Indian Institute of Technology Delhi

School of Interdisciplinary Research (SIRe)

Project Proposal for Ph.D.

SIRe Project Number

2026-01-35

(will be assigned by SIRe)

Project Details (The research problem must clearly indicate the need for an interdisciplinary approach)	
Project Title	Bio-fabrication of Ligament Constructs for Functional Knee Joint Reconstruction
Project Summary (Minimum 500 and maximum 2000 characters)	This project aims to develop 3D bio-printed cruciate ligaments for functional knee joint reconstruction. The study will focus on designing biocompatible bioinks that can support ligament tissue formation and organization. Using 3D bioprinting techniques, constructs with similar architecture to the native to the cruciate ligaments will be fabricated to guide cell alignment and extracellular matrix deposition. The engineered ligament constructs will be evaluated through biological, structural, and mechanical characterization. These analyses will help determine the structural integrity and functional properties of the bio-printed tissues. Note: The project is highly interdisciplinary, integrating tissue engineering, biomaterials science, and advanced bio-fabrication technologies to develop next-generation graft substitutes for improved ligament reconstruction.

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*	Prof. Dinesh Kalyanasundaram	CBME	dineshk@cbme.iitd.ac.in
Supervisor 2	Prof. Deepti Abbey	KSBS	adeepti@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)**

- Master's degree in Life Sciences / Biotechnology with strong academic performance
- Candidates with hands-on laboratory experience in cell culture techniques, molecular biology, along with exposure to 3D bioprinting, biocompatibility testing, or biomedical device evaluation, will be preferred.

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

Candidate with his/her own fellowship /institute assistantship

Role of Faculty Members involved:	
Supervisor-1	Scaffold design, and bio-mechanical characterizations of cadaveric and engineered ligament tissues, 3D Bio-fabrication.
Supervisor-2	Formulation of cell-compatible bioinks, characterization of tissue formation and extracellular matrix deposition, 3D cell culture.

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 SIRe.**

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 SIRe 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.**