



UNIVERSITY OF CALICUT

Abstract

General and Academic - Faculty of Science - Syllabus of MSc Chemistry Programme for affiliated colleges under CBCSS PG Regulations 2019 with effect from 2019 Admission onwards - Implemented- Orders Issued

G & A - IV - J

U.O.No. 8957/2019/Admn

Dated, Calicut University.P.O, 06.07.2019

*Read:-*1. U.O.No. 4487/2019/Admn dated 26.03.2019

2. Item No. 2 in the minutes of the meeting of the Board of Studies in Chemistry (PG) held on 12.06.2019
3. Item No. 1.13 in 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 Post Graduate (PG) Curriculum-2019 (CBCSS PG Regulations 2019) for all PG Programmes under CBCSS for Affiliated Colleges and SDE/PrivateRegistration w.e.f. 2019 admission has been implemented vide paper read first above.

The meeting of Board of Studies in Chemistry (PG) held on 12/06/2019 has approved the Syllabus of MSc Chemistry Programme in tune with the new CBCSS PG 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 meeting of the Board of Studies in Chemistry (PG) held on 12/06/2019, vide paper read third above.

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

The Scheme and Syllabus of M Sc Chemistry Programme for affiliated colleges in accordance with CBCSS PG 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

Copy to: PS to VC/PA to PVC/ PA to Registrar/PA to CE/JCE I/JCE V/DoA/EX and EG Sections/GA I F/CHMK Library/Information Centres/SF/DF/FC

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT
M.Sc. CHEMISTRY (CBCSS PATTERN)

Regulations and Syllabus with effect from 2019 admission

The Board of Studies in Chemistry (PG) at its meeting held on 15-05-2019 considered the revision of M.Sc. Chemistry syllabus under Credit Semester System (CBCSS) and resolved to implement the revised syllabus from 2019 admission onwards. The revised programme pattern; syllabus, distribution of credits and scheme of evaluation, etc. approved by the Board of studies in Chemistry (PG) at its meeting held on **12-06-2019** are given below:

The pattern of the Programme

- a) The name of the programme shall be **M.Sc. Chemistry under CBCSS pattern.**
- b) The programme shall be offered in four semesters within a period of two academic years.
- c) Eligibility for admission will be as per the rules laid down by the University from time to time.
- d) Details of the programme offered are given in Table 1. The programme shall be conducted in accordance with the programme pattern, the scheme of examination and syllabus prescribed. Of the 25 hours per week, 13 hours shall be allotted for theory and 12 hours for practicals. 1 theory hour per week during even semesters shall be allotted for the seminar.

Theory Courses

In the first three semesters there will be **four** theory courses and in the fourth semester **three** theory courses. All the theory courses in the first and second semesters are core courses. In the third semester, there will be three core theory courses and one elective theory course. Colleges can choose any one of the elective courses given in **table 1**. In the fourth semester, there will be one core theory course and two elective theory courses. Colleges can select any two of the elective courses from those given in table 1. However, a student may be permitted to choose any other elective course of his choice in the third and fourth semesters, without having any lecture classes. Of all the elective courses, one elective course in the third semester and two elective courses for the fourth semester chosen by the college only will be considered for calculating the workload of teachers. All the theory courses in the first, third and fourth semesters (both core and elective) are of 4 credits while the theory courses (both core and elective) in the second semester are of 3credits.

Practical Courses

In each semester, there will be three core practical courses. However, the practical

examinations will be conducted only at the end of the second and fourth semesters. At the end of the second semester, three practical examinations with the codes CHE1L01 & CHE2L04, CHE1L02 & CHE2L05, and CHE1L03 & CHE2L06 will be conducted. Practical examinations for the codes CHE3L07 & CHE4L10, CHE3L08 & CHE4L11, and CHE3L09 & CHE4L12 will be conducted at the end of the fourth semester. **Each practical examination will be of six-hour duration with 3 credits. Three hours per week in the fourth semester are allotted for conducting individual project work by the students under the guidance of a faculty and it can be treated as practical hours while calculating the workload of teachers.**

Project and Viva-Voce

Each student has to perform an independent research project work during the programme under the guidance of a faculty member of the college/ scientists or faculties of recognized research institutions. Projects done in the quality control or quality analysis division of the industries will not be considered. At the same time, projects done in the R & D division of the reputed industry can be considered. Each student has to submit three copies of the project dissertation for valuation at the end of the fourth semester. After the valuation one copy may be returned to the student, one may be given to the project supervisor and the third one should be kept in the department/college library. **Evaluation of the project work (4 credits) will be done on a separate day at the end of the fourth semester, after the theory examinations. Viva-voce on the project will also be done on the same day.**

A comprehensive viva voce examination (2credits), based on all the theory and practical courses, will be conducted at the end of the fourth semester, on a separate day.

Grading and Evaluation

- (1) Accumulated minimum credit required for successful completion of the programme shall be 80.**
- (2) A project work of 4 credits is compulsory and it should be done during the programme. 3 hours per week are allotted the IV semester, for carrying out the project work. Project evaluation should be conducted by three external examiners, one each from inorganic chemistry, organic chemistry and physical chemistry area, at the end of the fourth semester, on a separate day.**
- (3) Also, a comprehensive Viva Voce Examination (carrying 2 credits) may be conducted by three external examiners, one each from inorganic chemistry, organic chemistry and physical chemistry area, at the end of the fourth semester on a separate day.**
- (4) Evaluation and Grading should be done by the direct grading system. All grading during the evaluation of courses and the semester is done on a 6-point scale (A+, A, B, C, D, E). Grading in the 6-point scale is as given below.**

Grade	Grade point
A+	5
A	4
B	3
C	2
D	1
E	0

The calculation of GPA, SGPA & CGPA Shall be based on the direct grading system using a 10-point scale as detailed below.

Letter Grade	Grade Range	Range of Percentage (%)	Merit / Indicator
O	4.25 – 5.00	85.00 – 100.00	Outstanding
A+	3.75 – 4.24	75.00 – 84.99	Excellent
A	3.25 – 3.74	65.00 – 74.99	Very Good
B+	2.75 – 3.24	55.00 – 64.99	Good
B	2.50 – 2.74	50.00 – 54.99	Above Average
C	2.25 – 2.49	45.00 – 49.99	Average
P	2.00 -2.24	40.00 – 44.99	Pass
F	< 2.00	Below 40	Fail
I	0	-	Incomplete
Ab	0	-	Absent

Pass in a course: P grade and above (GPA 2.00 and above). Pass in all courses in a semester is compulsory to calculate the SGPA.GPA, SGPA, and CGPA will be between 0 to 5 and in two decimal points. An overall letter grade (Cumulative Grade) for the whole programme shall be awarded to the student based on the value of CGPA using a 10-point scale given below.

CGPA	Overall Letter Grade
4.25 – 5.00	O
3.75 – 4.24	A+
3.25 – 3.74	A
2.75 – 3.24	B+
2.50 – 2.74	B
2.25 – 2.49	C
2.00 -2.24	P
< 2.00	F
0	I
0	Ab

(5) Weightage of Internal and External valuation:

The evaluation scheme for each course shall contain two parts

- (a) Internal evaluation
- (b) External evaluation.

Its weightages are as follows:

<i>Evaluation</i>	<i>Weightage</i>
Internal	1 (or 20%)
External	4 (or 80%)

Both internal and external evaluation will be carried out using Direct Grading System, in 6 point scale.

(6) Internal evaluation(must be transparent and fair):

Theory: 5 weightages

- (a) Internal Examinations- weightage = 2 (2 internal exams, both should be considered)
- (b) Assignments and Exercises- weightage = 1

- i. Seminars/Viva Voce- weightage = 1
- ii. Attendance –weightage = 1

Practical: 10 weightages

- a) Attendance – weightage = 2
- b) Lab. skill/quality of their results- weightage = 2
- c) Model practical test-weightage = 2 (Best one, out of two model exams is considered)
- d) Record-weightage = 2
- e) Viva Voce- weightage = 2

Project: 10 weightages

- a) Literature survey and data collection-weightage = 2
- b) Interpretation of data & Preparation of Project report – weightage = 2
- c) Research attitude - weightage = 2
- d) Viva Voce- weightage = 4

Project internal evaluation of each student should be done by the supervising faculty assigned by the department.

Viva Voce: No internal evaluation for viva voce examinations (at the end of the 4th semester).

Attendance: Above 90 %: A+, 85 – 89.99 %: A, 80 – 84.99 %: B,
75 -79.99 %: C, 70– 74.99%: D, < 70%: E

(7) External evaluation:

a) **Theory:** In all semesters the theory courses have 30 weightage each. The pattern of Question Papers for theory courses is as follows

<i>Division</i>	<i>Type</i>	<i>No.of Questions</i>	<i>Weightage</i>	<i>Total Weightage</i>
<i>Section A</i>	<i>Short Answer</i>	<i>8 out of 12</i>	<i>1</i>	<i>8</i>
<i>Section B</i>	<i>Short Essay</i>	<i>4 out of 7</i>	<i>3</i>	<i>12</i>
<i>Section C</i>	<i>Essay</i>	<i>2 out of 4</i>	<i>5</i>	<i>10</i>
Total weightage in question paper				30

b) **Practicals:** At the end of II and IV semesters, there will be three practical examinations. Each examination has 30 weightage and 3 credits

c) **Comprehensive Viva Voce:** At the end of IV semester on a separate day (2credits). Vivavoce will be based on both the theory and practical courses of the programme.

Component	Weightage
Physical & Theoretical Chemistry – theory courses	5
Physical Chemistry – practical courses	5
Inorganic Chemistry – theory courses	5
Inorganic Chemistry – practical courses	5
Organic Chemistry – theory courses	5
Organic Chemistry – practical courses	5
Total weightage	30

c) **Project Evaluation:** End of IV semester on a separate day.

Evaluation is based on:

- a) Significance and relevance of the project-weightage = 5
- b) Project report – weightage = 8
- c) Presentation- weightage = 5
- c) Viva Voce- weightage = 12

Total weightage 30 and credit for the project is 4.

(8) Directions for question paper setters:

Section A: Set each questions to be answered in 5 minutes duration.

Section B: 20 minutes answerable questions each. May be asked as a single question or parts.

Section C: 30 minutes answerable questions each. May be asked as a single question or parts.

While setting the question paper, all units in each theory courses must be given due consideration and should give equal distribution as possible.

(Further details regarding the grading and evaluation are as per the University PG regulations 2019)

Dr. Abraham Joseph
Chairman, Board of Studies (Chemistry PG),
University of Calicut

Audit courses:

Ability Enhancement Course (AEC):

This course aims to have hands-on experience for the students in their respective field of study, both in the core and elective subject area. Also, it is a platform for the student community to have basic concepts of research and publication.

AEC is a 4 credit course and should be conducted during the first semester of the programme. The credit of the AECourse will not be considered while calculating the SGPA/CGPA. But the student has to obtain minimum pass requirements in this course, which is compulsory for an overall pass in the programme

One particular AEC may be selected for all the students in a batch in the department or each student in a batch may choose one AEC, among the pool of courses suggested below. The exact title of the course may be decided by the department, but the area of study should be from the pool of courses suggested below. Either a single faculty from the department may be in charge of this course for a batch or each student may be assigned to a particular faculty in the department, in charge of this AEC, which will be decided by the department council/ HoD.

- a) Industrial/Research institution visit/visits
- b) Publication of a research article/articles in the national/international journal
- c) Presentation of research paper/papers in national level seminar/conference, which should be published in the seminar/conference proceedings
- d) Review article/articles on research topics which are presented in a national level seminar/conference and published in the proceedings
- e) Internships at any reputed research institutions/R&D centre/Industry

After conducting the AEC, the evaluation/examination should be done either common for all students in a batch or individually depending upon the AEC conducted. The evaluation/ examination must be conducted jointly by the teacher in charge of the AEC and the head of the department. The result of the AEC, duly signed and sealed by both teacher in charge and head of the department, should be uploaded to the University during the stipulated time period in the third semester of the programme. Evaluation/examination must be conducted by 30 weightage pattern, as in the theory courses and the GPA and overall grade of the AEC should be uploaded to the University. Evaluation/examination on AEC must contain the following components: MCQ type written examination, Report on AEC, Presentation of AEC, Viva voce on AEC. Distribution of 30 weightage may be done by the teacher in charge in concurrence with the Head of the department.

Professional Competency Course (PCC):

This course particularly aims to improve the skill level of students, especially for using specific as well as nonspecific software useful in their respective field of study, both related to the core and elective subject area. Also, it is a platform for the student community to undertake socially committed projects and thereby developing a method of learning process by through the involvement with society.

PCC is a 4 credit course and should be conducted during the second semester of the programme. The credit of the PC course will not be considered while calculating the SGPA/CGPA.

But the student has to obtain minimum pass requirements in this course, which is compulsory for an overall pass in the programme

One particular PCC may be selected for all the students in a batch in the department or each student in a batch may choose one PCC, among the pool of courses suggested below. The exact title of the course may be decided by the department, but the area of study should be from the pool of courses suggested below. Either a single faculty from the department may be in charge of this course for a batch or each student may be assigned to a particular faculty in the department, in charge of this PCC, which will be decided by the department council/ HoD.

- a) Development of skills on using softwares like Gaussian, Gamessetc which is useful in molecular modeling, drug designing, etc.
- b) Development of skills on using softwares like Chemdraw, Chemwindow, ISIS draw, etc which is useful in drawing purposes, structural predictions, etc.
- c) Training on computational chemistry
- d) Case study and analysis on any relevant issues in the nearby society(for example water analysis, soil analysis, acid/alkali content analysis, sugar content analysis, etc)
- e) Any community linking programme relevant to the area of study(For example Training for society on soap/perfume making, waste disposal, plastic recycling, etc)

After conducting the PCC, the evaluation/examination should be done either common for all students in a batch or individually depending upon the PCC conducted. The evaluation/ examination must be conducted jointly by the teacher in charge of the PCC and the head of the department. The result of the PCC, duly signed and sealed by both teacher in charge and head of the department, should be uploaded to the University during the stipulated time period in the third semester of the programme. Evaluation/examination must be conducted by 30 weightage pattern, as in the theory courses and the GPA and overall grade of the PCC should be uploaded to the University. Evaluation/examination on PCC must contain the following components: MCQ type written examination, Report on PCC, Presentation on PCC, Viva voce on PCC. Distribution of 30 weightage may be done by the teacher in charge in concurrence with the Head of the department.

TABLE 1
Courses offered for M.Sc. Chemistry Programme under
CBCSS Patten in Affiliated Colleges (2019 onwards)

Semester	Course Code	Course Title	Instruction/Week	Credits
I	CHE1C01	Quantum Mechanics and Computational Chemistry	4	4
	CHE1C02	Elementary inorganic chemistry	3	4
	CHE1C03	Structure and reactivity of organic Compounds	3	4
	CHE1C04	Thermodynamics, kinetics, and catalysis	3	4
	CHE1L01	Inorganic chemistry practical I	4	-
	CHE1L02	Organic chemistry Practical I	4	-
	CHE1L03	Physical chemistry practical I	4	-
		Total credits:	Core	16
II	CHE2C05	Group theory and Chemical Bonding	3	3
	CHE2C06	Coordination chemistry	3	3
	CHE2C07	Reaction mechanism in Organic Chemistry	3	3
	CHE2C08	Electrochemistry, solid state chemistry, and Statistical Thermodynamics	3	3
	CHE2L04	Inorganic chemistry practical II	4	3
	CHE2L05	Organic chemistry practical II	4	3
	CHE2L06	Physical chemistry practical II	4	3
		Total credits:	Core	21
	CHE3C09	Molecular spectroscopy	4	4
	CHE3C10	Organometallic & Bioinorganic chemistry	3	4
	CHE3C11	Reagents and Transformations in Organic Chemistry	3	4

III	CHE3L07	Inorganic chemistry practical III	4		
	CHE3L08	Organic chemistry practical III	4		
	CHE3L09	Physical chemistry practical III	4		
	CHE3E01	Synthetic organic chemistry(Elective)	3	4	
	CHE3E02	Computational chemistry(Elective)	3	4	
	CHE3E03	Green and Nanochemistry(Elective)	3	4	
		Total Credits:		Core Elective	12 4
IV	CHE4C12	Instrumental Methods of Analysis	4	4	
	CHE4L10	Inorganic Chemistry Practical IV	3	3	
	CHE4L11	Organic Chemistry Practical IV	3	3	
	CHE4L12	Physical Chemistry Practical IV	3	3	
	CHE4E04	Petrochemicals and Cosmetics(Elective)	4	4	
	CHE4E05	Industrial Catalysis(Elective)	4	4	
	CHE4E06	Natural products & Polymer Chemistry (Elective)	4	4	
	CHE4E07	Material Science(Elective)	4	4	
	CHE4E08	Organometallic Chemistry	4	4	
	CHE4P01	Research Project	3	4	
	CHE4V01	Viva Voce		2	
		Total Credits:		Core Elective Project Viva	13 8 4 2
	TOTAL CREDITS OF THE PROGRAMME :				
	CORE ELECTIVE				62 12