

DEPARTMENT OF MATHEMATICS

IISER BHOPAL

INTEGRATED PHD PROGRAMME MANUAL (2017)

INSTITUTE-WIDE GUIDELINES

Guidelines and Policies for Integrated Ph.D. programme

The programme is aimed to provide young motivated individuals with a rigorous training, desired level of understanding and scientific maturity and a solid base at an early state to enable them to pursue a research career.

Admission:

Students with Bachelors Degree in the relevant discipline with a minimum of 60% marks or CGPA of 7.0 are eligible to apply for admission to Integrated Ph.D. programme.

Admissions to the Integrated Ph.D. programme will be through an oral/written exam held at IISER Bhopal.

Admission schedule:

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

Eligibility for admission:

1. Bachelors Degree in the relevant discipline with a minimum of 60% marks or CGPA (Cumulative Grade Point Average) of 7.0 are eligible to apply. Candidates who have passed their graduate examination in the preceding year or appearing in the final year examination of their Bachelors Degree and apply.
2. The number of seats available for admission to each department will be decided by the Senate from time to time.
3. Seats will be reserved according to the Central Government norms (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.

Fellowship:

- 1 Every Integrated student will be provided with Institute assistantship on a semester-to-semester basis for a period of six years from the date of joining. The period of assistantship will be extendable for one more year on the recommendation of the DPGC and approval of the Chair, Senate.
- 2 The payment of fellowship is subject to maintaining a CPI of 7.0. The fellowship 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.
3. All admitted students will receive a fellowship of Rs. 10,000/- pm. Subsequently, upon successful completion of Ph.D. candidacy requirements, a revised fellowship will be provided as per MHRD norms/guidelines.

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 pre-requisites, 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.

Registration Procedure:

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 having passed the

qualifying examination by the last date of submission as specified in the academic calendar, failing which their admission will be cancelled.

Academic Advising

1. The Convener, DPGC of the concerned department will be the faculty mentor for the first three semesters for students enrolled for Integrated Ph.D. programme. The DPGC will advise a student on the selection of course and will determine the preparedness of the students for completing the required coursework. Students registering for research credits/Integrated Ph.D. projects must have a dissertation/project guide assigned to them. At the end of the third semester DPGC will assign a faculty member to each student.
2. A student is allowed to repeat courses in which they have obtained 'F' grades either during regular semester(s) by taking overload with the permission of DPGC/Coordinator, Academic Affairs or by appearing in re-examination conducted in July every year. Students must clearly mark the courses for repeat during the registration of the course.
3. 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.

Semester load requirement

A semester load is defined as equivalent to 16 credits. It could be either course work or combination of course work and research work or research work only. One research workload carries 4 credits. Most courses carry 4 credits, while a few courses may carry less or more credits. Thus a student who has registered for a full semester load solely by course work is expected to attend 4 such four-credit courses. Under exceptional circumstances, the Senate may permit a student to register for a maximum of 20 credits or minimum of 12 credits. A student registered for a full semester load solely by research work is expected to register for 4 units of research work.

Course Structure:

The students are required to take core and elective courses. The core courses are intended to build a strong foundation in the core discipline. The elective course focuses on more diverse and advanced topics to develop and pursue an area of specialization.

Till the completion of the 4th semester, DPGC Convener will be the faculty member of the student. The mentor will determine the preparedness of the student for completing the required coursework. At the end of the third semester, DPGC will assign a faculty mentor to each student.

Minimum Residence, Maximum Duration and Academic requirements:

The aim of the course work is to strengthen the fundamental understanding in the subject and to prepare them for their specific research area.

- Integrated Ph.D. student should register for a total minimum of 128 credits comprising of a minimum course credit of 48 minimum research credits of 40. The remaining credits can be as per the advice of the department.
- Minimum residency requirement for submission of dissertation is 4.0 years (out of which 1.5 years is for research work). The registration of a student will automatically be cancelled if he/she does not submit the dissertation within 9 years of joining the program.
- Besides the above-mentioned minimum requirements, a department may prescribe some additional credits of courses/dissertation approved by the Dean/Coordinator of Academic Affairs.
- Some courses can be reading courses/projects under the guidance of faculty members at IISER Bhopal.

Academic Performance Requirements

1. A student must attain a minimum CPI of 7.0 in the first two years in order to continue his/her candidacy for Ph.D. Students having CPI less than 6.0 at the end of fourth semester may either exit the programme or continue to work towards obtaining an MS degree. Academic requirements during this period will be as mentioned in 'Exiting the programme with MS degree'.
2. More than 4F grades in the first two years will lead will lead to termination of the programme.

3. If a student gets an 'F' grade in a core course in the first two years, he/she must take the same course as an overload/appear in re-examination and improve the grade.
4. If a student gets an 'F' grade in an elective course in the first two years, he/she can substitute it with another elective as an overload and improve the grade.

Exiting the programme with MS degree:

All students admitted to the Integrated Ph.D. programme are expected to work towards obtaining a Ph.D. However, after completing six semesters a student may be permitted to exit the programme with a MS degree subject to fulfilment of the following:

1. He/she has earned a total minimum credit of 96 comprising of a minimum course credit of 48.
2. He/she has cleared all the courses registered for.
3. He/she has obtained a minimum CPI of 6.0

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.

For the detailed course structure please click the link below:

<http://acad.iiserb.ac.in>

DEPARTMENT-SPECIFIC GUIDELINES

Refer to the Integrated PhD Manual for Institute-wide guidelines for the Integrated Ph.D. programme. This document consists of guidelines specific to the Mathematics department.

1. INTRODUCTION

The Integrated Ph.D. programme in Mathematics at IISER Bhopal aims to rigorously train and guide students in the various research areas currently represented in the Department of Mathematics.

2. PROGRAMME STRUCTURE

The Integrated Ph.D. programme in Mathematics consists of two main components: i) coursework, and ii) research leading to a thesis.

1. Curriculum

As part of the coursework, students are required to take core and elective courses. The core courses are intended to build a strong foundation in the core areas of mathematics. The elective courses focus on more diverse and advanced topics in these areas. The detailed course structure is given in the following table:

Semester	Course Code	Course Title	Credits
1	MTH 311	Advanced Linear Algebra	4
	MTH 401	Fields and Galois Theory	4
	MTH 403	Real Analysis II	4
	MTH 407	Complex Analysis I	4
2	MTH 302	Modules	4
	MTH 304	Metric Spaces and Topology	4
	MTH 306	Ordinary Differential Equations	4
	MTH 404	Measure and Integration	4
3	MTH 405	Partial Differential Equations	4
	MTH 503	Functional Analysis	4
	MTH 605	Topology I	4
	MTH 5**	Departmental Elective I	4
4	MTH 4**	Departmental Elective II	4

	MTH 508	Introduction to Differentiable Manifolds and Lie Groups	4
	MTH 5**	Departmental Elective III	4
	MTH 5**	Departmental Elective IV	4

There are no compulsory courses in the 3rd year, the students can fulfil their credit requirements by taking departmental electives and reading courses, in consultation with the HoD/DPGC Convener.

2. Description of Coursework

1. In the first four semesters, students are required to take 12 core courses and 4 elective courses. At the time of joining the programme, each student will be assigned a faculty mentor. The mentor will determine the preparedness of the student for completing the requisite coursework. In case a student is found to be deficient in one or more areas, the mentor may recommend additional courses that need to be audited. The audited courses will not appear on the transcript.
2. Students are expected to take reading courses with a potential thesis supervisor in an area of mutual interest.
3. The departmental electives/reading course is optional if the student has passed the comprehensive exam before the start of 6th semester.

3. Ph.D. CANDIDACY REQUIREMENTS

Note that, If a student wishes to continue on in the PhD programme, then he/she needs to submit Form D (See Annexures) by the end of the fourth semester.

1. Assignment of Thesis Supervisor

1. Each student is expected to choose a potential supervisor by the end of fifth semester.
2. A student will be admitted to the candidacy for the Ph.D. degree after he/she has completed the course requirements for the degree with at least the minimum required CPI as mentioned in the Integrated PhD Manual, and has passed the comprehensive examination.
3. Once the student passes the comprehensive exam, the potential supervisor will become the official thesis supervisor.

2. Comprehensive Examination

The comprehensive exam is an oral Ph.D. candidacy exam to be conducted by a committee consisting of at least three but not more than five faculty members of the Mathematics Department and one faculty member from outside the Department. It comprises of an oral presentation on a topic in an area of student's research interest. A potential supervisor must be a committee member who should be willing to serve as the official thesis supervisor if the student passes the comprehensive exam.

1. The comprehensive exam can be taken as early as the end of 5th semester but no later than the end of 7th semester.
2. The evaluation for the comprehensive exam will be satisfactory or unsatisfactory.
3. 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 45-day gap before the next attempt can be made.
4. The student should submit Form B to the Department office at least 8 weeks before the oral exam alongwith the synopsis prepared in consultation with the potential thesis supervisor. The oral exam can be scheduled anytime subject to availability of the committee.
5. The oral exam committee is constituted as per Institute's guidelines for constitution of committee for comprehensive examination. If a student is funded by external (non-institute) sources, then the Oral Comprehensive Examination committee need consist of only 4 members (ie. Only 3 departmental members, and one external member need to be present), as against the 5 needed if the student is funded by the institute.
6. The oral exam is a presentation by the student followed by a question-answer session with the oral exam committee members. The presentation includes a seminar of at least 30 minutes duration and a brief disquisition on the study undertaken towards the oral exam and as notified in the synopsis.

3. Ph.D. Advisory committee

The thesis supervisor, in consultation with the DPGC, will form a Doctoral Advisory Committee (DAC), consisting of the supervisor and at least two other faculty members from the department. The DAC will oversee the progress of the candidate towards completing the requirements for Ph.D. after the comprehensive exam has been successfully cleared.

4. Annual Progress Report

Following successful completion of comprehensive exam requirements, each student is required to submit a yearly report of progress towards the thesis. This report must be submitted to the DAC with a copy to Convener, DPGC.

5. Graduate Seminar (referred to as the State-Of-The-Art seminar in the PhD Manual)

- A student is eligible for presenting the Graduate Seminar only after he/she clears the comprehensive examination and has to be completed within 6 months of clearing the comprehensive examination, unless approved by the Chairperson, Senate for any extension. Form C must be submitted at least one month before the graduate seminar date.
- The performance of the student will only be either Satisfactory or Unsatisfactory; no marks will be awarded. If the performance is evaluated to be the latter, the student has to repeat the Graduate Seminar.
- The Doctoral Advisory Committee (DAC) will evaluate the graduate seminar. The evaluation form will be signed by the supervisor, Convener DPGC and HoD, and will be submitted to the Office of the Academic Affairs.

FORMS:

Form B: Oral Comprehensive Examination with Synopsis, Form C: Graduate Seminar with DAC, Form D: Continuation in the PhD Program (*Other forms are available on Academic Office webpage*)

Reading Courses

Reading courses (MTH 698, MTH 699) are meant for Ph.D. and Integrated Ph.D. students prior to clearing the Ph.D. candidacy requirements, and are in the process of deciding a research topic and a thesis supervisor.

1. MTH 699: Reading Course (6 credits)

- This will be a semester long course.
- There will be one instructor for the course.
- The goal of the course is two fold:
 - to promote a focused self-study, and
 - to provide the instructor and student the opportunity to work with each other.
- If a student is taking two reading courses in a semester, it must necessarily be with two different instructors.
- A suggested list of reading courses (title, brief outline) with the instructor will be circulated to the students two weeks prior to the pre-registration each semester. The student may contact faculty members for topics outside this list.
- The student should register for the reading course during the pre-registration. The student should submit a hardcopy (Form A) of the title of reading course with instructor's signature, to the Department office, by the pre-registration deadline.
- The student should submit a hardcopy (Form B) of the course contents for the reading course to the department office within a week after the classes begin.
- The student will be required to give two mandatory seminars (for every reading course) in the Department during the course of the semester. The student should submit the seminar details (title and abstract) for each of the seminars to the DPGC no later than one week before the scheduled seminar.

- The course will be evaluated by the instructor based on the performance of the student in the material covered during the course, seminars, and the examinations.

2. MTH 698: Reading Course (with 4 credits)

- The model for this course with 4 credits is the same as for the Reading course (with 6 credits) as described above, except for the seminar component.