



Project Proposal for Ph.D.

Project Details(The research problem must clearly indicate the need for an interdisciplinary approach)

Project Title	Bioremediation for indoor air purification
Project Summary (Minimum 500 and maximum 2000 characters)	Indoor air pollutants include volatile organic compounds (VOCs), inorganic air pollutants (IAPs) and particulate matter (PMs). Plant leaves reduce such air pollution through adsorption and stomatal absorption. Microorganisms associated with the plant degrade and transform air pollution. However, the efficiency of bioremediation can be enhanced by a thorough understanding of the plant-microbe interactions. The release of exudates from plants leads to a mutual interaction with the microbiome that promotes the growth of the plant, thus enhancing degradation and detoxification of air pollutants. The biological fluid flow and species transfer will control the microbe functionality thereby dictating the pollutant capture. This understanding will further help in development of indoor air pollutant removal technology. Based on the type of pollutant the bioremediation can be customized by using the right combination of plant and microbes. The ambient condition like temperature, humidity, wind and water will also play a vital role in this design.

Ph.D. Supervisors*
(Supervisor 1 and Supervisor 2 cannot be from the same department of IITD)

Role	Name of Faculty	Academic Unit in IITD/Institute/University	Email ID (Official)
Supervisor 1*	Bahni Ray	Department of Mechanical Engineering	Bray@mech.iitd.ac.in
Supervisor 2	Shilpi Sharma	Department of Biochemical Engineering & Biotechnology	Shilpi@dbeb.iitd.ac.in

*Supervisor 1 must be from IIT, Delhi.

+All cells in this table are mandatory fields that need to be filled by faculty for consideration of proposal.

§The date of superannuation of supervisors should be at least three years from the date of registration of selected candidates.

Project requirements (Student qualifications, experience required, etc)
*The candidate will be shortlisted based on common shortlisting criteria decided by ScRC (SIRe)

- Degree in Environmental Biotechnology/ Life Science subjects / Agricultural Biotechnology
- Knowledge of biological fluid dynamics, heat and mass transfer

Source of fellowship/funding and project number
(CSIR/UGC/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE/IRD/FITT Project details, if any)

Institute fellowship

Role of Faculty Members involved:	
Supervisor-1	Dr. Shilpi Sharma (DBEB, IITD) is an agricultural microbiologist with expertise in analysis of soil microbial community composition, plant microbe interaction, and rhizosphere engineering. She has been working towards understanding the impact of various abiotic and biotic factors on soil- and plant associated- microbiomes and thereby on food security and agricultural sustainability.
Supervisor-2	Dr. Bahni Ray has expertise in air pollution domain, where she investigates the pollutant constituents and designs for mitigation technologies. Her knowledge on biological fluid mechanics and mass transfer will guide in understanding the microbe-plant interaction.
The bioremediation method will be explored together by both supervisors, and then scaling up of the method to address specific air polluted zone will be studied in Dr. Ray's lab.	

Note:-

1. Approval from the respective DRC/CRC/ScRC of your Department/Centre/School will be required for using the "Full-time Institute Assistantship (Category-wise) (FIA)" for selecting the students in SRe.
2. Declaration:- Faculty members, please ensure that you have at least 3 years of service left before superannuation along with adequate sitting space & lab facilities for the SRe student.
3. PI/s are also encouraged to submit joint proposals with AIIMS, NII, JNU and institutes with which IITD has an existing MoU. If the Co-PI (Supervisor 2) is from outside IITD, kindly share his/her detailed CV.
4. If a research scholar is to be considered for selection under the project fellowship, then the project should have a minimum of two-year duration remaining.
5. A candidate applying with a valid JRF/INSPIRE/any national level fellowship should have at least two-year validity from the date of joining the Ph.D. program.
6. The third supervisor's name (if required) can be added only after the formation of Student Research Committee (SRC) subject to a strong recommendation of SRC and subsequent approval from the competent authority.
7. If Institute fellowship is being sought, then DRC approval of the parent department of Supervisor 1 is required at the time of selection.