



**SarvodayaKelavaniSamaj managed,  
ShriManibhai Virani and Smt.NavalbenViraniScience College (Autonomous)**

**(Affiliated to SaurashtraUniversity, 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 EnvironmentAuditCenter

Nodal Center for capacity building by GSBTM

## **Department of Chemistry**

### **B.Sc. Chemistry**

#### **Scheme of Instruction and Examinations**

# DEPARTMENT OF CHEMISTRY

## Shree Manibhai Virani & Smt. Navalben Virani Science College, Rajkot (Autonomous)

### 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.

### OBJECTIVES OF THE PROGRAM: B.Sc. Chemistry:

Courses offered in this program are geared towards providing students with an overall understanding of general chemistry so that they can enter the workforce with the necessary knowledge and skills. It will enable students to gain familiarity with the current industry practices and technologies.

The objectives are to:

- Train graduates with the requisite knowledge and skill to pursue M.Sc. & Ph.D. degrees in Chemistry.
- Turn out graduates who can teach the subject in secondary and tertiary level of education in the county.
- Train graduates who can be employed in Industry and the other sectors of the economy.

### Program Specific Outcomes

- **Disciplinary knowledge:** An understanding of the nature, practice & application of the chosen science area of study.
- **Initiative and innovative ability:** An ability to think and work creatively, including the capacity for self-starting, and the ability to apply science skills to unfamiliar applications. Encompasses

problem solving, critical thinking and analysis attributes, and the ability to discover new knowledge.

- **Information literacy:** An understanding of, and ability with the different forms of communication – writing, reading, speaking, listening-including visual and graphical, within science and beyond and the ability to apply these appropriately and effectively for different audiences.
- **Modern tool usage.** The ability to acquire, develop, employ and integrate a range of technical, practical and professional skills, in appropriate and ethical ways within a professional context, autonomously and collaboratively and across a range of disciplinary and professional areas .
- **Professionalism and participation:** An awareness of the role of science within a global culture and willingness to contribute to the shaping of community views on complex issues where the methods and findings of science are relevant.

**SCHEME OF INSTRUCTION AND EXAMINATIONS**  
**For Students Admitted from A.Y. 2019-2020 & Onwards**

Semester –I							
Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hrs.)	Maximum Marks			Credits
				CIA	SEE	Total	
<b>PART –I</b>							
19ULCEN01	Functional English-I	3	3	40	60	100	3
<b>PART- II</b>							
19UCHCC101	<b>Core-1:</b> Fundamentals of Chemistry-I	5	3	30	70	100	5
19UCHCC102	<b>Core-2:</b> Fundamentals of Chemistry-II	5	3	30	70	100	5
19UCHDA101	<b>DSE-Allied-1:</b> Physics-I	3	3	30	70	100	3
19UCHCC103	<b>Core Practical-1:</b> Inorganic/Analytical Chemistry Practical	6	3	20	30	50	2
19UCHCC104	<b>Core Practical-2:</b> Organic/Physical Chemistry Practical	4	3	20	30	50	2
19UCHDA102	<b>DSE-Allied Practical-1:</b> Physics-I Practical	6	3	20	30	50	2
		<b>32</b>				<b>550</b>	<b>22</b>
<b>PART –III</b>							
19AEES01	<b>AECC-I:</b> Environmental Science	1	-	Evaluated at the end of the semester II			-
19AEVE01	<b>SEC-I:</b> Value Education for Consciousness Development	1	-	Evaluated at the end of the semester II			-
		<b>34</b>					<b>22</b>

Semester –II							
Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hrs.)	Maximum Marks			Credits
				CIA	SEE	Total	
<b>PART –I</b>							
19ULCEN02	Functional English-II	3	3	40	60	100	3
<b>PART- II</b>							
19UCHCC201	<b>Core-3:</b> Fundamentals of Chemistry-III	5	3	30	70	100	5
19UCHCC202	<b>Core-4:</b> Fundamentals of Chemistry-IV	5	3	30	70	100	5
19UCHDA201	<b>DSE-Allied-2:</b> Physics-II	3	3	30	70	100	3
19UCHCC203	<b>Core Practical- 3:</b> Inorganic/Analytical Chemistry Practical	6	3	20	30	50	2
19UCHCC204	<b>Core Practical-4:</b> Organic/Physical Chemistry Practical	4	3	20	30	50	2
19UCHDA202	<b>DSE-Allied Practical-2:</b> Physics-II Practical	6	3	20	30	50	2
		<b>32</b>				<b>550</b>	<b>22</b>
<b>PART –III</b>							
19AEES01	<b>AECC-I:</b> Environmental Science	1	-	Remarks			2
19AEVE01	<b>SEC-I:</b> Value Education for Consciousness Development	1	-	Remarks			2
-	-	<b>34</b>	-	-			<b>26</b>

Semester – III							
Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hrs.)	Maximum Marks			Credits
				CIA	SEE	Total	
<b>PART – I</b>							
19ULCEN03	Advanced English Language -I	3	3	40	60	100	3
<b>PART- II</b>							
19UCHCC301	<b>Core -5:</b> Inorganic Chemistry	4	3	30	70	100	4
19UCHCC302	<b>Core -6:</b> Analytical Chemistry	4	3	30	70	100	4
19UCHCC303	<b>Core -7:</b> Petroleum and Petrochemicals	2	2	30	70	100	2
19UCHDA301	<b>DSE-Allied-3:</b> Basic Mathematics for Chemistry	3	3	30	70	100	3
19UCHCC304	<b>Core Practical -5:</b> Inorganic Chemistry Practical	5	3	20	30	50	2
19UCHCC305	<b>Core Practical-6:</b> Analytical Chemistry Practical	5	3	20	30	50	2
19UCHCC306	<b>Core Practical-7:</b> Petroleum Analysis Practical	2	3	20	30	50	1
19UCHDA302	<b>DSE- Allied Practical-3:</b> Basic Mathematics for Chemistry Practical	2	3	20	30	50	1
		<b>30</b>				<b>700</b>	<b>22</b>

Semester- IV							
Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hrs.)	Maximum Marks			Credits
				CIA	SEE	Total	
<b>PART -I</b>							
<b>19ULCEN04</b>	Advanced English Language -II	3	3	40	60	100	3
<b>PART- II</b>							
<b>19UCHCC401</b>	<b>Core -8:</b> Organic Chemistry	4	3	30	70	100	4
<b>19UCHCC402</b>	<b>Core -9:</b> Physical Chemistry	4	3	30	70	100	4
<b>19UCHCC403</b>	<b>Core -10:</b> Agrochemicals	2	2	30	70	100	2
<b>19UCHDA401</b>	<b>DSE- Allied-4:</b> Advanced Mathematics for Chemistry	3	3	30	70	100	3
<b>19UCHCC404</b>	<b>Core Practical-8:</b> Organic Chemistry Practical	6	3	20	30	50	2
<b>19UCHCC405</b>	<b>Core Practical-9:</b> Physical Chemistry Practical	6	3	20	30	50	2
<b>19UCHDA402</b>	<b>DSE- Allied Practical-4:</b> Advanced Mathematics for Chemistry Practical	2	3	20	30	50	1
		<b>30</b>				<b>650</b>	<b>21</b>

Semester- V							
Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hrs.)	Maximum Marks			Credits
				CIA	SEE	Total	
<b>PART- II</b>							
19UCHCC501	<b>Core-11:</b> Spectroscopy & Separation Technique-I	4	3	30	70	100	4
19UCHCC502	<b>Core-12:</b> Polymer Chemistry	4	3	30	70	100	4
19UCHCC503	<b>Core-13:</b> Industrial Formulations (Self-Study core course)	2	2	15	35	50	4
19UCHDC501/ 19UCHDC502	<b>DSE-Core-1:</b> Green Methods in Chemistry/ Soil Analysis	3	3	30	70	100	3
19UCHCC504	<b>Core Practical-11:</b> Spectroscopy & Separation Technique-1 Practical	6	3	20	30	50	2
19UCHCC505	<b>Core Practical-12:</b> Polymer Chemistry Practical	3	3	20	30	50	1
19UCHDC503/ 19UCHDC504	<b>DSE-Core Practical-1:</b> Green Methods in Chemistry Practical / Soil Analysis Practical	3	2	20	30	50	1
19UCHCC506	<b>Core 14:</b> Computer Based Test	-	3	100	-	100	1
19UCHGE01	<b>Generic Elective-I</b>	2	-	100	-	100	2
	Group Project / Industrial Training / Instrumental Training/Review Article	3	-	Evaluated at the end of semester-VI			-
		<b>30</b>				<b>700</b>	<b>22</b>



Semester- VI							
Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hrs.)	Maximum Marks			Credits
				CIA	SEE	Total	
<b>PART- II</b>							
19UCHCC601	<b>Core-15:</b> Spectroscopy & Separation Technique-II	4	3	30	70	100	4
19UCHCC602	<b>Core-16:</b> Heterocyclic Chemistry and Synthetic Drugs	4	3	30	70	100	4
19UCHCC603	<b>Core-17:</b> Chemistry of Natural Products	4	3	30	70	100	4
19UCHDC601/ 19UCHDC602	<b>DSE-Core-2:</b> Unit Operation & Processes/ Surface Coating Techniques	3	3	30	70	100	3
19UCHCC604	<b>Core Practical-16:</b> Heterocyclic Chemistry and Synthetic Drugs Practical	4	6	20	30	50	2
19UCHCC605	<b>Core Practical-17:</b> Chemistry of Natural Products Practical	2	3	20	30	50	1
19UCHDC603/ 19UCHDC604	<b>DSE-Core Practical-2:</b> Unit Operation & Processes Practical / Surface Coating Techniques Practical	3	3	20	30	50	1
19UCHGE02	<b>Generic Elective-II</b>	2	-	100	-	100	2
19UCHCC606	<b>Core 18:</b> Group Project / Industrial Training / Instrumental Training/Review Article	4	-	40	60	100	2
		<b>30</b>				<b>750</b>	<b>23</b>
<b>Total</b>						<b>3900</b>	<b>136</b>

### TOTAL MARKS & CREDIT DISTRIBUTION

S.N.	PART	Total Marks	Total Credits
1.	PART-I: Language Courses	400	12
2.	PART-II : Core, DSE-Allied, DSE-Core, GE	3500	120
3.	PART-III: AECC- I & II and SEC- I, II & III	Remarks	08
<b>TOTAL</b>		<b>3900</b>	<b>140</b>

## DISTRIBUTION OF COURSES

### • PART-I : LANGUAGE COURSES

The following are compulsory courses offered in first to fourth semesters.

SN	Semester	Course Code	Course
1.	I	19LCEN101	Functional English-I
2.	II	19LCEN201	Functional English-II
3.	III	19LCEN301	Advanced English Language -I
4.	IV	19LCEN401	Advanced English Language -II

### • PART-II : CORE, DSE-ALLIED, DSE-CORE, GE

#### • CORE COURSES [Theory]

SN	Semester	Course Code	Course
1.	I	19UCHCC101	Fundamentals of Chemistry-I
2.		19UCHCC102	Fundamentals of Chemistry-II
3.	II	19UCHCC201	Fundamentals of Chemistry-III
4.		19UCHCC202	Fundamentals of Chemistry-IV
5.	III	19UCHCC301	Inorganic Chemistry
6.		19UCHCC302	Analytical Chemistry
7.		19UCHCC303	Petroleum and Petrochemicals
8.	IV	19UCHCC401	Organic Chemistry
9.		19UCHCC402	Physical Chemistry
10.		19UCHCC403	Agrochemicals
11.	V	19UCHCC501	Spectroscopy & Separation Technique-I
12.		19UCHCC502	Polymer Chemistry
13.		19UCHCC503	Industrial Formulations (Self-Study)
14.		19UCHCC506	Computer based Test (MCQs on Fundamentals and Principles of Core Courses up to V <sup>th</sup> Semester)
15.	VI	19UCHCC601	Spectroscopy and Separation Technique-II
16.		19UCHCC602	Heterocyclic Chemistry & Synthetic Drugs
17.		19UCHCC603	Chemistry of Natural Products

- CORE COURSES [Practical]**

SN	Semester	Course Code	Course
1.	I	<b>19UCHCC103</b>	Inorganic /Analytical Chemistry Practical
2.		<b>19UCHCC104</b>	Organic/Physical Chemistry Practical
3.	II	<b>19UCHCC203</b>	Inorganic /Analytical Chemistry Practical
4.		<b>19UCHCC204</b>	Organic/Physical Chemistry Practical
5.	III	<b>19UCHCC304</b>	Inorganic Chemistry Practical
6.		<b>19UCHCC305</b>	Analytical Chemistry Practical
7.		<b>19UCHCC306</b>	Petroleum Analysis Practical
8.	IV	<b>19UCHCC404</b>	Organic Chemistry Practical
9.		<b>19UCHCC405</b>	Physical Chemistry Practical
10.	V	<b>19UCHCC504</b>	Spectroscopy & Separation Tech.-I Practical
11.		<b>19UCHCC505</b>	Polymer Chemistry Practical
12.	VI	<b>19UCHCC604</b>	Heterocyclic and Synthetic Drugs Practical
13.		<b>19UCHCC605</b>	Chemistry of Natural Products Practical

- OTHER CORE COURSES**

SN	Semester	Course Code	Course
1.	V-VI	<b>19UCHCC606</b>	Group Project / Industrial Training / Instrumental Training

- DSE ALLIED COURSES[Theory]**

SN	Semester	Course Code	Course
1.	I	<b>19UCHDA101</b>	Physics- I
2.	II	<b>19UCHDA201</b>	Physics II
3.	III	<b>19UCHDA301</b>	Basic Mathematics for Chemistry
4.	IV	<b>19UCHDA401</b>	Advanced Mathematics for Chemistry

- DSE ALLIED COURSES [Practical]**

SN	Semester	Course Code	Course
1.	I	<b>19UCHDA102</b>	Physics- I Practical
2.	II	<b>19UCHDA202</b>	Physics II Practical
3.	III	<b>19UCHDA302</b>	Basic Mathematics for Chemistry Practical
4.	IV	<b>19UCHDA402</b>	Advanced Mathematics for Chemistry Practical

- **DSE CORE COURSES [Theory & Practical]**

Students are required to opt for any one of the courses offered in V<sup>th</sup>&VI<sup>th</sup> semesters respectively.

SN	Sem.	Theory		Practical	
		Course Code	Course	Course Code	Course
1.	V	<b>19UCHDC501</b>	Green methods in Chemistry	<b>19UCHDC503</b>	Green methods in Chemistry Practical
		<b>19UCHDC502</b>	Soil Analysis	<b>19UCHDC504</b>	Soil Analysis Practical
2.	VI	<b>19UCHDC601</b>	Unit Operation & Processes	<b>19UCHDC603</b>	Unit Operation & Processes Practical
		<b>19UCHDC602</b>	Surface Coating Techniques	<b>19UCHDC604</b>	Surface Coating Techniques Practical

• PART-III : AECC and SEC

Part - III						
Course Code	Semester	Particulars	Hrs. of instruction/ week	No. of Courses	Credit/ Course	Total Credits
<b>Ability Enhancement Compulsory Course (AECC)</b>						
As per common list	I & II	<b>AECC-I</b> Environment Science	1	1	2	2
	IV & V	<b>AECC-II</b> Communication Skill/Soft Skills	2	2	1	2
						<b>Sub Total</b>
<b>Skill Enhancement Course (SEC)</b>						
As per common list	I	<b>SEC-I</b> Value Education for Consciousness Development	1	1	1	1
	II		1	1	1	1
	Any Semester between II - V	<b>SEC-II</b> *Co-Curricular Course	> 40 hours in total	1	1	1
	Any Semester between II - V	<b>SEC-III</b> **Value Added Courses	40 hours in total	1	1	1
					<b>Sub Total</b>	<b>4</b>
					<b>Grand Total</b>	<b>8</b>

\*Co-Curricular Courses - Option to students to choose 1 from a list of courses offered by the college, such as Add on Courses, Gandhian Studies Certificate Course, Women Studies Course, etc.

\*\*Value Added Courses - Option to student to choose at least 1 from a list of courses offered from eachUG department.

- Courses offered by Chemistry Department to UG students of other departments

**I: DSE – Allied Courses [Theory]**

SN	Semester	Course Code	Course	Name of Program
1.	I	19UICDA101/ 19UBTDA101	Chemistry-I	B.Sc. Industrial Chemistry and B.Sc. Biotechnology
2.	II	19UICDA201/ 19UBTDA201	Chemistry-II	B.Sc. Industrial Chemistry and B.Sc. Biotechnology

**II: DSE – Allied Courses [Practical]**

SN	Semester	Course Code	Course	Name of Program
1.	I	19UICDA102/ 19UBTDA102	Chemistry-I Practical	B.Sc. Industrial Chemistry and B.Sc. Biotechnology
2.	II	19UICDA202/ 19UBTDA202	Chemistry-II Practical	B.Sc. Industrial Chemistry and B.Sc. Biotechnology

**III: Generic Elective Course**

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

SN	Semester	Course
1.	V	Any one course from the list of courses offered across UG departments
2.	VI	

- **GENERIC ELECTIVE COURSES OF CHEMISTRY OFFERED TO OTHER DEPARTMENT**

SN	Semester	Course
1.	V	Chemical Hazards & Safety
2	VI	Chemistry in Everyday life