

BHARATI VIDYAPEETH DEEMED UNIVERSITY, PUNE (INDIA)



Master of Science (Analytical/Organic/Inorganic Chemistry)

(CBCS -2018 COURSE)

**Under the Faculty of Science
(To be implemented from June 2018)**

1. INTRODUCTION

The Master of Science (Analytical/Organic/Inorganic Chemistry), program is a full time 84 Credits program offered by BharatiVidyapeeth Deemed University, Pune.

2. GENERAL OBJECTIVES OF THE COURSE:

Chemistry is a pervasive subject. All the branches of science need chemistry. It is an experimental science and students need to train in practicals to get expertise in doing fine experiments and handle sophisticated instruments. Along with the data obtained its statistical analysis is also required to establish authenticity in the fields like environmental science, space chemistry and biotechnology. There are immense potentialities for chemistry and post graduates to undertake advanced research or in Industries as skilled chemists.

Goal of the Syllabus: To impart the thorough knowledge of Chemistry, capability of self thinking, self study, identifying the problems and develop the problem solving attitude. To make the student globally competent.

3. ELIGIBILITY FOR ADMISSION TO THIS COURSE

A student shall be eligible for admission to the First Year M.Sc (Analytical/Organic/Inorganic Chemistry) degree course who has completed B.Sc (Chemistry) graduation from any recognized university satisfying the following conditions. The candidate should have secured at least 50% (45% for SC/ST) in aggregate at graduate level university examination.

4. INTAKE CAPACITY

The intake capacity of the course will be-

Analytical Chemistry – 80 seats

Organic Chemistry – 24 seats

Inorganic Chemistry – 24 seats

5. COURSE STRUCTURE

- 1) The M.Sc. (Chemistry) course will be of four semesters and with a minimum of 84 credits. The medium of instruction and examination will be only English.
- 2) Credits for Semester I-12 Credits, Semester II -30 Credits, Semester III- 18 Credits and Semester IV- 24 Credits.
- 3) The assessment of 1 credit at Semester IV of M.Sc.(Chemistry) that is for Industrial Training programme will be carried out as follows :-
 - i) A student will inform the department about the joining date of the above mentioned training.
 - ii) The student will have to make presentation at the end of the programme and the student will have to submit a compiled report which will be assessed towards course credit as Internal Assessment Marks for Core Elective subject.
- 4) Each theory course prescribed for M. Sc. should be covered in 4 hours, each of 60 minutes duration per week per course
- 5) Each practical course will require 4 hours of laboratory work per week and the course will be extended over two semesters and will be examined at the end of the academic year.
- 6) For theory course the question paper should include at least 20 % weightage for problem solving. Problem solving would include numerical problems and may be objective type questions.
- 7) Thus M.Sc (Analytical/Organic/Inorganic Chemistry) degree examination has four semesters and shall be of 2100 marks and of minimum 84 credits altogether. The following shall be the course structure:

M.Sc. (Analytical Chemistry): SEMESTER – I

Semester	Subject Type	Code	Title of the paper	Hrs/ Week	Credits	Exam.Hr s	Maximum Marks		
							Internal Assessment	University Examination	Total
Semester I	Core: Compulsory	PGCH- 101	Physical Chemistry- I	04	04	03	40	60	100
		PGCH- 102	Inorganic Chemistry-I	04	04	03	40	60	100
		PGCH- 103	Organic Chemistry-I	04	04	03	40	60	100

SEMESTER – II

Semester II	Core: Compulsory	PGCH- 201	Physical Chemistry- II	04	04	03	40	60	100
		PGCH- 202	Inorganic Chemistry-II	04	04	03	40	60	100
		PGCH- 203	Organic Chemistry-II	04	04	03	40	60	100
		PGCH -204	Fundamentals of analytical Chemistry	04	04	03	40	60	100
		PGCH -205	Physical Chemistry practical*	04	02+02	06	40	60	100
		PGCH -206	Inorganic Chemistry practical*	04	02+02	06	40	60	100
		PGCH- 207	Organic Chemistry practical*	04	02+02	06	40	60	100
	Ability Enhancement Course	PGAEC- 208	Scientific Writing	02	02	02	20	30	50

SEMESTER – III

Semester	Subject Type	Code	Title of the paper	Hrs/ Week	Credits	Exam. /Hrs	Maximum Marks		
							Internal Assessm ent	University Examinatio n	Total
Semester III	Core: Compulsory	PGAC 301	Thermal, Radio and Electro-analytical methods	04	04	03	40	60	100
		PGAC 302	Modern Aspects of Analytical Chemistry	04	04	03	40	60	100
		PGAC 303	Recent Analytical Techniques	04	04	03	40	60	100
		PGAC 304	Analysis of Pharmaceuticals	04	04	03	40	60	100
	Skill Enhancement Course	PGSEC 305	Assessment of Water Quality	02	02	02	20	30	50

SEMESTER- IV

Semester IV	Core: Compulsory	PGAC 401	Advanced Analytical Techniques	04	04	03	40	60	100
		PGAC 402	Recent Separation Techniques	04	04	03	40	60	100
Any one from the following: From PGAC-403 to PGAC-405									
Semester IV	Core: Elective#	PGAC 403	Environmental Analysis	04	3+1	03	40	60	100
		PGAC 404	Computer Interface with Chemistry	04	3+1	03	40	60	100
		PGAC 405	Modern Methods of Analysis	04	3+1	03	40	60	100
	Core: Compulsory	PGAC 406	Practical Course -I*	02	2+2	06	40	60	100
		PGAC 407	Practical Course -II*	02	2+2	06	40	60	100
		PGAC 408	Practical Course –III * OR Project Work*	02	2+2	06	40	60	100

* Examination for practical courses will be conducted at the end of academic year.

Core Elective Course includes Core: Elective subjects and Industrial project.

Industrial Project includes one day visit, Internet survey, project writing, presentation or oral and be evaluated as the internal marks for Core: Elective Course (PGAC-403, PGAC-404, PGAC-405).

M.Sc. (Organic Chemistry): SEMESTER – I

Semester	Subject Type	Code	Title of the paper	Hrs/ Week	Credits	Exam.Hr s	Maximum Marks		
							Internal Assessment	University Examination	Total
Semester I	Core: Compulsory	PGCH- 101	Physical Chemistry- I	04	04	03	40	60	100
		PGCH- 102	Inorganic Chemistry-I	04	04	03	40	60	100
		PGCH- 103	Organic Chemistry-I	04	04	03	40	60	100

SEMESTER – II

Semester II	Core: Compulsory	PGCH- 201	Physical Chemistry- II	04	04	03	40	60	100
		PGCH- 202	Inorganic Chemistry-II	04	04	03	40	60	100
		PGCH- 203	Organic Chemistry-II	04	04	03	40	60	100
		PGCH -204	Fundamentals of analytical Chemistry	04	04	03	40	60	100
		PGCH -205	Physical Chemistry practical*	04	02+02	06	40	60	100
		PGCH -206	Inorganic Chemistry practical*	04	02+02	06	40	60	100
		PGCH- 207	Organic Chemistry practical*	04	02+02	06	40	60	100
	Ability Enhancement Course	PGAEC- 208	Scientific Writing	02	02	02	20	30	50

SEMESTER – III

Semester	Subject Type	Code	Title of the paper	Hrs/Week	Credits	Exam. Hrs	Maximum Marks		
							Internal Assessment	University Examination	Total
Semester III	Core: Compulsory	PGOC 301	Advanced Organic Reaction Mechanism	04	04	03	40	60	100
		PGOC 302	Spectroscopic Methods In Structure Determination	04	04	03	40	60	100
		PGOC 303	Advanced Stereochemistry	04	04	03	40	60	100
		PGOC 304	Medicinal Chemistry	04	04	03	40	60	100
	Skill Enhancement Course	PGSEC 305	Assessment of Water Quality	02	02	03	20	30	50

SEMESTER- IV

Semester IV	Core: Compulsory	PGOC-401	Synthetic Organic Chemistry	04	04	03	40	60	100
		PGOC-402	Chemistry Of Natural Products	04	04	03	40	60	100
Any one from the following: From PGAC-403 to PGAC-405									
Semester IV	Core: Elective#	PGOC-403	Green Chemistry	04	04	3+1	40	60	100
		PGOC-404	Applied Organic Chemistry	04	04	3+1	40	60	100
		PGOC-405	Bio-Organic Chemistry	04	04	3+1	40	60	100
	Core: Compulsory	PGOC-406	Mixture Separation*	02	2+2	06	40	60	100
		PGOC-407	Advanced Preparations*	02	2+2	06	40	60	100
		PGOC-408	Research Project / Laboratory Course*	02	2+2	06	40	60	100

* Examination for practical courses will be conducted at the end of academic year.

Core Elective Course includes Core: Elective subjects and Industrial project.

Industrial Project includes one day visit, Internet survey, project writing, presentation or oral and be evaluated as the internal marks for Core: Elective Course (PGOC-403, PGOC-404, PGOC-405).

M.Sc. (Inorganic Chemistry): SEMESTER – I

Semester	Subject Type	Code	Title of the paper	Hrs/ Week	Credits	Exam.Hr s	Maximum Marks		
							Internal Assessment	University Examination	Total
Semester I	Core: Compulsory	PGCH- 101	Physical Chemistry- I	04	04	03	40	60	100
		PGCH- 102	Inorganic Chemistry-I	04	04	03	40	60	100
		PGCH- 103	Organic Chemistry-I	04	04	03	40	60	100

SEMESTER – II

Semester II	Core: Compulsory	PGCH- 201	Physical Chemistry- II	04	04	03	40	60	100
		PGCH- 202	Inorganic Chemistry-II	04	04	03	40	60	100
		PGCH- 203	Organic Chemistry-II	04	04	03	40	60	100
		PGCH -204	Fundamentals of analytical Chemistry	04	04	03	40	60	100
		PGCH -205	Physical Chemistry practical*	04	02+02	06	40	60	100
		PGCH -206	Inorganic Chemistry practical*	04	02+02	06	40	60	100
		PGCH- 207	Organic Chemistry practical*	04	02+02	06	40	60	100
	Ability Enhancement Course	PGAEC- 208	Scientific Writing	02	02	02	20	30	50

SEMESTER – III

Semester	Subject Type	Code	Title of the paper	Hrs/Week	Credits	Exam. Hrs	Maximum Marks		
							Internal Assessment	University Examination	Total
Semester III	Core: Compulsory	PGIC-301	Advanced Coordination Chemistry	04	04	03	40	60	100
		PGIC-302	Bioinorganic Chemistry and Heterogeneous Catalysis	04	04	03	40	60	100
		PGIC-303	Inorganic Solid State Chemistry and Inorganic Polymer Chemistry	04	04	03	40	60	100
		PGIC-304	Inorganic Analytical Chemistry	04	04	03	40	60	100
	Skill Enhancement Course	PGSEC 305	Assessment of Water Quality	02	02	03	20	30	50

SEMESTER- IV

Semester IV	Core: Compulsory	PGIC-401	Organometallic Chemistry	04	04	03	40	60	100
		PGIC-402	Material Chemistry and Nanoscience and Nanotechnology Related to Inorganic Systems	04	04	03	40	60	100
Any one from the following: From PGAC-403 to PGAC-405									
Semester IV	Core: Elective#	PGIC-403	Modern Instrumental Techniques for Inorganic Analysis	04	3+1	03	40	60	100
		PGIC-404	Inorganic Pharmaceutical Chemistry	04	3+1	03	40	60	100
		PGIC-405	Applications of Inorganic Chemistry in Agriculture, Environmental Science and Space Science	04	3+1	03	40	60	100
	Core: Compulsory	PGIC-406	Practical Course-I*	02	2+2	06	40	60	100
		PGIC-407	Practical Course-II*	02	2+2	06	40	60	100
		PGIC-408	Research Project OR Practical Course-III*	02	2+2	06	40	60	100

* Examination for practical courses will be conducted at the end of academic year.

Core Elective Course includes Core: Elective subjects and Industrial project.

Industrial Project includes one day visit, Internet survey, project writing, presentation or oral and be evaluated as the internal marks for Core: Elective Course (PGIC-403, PGIC-404, PGIC-405).

6. SCHEME OF CREDITS: The M.Sc (Analytical/Organic/Inorganic Chemistry) is of 84 credits. The distribution of credits over semesters is given below.

Course Type	Credits	SEM-I	SEM - II	SEM – III	SEM-IV	Total	Examination
		L(pw) 60Hrs	L(pw) 60Hrs	L(pw) 60Hrs	L(pw) 60Hrs	Credits	
Core Compulsory Theory	4	4 60Hrs	4 60Hrs	4 60Hrs	4 60Hrs	16C 240Hrs	University
Core Compulsory Theory-	4	4 60Hrs	4 60Hrs	4 60Hrs	4 60Hrs	16C 240Hrs	University
Core Compulsory Theory-	4	4 60Hrs	4 60Hrs	4 60Hrs	-	12C 180Hrs	University
Core Compulsory Theory-	4	-	4 60Hrs	4 60Hrs	-	8C 120Hrs	University
Core: Elective Theory	3	-	-	-	3 45Hrs	3C 45Hrs	University
Industrial Project	1	-	-	-	1 15Hrs	1C 15Hrs	Institute
Ability Enhancement Course	2	-	2 30Hrs	-	-	2C 30Hrs	University
Skill Enhancement Course	2	-	-	2 30Hrs	-	2C 30Hrs	University
Physical Chemistry Practical	2+2	2 60Hrs	2 60Hrs	-	-	4C 60Hrs	University
Inorganic Chemistry Practical	2+2	2 60Hrs	2 60Hrs	-	-	4C 60Hrs	University
Organic Chemistry Practical	2+2	2 60Hrs	2 60Hrs	-	-	4C 60Hrs	University
Practical Course –I	2+2	-	-	2 60Hrs	2 60Hrs	4C 60Hrs	University
Practical Course-II	2+2	-	-	2 60Hrs	2 60Hrs	4C 60Hrs	University
Practical Course-III OR Project Work	2+2	-	-	2 60Hrs	2 60Hrs	4C 60Hrs	University

Total Required Credits:

Semester	Core Courses	Elective Course	SEC / AECC	Total
I	12	----	----	12
II	28	----	02	30
III	16	----	02	18
IV	20	04	----	24
Grand Total	76	04	04	84

7. MEDIUM OF INSTRUCTION:

The medium of instruction and examination shall be English.

8. UNIVERSITY TERMS:

The dates for the commencement and conclusion of the First and the Second terms shall be fixed by the University authorities. The terms can be kept by students, who have registered their names with the University.

9. SCHEME OF EXAMINATION:

The Assessment of Regular students of Master of Science (M.Sc.) course in the academic session 2018-19 and thereafter shall be based on

- (a) University Examinations (UE),
- (b) Continuous Internal Assessment (IA),
- (c) Choice Based Credit System (CBCS), and
- (d) Semester Grade Point Average (SGPA) and Cumulative Grade Point Average system (CGPA)

For each paper of 100 marks, there will be Internal Assessment of 40 marks and the University Examination of 60 marks/3 hours duration at the end of each semester. The 04 credit will be given to a student who secures atleast 40% of marks allotted to each paper. A candidate who does not pass the examination in any subject or subjects in one semester will be permitted to reappear in such failed subject or subjects along with the papers of following semesters.

The Internal Assessment (IA) for each paper will be of 40 marks which will be carried out by the department during the term. The Internal Assessment may be in the forms as follows: Attendance, Written tests, seminars, term papers, presentations, assignments, orals or any such others. There will be at least two types of assessments from the types given above.

At the end of each semester, a cumulative grade point average (CGPA) and also Semester grade point average (SGPA) will be calculated as a weighted average of the GPI of all courses in which the student has passed till that semester.

A candidate shall be permitted to proceed from the First Semester up to Fourth Semester irrespective of his/her failure in any of the Semester examinations subject to the condition that the candidates should register for all the arrear subjects of earlier semesters along with current (subsequent) semester subjects.

10. Research Project Work:

There will be a Research Project optional for practical course –III to be prepared by a student. The objective of the project work is to introduce students to research methodology in the subject and prepare them for pursuing research in theoretical or experimental or computational areas of the subject. The project work is to be undertaken under guidance of a teacher allotted to a student by the department.

Division of Marks

Internal Assessment :40 Marks

A full Project Report&Viva Voce (University Assessment) : 60 Marks

As the Research Project is based on the self study done by the candidate and evaluated for 100 marks altogether, 04 credits will be awarded to a successful candidate in this subject. The project may be evaluated by three examiners one internal and two external, selected from the panel of PG examiners of the University.

The candidate has to submit the project report before the deadline announced by the department. A candidate who fails to submit the project may resubmit the same in the subsequent semester examination for evaluation. The project work activities must be duly supported by documentary evidences to be endorsed by the Head or the Guide.

11. STANDARD OF PASSING:

For all courses, both UE and IA constitute separate heads of passing. In order to pass in such courses and to earn the assigned credits, a student must obtain a minimum grade point of 5.0 (40% marks) at UE and also a minimum grade point of 5.0 (40% marks) at IA.

Even a student fails in IA, he/she shall be declared 'pass' in the course provided he/she obtains a minimum of 25% in IA and GPA for the course is at least 6.0 (50% in aggregate). The GPA for a course will be calculated only if the student passes at the UE.

A student who fails at UE in a course has to reappear only at UE as a backlog candidate and clear the head of passing. Similarly, a student who fails in a course at IA has to reappear only at IA as a backlog candidate and clear the head of passing.

The 10-point scale Grades and Grade Points according to the following table.

Range of Marks (Out of 100)	Grade	Grade Point
$80 \leq \text{Marks} \leq 100$	O	10
$70 \leq \text{Marks} < 80$	A+	9
$60 \leq \text{Marks} < 70$	A	8
$55 \leq \text{Marks} < 60$	B+	7
$50 \leq \text{Marks} < 55$	B	6
$40 \leq \text{Marks} < 50$	C	5
Marks < 40	D	0

The performances at UE and IA will be combined to obtain the Grade Point Average (GPA) for the course. The weighteg for performance at UE and IA shall be 60% and 40% respectively.

GPA is calculated by adding the UE marks out of 60 and IA marks out of 40. The total marks out of 100 are converted to grade point, which will be the GPA

FORMULA TO CALCULATE GRADE POINTS (GP):

Suppose that 'Max' is the maximum marks assigned for an examination or evaluation based on which GP will be computed. In order to determine the GP, Set $x = Max / 10$ (since we have adapted 10-point system). Then GP is calculated by the formulas shown as below.

Range of Marks at the evaluation	Formula for the Grade Point
$8x \leq \text{Marks} \leq 10x$	10
$5.5x \leq \text{Marks} < 8x$	Truncate (Marks/x) +2
$4x \leq \text{Marks} < 5.5x$	Truncate (Marks/x) +1

Two kinds of performance indicators, namely, the Semester Grade Point Average (SGPA) and the Cumulative Grade Point Average (CGPA) shall be computed at the end of each term. The SGPA measures the cumulative performance of a student in all the courses in a particular semester, while the CGPA measures the cumulative performance in all courses since his/her enrolment to the course. The CGPA of learner when he/she completes the programme is the final result of the learner.

The SGPA is calculated by the formula $SGPA = \frac{\sum C_k \times GP_k}{\sum C_k}$, where C_k is the credit-value assigned to a course and GP_k is the GPA obtained by the student in the course. In the above, the sum is taken over all the courses that the student has undertaken for the study during the semester, including those in which he/she might have failed or those for which he/ she remained absent. The SGPA shall be calculated up to two decimal place accuracy.

The CGPA is calculated by the formula $CGPA = \frac{\sum C_k \times GP_k}{\sum C_k}$, where C_k is the credit-value assigned to a course and GP_k is the GPA obtained by the student in the course. In the above, the sum is taken over all the courses that the student has undertaken for the study from the time of his/her enrolment to the course and also during the semester for which CGPA is calculated, including those in which he/she might have failed or those for which he/she remained absent. The CGPA shall be calculated up to two decimals place accuracy.

The Formula to compute equivalent percentage marks for specified CGPA:

% Marks (CGPA) =	$10 \times CGPA - 10$	if $5.00 \leq CGPA \leq 6.00$
	$5 \times CGPA + 20$	if $6.00 \leq CGPA \leq 8.00$
	$10 \times CGPA - 20$	if $8.00 \leq CGPA \leq 9.00$
	$20 \times CGPA - 110$	if $9.00 \leq CGPA \leq 9.50$
	$40 \times CGPA - 300$	if $9.50 \leq CGPA \leq 10.00$

12. AWARD OF HONOURS:

A student who has completed the minimum credits specified for the programme shall be declared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The criteria for the award of honours are given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks (%)
$9.50 \leq \text{CGPA} \leq 10.00$	O	Outstanding	$80 \leq \text{Marks} \leq 100$
$9.00 \leq \text{CGPA} \leq 9.49$	A+	Excellent	$70 \leq \text{Marks} < 80$
$8.00 \leq \text{CGPA} \leq 8.99$	A	Very Good	$60 \leq \text{Marks} < 70$
$7.00 \leq \text{CGPA} \leq 7.99$	B+	Good	$55 \leq \text{Marks} < 60$
$6.00 \leq \text{CGPA} \leq 6.99$	B	Average	$50 \leq \text{Marks} < 55$
$5.00 \leq \text{CGPA} \leq 5.99$	C	Satisfactory	$40 \leq \text{Marks} < 50$
CGPA Below 5.00	F	Fail	Marks Below 40

A candidate shall be permitted to proceed further from the First Semester up to Fourth Semester irrespective of his/her failure in any of the Semester examinations subject to the condition that the candidates should register for all the backlog subjects of earlier semesters along with current (subsequent) semester subjects.

13. GRACING:

The gracing shall be done as per existing rules of the University.

14. VERIFICATION AND REVALUATION:

There is provision for verification and revaluation of the result. A student can apply for the verification and revaluation of the result within two weeks from the declaration of the results with the prescribed fee. The verification and revaluation shall be done as per the existing rules of the University.

15. FORMAT OF THE TRANSCRIPT:

The student will be given a transcript indicating his/her performance at the end of every semester examination. The transcript shall be given as per the following table along with other necessary details:

Course No.	Course Name	No. of Credits	University Examination		Internal Assessment		Grade Point Average	Result
			Grade	Grade Point	Grade	Grade Point		
1								
2								
3								
4								
5								
Total Cumulative Credits Completed			SGPA		CGPA		Equivalent Marks (%)	
<u>Note:</u> GPA is calculated by adding the UE marks out of 60 and IA marks out of 40. The total marks out of 100 are converted to Grade Point, which will be the GPA.								

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