



केंद्रीय जनजातीय विश्वविद्यालय आंध्र प्रदेश  
కేంద్రీయ గరిజన విశ్వవిద్యాలయం ఆంధ్రప్రదేశ్  
**CENTRAL TRIBAL UNIVERSITY OF ANDHRA PRADESH**  
(A CENTRAL UNIVERSITY ESTABLISHED BY AN ACT OF PARLIAMENT)

**CURRICULUM**

**B.Sc. (Hons.) Chemistry /**  
**B.Sc. (Hons. with Research) Chemistry**  
[Duration: 4 years]

(As per National Education Policy 2020)

w.e.f. 2023-24 admitted batch

**DEPARTMENT OF CHEMISTRY**  
**SCHOOL OF SCIENCE**



# B.Sc. (Hons.) Chemistry/ B.Sc. (Hons. with Research) Chemistry

## REGULATIONS (w.e.f. 2023-24 admitted batch)

### 1. CURRICULUM AND CREDIT FRAMEWORK FOR UNDERGRADUATE PROGRAMMES

The National Education Policy (NEP) 2020 recognizes that higher education plays an extremely important role in promoting human as well as societal well-being. It notes that “given the 21st-century requirements, quality higher education must aim to develop good, thoughtful, well-rounded, and creative individuals”.

A new student-centric “Curriculum and Credit Framework for Undergraduate Programmes (CCFUP)” incorporating a flexible choice-based credit system, multidisciplinary approach, and multiple entry and exit options. This will facilitate students to pursue their career path by choosing the subject/field of their interest.

The NEP envisages several transformative initiatives in higher education. These include:

- Adoption of flexible curricular structures in order to enable creative combinations of disciplinary areas for study in multidisciplinary contexts that would also allow flexibility in course options that would be on offer to students, in addition to rigorous specialization in a subject or subjects.
- B.Sc Chemistry degree program of either 3 or 4-year duration, with multiple entry and exit points and re-entry options, with appropriate certifications such as:
  - UG certificate after completing 1 year (2 semesters) of study in Chemistry.
  - UG diploma in Chemistry after 2 years (4 semesters) of study.
  - B.Sc in Chemistry after a 3-year (6 semesters) programme of study,
  - 4-year B.Sc (Honours) after eight semesters programme of study. If the student completes a rigorous research project in their major area(s) of study in the 4th year of a B.Sc (Honours with Research).
- The 4-year bachelor’s degree programme is considered a preferred option since it would provide the opportunity to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per the choices of the student.
- Inclusion of credit-based courses and projects in the areas of community engagement and service, environmental education, and value-based education.
- Value-based education to include the development of humanistic, ethical, Constitutional, and universal human values of truth, righteous conduct, peace, love, nonviolence, scientific temper, citizenship values, and life skills.
- Lessons in service and participation in community service programmes to be an integral part of holistic education.



## 2. SEMESTER/CREDITS

- A semester comprises 90 working days and an academic year is divided into two semesters.
- A summer term is for eight weeks during summer vacation. Internship/apprenticeship/work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study. Regular courses may also be offered during the summer on a fast-track mode to enable students to do additional courses or complete backlogs in coursework.

## 3. MAJOR AND MINOR DISCIPLINES

- **Major discipline: Chemistry** is the discipline or subject of main focus and the degree will be awarded in Chemistry. Students should secure the prescribed number of credits (about 50% of total credits) through core courses in the major discipline.
- **Minor discipline** helps a student to gain a broader understanding beyond the major discipline. For example, if a student pursuing a Chemistry major obtains a minimum of 12 credits from a bunch of courses in Physics, then the student will be awarded a B.Sc. degree in Chemistry with a Minor in Physics. The Department of Chemistry will encourage the students to take up minors in Physics/Mathematics/Botany/Geology/AI etc.

## 4. AWARDING UG CERTIFICATE, UG DIPLOMA, AND DEGREES

- **UG Certificate:** Students who opt to exit after completion of the first year and have secured 40 credits will be awarded a UG certificate if, in addition, they complete one vocational course of 4 credits during the summer vacation of the first year. These students are allowed to re-enter the degree programme within three years and complete the degree programme within the stipulated maximum period of seven years.
- **UG Diploma:** Students who opt to exit after completion of the second year and have secured 80 credits will be awarded the UG diploma if, in addition, they complete one vocational course of 4 credits during the summer vacation of the second year. These
- Students are allowed to re-enter within a period of three years and complete the degree programme within the maximum period of seven years.
- **3-year UG Degree:** Students who wish to undergo a 3-year UG programme will be awarded UG Degree in the Major discipline after successful completion of three years, securing 120 credits and satisfying the minimum credit requirement as given in table 2 (Section 5).
- **4-year UG Degree (Honours):** A four-year UG Honours degree in the major discipline will be awarded to those who complete a four-year degree programme with 160 credits and have satisfied the credit requirements as given in table 2 in Section 5.
- **4-year UG Degree (Honours with Research):** Students who secure 75% marks and above in the first six semesters and wish to undertake research at the undergraduate level can choose a research stream in the fourth year. They should do a research project or dissertation under the guidance of a faculty member of the University/College. The research project/dissertation will be in the major discipline. The students who secure 160 credits, including 12 credits from a research project/dissertation, are awarded UG Degree (Honours with Research).



- **UG Degree Programmes with Single Major:** A student has to secure a minimum of 50% credits from the major discipline for the 3-year/4-year UG degree to be awarded a single major. For example, in a 3-year UG programme, if the total number of credits to be earned is 120, a student of Chemistry with a minimum of 60 credits will be awarded a B.Sc. in Chemistry with a single major. Similarly, in a 4-year UG programme, if the total number of credits to be earned is 160, a student of Chemistry with a minimum of 80 credits will be awarded a B.Sc. (Hons./ Hon. With Research) in Chemistry in a 4-year UG programme with a single major.

## 5. CREDIT HOURS FOR DIFFERENT TYPES OF COURSES

The workload relating to a course is measured in terms of credit hours. A credit is a unit by which the coursework is measured. It determines the number of hours of instruction required per week over the duration of a semester (minimum 15 weeks).

- Each course may have only a lecture component or a lecture and tutorial component or a lecture and practicum component or a lecture, tutorial, and practicum component, or only practicum component. For example, a three-credit lecture course in a semester means three one-hour lectures per week with each one-hour lecture counted as one credit. In a semester of 15 weeks duration, a three-credit lecture course is equivalent to 45 hours of teaching.
- One credit for tutorial work means one hour of engagement per week. In a semester of 15 weeks duration, a one-credit tutorial in a course is equivalent to 15 hours of engagement.
- A one-credit course in practicum or lab work, community engagement and services, and fieldwork in a semester mean two-hour engagement per week. In a semester of 15 weeks duration, a one-credit practicum in a course is equivalent to 30 hours of engagement.
- A one-credit of Seminar or Internship or Studio activities or Field practice/projects or Community engagement and service means two-hour engagements per week. Accordingly, in a semester of 15 weeks duration, one credit in these courses is equivalent to 30 hours of engagement.

## 6. ELIGIBILITY FOR THE UG PROGRAMMES

Senior Secondary School Leaving Certificate or Higher Secondary (12th Grade) Certificate obtained after successful completion of Grade 12 or equivalent stage of education corresponding to Level-4.

## 7. DURATION OF THE PROGRAMME

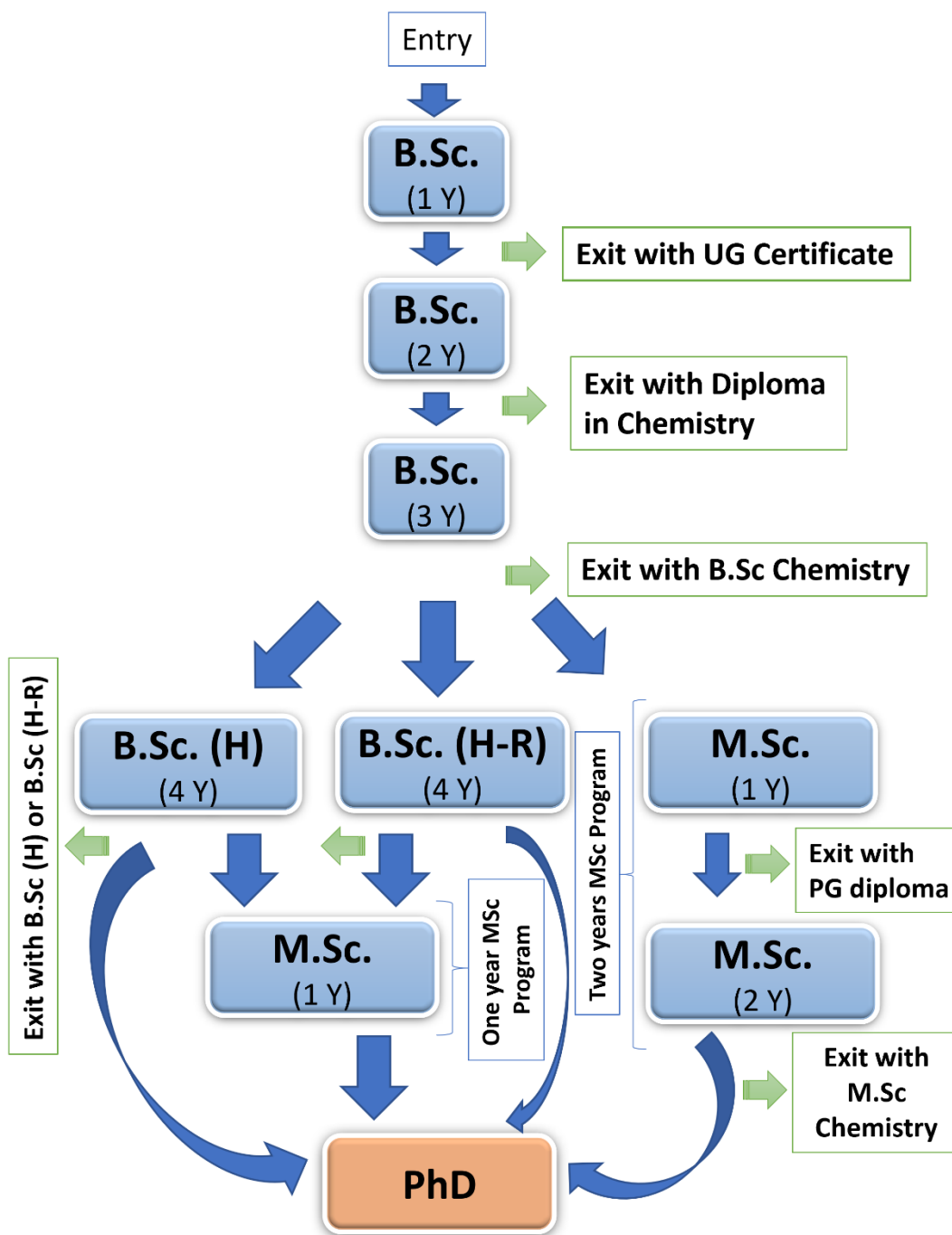
- The duration of the UG programme is 4 years or 8 semesters. Students who desire to undergo a 3-year UG Programme will be allowed to exit after completion of the 3rd year. If a student wants to leave after the completion of the first or second year, the student will be given a UG Certificate or UG Diploma, respectively, provided they secure the prescribed number of credits (as given in Table 3). Students who exit with a UG certificate or UG diploma are permitted to re-enter within three years and complete the degree programme.
- Students may be permitted to take a break from the study during the period of study but the total duration for completing the programme shall not exceed 7 years.



## 8. STRUCTURE OF THE UNDERGRADUATE PROGRAMME

The UG programme will consist of the following categories of courses and the minimum credit requirements for 3-year UG and 4-year UG (Honours) or UG (Honours with Research) programmes are given below:

S. No.	Broad Category of Course	Minimum Credit Requirement	
		3-year UG	4-Year UG
1	Major (Core)	60	80
2	Minor Stream	24	32
3	Multidisciplinary	09	09
4	Ability Enhancement Courses (AEC)	08	08
5	Skill Enhancement Courses (SEC)	09	09
6	Value Added Courses common for all UG	06 - 08	06 – 08
7	Summer Internship	02 - 04	02 – 04
8	Research Project / Dissertation	-	12
<b>Total</b>		<b>120</b>	<b>160</b>



**SCHEME – MULTIPLE ENTRY/EXIT OPTIONS AS PER NEP-2020**



## CURRICULUM STRUCTURE

### 4-Year B.Sc. (Hons.) Chemistry / B.Sc. (Hons. with research) Chemistry

Semester	Major Core	Minor stream	Multidisciplinary Courses	Ability Enhancement Courses	Skill Enhancement Courses/ Internship	Value added Courses	Total credits		
I	Major-I (3+0+2)	Minor-I (3+0+1)	Course-I (3+0+0)	English for Communication-I (2+0+0)	Soft skills-1 (1+1+0) Soft Skills-2 (1+1+0)	Indian Constitution & Heritage (3+0+0)	21	42	
II	Major-II (3+0+2)	Minor-II (3+0+1)	Course-II (3+0+0)	Telugu-I/Hindi-I (2+0+0)	Soft Skills-3 (1+1+0) Soft Skills-4 (1+1+0)	Environmental Studies (3+0+0)	21		
<b>Exit option with Certificate in Chemistry &amp; Option of major and minor interconversion **</b>								<b>42</b>	
III	Major -III (3+0+2) Major -IV (3+0+2)	Minor-III (3+0+1)	Course-III (3+0+0)	English for Communication-II (2+0+0)	Soft Skills-5 (1+1+0)	-	21	41	
IV	Major -V (3+0+2) Major -VI (3+0+2)	Minor-IV (3+0+1)	-	Telugu-II/Hindi-II (2+0+0)	GLP (1+1+0)	Human Values and Ethics (1+1+0)	20		
<b>Exit option with Diploma in Chemistry#</b>								<b>83</b>	
V	Major -VII (3+0+2) Major -VIII (3+0+2) Major -IX (3+0+2)	Minor-V (3+0+1)	-	-	Internship (2)	-	21	42	
VI	Major -X (3+0+2) Major -XI (3+0+2) Major -XII (3+0+2) Minor Project (2)	Minor-VI (3+0+1)	-	-	-	-	21		
	62	24	9	8	12 + 2	8	<b>125</b>		
<b>Exit option with B.Sc. Chemistry</b>									
* Candidate has to complete the 2 credit Laboratory course from latest chosen major if interchanged the first chosen Minor to Major.									
# Candidate who wants to exit the program has to complete an additional 4 credit Vocational Course/Internship to get the Certificate/ Diploma.									
VII	Major -XIII (3+0+2) Major -XIV (3+0+2) Major -XV (Elective) <sup>§</sup> (3+0+0) Research Methodology (3)	Minor-VII (3+0+1)	-	-	-	-	20	42(H)	
VIII	<b>Hons.</b>								
	Major -XVII (3+0+0) Major -XIV (3+0+2) Major -XV (3+0+2) Major -XVI (Elective) <sup>§</sup> (3+0+0) Minor Project (2)	Minor-VIII (3+0+1)	-	-	-	-	22	/	
	<b>Hons. with Research</b>								
	Major-XVI (Elective) <sup>§</sup> (3+0+0) Pre-project Seminar (2) Research Project & Dissertation (12)	Minor-VIII (3+0+1)	-	-	-	-	21	41 (H-R)	
	34 (96)/ 33 (95)							<b>167/ 166</b>	
<b>Exit with B.Sc. (Hons.) Chemistry or B.Sc. (Hons. with Research) Chemistry</b>									



## YEAR-WISE CURRICULA PLAN

### 1<sup>st</sup> Year

	COURSE LEVEL	COURSE CODE	TITLE OF THE COURSE	CATEGORY	CREDIT HOURS			CREDITS
					LECTURES	TUTORIAL	PRACTICUM	
SEMESTER-I	100	CHE101	Inorganic Chemistry-I	Major	3	0	0	3
	100	PHY121	Physics: Mechanics	Minor	3	0	0	3
	100	MDC101 to MDC105	Course-1 (AI/Biology/Chemistry/Geology/Management)	Multi-discipline	3	0	0	3
	100	AEC101	English for Communication-I	AEC	2	0	0	2
	100	SEC101	Soft Skills-I: Verbal Ability and Quantitative Aptitude	SEC	1	1	0	2
	100	SEC102	Soft Skills-2: Personality Development	SEC	1	1	0	2
	100	VAC101	Indian Constitution & Heritage	VAC	3	0	0	3
	100	CHE111	Inorganic Chemistry-1 Practicum	Major	0	0	4	2
	100	PHY131	Physics practicum: Mechanics	Minor	0	0	2	1
							<b>Total</b>	<b>21</b>
SEMESTER-II	100	CHE151	Organic Chemistry-I	Major	3	0	0	3
	100	PHY171	Physics: Waves and Oscillations	Minor	3	0	0	3
	100	MDC151 to MDC155	Course-II (AI/Biology/Chemistry/Geology/Management)	Multi-discipline	3	0	0	3
	100	AEC151/AEC152	Telugu-I / Hindi-I	AEC	2	0	0	2
	100	SEC151	Soft Skills-III	SEC	1	1	0	2
	100	SEC151	Soft Skills-IV	SEC	1	1	0	2
	100	VAC151	Environmental Studies	VAC	3	0	0	3
	100	CHE161	Organic Chemistry-1 Practicum	Major	0	0	4	2
	100	PHY181	Physics Practicum: Waves and Oscillations	Minor	0	0	2	1
							<b>Total</b>	<b>21</b>

[**Major**: Major core, **Minor**: Minor stream, **Multidiscipline**: Multidiscipline courses, **AEC**: Ability Enhancement Courses, **SEC**: Skill Enhancement Courses, **VAC**: Value Added Courses]





## 2<sup>nd</sup> Year

	COURSE LEVEL	COURSE CODE	TITLE OF THE COURSE	CATEGORY	CREDIT HOURS			CREDITS
					LECTURES	TUTORIAL	PRACTICUM	
SEMESTER-III	200	CHE201	Physical Chemistry-I	Major	3	0	0	3
	200	CHE202	Inorganic Chemistry-II	Major	3	0	0	3
	200	PHY221	Physics: Modern Optics	Minor	3	0	0	3
	200	MDC201 to MDC205	Course-III (AI/Biology/Chemistry/Geology/Management)	Multi-discipline	3	0	0	3
	200	AEC201	English for Communication-II	AEC	2	0	0	2
	200	SEC201	Soft Skills-V	SEC	1	1	0	2
	200	CHE211	Physical Chemistry-I Practicum	Major	0	0	4	2
	200	CHE212	Inorganic Chemistry-II Practicum	Major	0	0	4	2
	200	PHY211	Physics Practicum: Modern Optics	Minor	0	0	2	1
							<b>Total</b>	<b>21</b>
SEMESTER-IV	200	CHE251	Organic Chemistry-II	Major	3	0	0	3
	200	CHE252	Physical Chemistry-II	Major	3	0	0	3
	200	PHY271	Physics: Thermodynamics and Quantum Theory of Radiation	Minor	3	0	0	3
	200	AEC251/ AEC252	Telugu-II / Hindi-II	AEC	2	0	0	2
	200	SEC251	Good Laboratory Practices	SEC	1	1	0	2
	200	VAC251	Human Values and Ethics	VAC	1	1	0	2
	200	CHE261	Organic Chemistry-II Practicum	Major	0	0	4	2
	200	CHE262	Physical Chemistry-II Practicum	Major	0	0	4	2
	200	PHY281	Physics Practicum: Thermodynamics and Quantum Theory of Radiation	Minor	0	0	2	1
							<b>Total</b>	<b>20</b>

[**Major:** Major core, **Minor:** Minor stream, **Multidiscipline:** Multidiscipline courses, **AEC:** Ability Enhancement Courses, **SEC:** Skill Enhancement Courses, **VAC:** Value Added Courses]



### 3<sup>rd</sup> Year

	COURSE LEVEL	COURSE CODE	TITLE OF THE COURSE	CATEGORY	CREDIT HOURS			CREDITS
					LECTURES	TUTORIAL	PRACTICUM	
<b>SEMESTER-V</b>	300	CHE301	Inorganic Chemistry-III	Major	3	0	0	3
	300	CHE302	Organic Chemistry-III	Major	3	0	0	3
	300	CHE303	Physical Chemistry-III	Major	3	0	0	3
	300	PHY 321	Physics: Electricity and Magnetism	Minor	3	0	0	3
	300	CHE311	Inorganic Chemistry-III Practicum	Major	0	0	4	2
	300	CHE312	Organic Chemistry-III Practicum	Major	0	0	4	2
	300	CHE313	Physical Chemistry-III Practicum	Major	0	0	4	2
	300	PHY331	Physics Practicum: Electricity and Magnetism	Minor	0	0	2	1
	300	CHE341	Summer Internship	Internship	0	0	4	2
							<b>Total</b>	<b>21</b>
<b>SEMESTER-VI</b>	300	CHE351	Fundamentals of Analytical Chemistry	Major	3	0	0	3
	300	CHE352	Green Chemistry	Major	3	0	0	3
	300	CHE353	Organic Spectroscopy	Major	3	0	0	3
	300	PHY 371	Physics: Elements of Modern Physics	Minor	3	0	0	3
	300	CHE361	Analytical Chemistry Practicum	Major	0	0	4	2
	300	CHE362	Green Chemistry Practicum	Major	0	0	4	2
	300	CHE363	Organic Spectroscopy Practicum	Major	0	0	4	2
	300	PHY381	Physics Practicum: Elements of Modern Physics	Minor	0	0	2	1
	300	CHE391	Minor Project	Major	0	0	4	2
							<b>Total</b>	<b>21</b>

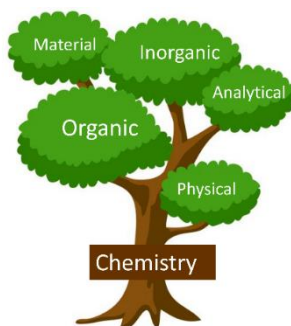
[**Major:** Major core, **Minor:** Minor stream]



#### 4<sup>th</sup> Year (Tentative scheme with titles)

	COURSE LEVEL	COURSE CODE	TITLE OF THE COURSE	CATEGORY	CREDIT HOURS			CREDITS	
					LECTURES	TUTORIAL	PRACTICUM		
<b>SEMESTER-VII</b>	400	CHE401	Inorganic Chemistry-IV	Major	3	0	0	3	
	400	CHE402	Organic Chemistry-IV	Major	3	0	0	3	
	400	CHE403	Research Methodology	Major	3	0	0	3	
	400	CHE404/ CHE405/ CHE406	Elective-I	Major	3	0	0	3	
	400	CHE421	Physics-VII	Minor	3	0	0	3	
	400	CHE411	Inorganic Chemistry-IV Practicum	Major	0	0	4	2	
	400	CHE412	Organic Chemistry-IV	Major	0	0	4	2	
	400	PHY431	Physics-VII Practicum	Minor	0	0	2	1	
							<b>Total</b>	<b>20</b>	
<b>SEMESTER-VIII</b>	<b>Courses for B.Sc (Hons.) Chemistry</b>								
	400	CHE451H	Physical Chemistry-IV	Major	3	0	0	3	
	400	CHE452H	Organic Chemistry-V	Major	3	0	0	3	
	400	CHE453H	Analytical Techniques	Major	3	0	0	3	
	400	CHE454/ CHE455/ CHE456	Elective-II (Advanced Inorganic Chem/Adv. Organic Chem/Adv. Physical Chem)	Major	3	0	0	3	
	400	CHE471	Physics-VIII	Minor	3	0	0	3	
	400	CHE61H	Physical Chemistry-IV Practicum	Major	0	0	4	2	
	400	CHE462H	Organic Chemistry-V Practicum	Major	0	0	4	2	
	400	PHY481	Physics-VIII Practicum	Minor	0	0	2	1	
	400	CHE491	Minor project	Major	0	0	4	2	
								<b>Total</b>	<b>22</b>
	<b>Courses for B.Sc (Hons. with Research) Chemistry</b>								
	400	CHE454/ CHE455/ CHE456	Elective-II (Advanced Inorganic Chem/Adv. Organic Chem/Adv. Physical Chem)	Major	3	0	0	3	
	400	CHE451R	Research Seminar	Major	0	0	4	2	
400	CHE452R	Research Project & Dissertation	Major	0	0	24	12		
400	CHE471	Physics-VIII	Minor	3	0	0	3		
400	PHY481	Physics-VIII Practicum	Minor	0	0	2	1		
							<b>Total</b>	<b>21</b>	

[Major: Major core, Minor: Minor stream]



### LIST OF CHEMISTRY COURSES UNDER MAJOR CORE

Semester	Level	Course Code	Course	Credits
I	100	CHE101	Inorganic Chemistry-I	3
	100	CHE111	Inorganic Chemistry-I Practicum	2
II	100	CHE151	Organic Chemistry-I	3
	100	CHE161	Organic Chemistry-I Practicum	2
III	100	CHE201	Physical Chemistry-I	3
	100	CHE211	Physical Chemistry-I Practicum	2
	200	CHE202	Inorganic Chemistry-II	3
	200	CHE212	Inorganic Chemistry-II Practicum	2
IV	200	CHE251	Organic Chemistry-II	3
	200	CHE261	Organic Chemistry-II Practicum	2
	200	CHE252	Physical Chemistry-II	3
	200	CHE262	Physical Chemistry-II Practicum	2
V	300	CHE301	Inorganic Chemistry-III	3
	300	CHE311	Inorganic Chemistry-III Practicum	2
	300	CHE302	Organic Chemistry-III	3
	300	CHE312	Organic Chemistry-III Practicum	2
	300	CHE303	Physical Chemistry-III	3
	300	CHE313	Physical Chemistry-III Practicum	2
VI	300	CHE351	Fundamentals of Analytical Chemistry	3
	300	CHE361	Analytical Chemistry Practicum	2
	300	CHE352	Green Chemistry	3
	300	CHE362	Green Chemistry Practicum	2
	300	CHE353	Organic Spectroscopy	3
	300	CHE363	Organic Spectroscopy Practicum	2
	300	CHE391	Minor Project	2