro-analytical techniques.
				CO5: Elaborate and deduce expressions for kinetics of chemical reactions.

				CO6: Solve concept-based problems
11	IV	20CHP5PC42	Physical Chemistry-Practical	**CO1:** Handle potentiometer, conductivity meter and perform experiments in electrochemistry.
				CO2: Determine the order and average rate constant of chemical reactions
				CO3: Use glassware, equipment, chemicals and follow experimental procedures in the laboratory.
12	V (SET 1)	20CHSEC11SO3	Synthetic Organic Chemistry	**CO1:** Summarize different types of pericyclic reactions
				CO2: Explain protection and deprotection concepts in synthetic organic chemistry
				CO3: Outline the concepts of retro synthesis and reagents in organic chemistry
				CO4: Outline the mechanisms of certain chemical reactions
				CO5: Solve concept-based problems
13	V (SET1)	20CHP611SO2	Synthetic Organic Chemistry - Practical	**CO1:** Perform the organic qualitative analysis for the detection of N using the green procedure.
				CO2: Learn the procedure for the separation of mixture of amino acids using Paper Chromatography
14	V (SET 1)	20CHSEC12AO3	Analysis of Organic Compounds	**CO1:** Apply spectroscopy to analyse molecular structure
				CO2: Discuss basic principle, instrumentation, experimental procedures,applications of solvent extraction and chromatography methods(CC,PC, TLC, HPLC)
				CO3: Solve concept-based problems
15	V (SET 1)	20CHP712AO2	Analysis of Organic Compounds - Practical	**CO1:** Handle separatory funnel, TLC sheets, chromatography papers, applicator, UV chamber etc.
				CO2: Perform experiments on PC, TLC and Solvent extraction.
				CO3: Apply spectroscopic data for structural elucidation.
16	V (SET 2)	20CHSEC21AM3	Analytical Methods in Chemistry - I	**CO1:** Summarize general lab practices and concepts.
				CO2: Explain various operations of gravimetric analysis.
				CO3: Classify errors and describe basic methods, concepts in data analysis.
				CO4: Discuss the principle, instrumentation and applications of spectrophotometry, Potentiometry, AAS.
				CO5: Solve concept- based problems
17	V (SET 2)	20CHP621AM2	Analytical Methods in Chemistry–I-Practical	**CO1:** Handle instruments potentiometer, colorimeter etc.and perform experiments on them.
				CO2: Analyze water samples for certain parameters
18	V (SET 2)	20CHSEC22AM3	Analytical Methods in Chemistry - II	**CO1:** Discuss basic principle, instrumentation, experimental procedures, applications of solvent extraction and chromatography methods (CC, PC, TLC, HPLC, GC).

				CO2: Explain the concept of ion exchange method.
				CO3: Solve concept-based problems.
19	V (SET 2)	20CHP722AM2	Analytical Methods in Chemistry – II - Practical	**CO1:**Handle separatory funnel, TLC sheets, chromatography papers, applicator, UV chamber etc.
				CO2: Perform experiments on PC, TLC and Solvent extraction.
20	V (SET 3)	20CHSEC31AM3	Analytical Methods in Chemistry	**CO1:** Classify errors and describe basic methods, concepts in data analysis.
				CO2: Explain various operations of gravimetric analysis.
				CO3: Summarize basic principle, instrumentation, experimental procedures, applications of spectrophotometry, solvent extraction, chromatography and ion exchange methods
				CO4: Solve concept-based problems.
21	V (SET 3)	20CHP631AM2	Analytical Methods in Chemistry - Practical	**CO1:**Handle colorimeter/ spectrophotometer, separatory funnel, TLC sheets, chromatography papers, applicator, UV chamber etc.
				CO2: Perform experiments on colorimeter, PC, TLC and Solvent extraction.
22	V (SET 3)	20CHSEC32CP3	Cosmetics & Pharmaceutical Chemistry	**CO1:**Summarize the terminology and nomenclature of drugs, different formulations.
				CO2 : Classify formulations and discuss the properties of drugs.
				CO3: Outline the synthesis and therapeutic action of different types of drugs.
				CO4: Discuss the preparation and uses of certain Cosmetics & perfumes.
				CO5: Solve concept based problems
23	V (SET 3)	20CHP732CP2	Cosmetics & Pharmaceutical Chemistry - Practical	**CO1:** Prepare cosmetics.
				CO 2: Prepare anti-inflammatory drug aspirin.
				CO 3: Perform experiments on solubility and pH conditions of drugs

Mapping of COs with PSOs & POs

S. No.	Sem	Course Code	Course Title	COs	PSOs	POs
1	I	20CHCCIP13	Inorganic & Physical chemistry	CO1	PSO1, PSO4	PO1, PO2, PO3, PO4, PO5
				CO2	PSO1, PSO2, PSO4	PO1, PO2, PO3, PO4, PO5
				CO3	PSO1, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
				CO4	PSO1, PSO2,PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
				CO5	PSO3	PO1, PO2, PO3, PO4, PO5
2	I	20CHP1SM12	Analysis of Salt Mixture - Practical	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
3	II	20CHCCOG23	Organic & General Chemistry	CO1	PSO1, PSO4	PO1, PO2, PO3, PO4, PO5
				CO2	PSO1, PSO4	PO1, PO2, PO3, PO4, PO5
				CO3	PSO1, PSO4	PO1, PO2, PO3, PO4, PO5
				CO4	PSO1, PSO4	PO1, PO2, PO3, PO4, PO5
				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
4	II	20CHP2VA22	Volumetric Analysis - Practical	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
5	II	20SDCFA2	Food Adulterat i on	CO1	PSO1, PSO2, PSO4	PO1, PO2, PO3, PO4, PO5, PO8
				CO2	PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5, PO8
				CO3	PSO1, PSO4	PO1, PO2, PO3, PO4, PO5, PO8
				CO1	PSO1	PO1, PO2, PO3, PO4, PO5

6	III	20CHCCOS33	Organic Chemistry & Spectroscopy	**CO2**	PSO1,PSO2	PO1, PO2, PO3, PO4, PO5
				CO3	PSO2,PSO3	PO1, PO2,PO3,PO4,PO5
				CO4	PSO3, PSO4	PO1, PO2,PO3,PO4,PO5
7	III	20CHP3OS3**2**	Organic Preparations & IR Spectral Analysis - Practical	**CO1**	PSO1, PSO2, PSO3, PSO4	PO1,PO2,PO3,PO4,PO5
				CO2	PSO1, PSO2, PSO3, PSO4	PO1,PO2,PO3,PO4,PO5
				CO3	PSO1, PSO2, PSO3, PSO4	PO1,PO2,PO3,PO4,PO5
8	IV	20CHCCIO43	Inorganic, Organic & Physical Chemistry	**CO1**	PSO1, PSO3	PO1, PO2,PO4, PO5
				CO2	PSO1, PSO2	PO1, PO2,PO4, PO5
				CO3	PSO1, PSO2	PO1, PO2,PO4, PO5
				CO4	PSO1, PSO3	PO1, PO2, PO4, PO5
				CO5	PSO3, PSO4	PO1, PO2,PO3,PO4,PO5
9	IV	20CHP4OA42	Organic Qualitative Analysis - Practical	**CO1**	PSO1, PSO2, PSO3, PSO4	PO1, PO2,PO3,PO4,PO5
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2,PO3,PO4,PO5
10	IV	20CHCCIP43	Inorganic & Physical Chemistry	**CO1**	PSO1, PSO2	PO1, PO2,PO4, PO5
				CO2	PSO1, PSO3	PO1, PO2,PO4, PO5
				CO3	PSO1	PO1, PO2,PO4, PO5
				CO4	PSO1, PSO4	PO1, PO2,PO4, PO5
				CO5	PSO1, PSO2, PSO3	PO1, PO2,PO4, PO5

				CO6	PSO3	PO1, PO2,PO3,PO4,PO5
11	IV	20CHP5PC42	Physical chemistry - practical	**CO1**	PSO1, PSO2, PSO3, PSO4	PO1, PO2,PO3,PO4,PO5
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2,PO3,PO4,PO5
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2,PO3,PO4,PO5
12	V/VI (SET1)	20CHSEC11 SO3	Synthetic Organic chemistry	**CO1**	PSO1, PSO2	PO1, PO2,PO3,PO4,PO5
				CO2	PSO1, PSO2	PO1, PO2,PO3,PO4,PO5
				CO3	PSO1, PSO2	PO1, PO2, PO3, PO4,PO5
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2,PO3,PO4,PO5
				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2,PO3,PO4,PO5
13	V/VI (SET1)	20CHP611SO2	Synthetic Organic Chemistry - Practical	**CO1**	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3,PO4, PO5
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3,PO4, PO5
14	V/VI (SET1)	20CHSEC12 AO3	Analysis of Organic Compounds	**CO1**	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
				CO2	PSO1, PSO2	PO1, PO2, PO3, PO4, PO5
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
15	V/VI (SET1)	20CHP712AO2	Analysis of Organic Compounds - Practical	**CO1**	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4,PO5
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5
16	V/VI (SET2)	20CHSEC21 AM3	Analytical Methods in Chemistry - I	**CO1**	PSO1, PSO2	PO1, PO2, PO3, PO4, PO5
				CO2	PSO1, PSO2	PO1, PO2, PO3, PO4, PO5

				CO3	PSO1, PSO2, PSO3	PO1, PO2, PO3, PO4, PO5
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5,PO8
				CO5	PSO1, PSO3	PO1, PO2, PO3, PO4, PO5,PO8
17	V/VI (SET2)	20CHP621A M2	Analytical Methods in Chemistry–I-Practical	**CO1**	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5,PO8
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5,PO8
18	V/VI (SET2)	20CHSEC22 AM3	Analytical Methods in Chemistry - II	**CO1**	PSO1, PSO2	PO1, PO2, PO3, PO4, PO5,PO8
				CO2	PSO1, PSO2	PO1, PO2, PO3, PO4, PO5,PO8
				CO3	PSO3, PSO4	PO1, PO2, PO3, PO4, PO5,PO8
19	V/VI (SET2)	20CHP722A M2	Analytical Methods in Chemistry – II - Practical	**CO1**	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5,PO8
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5,PO8
20	V/VI (SET3)	20CHSEC31 AM3	Analytical Methods in Chemistry	**CO1**	PSO1,PSO2	PO1, PO2, PO3, PO4, PO5, PO8
				CO2	PSO1,PSO2	PO1, PO2, PO3, PO4, PO5
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5, PO8
				CO4	PSO1, PSO3	PO1, PO2, PO3, PO4, PO5, PO8
21	V/VI (SET3)	20CHP631A M2	Analytical Methods in Chemistry - Practical	**CO1**	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5, PO8
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO1,PO2,PO3,PO4, PO5, PO8
				CO1	PSO1,PSO2	PO1, PO2, PO3, PO4, PO5, PO8

22	V/VI (SET3)	20CHSEC32 CP3	Cosmetics andPharmaceutical Chemistry	**CO2**	PSO1,PSO2	PO1, PO2, PO3, PO4, PO5, PO8
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5, PO8
				CO4	PSO1,PSO2	PO1, PO2, PO3, PO4, PO5, PO8
				CO5	PSO1, PSO3	PO1, PO2, PO3, PO4, PO5, PO8
23	V/VI (SET3)	20CHP732C P2	Cosmetics and Pharmaceutical Chemistry - Practical	**CO1**	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5, PO8
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5, PO8
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4, PO5, PO8

Mapping of Courses with PSOs

Course Title	Course Code	PSO1	PSO2	PSO3	PSO4
Inorganic & Physical chemistry(IP)	20CHCCIP13	✔	✔	✔	✔
Analysis of Salt Mixture - Practical 1	20CHP1SM12	✔	✔	✔	✔
Organic & General Chemistry(OG)	20CHCCOG23	✔	✔	✔	✔
Volumetric Analysis - Practical 2	20CHP2VA22	✔	✔	✔	✔
Food Adulteration(FA)	20SDCFA2	✔	✔	✔	✔
Organic Chemistry & Spectroscopy(OS)	20CHCCOS33	✔	✔	✔	✔
Organic Preparations & IR Spectral Analysis - Practical 3	20CHP3OS32	✔	✔	✔	✔
Inorganic, Organic & Physical Chemistry (IO)	20CHCCIO43	✔	✔	✔	✔
Organic Qualitative Analysis - Practical 4	20CHP4OA42	✔	✔	✔	✔
Inorganic & Physical Chemistry (IP)	20CHCCIP43	✔	✔	✔	✔
Physical chemistry - Practical 5	20CHP5PC42	✔	✔	✔	✔
Synthetic Organic chemistry (SO)	20CHSEC11SO3	✔	✔	✔	✔
Synthetic Organic chemistry - Practical 6	20CHP611SO2	✔	✔	✔	✔
Analysis of Organic Compounds(AO)	20CHSEC12AO3	✔	✔	✔	✔
Analysis of Organic Compounds - Practical 7	20CHP712AO2	✔	✔	✔	✔
Analytical Methods in Chemistry - I(AM)	20CHSEC21AM3	✔	✔	✔	✔
Analytical Methods in Chemistry - I - Practical 6	20CHP621AM2	✔	✔	✔	✔
Analytical Methods in Chemistry - II(AM)	20CHSEC22AM3	✔	✔	✔	✔
Analytical Methods in Chemistry - II - Practical 7	20CHP722AM2	✔	✔	✔	✔
Analytical Methods in Chemistry (AM)	20CHSEC31AM3	✔	✔	✔	✔
Analytical Methods in Chemistry - Practical 6	20CHP631AM2	✔	✔	✔	✔
Cosmetics and Pharmaceutical Chemistry (CP)	20CHSEC32CP3	✔	✔	✔	✔
Cosmetics and Pharmaceutical Chemistry - Practical 7	20CHP732CP2	✔	✔	✔	✔

Mapping of Courses with POs

Course	PO1 Essential Knowledge	PO2 Creative and critical thinking and problem solving abilities	P O 3 Teamwork and communication skills	PO4 Motivation and preparation in life-long learning	P O 5 Professionalism and leadership readiness	PO6 Intercultural and ethical competency	PO7 Self-awareness and emotional intelligence	PO8 Social Responsibility
IP	✔	✔	✔	✔	✔			
SM - P1	✔	✔	✔	✔	✔			
OG	✔	✔	✔	✔	✔			
VA - P2	✔	✔	✔	✔	✔			
FA	✔	✔	✔	✔	✔			✔
OS	✔	✔	✔	✔	✔			
OS - P3	✔	✔	✔	✔	✔			
IO	✔	✔	✔	✔	✔			
OA - P4	✔	✔	✔	✔	✔			
IP	✔	✔	✔	✔	✔			
PC - P5	✔	✔	✔	✔	✔			
SO(SET 1)	✔	✔	✔	✔	✔			
SO - P6	✔	✔	✔	✔	✔			
AO (SET 1)	✔	✔	✔	✔	✔			
AO - P7	✔	✔	✔	✔	✔			
AM-I (SET 2)	✔	✔	✔	✔	✔			✔
AM-I - P6	✔	✔	✔	✔	✔			✔
AM-II (SET2)	✔	✔	✔	✔	✔			✔
AM-II - P7	✔	✔	✔	✔	✔			✔
AM (SET 3)	✔	✔	✔	✔	✔			✔
AM - P6	✔	✔	✔	✔	✔			✔
CP (SET 3)	✔	✔	✔	✔	✔			✔
CP - P7	✔	✔	✔	✔	✔			✔