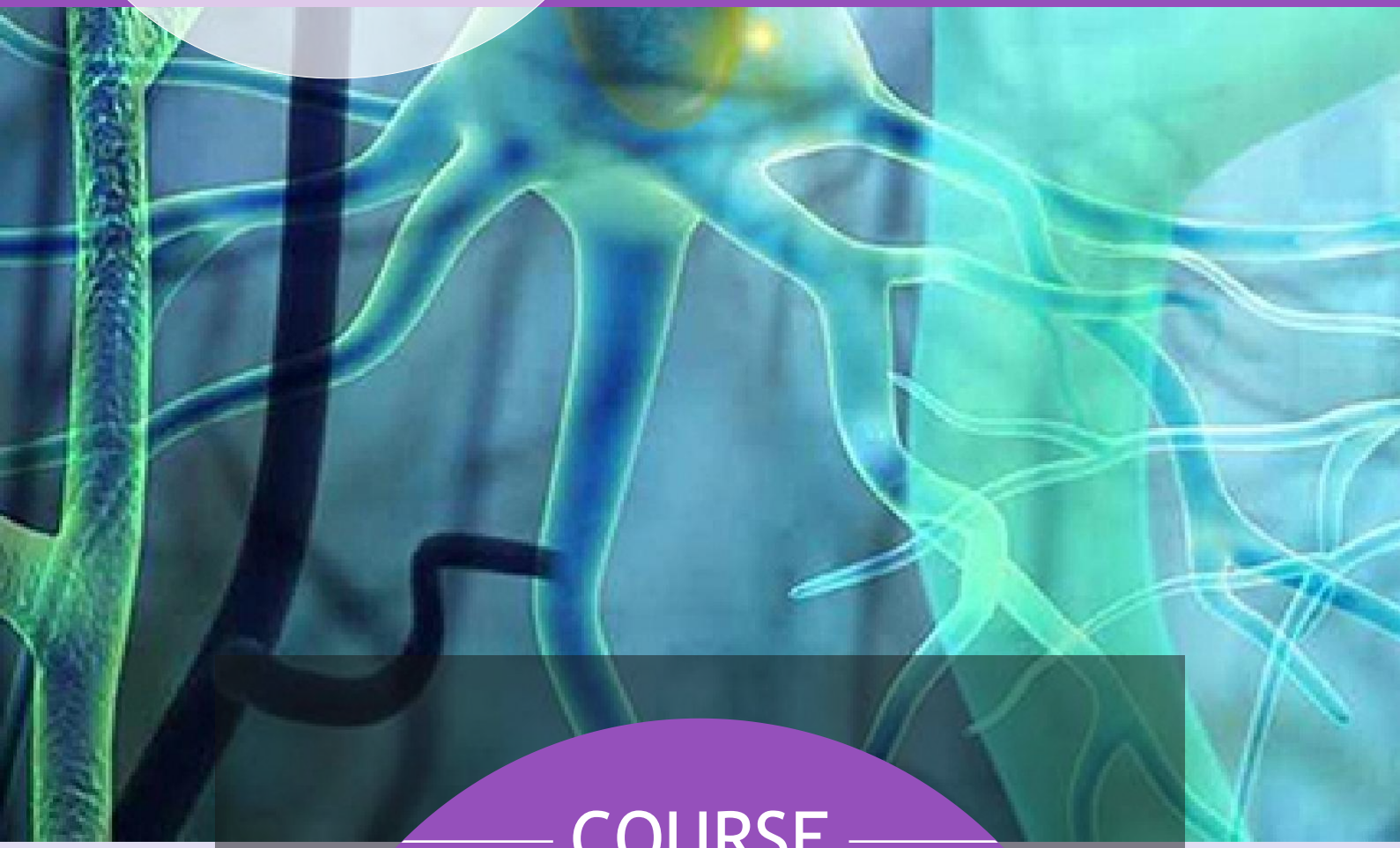
SHARDA UNIVERSITY
Beyond Boundaries

NAAC A+ ACCREDITED

SHARDA SCHOOL OF
BIO SCIENCE &
TECHNOLOGY



COURSE

Translational Nanomedicine (NVF2101)

VALUE ADDED
COURSE BROCHURE-30 HRS
2025-26

ABOUT THE UNIVERSITY

Sharda University is a leading Educational institution based out of Greater Noida, Delhi NCR. A venture of the renowned Sharda Group of Institutions (SGI), The University has established itself as a high quality education provider with prime focus on holistic learning and imbibing competitive abilities in students.

The University is approved by UGC and prides itself in being the only multi-discipline campus in the NCR, spread over 63 acres and equipped with world class facilities.

Sharda University promises to become one of the India's leading universities with an acknowledged reputation for excellence in research and teaching. With its outstanding faculty, world class teaching standards, and innovative academic programs, Sharda intends to set a new benchmark in the Indian education system.

Sharda School of Bioscience and Technology (SSBT) boasts of providing exposure in molecular biology, genetic engineering, bioinformatics, biochemistry, plant biotechnology, microbiology, zoology, animal biotechnology & environmental biotechnology

ABOUT SCHOOL

Sharda School of Bioscience and Technology (SSBT) The Sharda School of Bio-Science and Technology is one of the most dynamic and vibrant School for Life Sciences and Biological Engineering in the Delhi-NCR, Greater Noida India. The school is providing excellent and quality educational opportunities in are areas of Moleuclar Biology, Biochemistry, Immunology, Microbiology, Virology, Cancer Biology, Plant Molecular Biology, Agriculture Biotechnology, Animal Biotechnology etc by training the student community for Entrepreneurship development, Research and technical skills for the student community in particular for those coming from the diverse cultural and socio-economic background of the nation. SSBT offers innovative postgraduate and PhD programmes that inculcate personal and professional enrichment leading to the formation of vivacious and enthusiaistic student community.

ABOUT THE COURSE

This course will explore the world of micro/nanotechnology for applications in biomedical engineering. Topics that will be covered are prospects of nanomedicine and its importance in medical diagnostics, pathways to molecular manufacturing, molecular transport, and nano-sensor for medical applications. This course can provide employability in medical and pharma companies, paramedic clinical centers and educational institutes.

Course Schedule

Week	Content	Duration (Hrs)
1	Introduction to Nanotechnology: Definitions, principles, and Nano-Biomimicry	**2**
2	Classification of Nanomaterials: 0D, 1D, 2D, and 3D structures	**2**
3	Bio-nanomaterials: Polymer nanoparticles, lipid-based nanoparticles, and inorganic nanostructures	**2**
4	DNA and RNA Nanotechnology: Design, synthesis, and applications	**2**
5	Protein and Glyconanotechnology: Functionalization and biomedical utility	**2**
6	Carbon Nanotubes, Quantum Dots, and Bio-Nanomachines in biomedicine	**2**
7	Nanomaterials in Cancer Diagnosis and Targeted Therapy	**2**
8	Nanoparticles for Controlled and Targeted Drug Delivery	**2**
9	Nanotechnology in Tissue Engineering and Stem Cell-Based Therapies	**2**
10	Nanotechnology in Point- of - Care Diagnostics	**2**
11	Nano- Pharmacology and Drug Targeting	**2**
12	Cellular uptake mechanisms of nanomaterials	**2**
13	Introduction of Nanotoxicology	**2**
14	Target Organ Toxicity of Nanoparticles	**2**
15	Case studies and Regulatory needs, Ethical Issues and Safe-by-Design Approaches in Biomedical Nanotechnology	**2**
Total		30 hrs

Resource Person

Dr. Ashwini Kumar

Dr Ashwini Kumar is presently working as an Assistant Professor in the Department of Life Sciences, Sharda School of Basic Sciences and Research, Sharda University, Greater Noida, Uttar Pradesh. Previously, he has served as an Assistant Professor in the Biotechnology and Bioinformatics Area at NIIT University, Neemrana (Rajasthan), Department of Biotechnology at IMS Engineering College, Ghaziabad, and as a Lecturer in the Department of Biotechnology, National Institute of Technology, Raipur, Chhattisgarh. The central component of Dr Kumar's research has been biomaterial science, more specifically, in the field of novel drug delivery systems. The target applications of his research are formulating non-invasive and minimally invasive drug delivery approaches for better results both in terms of pharmaceutics and patient compliance. His interest also lies in the field of tissue engineering and diabetes. He has authored 23 journal articles in national and international journals, 9 book chapters, and a book. He also holds a patent on his work from PhD.

School:		**SSBT** **Batch: 2024-2026**	
Program:		**PG** **Current Academic Year: 2025-26**	
Branch:			
1	Course Code	**NVF2101**	
2	Course Title	**Translational Nanomedicine**	
3	Credits	**0**	
4	Contact Hours	**30**	
	Course Type	**Value Added Course**	
5	Course Objective	The course aims to provide postgraduate students with an in-depth understanding of nanotechnology principles and their translational applications in biomedical sciences. It focuses on the design, synthesis, and characterization of nanomaterials, their functional roles in drug delivery, diagnostics, tissue engineering, and regenerative medicine, as well as their toxicological implications.	
6	Course Outcomes	On successful completion of the course, students will be able to: CO1: Analyse novel function resulted from the nanoscale structures using scientific and technological principles CO2: Exemplifying knowledge of various nanoscale fabrication and characterization techniques CO3: Identify the unique elements of nanostructured materials for biomedical applications CO4: Determine mechanism of nanoparticles in drug delivery CO5: Deduce the nature and mechanism of toxic effects of nanoscale materials/particles on living organisms and other biological system. CO6: Illustrate the present and ever-developing state-of-art biomedical nanotechnology in the areas of tissue engineering, and stem cell research by considering the elements unique to nanostructured materials, nanostructures, nanofabrication techniques, and cell behavior.	
7	Course Description	This course will explore the world of micro/nanotechnology for applications in biomedical engineering. Topics that will be covered are prospects of nanomedicine and its importance in medical diagnostics, pathways to molecular manufacturing, molecular transport, and nano-sensor for medical applications. This course can provide employability in medical and pharma companies, paramedic clinical centers and educational institutes.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to nanomaterials**	
	A	Introduction to Nanotechnology: Definitions, principles, and Nano-Biomimicry	CO1, CO6
	B	Classification of Nanomaterials: 0D, 1D, 2D, and 3D structures	CO1, CO6
	C	Bio-nanomaterials: Polymer nanoparticles, lipid-based nanoparticles, and inorganic nanostructures	CO1, CO6
	Unit 2	**Nanotechnology in Cell Engineering**	
	A	DNA and RNA Nanotechnology: Design, synthesis, and applications	CO2, CO6
	B	Protein and Glyconanotechnology: Functionalization and biomedical utility	CO2, CO6

	C	Carbon Nanotubes, Quantum Dots, and Bio-Nanomachines in biomedicine	CO2, CO6
	Unit 3	**Nanomedicine for Cancer and Regenerative Therapies**	
	A	Nanomaterials in Cancer Diagnosis and Targeted Therapy	CO3, CO6
	B	Nanoparticles for Controlled and Targeted Drug Delivery	CO3, CO6
	C	Nanotechnology in Tissue Engineering and Stem Cell-Based Therapies	CO3, CO6
	Unit 4	**Nanotechnology in Drug Delivery**	
	A	Nanotechnology in Point- of - Care Diagnostics	CO4, CO6
	B	Nano- Pharmacology and Drug Targeting	CO4, CO6
	C	Cellular uptake mechanisms of nanomaterials	CO4, CO6
	Unit 5	**Nano-Toxicology**	
	A	Introduction of Nanotoxicology	CO5, CO6
	B	Target Organ Toxicity of Nanoparticles	CO5, CO6
	C	Case studies and Regulatory needs, Ethical Issues and Safe-by-Design Approaches in Biomedical Nanotechnology	CO5, CO6
	Mode of examination	Quiz/Viva	