

Integrated Ph.D. Program
Course Curriculum and Guidelines
Department of Chemistry

1. Introduction

The primary objective of this comprehensive training program is to educate bright and motivated students who have received their Bachelor's degree, with a strong emphasis on the development of fundamental concepts and independent research potential in chemistry. The program consists of two years of rigorous coursework followed by state-of-the-art research leading to the Ph.D. degree. The number of seats available for admission will be decided by the Senate from time to time.

2. Eligibility for admission

Candidates with a Bachelor's degree in Chemistry or B.E./B.Tech. in Chemical Engineering from a recognized Indian University/Institute/College can apply to this program. ONLY Candidates who have secured a minimum of 60% marks or CGPA (Cumulative Grade Point Average) of 7.0 in the Bachelor's program are eligible to apply to this program. Candidates who have passed their graduate examination in the preceding year or appearing in the final year examination of their Bachelor's Degree can apply. Further, candidates with Major/Honors in Chemistry should have Mathematics as subsidiary subject in their Bachelor's program. The relaxation of qualifying marks for SC/ST candidates is applicable as per the Central Government policy (i.e., 15% for SC, 7.5% for ST candidates and 27% for Other Backward Classes). In addition, 3% horizontal reservation would be provided for candidates belonging to PH category.

3. Admission

In order to seek admission in this program, the applicants should qualify the nationwide aptitude test, Joint Admission Test for Masters (JAM). The short-listed candidates will be called for an interview, and the final selection will be based on the performance at the interview.

Admission schedule:

- (1) Admission to the Integrated Ph.D. program will be made once a year during May and June.
- (2) Admission for Integrated Ph.D. program will be advertised by the academic office, as advised by the Head of the Department, between March and April.

4. Curriculum

4.1. Coursework

The coursework spans the first four semesters of the program, where the students are required to take a set of core and elective courses. The core courses are intended to provide a strong foundation in the core discipline of Chemistry, and the elective courses are meant to further advance the knowledge in

the areas of interest of the individual. The course structure of the program is given in the following table:

Semester	Course Code	Course Title	Credit
Semester-I	CHM 301I	Symmetry and Group Theory	4
	CHM 311I	Organic Chemistry I	4
	CHM 313I	Organic Chemistry Laboratory II	3
	CHM 321I	Physical Chemistry of Solutions	4
	CHM 325I	Mathematical Methods for Chemists	4
	CHM 3xxI	Departmental Elective I	3/4
	Total		
Semester-II	CHM 302I	Chemistry of Transition Metals	4
	CHM 304I	Inorganic Chemistry Laboratory II	3
	CHM 312I	Organic Chemistry II	4
	CHM 322I	Principles of Quantum Chemistry	4
	CHM 3xxI	To be announced	4
	CHM 3xxI	Departmental Elective II	3/4
	Total		
Semester-III	CHM 401I	Non-transition Metal Chemistry	4
	CHM 411I	Physical Organic Chemistry	4
	CHM 421I	Statistical Mechanics	4
	CHM 423I	Physical Chemistry Laboratory II	3
	CHM 6xxI	Departmental Elective III	4
	CHM 6xxI	Departmental Elective IV	4
	Total		
Semester-IV	CHM 402I	Applications of Modern Physical Methods	4
	CHM 416I	Spectroscopy and Its Application in Organic Molecules	4
	CHM 422I	Molecular Spectroscopy	4
	CHM 6xxI	Departmental Elective V	4
	*** **	Open Elective I	4
	*** **	Open Elective II	4
	Total		
Semester-V	CHM 501I	I-PhD Project	16
	Total		
Semester-VI	CHM 501I	I-PhD Project	16
	Total		
Semester-VII onward			
	CHM 800I	Thesis work	16

4.2. Description of Coursework

(1) **Lab rotations:** During the first four semesters, each student is required to do **three lab rotations** of his/her choice. A student is required to spend a **minimum of one month time** in **one research lab** for **one rotation**. Three such labs are to be selected **one each** from Inorganic Chemistry, Organic Chemistry and Physical Chemistry sections **from the prescribed time slots only**.

Time slots for the lab rotation will be the following (**any three time slots to be taken**):

Slot-I: Month of December immediately after the 1st semester

Slot-II/III/IV: Month of May **or** June **or** July immediately after the 2nd semester

Slot-V: Month of December immediately after the 3rd semester

After the completion of each lab rotation, the student will be required to submit a report (in prescribed format, Annexure-I) to the DUGC.

Note: No more than 2 students will be allowed to do lab rotation in one lab at a time.

(2) At the end of fourth semester, the Integrated Ph.D. convener (a member nominated from DUGC) will assign an Advisor to each student, based on the student's interest, performance in last four semesters and the availability of positions in different research groups.

(3) In the fifth and sixth semesters, students will work toward the Integrated Ph.D. project. Students will have to submit the project report and subsequently defend it at the end of the sixth semester.

(4) The performance of each student in the research project will be evaluated on the basis of: (a) research work carried out by the student in the laboratory of a faculty member, and (b) a presentation of the research work by the student to the entire department. Students will be assigned grades 'S' (satisfactory) or 'X' (unsatisfactory) for Integrated Ph.D. project work. In each semester, out of 16 grades, 12 of them will be evaluated by a three-member committee and the remaining 4 by the Advisor.

4.3. Registration

(1) Every student is required to register in each semester for the courses to be taken by him/her during that semester on the dates given in the academic calendar. It is the duty of the student to ensure that he/she has completed all the prerequisites, if any, required to register for a course.

(2) Registration of the students will be carried out under the supervision of the Head of the Department.

(3) The student is entirely responsible for registration of appropriate courses.

4.4. Registration Process for "Result Awaiting" Candidates

New entrants to the Integrated Ph.D. programme who are awaiting the final results of their qualifying examination, will be allowed to register 'provisionally' on submission of a certificate from their Head of the Institution certifying that they have appeared in the final qualifying examination (including all papers in theory, practical, project and viva-voce). Candidates will have to submit the attested copies of the certificate of the qualifying examination satisfying the admission criteria set up by the department and by last date of submission as specified in the academic calendar, failing which their admission will be cancelled.

4.5 Academic Advising

(1) Integrated Ph.D. convener (a member nominated from **DUGC**) will serve as the faculty mentor for each student till he/she completes the **fourth semester**. The mentor will determine the preparedness of the student for completing the requisite coursework.

(2) Students can repeat a course during regular semester by taking overload to improve his/her CPI. A total of four attempts would be permitted towards grade improvement. Clearing 'F' courses will not be counted towards grade improvement.

4.6. Academic Performance Requirements

(1) A student must attain a minimum CPI of 7.0 in the first four semesters of the program to continue his/her candidacy for Ph.D. However, students having CPI less than 7.0 at the end of 4th semester will be eligible for MS degree provided they fulfill all the requirements of section 7.

(2) If a student gets more than four 'F' grade in the first four semesters, he/she will be terminated from the program.

(3) If a student gets an 'F' grade in a core course in the first four semesters, he/she must take the same course again as an overload/appear in re-examination within a year to improve the grade.

(4) If a student gets an 'F' grade in an elective course in the first four semesters, he/she can repeat the course or substitute it with another elective as an overload within a year to improve the grade.

(5) Students must not obtain more than 2 'X' grades (out of total 8) in the Integrated Ph.D. project work during the 5th and 6th semesters in order to continue in the program.

(6) If a student obtains 8 'X' grades in research work (including the 5th and 6th semesters) or, 6 or more 'X' grades in research work in two consecutive semesters, he/she will be terminated from the Integrated Ph.D. program.

(7) **From third year onwards, DPGC** will monitor the performance of every student and whenever a student falls below the desired requirements of the program, **DPGC** will inform the Dean of Academic Affairs. If the student is recommended to be terminated from the program, the Head of the Department will issue a termination letter.

4.7. Comprehensive Examination and Graduate Seminar

(1) On successful completion of the coursework (a minimum CPI of 7.0 in the first four semesters), a student must appear for the Comprehensive Examination before the end of 5th semester in order for him/her to work towards obtaining a Ph.D.

(2) A student must pass the exam in no more than two attempts. In case of failure in the first attempt, there should be at least 15-days gap before the next attempt can be made.

(3) A student who is unable to qualify the comprehensive examination within a period of seven registered semesters after joining the program will be terminated from the Integrated Ph.D. program.

(4) Once a student attains JRF status, he/she will be governed by the same rules as those applicable to a regular Ph.D. student, unless specified otherwise.

(5) A student must present his/her graduate seminar within six months of completing the comprehensive examination.

5. Scholarship/Fellowship

All students admitted to the program will be given a scholarship of Rs. 10,000 per month for first two years provided that they maintain a CPI of 7.0. The scholarship will be stopped if the CPI drops below 7.0. It will be resumed once the CPI improves to 7.0 or above, but without payment of arrears for the period it was stopped. On successful completion of PhD candidacy requirements, students will be awarded the Research Fellowship as per the UGC/CSIR norms. Fellowship is payable for a period of 4 years, extendable for one more year on the recommendation of the doctoral committee of the student and approval of the Chair, Senate or till fellowship from other sources like UGC/CSIR etc. is active.

6. Minimum Residence, Maximum Duration

The minimum residency requirement for submission of Ph.D. dissertation is 4.5 years. The registration of a student will automatically be cancelled if he/she does not submit the dissertation within 9 years of joining the program. Under exceptional circumstances, the period of registration can be extended beyond 9 years with the approval of the Senate on the recommendation of DPGC and the Dean Academic Affairs.

7. Exiting the program with MS degree

All students admitted to the Integrated Ph.D. program are expected to work towards obtaining a Ph.D. degree. However, after completing six semesters (three years) in the program, a student may be permitted to exit the program with a MS degree provided he/she has successfully cleared all required courses, has a minimum CPI of 6.0 at the end of 4th semester and no more than '2X' grades in the Integrated Ph.D. project work. At the end of six semesters, if a student did not meet the academic requirements for Integrated Ph.D. programme or MS degree (exit option), he/she with the permission of DPGC/Coordinator Academic can register of additional year to meet the minimum requirements for obtaining a MS degree. However, if the student fails to meet the requirement specified for MS degree within 4 years, he/she will be terminated without award of any degree. Fellowship will be paid for a maximum period of 3 years only.

Note: A student cannot get more than 2X in the Project Work (which is to be done during the 5th & 6th Semesters) out of 16 credits in each Semester, 12 will be evaluated by Three Member Committee.

Minimum Credits for getting MS degree: 111 (out of which, 24 is from project work).

Annexure-I: Report of Lab Rotation (to be duly filled, signed and submitted to the Department Office)

Report of Lab Rotation	
Name of the student	
Roll No.	
Date of admission	
Name of the faculty member whose lab/research group was attended during the lab rotation	
Duration of the lab rotation	From: _____ To: _____
A short report on the lab activity during the rotation (within 500 words):	
Signature of the student with date	
Signature of the faculty member with date	
Additional information: Previous labs attended (if applicable)	(i) (ii)
Signature of Convener, Int. PhD with date	