Indian Institute of Technology Delhi

School of Interdisciplinary Research (SIRe)

SIRe Project Number

2025-01-03

(will be assigned by SIRe)

Project Proposal for Ph.D.

Project Details (The research problem must clearly indicate the need for an interdisciplinary approach)	
Project Title	Design, fabrication and testing of Peripheral novel auxetic stents
Project Summary (Minimum 500 and maximum 2000 characters)	This project aims to evaluate novel auxetic designs for peripheral arteries through **bench and animal testing** as per regulatory standards. **Bench testing** will assess **radial compression, burst pressure, fatigue, and recoil** to ensure mechanical strength and durability. **Flexibility, trackability, and pushability** tests will evaluate ease of deployment. **Drug-coated variants** will undergo **elution, coating adhesion, and particulate shedding tests** to ensure controlled drug release and coating stability. **Pulsatile flow simulation and shear stress testing** will replicate real physiological conditions. After successful **bench testing**, **animal studies** will assess **biocompatibility, thrombogenicity, endothelialization, and inflammatory response** to validate long-term safety. **In vivo deployment and durability tests** will evaluate structural adaptation, healing response, and patency. **Histological and imaging analyses** will confirm cellular integration. This study ensures auxetic stents meet **safety, functionality, and clinical efficacy** standards.

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	Kusum Meena	Mechanical Department	kusum@iitd.ac.in
Supervisor 2	Dinesh Kalyanasundaram	Centre of Biomedical Engineering	dineshk@cbme.iitd.ac.in

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

- BS and MS in Biotechnology, MBBS, MD
- Hand on experience of implant testing.

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

Institute Funding

Role of Faculty Members involved:	
Supervisor-1	To guide on Design and prototyping
Supervisor-2	To mentor on fabrication and testing