



**Sarvodaya Kelavani Samaj managed,
Shri Manibhai Virani and Smt. Navalben Virani Science College (Autonomous)**

(Affiliated to Saurashtra University, Rajkot)

Re-Accredited at 'A' Level by NAAC

STAR college Scheme & Status by MST-DBT

UGC-College with Potential for Excellence (CPE)

UGC-DDU KAUSHAL Kendra

GAAA –Grade A-1 by KCG, Government of Gujarat

GPCB-Government of Gujarat approved Environment Audit Center

Nodal Center for capacity building by GSBTM

DEPARTMENT OF CHEMISTRY

M.Sc. Chemistry

(Specialization in Organic /Analytical Chemistry)

Scheme of Instruction and Examinations

Vision

The Department of Chemistry endeavors to be recognized for excellence in Teaching – Learning adjunct by empowering graduating students to compete in and contribute to the developing needs of the society

Mission

Department of Chemistry strives to:

- To provide quality teaching-learning, research and service opportunities leading to holistic development of students through collegial exchange of ideas, independent thought, and the highest ethical standards.
- To provide high quality academic experiences through comprehensive & relevant curriculum at all UG & PG levels.
- To foster research aptitude by extending infrastructural support and research guidance.
- To inculcate the values of multi-disciplinary approach and innovative thinking by facilitating learning experiences in the field of chemical sciences and its allied fields
- To produce knowledgeable graduates for careers in academia, industry and GOs/NGOs.
- To promote ethical and professional environment amongst faculties and students of the department..

List of Program Outcomes (POs)

PO No.	PO detail
PO ₁	Depth and breadth of knowledge: To prepare efficient chemistry graduates with strong fundamental knowledge to cater the needs of industries/laboratories/Academics related to chemistry.
PO ₂	Practice, Operation and usage of modern tools and technology: To inculcate technical skills in the chemistry graduates towards the use of modern & sophisticated instruments, equipments & cheminformatic tools to analyze and obtain molecular information of the material.
PO ₃	Research, numeracy and scholarship: To develop ability among graduates to work for the effective & practical solutions for issues related to chemical science while complying with economical, environmental, ethical, and safety aspects.
PO ₄	Professional capacity and passion of learning: To provide graduates who can skillfully utilize the chemical literature to assess & identify problems significant to industries & society.
PO ₅	Global, moral and aesthetic sustainability: To enrich graduates with contemporary training in professional responsibility, including ethics, the global and societal impact of scientific decisions, and the need for lifelong learning.

List of Program Specific Outcomes(PSOs):

PSO-Side Heading	PSO No.	PSO detail
Fundamental Knowledge	PSO₁	Understand the traditional core of chemistry and acquire the ability to apply chemistry knowledge for qualitative or quantitative behavior of molecules to a broad variety of chemical problems.
	PSO₂	Understand and demonstrate a working knowledge of specialized area comprising Organic / Analytical / Pharmaceutical chemistry
Technical Skill	PSO₃	Design and perform a broad variety of analytical and synthetic experiments
	PSO₄	Show ability to use the techniques, skills, and modern tools necessary for chemistry domain.
Research Skill	PSO₅	Comprehend and apply chemical literature for effective problem solving
	PSO₆	Examine and critically evaluate the experimental results and extend the knowledge with skills to secure placement.
Critical Thinking	PSO₇	Apply critical thinking skills for the environmental issues & Sustainable development through chemistry research
Effective Communication	PSO₈	Communicate scientific information orally and in writing.
Self-directed and life-long learning	PSO₉	Acquire the ability to engage in independent and life- long learning in the broadest context socio- technological changes.
Ethics	PSO₁₀	Appraise and Demonstrate professional & ethical responsibility with Universal brotherhood (<i>Atmiyata</i>)

SCHEME OF INSTRUCTION AND EXAMINATIONS
For Students Admitted from A.Y. 2019&Onwards

M.Sc. Chemistry Semester-I									
Subject Code	Course	Hrs. of Instruction			Exam Duration (Hrs)	Max. Marks			Credit
						CIA	SEE	Total	
Part - I									
		Th	Pr	Tu					
19PCECC101	Core 1: Organic Chemistry	4	-	-	3	40	60	100	4
19PCECC102	Core 2: Analytical Chemistry	3	-	-	3	40	60	100	3
19PCECC103	Core 3: Inorganic Chemistry	4	-	-	3	40	60	100	4
19PCECC104	Core 4: Physical Chemistry	3	-	-	3	40	60	100	3
19PCEID101/ 19PCEID102	DSE - ID-1: <ul style="list-style-type: none"> • Industrial Environment Management/ • Chemistry of Biomolecules 	4	-	-	2	50	50	100	4
19PCECC105	Practical Core 1 & 2: Organic & Analytical Chemistry	-	5	-	6	40	60	100	3
19PCECC106	Practical Core 3 & 4: Inorganic & Physical Chemistry	-	5	-	6	40	60	100	3
Part - II									
	CEC-I: Scientific Writing (Chem Draw Tools Training)	1	-	-	-	Remarks at the End of SEM-II			-
	*CEC- II STC/Online Courses/ Professional Certification Courses	Remarks at the End of SEM-IV							-
	Value Education for Consciousness Development	1	-	-	-	Remarks at the End of SEM-II			-
	TOTAL	30						700	24

*Relevant Self learning Short Term Course (STC)/ Online courses/Professional Certification Courses from choice and evaluated at the end of semester-IV.

**M.Sc. Chemistry
Semester-II**

Subject Code	Course	Hrs. of Instruction			Exam Duration (Hrs)	Max. Marks			Credit
						CIA	SEE	Total	
Part - I									
		Th	Pr	Tu					
19PCECC201	Core 5: Separation Techniques	4	-	-	3	40	60	100	4
19PCECC202	Core 6: Organic Reactions & Rearrangements	3	-	-	3	40	60	100	3
19PCECC203	Core 7: Stereochemistry	3	-	-	3	40	60	100	3
19PCECC204	Core 8: Modern Analytical Techniques	3	-	-	3	40	60	100	3
19PCEID201/ 19PCEID202	DSE - ID-2: • Statistical Methods/ • Chemical Technology	4	-	-	2	50	50	100	4
19PCECC205	Practical Core 5& 6: Separation Techniques & Organic Synthesis	-	6	-	6	40	60	100	2
19PCECC206	Practical Core 7 & 8: Stereochemistry & Modern Analytical Techniques	-	5	-	6	40	60	100	2
Part - II									
19PCECE01	CEC-I: Scientific Writing (Research review & presentation)	1	-	-	-	Remarks			2
	*CEC- II STC/Online Courses/ Professional Certification Courses	Evaluated at the End of SEM-IV							-
19LSVE01	Value Education for Consciousness Development	1	-	-	-	Remarks			2
	TOTAL	30						700	25

*Relevant Self learning Short Term Course (STC)/ Online courses/Professional Certification Courses from choice and evaluated at the end of semester-IV.

#After successful completion of Semester I & II, option for student to opt one of the sub-disciplines viz., Organic Chemistry **OR** Analytical Chemistry (Intake ratio is 60:40 respectively, ± 5 %) in Semester III & IV on the basis of merit.

M.Sc. Chemistry (Organic Chemistry) Semester-III									
Subject Code	Course	Hrs. of Instruction			Exam Duration (Hrs)	Max. Marks			Credit
		Th	Pr	Tu		CIA	SEE	Total	
Part - I									
19PCEOCC301	Core 9: Interpretative Molecular Spectroscopy (Self study)	1	-	-	3	50	50	100	3
19PCEOCC302	Core 10: Heterocyclic Chemistry	4	-	-	3	40	60	100	4
19PCEOCC303	Core 11: Organic Synthesis: A Disconnection Approach	4	-	-	3	40	60	100	4
19PCEODC301/ 19PCEODC302	DSE –Core 1 • Medicinal Chemistry / • Pharmaceutical Technology	4	-	-	3	40	60	100	4
19PCEGE01	Generic Elective	2	-	-	-	100	-	100	2
19PCEOCC304	Practical Core 10&11: Heterocyclic Chemistry&Organic Synthesis	-	9	-	6	60	90	150	4
19PCEODC303/ 19PCEODC304	PracticalDSE –Core 1 • Medicinal Chemistry / • Pharmaceutical Technology	-	3	-	3	20	30	50	2
	Core 12: Project/Internship/Skill Training/Advance Practical (Research proposal & presentation)	-	3	-	-	Evaluated at the End of SEM-IV			2#
Part - II									
	*CEC- 2 : STC/ Online Courses / Professional Certification Courses	-	-	-	-	Evaluated at the End of SEM-IV			-
	TOTAL	30						700	23

*Relevant Self learning Short Term Course (STC)/ Online courses/Professional Certification Courses from choice and evaluated at the end of semester-IV.

In semester III and IV, Students can select project work or advance practical on the basis of their own choice and merit. (Intake ratio for project work in semester III and IV is 20% ± 5%)

Only for the student who take exit at end of Semester-III. The Core 12: Dissertation course code be 19PCEOCC305 and student will be only evaluated for 2 credits.

M.Sc. Chemistry (Organic Chemistry) Semester-IV									
Subject Code	Course	Hrs. of Instruction			Exam Duration (Hrs)	Max. Marks			Credit
						CIA	SEE	Total	
Part - I									
		Th	Pr	Tu					
19PCEOCC401	Core12: Project/Internship/Skill Training/Advance Practical	-	20	-	6	80	120	200	12
19PCEOCC402	Core13: Chemistry of Natural Products	5	-	-	3	50	50	100	5
19PCEOCC403	Core14: Chemistry of Synthetic Drugs	5	-	-	3	50	50	100	5
Part - II									
19PCECE02	*CEC- 2 : STC/ Online Courses / Professional Certification Courses	Successfully completion of the courses certified by provider and Approval by the Department						2	
	TOTAL	30						400	24
Grand Total								2500	96

*Relevant Self learning Short Term Course (STC)/ Online courses/Professional Certification Courses from choice and evaluated at the end of semester-IV.

**M.Sc. Chemistry (Analytical Chemistry)
Semester-III**

Subject Code	Course	Hrs. of Instruction	Exam Duration (Hrs)	Max. Marks			Credit		
				CIA	SEE	Total			
Part – I									
		Th	Pr	Tu					
19PCEACC301	Core 9: Interpretative Molecular Spectroscopy (Self Study)	1	-	-	3	50	50	100	3
19PCEACC302	Core 10: Analytical Method Development & Validation	4	-	-	3	40	60	100	4
19PCEACC303	Core 11: Industrial Formulations Development	4	-	-	3	40	60	100	4
19PCEADC301/ 19PCEADC302	DSE – Core1 • Chemistry of Food Analysis or Instrumental Methods of Analysis	4	-	-	3	40	60	100	4
19PCEGE01	Generic Elective	2	-	-	-	100	-	100	2
19PCEACC304	Practical Core 10 & 11: Analytical Method Development & Validation & Industrial Formulations Development	-	9	-	6	60	90	150	4
19PCEADC303/ 19PCEADC304	Practical DSE – Core1 : • Chemistry of Food Analysis or Instrumental Methods of Analysis	-	3	-	3	20	30	50	2
	Core 12: Project/Internship/Skill Training/Advance Practicals (Research proposal & presentation)	-	3	-	-	Evaluated at the End of SEM-IV			2#
Part - II									
	*CEC- 2 : STC/ Online Courses / Professional Certification Courses	Evaluated at the End of SEM-IV						-	
TOTAL		30						700	23

*Relevant Self learning Short Term Course (STC)/ Online courses/Professional Certification Courses from choice and evaluated at the end of semester-IV.

In semester III and IV, Students can select project work or advance practical on the basis of their own choice and merit. (Intake ratio for project work in semester III and IV is 20% ± 5%)

Only for the student who take exit at end of Semester-III. The Core 12: Dissertation course code be 19PCEACC305 and student will be only evaluated for 2 credits.

M.Sc. Chemistry(Analytical Chemistry)									
Semester-IV									
Subject Code	Course	Hrs. of Instruction			Exam Duration (Hrs)	Max. Marks			Credit
						CIA	SEE	Total	
Part – I									
		Th	Pr	Tu					
19PCEACC401	Core12: Project/Internship/Skill Training/Advance Practicals	-	20	-	6	80	120	200	12
19PCEACC402	Core13: Chemistry of Natural Products	5	-	-	3	50	50	100	5
19PCEACC403	Core14: Regulatory Affairs	5	-	-	3	50	50	100	5
Part-II									
19PCECE02	*CEC- 2 : STC/ Online Courses / Professional Certification Courses	-	-	-	-	Successfully completion of the courses certified by provider and Approval by the Department			2
	TOTAL	30						400	24
Grand Total								2500	96

*Relevant Self learning Short Term Course (STC)/ Online courses/Professional Certification Courses from choice and evaluated at the end of semester-IV.

TOTAL MARKS & CREDIT DISTRIBUTION

SN	PART	Total Marks	Total Credits
1.	PART-I: Core, DSE Courses& GE Courses	2500	90
2.	PART-II : Competency EnhancementCourses	-	04
3.	PART-II : Value Education for Consciousness Development	-	02
TOTAL		2500	96

DISTRIBUTION OF COURSES

- Part – I: CORE & DSE-CORE**

CORE COURSES [Theory]

SN	Semester	Course Code	Course
1.	I	19PCECC101	Organic Chemistry
2.		19PCECC102	Analytical Chemistry
3.		19PCECC103	Inorganic Chemistry
4.		19PCECC104	Physical Chemistry
5.	II	19PCECC201	Separation Techniques
6.		19PCECC202	Organic Reactions& Rearrangements
7.		19PCECC203	Stereochemistry
8.		19PCECC204	Modern Analytical Techniques
9.	III (Specialization in Organic Chemistry)	19PCEOCC301	Interpretative Molecular Spectroscopy (Self study)
10.		19PCEOCC302	Heterocyclic Chemistry
11.		19PCEOCC303	Organic Synthesis: A Disconnection Approach
12.	III (Specialization in Analytical Chemistry)	19PCEACC301	Interpretative Molecular Spectroscopy (Self study)
13.		19PCEACC302	Analytical Method Development &Validation
14.		19PCEACC303	Industrial Formulation
15.	IV (Specialization in Organic Chemistry)	19PCEOCC402	Chemistry of Natural Products
16.		19PCEOCC403	Chemistry of Synthetic Drugs
17.	IV (Specialization in Analytical Chemistry)	19PCEACC402	Chemistry of Natural Products
18.		19PCEACC403	Regulatory Affairs

CORE COURSES [Practical]

SN	Semester	Course Code	Course
1.	I	19PCECC105	Organic & Analytical Chemistry Practical
2.		19PCECC106	Inorganic & Physical Chemistry Practical
3.	II	19PCECC205	Separation Techniques Practical&Organic Synthesis
4.		19PCECC206	Modern Analytical Techniques Practical& Stereochemistry
5.	III (Specialization in Organic Chemistry)	19PCEOCC304	Heterocyclic Chemistry
6.		19PCEOCC305	Project/Internship/Skill Training/Advance Practicals (Research proposal & presentation)
7.	III (Specialization in Analytical Chemistry)	19PCEACC304	Analytical Method Development & Validation&Industrial formulation
8.		19PCEACC305	Project/Internship/Skill Training/Advance Practicals (Research proposal & presentation)
9.	IV (Specialization in Organic Chemistry)	19PCEOCC401	Project/Internship/Skill Training/Advance Practicals
10.	IV (Specialization in Analytical Chemistry)	19PCEACC401	Project/Internship/Skill Training/Advance Practicals

DSE INTER DISCIPLINARY (DSE-ID)&DSE CORE COURSES[Theory & Practical]

Students are required to opt for any one of the courses offered in eachsemester respectively.

SN	Semester	Theory		Practical	
		Course Code	Course	Course Code	Course
1.	I	19PCEID101/ 19PCEID102	Industrial Environment Management / Chemistry of Biomolecules	-	-
2.	II	19PCEID201/ 19PCEID202	Statistical Methods / Chemical Technology	-	-
3.	III (Specialization in Organic Chemistry)	19PCEODC301/ 19PCEODC302	Medicinal Chemistry/Pharmaceutical Technology	19PCEODC303/ 19PCEODC304	Medicinal Chemistry/Pharmaceutical TechnologyPractical
4.	III (Specialization in Analytical Chemistry)	19PCEADC301/ 19PCEADC302	Chemistry of Food Analysis/Instrumental Methods of Analysis	19PCEADC303/ 19PCEADC304	Chemistry of Food Analysis/Instrumental Methods of Analysis Practical

• **Part – II: COMPETANCY ENHANCEMENT COURSES (CEC)**

SN	Semester	Course Code	Course
1.	I	-	CEC-I: Scientific Writing
2.		-	*CEC- 2 : STC/ Online Courses / Professional Certification Courses
3.		-	Value Education for Consciousness Development
4.	II	19PCECE01	CEC-I: Scientific Writing
5.		-	*CEC- 2 : STC/ Online Courses / Professional Certification Courses
6.		19LSVE01	Value Education for Consciousness Development
7	III (Specialization in Organic/Analytical)	-	*CEC- 2 : STC/ Online Courses / Professional Certification Courses
8	IV (Specialization in Organic/Analytical)	19PCECE02	*CEC- 2 : STC/ Online Courses / Professional Certification Courses

- **Courses offered by Chemistry Department to PG students of other departments**

I: DSE – ID Courses [Theory]

SN	Semester	Course Code	Course	Name of Program
1.	II	19MICID202	DSE-ID 2: Medicinal Chemistry-I	M.Sc. Industrial Chemistry

- **Generic Elective Course offered to other department**

SN	Semester	Course Code	Course	Name of Program
1.	II	19PCEGE01	Generic Elective	Other department of the College

- Student has to choose the Generic elective courses from the common pool offered by the other department of the college