

**INDIAN INSTITUTE OF TECHNOLOGY
DHARWAD**



॥ सा विद्या या विमुक्तये ॥

भारतीय प्रौद्योगिकी संस्थान धारवाड
Indian Institute of Technology Dharwad

Information Brochure

(For Indian Nationals)

Ph.D. Admissions

Autumn Semester 2021-22

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A. SCHEDULE OF Ph.D. ADMISSION (Tentative)

Serial No.	Description	Relevant dates
1	Last Date to apply online	10-June-2021
2	Announcement of shortlist and Online Interview Schedule (tentatively)	15-June-2021
3	Online Interview ends	02-July-2021
4	Declaration of final list of selected candidates	14-July-2021
5	Admission for waitlisted candidates starts	22-July-2021
6	Admission for waitlisted candidates ends	23- July-2021

All potential candidates are requested to visit the institute website regularly for updated information about the schedule, especially in context on ongoing Coronavirus (COVID-19) related developments. **Future updates regarding the admission process will be made available on the institute website under section Academics >> Admissions >> Doctoral.**

B. APPLICATION CATEGORIES & FINANCIAL SUPPORT

IIT Dharwad admits Ph.D. candidates under the full time research scholarship or Teaching Assistantship (TA) and part-time externally sponsored research scholars. However, **each department may not have an opening in all the following modes of support.** More details can be found in the Appendix section corresponding to the department.

B.1 Teaching Assistantship (TA)

Funded by MHRD, the TAs are expected to assist in the academic/administrative work for smooth functioning of the Institute. Students under this category are entitled to financial support as per the MHRD norms.

1. For students with M.Tech./M.E./M.Sc.(Engg.)/M.Phil. or equivalent degree as the qualifying degree, the assistantship is payable for a maximum duration of 5 years or up to the thesis submission, whichever is earlier. At present, the monthly rate of assistantship is ₹31,000 for the first 2 years and enhanced rate of ₹35,000/- for the remaining 3 years and HRA as per rules.
2. To get the Teaching Assistantship, the students concerned must assist in teaching, research and/or administrative work as assigned by the respective Academic Unit to the extent of 8 hours of work per week.
3. The continuation of the assistantship will be subject to the satisfactory performance of the duties assigned by the Departments as well as satisfactory academic performance.
4. As per MHRD directives, the employees on the rolls (with or without pay) of any organization are not eligible for admission under this category. Candidates selected in this category have to resign from the current job and submit a relieving letter from their employer before joining the programme.
5. Students getting assistantships from the Institute may join projects sponsored by external agencies and obtain corresponding fellowships in lieu of TA ship.

B.2 Fellowship Awardee (FA)

B.2.a. Description – FA

The financial support under this category is provided by various Govt. / Semi Govt. schemes (CSIR, UGC, DAE, DST, DBT, NBHM, etc.) and some other organizations.

A valid Junior Research fellowship (JRF) award letter from the Govt. / Semi Govt. agencies (e.g. CSIR / UGC / DAE / DST / DBT / NBHM / (confirmed) DST INSPIRE, etc.) is required for the execution of this fellowship.

The amount and duration of the fellowship will be as specified by the awarding agency. The disbursement and continuation of the fellowship will be subject to as per the norms specified by the awarding agency or specified by IIT Dharwad, as deemed fit.

B.2.b. PMRF: A brief Note on Prime Minister's Research Fellowship

The Prime Minister's Research Fellows (PMRF) Scheme has been designed for improving the quality of research in various higher educational institutions in the country. With attractive fellowships, the scheme seeks to attract the best talent into research thereby realizing the vision of development through innovation. The scheme was announced in the Budget 2018-19. The institutes which can offer PMRF include all the IITs, all the IISERs, Indian Institute of Science, Bengaluru and some of the top Central Universities/NITs that offer science and/or technology degrees. The candidates will be selected through a rigorous selection process and their performance will be reviewed suitably through a national convention.

B.3 Project Assistantship (PA)

Funded from projects sponsored by industries and government funding agencies. Under this category, candidates will be paid fellowship as per the rules & regulations of the governing project.

B.4 Externally sponsored Ph.D. (EX)

The candidates employed in recognized R&D organizations and desirous of pursuing Ph.D. programmes while in employment may apply for admission as external candidates. The option of external registration is for applicants who are working in well-equipped scientific institutions, laboratories, R&D establishments and industrial organizations engaged in research based activities. Persons working in colleges/universities are not eligible under this category. After fulfilling the coursework requirement at the Institute, these candidates will be allowed to register for Ph.D. with a Supervisor (internal) from the Institute and a Co-supervisor (external) from their parent organization where they will be doing the research work. The admissions are based on the following norms:

1. The competence of these candidates will be assessed along with the regular candidates.
2. On the day of selection process, the candidate should submit a Sponsorship Certificate (Appendix A) from the organization in which he / she is employed giving an undertaking that the candidate would be released from the normal duties to fulfill the coursework requirement (and qualifier examination, if applicable). The certificate should also provide details of facilities relevant to the research programme and available to the candidate.
3. The candidate is required to be at the Institute as a full-time student for the coursework (and

qualifier examination, if applicable) of his/her Ph.D. Programme. The coursework requirement is likely to be a period of 1-2 semesters. Depending on the student's background and the programme requirements, an additional semester may be needed to complete the coursework/qualifier examination.

4. To promote interaction between the internal supervisor and external co-supervisor, meetings between them should be arranged at least once in a year in the Institute or in the sponsoring organization.
5. The Ph.D. registration of an external candidate would be reviewed at the end of each year from the date of registration in terms of his progress in courses / seminars / approved research programme by a Research Progress Committee (RPC) nominated by the concerned Department Postgraduate Committee (DPGC).
6. At the time of joining the programme, the students will have to produce a “Relieving certificate” from his / her employer that he / she has been fully relieved from normal duties during the semester(s) to complete the course work and other academic work at IIT Dharwad.

Based on the information provided by the applicants a short-list of candidates called for the selection process will be declared on the Institute website on the date specified in the schedule. Only the short-listed candidates are permitted to participate in the selection process.

C. GENERAL GUIDELINES for APPLYING ONLINE

1. Please read all the instructions given in the brochure carefully before filling up the application form.
2. Please note that the application is to be filled at one go. There is no save and proceed option. The application process flow is given below.

Keep all the documents handy >> pay the application fee through SBI e collect facility >> Note down SBI e collect reference No>> Start online application form>> Fill all particulars including SBI e collect reference No>> Take a print/ save a pdf copy of preview of completed application form >> Final submission of application form >> Note down submission ID for future reference

3. The procedure to pay the application fee through SBI e collect facility is made available on the website and application form. Candidates are requested to pay the application fee through the steps/procedure described there. Candidates may contact pgadmissions@iitdh.ac.in for any errors/issues pertaining to payment of application fees.
4. This information brochure and future updates regarding the admission process will be made available on the institute website under section Academics >> Admissions >> Doctoral.
5. You are required to submit the application form online. There are no downloadable forms available. After filling the form, you are advised to take a print and keep the same for future reference.

6. The application fee is as follows:

Gen/Gen (EWS)/OBC/ all other candidates	₹ 200/-
Women/SC/ST/PwD category candidates	₹ 100/-

7. **The Application Form without valid online payment details will not be considered. Application FEE is Non-Refundable.**

8. Applicants may find it convenient to keep following information handy while filling the application form online (whichever relevant):

- Skype Id / Gmail Id for G-meet
- Passport size photo whose size is less than 50 kb
- Educational details from secondary school onwards
- GATE qualification details
- Statement of Purpose (pdf file)
- Proof of application fee payment (pdf file)
- List of fellowship/ awards
- Publications
- Any other achievements/information.

9. Amendments to the form will not be possible once the last date to apply online is over. However, amendments can be considered if the applicant resubmits the entire form without making repeat fee payment before the deadline.

10. Check your emails regularly for any communication from the institute regarding the selection process.

11. **Keep checking the institute website regularly for updates regarding the selection process. Shortlisted candidates list will be uploaded on the institute website as per the schedule given above.**

Candidates (if) called for written test / interview should bring with them Photo ID Card, Printed Copy of Online Application Form, and Photocopies of Academic Transcripts, Degree Certificates & Experience Certificates, Caste Certificate (if applicable), PwD Certificate (if applicable), EWS Certificate (if applicable), Thesis/Dissertation/Report/Publications and all other relevant documents.

D. INFORMATION PERTAINING TO HOSTELS

About IIT Dharwad	Kindly visit the website https://www.iitdh.ac.in/ for available facilities
Hostel Room Allocation (on sharing basis)	You will be allotted a room in the hostel & the room key will be handed over on your arrival at the Institute. Each room will accommodate roughly two/four students (depending on the prevailing conditions) and has an attached bath & toilet.
Are hostel rooms furnished	Each student will be provided a cot, chair & study table and wardrobe. Students can purchase mattress/bedding, bucket, etc. locally. Arrangements will be made for on-campus shopping for these items.
Possession of motorized vehicle	NOT ALLOWED, however bicycles are permitted in the campus.
Climatic conditions	The weather at Dharwad is pleasant throughout the year. Generally, it will be raining in the months of June to September and weather will be windy and cold during the months of October to January. It is suggested that you carry protective clothing accordingly.

E. FEES, DEPOSITS & HOSTEL RENT

The fee applicable for admission to Ph.D. programmes (as collected during the Autumn Semester 2020-21) is provided below for reference purpose only:

S. No.	Fee Description	Amount (in INR) General/OBC/EWS	Amount (in INR) SC/ST/PwD
A. One-time payment at the time of admission			
1	Admission fee	2,200.00	2,200.00
2	Thesis fee	2500.00	2500.00
3	Medical examination	400.00	400.00
4	Provisional certificate	500.00	500.00
5	Student welfare fund	1,000.00	1,000.00
6	Modernisation & upgradation	2500.00	2500.00
7	Identity card	500.00	500.00
	Sub-total (A)	9,600.00	9,600.00
B. Per semester fee			
1^	Tuition Fee-Statutory fee	2500.00	00.00
2	Examination fee	1,000.00	1,000.00
3	Registration fee	750.00	750.00
4*	Gymkhana fee	525.00	525.00
5	Student benevolent fund	500.00	500.00
6*	Medical fee	450.00	450.00
7	Hostel room rent	-	-
8	Electricity & water charges	-	-
9	Hostel establishment charges	3,000.00	3,000.00
10	Mess establishment charges	1,550.00	1,550.00
	Sub-total (B)	10,275.00	7,775.00
C. Deposits (refundable) to be paid at the time of admission			
1	Institute security deposit	1,000.00	1,000.00
2	Library security deposit	1,000.00	1,000.00
3	Mess security deposit	1,000.00	1,000.00
	Sub-total (C)	3,000.00	3000.00
GRAND TOTAL FEE (A+B+C)		22,875.00	20,375.00

NOTE:

Note:

- All the SC/ST/PwD-Divyangjan students are exempted from payment of Tuition fee.
- The Hostel Room rent (Rs.2,000/-), Electricity & water charges (Rs.3,000/-) and Mess Fee advance (Rs.26,000/-) have not been charged presently for Autumn Semester.
- *The Gymkhana Fee & Medical Fee have been partially charged (i.e. 30% each of the actual cost).
- The reduction in fee is due to the present COVID-19 conditions and if in case the students are required to join the Institute in future (during Semester), then the reduced portion will be required to be paid on further notice (on a pro-rata basis, wherever applicable).
- ^IIT Dharwad reserves the right to revise the Tuition Fee-Statutory Fee (in future).

Kindly note that the above-mentioned fee structure is applicable for TA category students. The tuition fee and other heads may differ in case of other categories (Project/FA/External etc.). The details of the applicable fee structure are available on our website at https://iitdh.ac.in/academic_circulars.php

The fee structure will also be made available to the selected candidates at the time of announcement of results for this round of admission.

F. DEPARTMENT OF CHEMISTRY

F.1 Eligibility for Admission

F.1.a Qualifying Degree

M.Sc. or equivalent degree in Chemistry/Biochemistry/Biotechnology/Microbiology/Pharmacy and any other related areas

The candidates must also fulfil **ONE** of the following additional requirements:

- **Junior Research Fellowship** (JRF) of CSIR/UGC/DST INSPIRE/DBT/MHRD/ICMR or any other funding agencies.

F.1.b Minimum score in the qualifying degree

1. For General/OBC category candidates and/or for candidates where no concession in academic performance is called for, the eligibility criteria in the qualifying degree is First Class, as specified by the candidate's Institution/University. If the Institution/University does not specify the division/class, then one of the following will be considered as the eligibility criteria:
 - a minimum of 60% marks (without round off) in aggregate. (OR)
 - a minimum Cumulative Grade Point Average (CGPA) or Cumulative Performance Index (CPI) of 6.0 on the scale of 0-10; with corresponding proportional requirements when the scales are other than on 0-10, (for example, 4.8 on a scale of 0-8).
2. **For SC/ST/PwD category candidates, a relaxation of 5% in the qualifying degree is applicable.**

F.1.c Eligibility of applicants who are in the final phase of getting the qualifying degree

Students who are in the final phase of receiving above mentioned qualifying degree and who are likely to graduate before commencement of Autumn 2021-22 semester of IIT Dharwad are also eligible to apply. However, if offered, the admission to those candidates would be provisional. To join academic program at IIT Dharwad, such candidates need to furnish necessary documents regarding completion of the degree on the date of joining mentioned in the Section A above. They need to meet the criteria specified in section above considering updated score in the qualifying degree. In the meanwhile, the aggregate academic performance announced by the respective university till the last date for submission mentioned in above section should be used to determine eligibility for application and same to be reported in the online application.

F.1.d Application Categories and Financial Support

The Department of Chemistry admits Ph.D. candidates under the Fellowship Assistantship (FA) category only for this round of admissions.

Based on the information provided by the applicants a short-list of candidates called for the selection process will be declared on the Institute website on the date specified in the schedule. Only the short-listed candidates are permitted to participate in the selection process.

F.1.e Modality of the Selection Process

Only the short-listed applicants are permitted to participate in the selection process.

- The selection process consists of **one round** of online interview and interaction.

F.2. Syllabus

- Fundamental principles of chemistry
Recommended textbooks: J. Clayden, L. G. Wade, J. D. Lee and P. Atkins
- Organometallic chemistry: Metals aryls and alkyls, π -bound ligands etc, oxidative addition-reductive elimination, applications to organic chemistry
Recommended textbooks: R.H. Crabtree and BD Gupta and A. J. Elias
- Spectroscopy: Rotational, vibrational and electronic spectroscopy, NMR and mass spectrometry
Recommended textbooks: C. N. Banwell, D. L. Pavia and H. Gunther
- Organic name reactions: Reactions and their mechanisms
Recommended textbooks: W. Carruthers and J. Clayden
- Basic Bioorganic chemistry and Biochemistry: Biomolecules (proteins, carbohydrates, nucleic acids and fatty acids) and their chemistry, biomimetic chemistry, metabolic pathways, biosynthesis of biomolecules, enzymes mechanisms, metalloenzymes, central dogma of life, basic concepts of medicinal chemistry
Recommended textbooks: Voet and Voet, Lehninger, Hermann Dugas

F.3. Research Topics

The 2 research topics are broadly classified as given below. The applicant may be asked to indicate the choice of the research topics in the order of preference.

1. Organic chemistry of the enzyme catalysed reactions in antibiotic compounds:

Enzymes are nature's organic chemists that carry out remarkable chemical reactions, particularly in the synthesis of antibiotics and other important drug compounds. To study the enzyme reaction mechanisms, one requires sound knowledge of chemistry and biochemistry. One particular area of interest is the ribosomally synthesized and post-translationally modified (RiPP) peptide natural products which show unique antibiotic properties. In today's world, the emergence of antibiotic resistance in bacteria is proving to be a serious and increasing threat to human health. Therefore, discovery of new structural motifs with novel antibacterial targets exhibiting activity against multi-drug resistant pathogens is of utmost importance. RiPP natural products, produced by bacteria, are an emerging class of peptide derived compounds with diverse structural features exhibiting wide array of bioactivities ranging from antibacterial to anticancer properties. RiPP precursor peptides are direct ribosomal gene products that undergo various post-translational modifications (PTMs) by enzymes to synthesize the mature, structurally complex antibiotics. We would like to study the chemistry of the enzyme mechanisms (such as C-H activation, C-C bond formation, molecular rearrangement, amide bond activation etc.) involved in synthesizing these natural products. One class of enzymes involved is called radical S-Adenosylmethionine (rSAM) enzymes that contain [4Fe-4S] clusters and carry out fascinating transformations using organic radical mediated chemistry. Recently, they were shown to catalyze reactions via an organometallic (Fe-C) intermediate as well. We would employ

interdisciplinary techniques from chemistry (synthetic organic chemistry, physical organic chemistry, spectroscopic techniques, inorganic chemistry and anaerobic techniques), biochemistry/chemical biology, protein chemistry, and molecular biology/microbiology during these studies and suitable collaborations (such as for protein crystallography, complex synthesis, EPR techniques, proteomics, and synthetic biology etc.) will be initiated to gain insights into the molecular details of these mechanisms. In addition, analog generation for medicinal chemistry, enzyme inhibitors development and structure-function elucidation of new compounds will also be undertaken in the future.

2. Tryptophan derived bioactive natural products: Investigation of the chemistry of the biosynthesis pathways, and elucidation of structure and function

Tryptophan, the most chemically complex and the least abundant of the 20 common proteinogenic amino acids, is a biosynthetic precursor to many complex microbial natural products (such as antibiotic pyrrolnitrin), which are promising scaffolds for drug discovery and development. The chemical features of tryptophan, including its ability to undergo chemistry at almost every atom makes it a unique biological precursor for the generation of chemical complexity. Recently it was discovered that tryptophan leads to the formation of a few novel anticancer compounds of highly functionalized alkaloid family which were shown to induce DNA single and double strand breaks and metal dependent DNA complex formation. Moreover, they also cause several chromosomal aberrations, and blocks the synthesis of DNA and RNA by inhibiting topoisomerase II. Our goal would be to study the chemistry of the biosynthetic machineries (synthesis by enzymes in a biological set up) of such natural products *in-vitro*, understand the fundamental principles of the complex organic/inorganic chemical reactions (they also involve metalloenzymes) and characterize the molecular details of these proteins using various techniques from chemistry (synthetic chemistry, bioorganic/bioinorganic and biophysical chemistry) and biology (protein biochemistry, bioinformatics, molecular and cell biology). This investigation will also enable us to create variants of such compounds as potential anticancer agents by using chemo-enzymatic methods. In addition, bioinformatics/genomics guided discovery and structural characterization of new microbial antibiotic/anticancer compounds, determination of mode of the action, and related structure-activity relationship studies will also be taken up in the future.

G. APPENDIX A

Sponsorship Certificate for PhD External Registration (EX)

(To be typed on letterhead of the Sponsoring Organization)

Name of the applicant:

Name of the sponsoring organization:

Address:

Present Designation of the applicant:

Present status of the applicant: (Permanent/Semi-permanent/Temporary)

Division where research work is proposed to be done:

Name of supervisor from the sponsoring organization:

(CV of supervisor is requested to be produced on the day of selection giving details of designation, qualification, research experience etc.)

Details of facilities relevant to the research problem which will be made available to the candidate by the organization.

Statement of proposed co-supervisor (external)

If Shri / Kum. / Smt. _____

is registered for the PhD degree, I, _____

Agree to act as his/ her research Co-supervisor along with the research Supervisor from IIT Dharwad.

Date:

Signature of proposed Co-supervisor (external)

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Statement of sponsoring authority

If Shri. / Kum./ Smt. _____

is admitted to the PhD programme, we shall allow him/her to undergo the programme of studies at IIT Dharwad.

Further, we shall fully relieve him/her from normal duties to complete the residential course work requirement (and qualifier examination, if applicable) at IIT Dharwad.

During the period of PhD studies, the candidate will be permitted to carry out his / her research work at our laboratories / organization and will be given the required facilities.

We also give our consent to _____ of our organization to be the Co-supervisor (external) of the PhD thesis, along with a faculty member of IIT Dharwad as the Supervisor.

Date:

Signature and Seal of the Sponsoring Authority

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