



**Yogi Divine Society inspired,  
Sarvodaya Kelavani Samaj managed,  
Shree Manibhai Virani and Smt. Navalben Virani Science College, Rajkot**

**(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 – Highest Grade A-1 by KCG, Government of Gujarat

GPCB-Government of Gujarat approved Environment Audit Center

UGC-Autonomous College

## **DEPARTMENT OF CHEMISTRY**

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

**Shree Manibhai Virani and Smt. Navalben Virani Science College, Rajkot  
(Autonomous)  
Affiliated to Saurashtra University, Rajkot**

**Department of Chemistry**

**B.Sc. CHEMISTRY**

**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 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.

**Graduates from the Chemistry degree program will have to demonstrate:**

- An understanding of major concepts, theoretical principles and experimental findings in chemistry.
- An ability to work effectively in diverse teams in both classroom and laboratory.
- An ability to employ critical thinking and efficient problem-solving skills in the four basic areas of chemistry (analytical, inorganic, organic, and physical).
- An ability to conduct experiments, analyze data, and interpret results, while observing responsible and ethical scientific conduct.
- Effective written and oral communication skills, especially the ability to transmit complex technical information in a clear and concise manner.
- The ability to use classical & modern instrumentation for chemical analysis and separation.
- The ability to use computers for chemical simulation and computation.
- The ability to employ modern library search tools/ databases (e.g. Scifinder, Science direct etc.) to locate, retrieve, and evaluate scientific information.
- A familiarity with and application of safety and chemical hygiene regulations and good laboratory practices.
- An ability to gain entry into PG programs, professional organizations, or other related job.

**SCHEME OF INSTRUCTION AND EXAMINATIONS**  
**For Students Admitted from A.Y. 2016-2017 & Onwards**

<b>Semester - I</b>							
Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hrs.)	Maximum Marks			Credits
				CIE	SEE	Total	
<b>PART - I</b>							
16ULCEN01	Functional English-I	3	3	40	60	100	3
<b>PART- II</b>							
16UCHCC01	<b>Core-1:</b> Fundamentals of Chemistry-I	5	3	30	70	100	5
16UCHCC02	<b>Core-2:</b> Fundamentals of Chemistry-II	5	3	30	70	100	5
16UCHDA01	<b>DSE-Allied-1:</b> Physics-I	3	3	30	70	100	3
16UCHCC03	<b>Core Practical-1:</b> Inorganic/Analytical Chemistry Practical	6	3	20	30	50	3
16UCHCC04	<b>Core Practical-2:</b> Organic/Physical Chemistry Practical	4	3	20	30	50	2
16UCHDA02	<b>DSE-Allied Practical-1:</b> Physics-I Practical	2	3	20	30	50	1
		<b>28</b>				<b>550</b>	<b>22</b>
<b>PART -III</b>							
	<b>AECC-1:</b> Environmental Science	1	-	-	-	-	-
	<b>SEC-1:</b> Value Education- I	1	-	Remarks			1
		<b>30</b>					

Semester - II							
Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hrs.)	Maximum Marks			Credits
				CIE	SEE	Total	
<b>PART - I</b>							
16ULCEN02	Functional English-II	3	3	40	60	100	3
<b>PART- II</b>							
16UCHCC05	<b>Core-3:</b> Fundamentals of Chemistry-III	5	3	30	70	100	5
16UCHCC06	<b>Core-4:</b> Fundamentals of Chemistry-IV	5	3	30	70	100	5
16UCHDA03	<b>DSE-Allied-2:</b> Physics-II	3	3	30	70	100	3
16UCHCC07	<b>Core Practical- 3:</b> Inorganic/Analytical Chemistry Practical	6	3	20	30	50	3
16UCHCC08	<b>Core Practical-4:</b> Organic/Physical Chemistry Practical	4	3	20	30	50	2
16UCHDA04	<b>DSE-Allied Practical-2:</b> Physics-II Practical	2	3	20	30	50	1
		<b>28</b>				<b>550</b>	<b>22</b>
<b>PART -III</b>							
	<b>AECC-1:</b> Environmental Science	1	-	Remarks			2
	<b>SEC-2:</b> Value Education -II	1	-	Remarks			1
		<b>30</b>					

Semester - III							
Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hrs.)	Maximum Marks			Credits
				CIE	SEE	Total	
<b>PART – I</b>							
16ULCEN03	Advanced English Language -I	3	3	40	60	100	3
<b>PART- II</b>							
16UCHCC09	<b>Core -5:</b> Inorganic Chemistry	4	3	30	70	100	4
16UCHCC10	<b>Core -6:</b> Analytical Chemistry	4	3	30	70	100	4
16UCHCC11	<b>Core -7:</b> Petroleum and Petrochemicals	2	2	30	70	100	2
16UCHDA05	<b>DSE-Allied-3:</b> Mathematics-I	3	3	30	70	100	3
16UCHCC12	<b>Core Practical -5:</b> Inorganic Chemistry Practical	5	3	20	30	50	2
16UCHCC13	<b>Core Practical-6:</b> Analytical Chemistry Practical	5	3	20	30	50	2
16UCHCC14	<b>Core Practical-7:</b> Petroleum Analysis Practical	2	3	20	30	50	1
16UCHDA06	<b>DSE- Allied Practical-3:</b> Mathematics-I Practical	2	3	20	30	50	1
		<b>30</b>				<b>700</b>	<b>22</b>

Non credit compulsory Course	<p>Add on <b>Certificate Course</b> : (Hands on experiential course) <b>Formulation of Perfume, Cosmetics &amp; Toiletries</b> of 15 hrs. duration in Sem.-III &amp; IV each, is compulsory to earn degree.</p>	Evaluation will be made in Sem.-IV.
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Semester- IV							
Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hrs.)	Maximum Marks			Credits
				CIE	SEE	Total	
<b>PART – I</b>							
16ULCEN04	Advanced English Language -II	3	3	40	60	100	3
<b>PART- II</b>							
16UCHCC15	<b>Core -8:</b> Organic Chemistry	4	3	30	70	100	4
16UCHCC16	<b>Core -9:</b> Physical Chemistry	4	3	30	70	100	4
16UCHCC17	<b>Core -10:</b> Agrochemicals	2	2	30	70	100	2
16UCHDA07	<b>DSE- Allied-4:</b> Mathematics-II	3	3	30	70	100	3
16UCHCC18	<b>Core Practical-8:</b> Organic Chemistry Practical	6	3	20	30	50	2
16UCHCC19	<b>Core Practical-9:</b> Physical Chemistry Practical	6	3	20	30	50	2
16UCHDA08	<b>DSE- Allied Practical-4:</b> Mathematics-II Practical	2	3	20	30	50	1
		<b>30</b>				<b>650</b>	<b>21</b>

Non credit compulsory Course	<p>Add on <b>Certificate Course</b> : (Hands on experiential course) <b>Formulation of Perfume, Cosmetics &amp; Toiletries</b> of 15 hrs. duration in Sem.-III &amp; IV each, is compulsory to earn degree.</p>	Evaluation by Remarks
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Semester- V							
Course Code	Course	Hrs. of Instruction/ week	Exam Duration (Hrs.)	Maximum Marks			Credits
				CIE	SEE	Total	
<b>PART- II</b>							
16UCHCC20	<b>Core-11:</b> Spectroscopy & Separation Technique-I	4	3	30	70	100	4
16UCHCC21	<b>Core-12:</b> Polymer Chemistry	4	3	30	70	100	4
16UCHCC22	<b>Core-13:</b> Industrial Formulations (Self Study core course)	2	-	50	-	50	4
16UCHDC01/ 16UCHDC02/ 16UCHDC03	<b>DSE-Core-1:</b> Application of Computer in Chemistry / Green Methods in Chemistry/ Soil Analysis	3	3	30	70	100	3
16UCHCC23	<b>Core Practical-10:</b> Spectroscopy & Separation Technique-1 Practical	6	3	20	30	50	2
16UCHCC24	<b>Core Practical-11:</b> Polymer Chemistry Practical	3	3	20	30	50	1
16UCHDC04/ 16UCHDC05/ 16UCHDC06	<b>DSE-Core Practical-1:</b> Applications of Computer in Chemistry Practical / Green Methods in Chemistry Practical / Soil Analysis Practical	3	2	20	30	50	1
16UCHCC25	<b>Core 14:</b> Computer Based Test	-	3	100	-	100	1
	<b>Generic Elective-1</b>	2	-	100	-	100	2
-	Group Project/ Review Article/ Industrial Training/ Instrumental Training	3	-	Evaluation in SEM.-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
				CIE	SEE	Total	
<b>PART- II</b>							
16UCHCC26	<b>Core-15:</b> Spectroscopy & Separation Technique-II	4	3	30	70	100	4
16UCHCC27	<b>Core-16:</b> Heterocyclic Chemistry and Synthetic Drugs	4	3	30	70	100	4
16UCHCC28	<b>Core-17:</b> Chemistry of Natural Products	4	3	30	70	100	4
16UCHDC07/ 16UCHDC08/ 16UCHDC09	<b>DSE-Core-2:</b> Unit Operation & Processes/ Biochemical Analysis / Chemistry of Surface Coating	3	3	30	70	100	3
16UCHCC29	<b>Core Practical-12:</b> Heterocyclic Chemistry and Synthetic Drugs Practical	4	6	20	30	50	2
16UCHCC30	<b>Core Practical-13:</b> Chemistry of Natural Products Practical	2	3	20	30	50	1
16UCHDC10/ 16UCHDC11/ 16UCHDC12	<b>DSE-Core Practical-2:</b> Unit Operation & Processes Practical / Biochemical Analysis Practical / Chemistry of Surface Coating Practical	3	3	20	30	50	1
	<b>Generic Elective-2</b>	2	-	100	-	100	2
16UCHCC31	Group Project / Review article / Industrial Training/ Instrumental Training	4	-	40	60	100	2
		<b>30</b>				<b>750</b>	<b>23</b>
<b>Total Marks : 3900</b>							



<b>Part - III</b>						
<b>Course Code</b>	<b>Semester</b>	<b>Particulars</b>	<b>Hrs. of instruction/ week</b>	<b>No. of Courses</b>	<b>Credit/ Course</b>	<b>Total Credits</b>
<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>4</b>
<b>Skill Enhancement Course (SEC)</b>						
As per common list	I	<b>SEC-I</b> Value Education-I	1	1	1	1
	II	Value Education-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 by UG departments.

### TOTAL MARKS & CREDIT DISTRIBUTION

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

Non-credit compulsory Course: Add on **Certificate Course**: (Hands on experiential course): **Formulation of Perfume, Cosmetics & Toiletries** of 15 hrs. Duration in Sem.-III & IV each, is compulsory to earn degree.

## DISTRIBUTION OF COURSES

### • PART-I : LANGUAGE COURSES

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

S.N.	Semester	Course Code	Course
1.	I	16ULCEN01	Functional English-I
2.	II	16ULCEN02	Functional English-II
3.	III	16ULCEN03	Advanced English Language -I
4.	IV	16ULCEN04	Advanced English Language -II

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

#### CORE COURSES [Theory]

S.N.	Semester	Course Code	Course
1.	I	16UCHCC01	Fundamentals of Chemistry-I
2.		16UCHCC02	Fundamentals of Chemistry-II
3.	II	16UCHCC05	Fundamentals of Chemistry-III
4.		16UCHCC06	Fundamentals of Chemistry-IV
5.	III	16UCHCC09	Inorganic Chemistry
6.		16UCHCC10	Analytical Chemistry
7.		16UCHCC11	Petroleum & Petrochemicals
8.	IV	16UCHCC15	Organic Chemistry
9.		16UCHCC16	Physical Chemistry
10.		16UCHCC17	Agrochemicals
11.	V	16UCHCC20	Spectroscopy & Separation Technique-I
12.		16UCHCC21	Polymer Chemistry
13.		16UCHCC22	Industrial Formulations (Self-Study)
14.		16UCHCC25	Computer based Test (MCQs on Fundamentals and Principles of Core Courses up to V <sup>th</sup> Semester)
15.	VI	16UCHCC26	Spectroscopy & Separation Technique-II
16.		16UCHCC27	Heterocyclic Chemistry & Synthetic Drugs
17.		16UCHCC28	Chemistry of Natural Products

#### • CORE COURSES [Practical]

S.N.	Semester	Course Code	Course
1.	I	16UCHCC03	Inorganic /Analytical Chemistry Practical
2.		16UCHCC04	Organic/Physical Chemistry Practical
3.	II	16UCHCC07	Inorganic /Analytical Chemistry Practical
4.		16UCHCC08	Organic/Physical Chemistry Practical
5.	III	16UCHCC12	Inorganic Chemistry Practical
6.		16UCHCC13	Analytical Chemistry Practical
7.		16UCHCC14	Petroleum Analysis Practical
8.	IV	16UCHCC18	Organic Chemistry Practical
9.		16UCHCC19	Physical Chemistry Practical
10.	V	16UCHCC23	Spectroscopy & Separation Tech.-I Practical
11.		16UCHCC24	Polymer Chemistry Practical
12.	VI	16UCHCC29	Heterocyclic & Synthetic Drugs Practical
13.		16UCHCC30	Chemistry of Natural Products Practical

• **OTHER CORE COURSES**

S.N.	Semester	Course Code	Course
1.	V-VI	16UCHCC31	Group Project / Review article / Industrial Training/ Instrumental Training

S.N.	Semester	Course Code	Course
1.	III & IV	N.A. (Non credit compulsory Course)	Add on <b>Certificate Course</b> : (Hands on experiential course) <b>Formulation of Perfume, cosmetics &amp; Toiletries</b> of 15 hrs. duration in Sem.-III & IV each, is compulsory to earn degree (Evaluation by Remarks in Sem.-IV only)

• **DSE ALLIED COURSES [Theory]**

S.N.	Semester	Course Code	Course
1.	I	16UCHDA01	Physics- I
2.	II	16UCHDA03	Physics II
3.	III	16UCHDA05	Mathematics- I
4.	IV	16UCHDA07	Mathematics- II

• **DSE ALLIED COURSES [Practical]**

S.N.	Semester	Course Code	Course
1.	I	16UCHDA02	Physics- I Practical
2.	II	16UCHDA04	Physics II Practical
3.	III	16UCHDA06	Mathematics- I Practical
4.	IV	16UCHDA08	Mathematics- II Practical

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

Students are required to opt for any one of the courses offered in 5<sup>th</sup> & 6<sup>th</sup> semesters respectively.

S.N.	Sem.	Theory		Practical	
		Course Code	Course	Course Code	Course
1.	V	16UCHDC01/	Applications of Computer in Chemistry /	16UCHDC04/	Applications of Computer in Chemistry Practical/
2.		16UCHDC02/	Green Methods in Chemistry/	16UCHDC05/	Green Methods in Chemistry Practical/
3.		16UCHDC03	Soil Analysis	16UCHDC06	Soil Analysis Practical
1.	VI	16UCHDC07/	Unit Operation & Processes/	16UCHDC10/	Unit Operation & Processes Practical/
2.		16UCHDC08/	Biochemical Analysis/	16UCHDC11/	Biochemical Analysis Practical/
3.		16UCHDC09	Chemistry of Surface Coating	16UCHDC12	Chemistry of Surface Coating Practical

• **GENERIC ELECTIVE**

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

• **PART-II : AECC and SEC**

<b>Part - III</b>						
Course Code	Semester	Particulars	Hrs. of instruction/ week	No. of Courses	Credit/ Course	Total Credits
<b><i>Ability Enhancement Compulsory Course (AECC)</i></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>4</b>
<b><i>Skill Enhancement Course (SEC)</i></b>						
As per common list	I	<b>SEC-I</b> Value Education-I	1	1	1	1
	II	Value Education-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 each UG department.

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

**I : DSE – Allied Courses [Theory]**

S.N.	Semester	Course Code	Course	Name of Program
1.	I	16UBTDA01 & 16UICDA01	Chemistry-I	B.Sc. Biotechnology & B.Sc. Industrial Chemistry
2.	II	16UBTDA03 & 16UICDA03	Chemistry-II	B.Sc. Biotechnology & B.Sc. Industrial Chemistry
3.	III	-	Chemistry-I	B.Sc. Biochemistry
4.	IV	-	Chemistry-II	B.Sc. Biochemistry

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

S.N.	Semester	Course Code	Course	Name of Program
1.	I	16UBTDA02 & 16UICDA02	Chemistry-I Practical	B.Sc. Biotechnology & B.Sc. Industrial Chemistry
2.	II	16UBTDA04 & 16UICDA04	Chemistry-II Practical	B.Sc. Biotechnology & B.Sc. Industrial Chemistry
3.	III	-	Chemistry-I Practical	B.Sc. Biochemistry
4.	IV	-	Chemistry-II Practical	B.Sc. Biochemistry

**III : Generic Elective Course**

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

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