



UNIVERSITY OF CALICUT

**Abstract**

General and Academic - Faculty of Science - Syllabus of BSc Chemistry Programme under CBCSS UG Regulations 2019 with effect from 2019 Admission onwards - Implemented - Orders Issued

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**G & A - IV - J**

U.O.No. 9082/2019/Admn

Dated, Calicut University.P.O, 09.07.2019

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*Read:-*1. U.O.No. 4368/2019/Admn dated 23.03.2019

2. Item No. 1 of the minutes of the combined meeting of the Boards of Studies in Chemistry UG, Polymer Chemistry and Industrial Chemistry held on 27.05.2019

3. Item No. 1.16 of the minutes of the meeting of Faculty of Science held on 27.06.2019

**ORDER**

The Regulations for Choice Based Credit and Semester System for Under Graduate (UG) Curriculum 2019 (CBCSS UG Regulations 2019) for all UG Programmes under CBCSS-Regular and SDE/Private Registration w.e.f. 2019 admission has been implemented vide paper read first above.

The combined meeting of the Boards of Studies in Chemistry UG, Polymer Chemistry and Industrial Chemistry on 27.05.2019 has approved the Syllabus of BSc Chemistry Programme in tune with the new CBCSS UG Regulations with effect from 2019 Admission onwards, vide paper read second above.

The Faculty of Science at its meeting held on 27.06.2019 has approved the minutes of the combined meeting of the Boards of Studies in Chemistry UG, Polymer Chemistry and Industrial Chemistry on 27.05.2019 vide paper read third above.

Under these circumstances, considering the urgency, the Vice Chancellor has accorded sanction to implement the Scheme and Syllabus of BSc Chemistry Programme in accordance with the new CBCSS UG Regulations 2019, in the University with effect from 2019 Admission onwards, subject to ratification by the Academic Council.

The Scheme and Syllabus of BSc Chemistry Programme in accordance with CBCSS UG Regulations 2019, is therefore implemented in the University with effect from 2019 Admission onwards.

Orders are issued accordingly. (Syllabus appended)

Biju George K

Assistant Registrar

To

The Principals of all Affiliated Colleges

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Section Officer



# **UNIVERSITY OF CALICUT**

## **B.Sc. DEGREE PROGRAMME IN CHEMISTRY**

(CBCSSUG 2019)

**UNDER CHOICE BASED CREDIT AND SEMESTER SYSTEM**

## **SCHEME AND SYLLABI**

**2019 ADMISSION ONWARDS**

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## UNDERGRADUATE PROGRAMME – AN OVERVIEW

**Programme** means the entire course of study and examinations for the award of a degree. **Duration** of an undergraduate programme is six semesters distributed in a period of 3 years. An **academic week** is a unit of five working days in which distribution of work is organized from Monday to Friday with five contact periods of one hour duration on each day. A sequence of 18 such weeks (16 instructional weeks and two weeks for examination) constitutes a **semester**.

**Course** means a segment of subject matter to be covered in a semester. The undergraduate programme includes 5 types of courses, *viz.*, common courses, core courses, complementary courses, open course and audit course. **Common courses** include English and additional language courses. Every undergraduate student shall undergo 10 common courses [6 English courses and 4 additional language courses] for completing the programme. **Core courses** comprise compulsory course in a subject related to a particular degree programme offered by the parent department. There are 18 core courses including a project work. **Complementary courses** cover two disciplines that are related to the core subject and are distributed in the first four semesters. There shall be one **open course** in the 5<sup>th</sup> semester. Students can opt one open course of their choice offered by any department in the institution other than their parent department. **Audit courses** are courses which are mandatory for a programme but not conducted for the calculation of SGPA or CGPA. There shall be one audit course each in the first 4 semesters. Audit courses are not meant for class room study. The students can attain only pass (Grade P) for these courses. At the end of each semester there shall be examination conducted by the college from a pool of questions (Question Bank).

Each course shall have certain credits. **Credit** is a unit of academic input measured in terms of weekly contact hours/course contents assigned to a course. A student is required to acquire a minimum of 140 credits for the completion of the UG programme, of which 120 credits are to be acquired from class room study and shall only be counted for SGPA and CGPA. Out of the 120 credits, 38 (22 for common (English) courses + 16 for common languages other than English) credits shall be from common courses, 55 credits for core courses (including 2 credits each for project work and Elective), 24 credits for complementary courses (12 credits each) and 3 credits for the open course. Audit courses shall have 4 credits per course and a total of 16 credits in the entire programme.

**Extra credits** are mandatory for the programme. Extra credits will be awarded to students who participate in activities like NCC, NSS and Swatch Bharath. Those students who could not join in any of the above activities have to undergo Calicut University Social Service Programme (CUSSP). Extra credits are not counted for SGPA or CGPA. The maximum credit acquired under extra credit shall be 4. If more Extra credit activities are done by a student that may be mentioned in the Grade card.

Each course shall have a unique alphanumeric **code number**, which includes abbreviation of the subject in three letters, the semester number (1 to 6) in which the course is offered, the code of the course (A: Common course, B: Core course, C: Complementary course, D: Open course and E: Audit course) and the serial number of the course (01, 02, *etc.*). For example, CHE5B06 represents a core course of serial number 06 offered in 5<sup>th</sup> semester in B.Sc. Chemistry Programme.

## UNDERGRADUATE PROGRAMME IN CHEMISTRY

### PREAMBLE

Science education is central to the development of any society. This can be achieved only by revamping the undergraduate programme to make it effective and meaningful. The development of scientific temper in society necessitates proper education and guidance. In order to achieve this, one must update the developments in the field of science. An effective science education can be imparted at the undergraduate level only by revamping the present curriculum. To achieve this goal, the curriculum should be restructured by emphasising various aspects such as the creativity of students, knowledge of current developments in the discipline, awareness of environmental impacts due to the development of science and technology, and the skills essential for handling equipments and instruments in laboratories and industries.

Chemistry, being an experimental science, demands testing theories through practical laboratory experiences for a thorough understanding of the subject. Nowadays, chemistry laboratories in academic institutions use large amounts of chemicals. The awareness and implementation of eco-friendly experiments becomes a global necessity. It is essential to ensure that laboratory chemicals are used at a minimal level without affecting the skill and understanding aimed through laboratory sessions. This creates an environmental awareness among the students and pollution free atmosphere in the campus.

During the preparation of the syllabus, the existing syllabus, the syllabi of XI<sup>th</sup> & XII<sup>th</sup> standards, UGC model curriculum and the syllabi of other universities have been referred. Care has been taken to ensure that the syllabus is compatible with the syllabi of other universities at the same level. Sufficient emphasis is given in the syllabus for training in laboratory skills and instrumentation.

The units of the syllabus are well defined. The number of contact hours required for each unit is given which excludes prerequisites. The pre requisites provided at the beginning of the units guides the students to what he/she should know before exploring the topic. This can be assessed by the teacher either before delivering the particular topic or as a bridge course at the beginning of each semester. **These shall not be considered for external evaluation.** A list of references and further readings are provided at the end of each unit.

### AIMS

This curriculum has been prepared with the objective of giving sound knowledge and understanding of chemistry to undergraduate students. The goal of the syllabus is to make the study of chemistry stimulating, relevant and interesting. It has been prepared with a view to equip students with the potential to contribute to academic and industrial environments. This curriculum will expose students to various fields in chemistry and develop interest in related disciplines. Chemistry, being a border science to biology, physics and engineering, has a key role to play in the understanding of these disciplines. The updated syllabus is based on an interdisciplinary approach to understand the application of the subject in daily life.

**BROAD OBJECTIVES**

To enable the students

- To understand basic facts and concepts in chemistry.
- To apply the principles of chemistry.
- To appreciate the achievements in chemistry and to know the role of chemistry in nature and in society.
- To familiarize with the emerging areas of chemistry and their applications in various spheres of chemical sciences and to apprise the students of its relevance in future studies.
- To develop skills in the proper handling of instruments and chemicals.
- To familiarize with the different processes used in industries and their applications.
- To develop an eco-friendly attitude by creating a sense of environmental awareness.
- To be conversant with the applications of chemistry in day-to-day life.

**PROGRAMME STRUCTURE**

Semester	Common course		Core course	Complementary course		Open course	Total
	English	Additional Language		Mathematics	Physics		
II	4+3	4	2	3	2	-	18
III	4	4	3	3	2	-	16
IV	4	4	3+4*	3	2+4*	-	24
V	-	-	3+3+3	-	-	3	12
VI	-	-	3+3+3+3+2 <sup>#</sup> +4*+4*+4*+ 4*+2**	-	-	-	32
<b>Total</b>	<b>22</b>	<b>16</b>	<b>55</b>	<b>12</b>	<b>12</b>	<b>3</b>	<b>120</b>

\*Practical    \*\*Project    #Elective

**Mark and Indirect Grading System**

Mark system is followed instead of direct grading for each question. After external and internal evaluations marks are entered in the answer scripts. All other calculations, including grading, will be done by the university using the software. Indirect Grading System in 10 point scale is followed. Each course is evaluated by assigning marks with a letter grade (O, A<sup>+</sup>, A, B<sup>+</sup>, B, C, P, F, I or Ab) to that course by the method of indirect grading.

**Mark Distribution**

Sl. No.	Course	Marks
1	English	550
2	Additional Language	400
3	Core course: Chemistry	1475
4	Complementary course: Mathematics	300
5	Complementary course: Physics/Food Science/Computer science	400
6	Open Course	75
	<b>Total Marks</b>	<b>3200</b>



### Ten point Indirect Grading System

<i>% of Marks (Both Internal &amp; external put together)</i>	<i>Grade</i>	<i>Interpretation</i>	<i>Grade Point Average</i>	<i>Range of Grade points</i>	<i>Class</i>
95 and above	O	Outstanding	10	9.5 - 10	First Class with distinction
85 to below 95	A <sup>+</sup>	Excellent	9	8.5 - 9.49	
75 to below 85	A	Very good	8	7.5 – 8.49	
65 to below 75	B <sup>+</sup>	Good	7	6.5 – 7.49	First Class
55 to below 65	B	Satisfactory	6	5.5 – 6.49	
45 to below 55	C	Average	5	4.5 – 5.49	Second Class
35 to below 45	P	Pass	4	3.5 – 4.49	Third class
Below 35	F	Failure	0	0	Fail
Incomplete	I	Incomplete	0	0	Fail
Absent	Ab	Absent	0	0	Fail

**CREDIT AND MARK DISTRIBUTION IN EACH SEMESTER****Total Credits: 120**

<i>Semester</i>	<i>Course</i>	<i>Credit</i>	<i>Mark</i>
<b>I</b>	Common course: English	4	100
	Common course: English	3	75
	Common course: Additional Language	4	100
	Core Course I: Theoretical and Inorganic Chemistry- I	2	75
	Complementary course: Mathematics	3	75
	Complementary course: Physics	2	75
	<b>Total</b>	<b>18</b>	<b>500</b>
<b>II</b>	Common course: English	4	100
	Common course: English	3	75
	Common course: Additional Language	4	100
	Core Course II: Theoretical and Inorganic Chemistry- II	2	75
	Complementary course: Mathematics	3	75
	Complementary course: Physics	2	75
	<b>Total</b>	<b>18</b>	<b>500</b>
<b>III</b>	Common course: English	4	100
	Common course: Additional Language	4	100
	Core Course III: Physical Chemistry-I	3	75
	Complementary course: Mathematics	3	75
	Complementary course: Physics	2	75
	<b>Total</b>	<b>16</b>	<b>425</b>
<b>IV</b>	Common course: English	4	100
	Common course: Additional Language	4	100
	Core Course IV: Organic Chemistry-I	3	75
	Core Course V: Inorganic Chemistry Practical-I	4	100
	Complementary course: Mathematics	3	75
	Complementary course: Physics	2	75
	Complementary course: Physics Practical	4	100
	<b>Total</b>	<b>24</b>	<b>625</b>
<b>V</b>	Core Course VI: Inorganic Chemistry-III	3	75
	Core Course VII: Organic Chemistry-II	3	75
	Core Course VIII: Physical Chemistry-II	3	75
	Open course	3	75
	<b>Total</b>	<b>12</b>	<b>300</b>
<b>VI</b>	Core Course IX: Inorganic Chemistry-IV	3	75
	Core Course X: Organic Chemistry-III	3	75
	Core Course XI: Physical Chemistry-III	3	75
	Core Course XII: Advanced and Applied Chemistry	3	75
	Core Course XIII: Elective	2	75
	Core Course XIV: Physical Chemistry Practical	4	100
	Core Course XV: Organic Chemistry Practical	4	100
	Core Course XVI: Inorganic Chemistry Practical-II	4	100
	Core Course XVII: Inorganic Chemistry Practical-III	4	100
	Core Course XVIII: Project Work	2	75
	<b>Total</b>	<b>32</b>	<b>850</b>

**SYLLABUS**

**FOR**

**CORE COURSE**

**Core Course Structure - Total Credits: 55 (Internal: 20%; External: 80%)**

<i>Semester</i>	<i>Code No</i>	<i>Course Title</i>	<i>Hrs/Week</i>	<i>Total Hrs</i>	<i>Credit</i>	<i>Marks</i>	
<b>I</b>	CHE1B01	Core Course I: Theoretical and Inorganic Chemistry- I	2	32	2	75	
	-	Core Course V : Inorganic Chemistry Practical-I	2	32	-*	-	
<b>II</b>	CHE2B02	Core Course II: Theoretical and Inorganic Chemistry- II	2	32	2	75	
	-	Core Course V : Inorganic Chemistry Practical-I	2	32	-*	-	
<b>III</b>	CHE3B03	Core Course III: Physical Chemistry-I	3	48	3	75	
	-	Core Course V : Inorganic Chemistry Practical-I	2	32	-*	-	
<b>IV</b>	CHE4B04	Core Course IV: Organic Chemistry-I	3	48	3	75	
	CHE4B05(P)	Core Course V : Inorganic Chemistry Practical-I	2	32	4	100	
<b>V</b>	CHE5B06	Core Course VI: Inorganic Chemistry-III	3	48	3	75	
	CHE5B07	Core Course VII: Organic Chemistry-II	4	64	3	75	
	CHE5B08	Core Course VIII: Physical Chemistry-II	3	48	3	75	
	-	Core Course XIV: Physical Chemistry Practical	5	80	-**	-	
	-	Core Course XV: Organic Chemistry Practical	5	80	-**	-	
	-	Core Course XVIII: Project Work	2	32	-**	-	
<b>VI</b>	CHE6B09	Core Course IX: Inorganic Chemistry-IV	3	48	3	75	
	CHE6B10	Core Course X: Organic Chemistry-III	3	48	3	75	
	CHE6B11	Core Course XI: Physical Chemistry-III	3	48	3	75	
	CHE6B12	Core Course XII: Advanced and Applied Chemistry	3	48	3	75	
	CHE6B13(E1)	Core Course XIII: Elective ***	1. Industrial Chemistry	3	48	2	75
	CHE6B13(E2)		2. Polymer Chemistry				
	CHE6B13(E3)		3. Medicinal and Environmental Chemistry				
	CHE6B14(P)	Core Course XIV: Physical Chemistry Practical	-	-	4**	100	
	CHE6B15(P)	Core Course XV: Organic Chemistry Practical	-	-	4**	100	
	CHE6B16(P)	Core Course XVI: Inorganic Chemistry Practical-II #	5	80	4	100	
	CHE6B17(P)	Core Course XVII: Inorganic Chemistry Practical-III	5	80	4	100	
CHE6B18(Pr)	Core Course XVIII: Project Work	-	-	2**	75		
<b>Total</b>					<b>55</b>	<b>1475</b>	

\* Exam will be held at the end of 4<sup>th</sup> semester

\*\* Exam will be held at the end of 6<sup>th</sup> semester

\*\*\* An institution can choose any one among the three courses.

# Includes industrial visit also. Marks: 85 (Inorganic Chemistry Practical–II) + 15 (Industrial visit).