



**Establishment of Centre of Excellence**  
**Amity Centre for Nanobiotechnology and Nanomedicine (ACNN)**  
[Established on 22/08/2019]

### 1. Introduction

Advances in nanotechnology, biotechnology, and biomedical sciences have created unprecedented opportunities to address pressing challenges in healthcare, environmental sustainability, agriculture, and industrial biotechnology. Nanobiotechnology and nanomedicine represent rapidly emerging interdisciplinary fields that integrate nanoscience with biological systems to develop innovative diagnostics, therapeutics, drug delivery systems, biosensors, regenerative medicine approaches, and sustainable biotechnological solutions. To capitalize on these opportunities and strengthen translational research and innovation, the **Amity Centre for Nanobiotechnology and Nanomedicine (ACNN)** was established, in 2019, as a multidisciplinary research and innovation hub within Amity University Rajasthan.

### 2. Background and Rationale

Nanobiotechnology and nanomedicine have emerged as transformative disciplines that integrate nanoscience, biotechnology, molecular biology, medicine, and environmental sciences to develop innovative solutions for some of the most pressing global challenges. The convergence of these disciplines offers unprecedented opportunities to address environmental pollution, antimicrobial resistance, disease diagnosis, targeted therapeutics, food security, and sustainable agriculture. Recognizing the growing importance of these interdisciplinary fields and their relevance to national priorities such as healthcare innovation, environmental sustainability, One Health, and climate-resilient agriculture, Amity University Rajasthan established the **Amity Centre for Nanobiotechnology and Nanomedicine (ACNN)** on 22 August 2019. The Centre serves as a multidisciplinary platform dedicated to advanced research, innovation, capacity building, technology development, and translation of scientific discoveries into practical solutions for societal benefit.

### 3. Mandate of the Centre

The Centre will serve as a platform for advanced research, technology development, capacity building, industry collaboration, and entrepreneurship in nanobiotechnology and nanomedicine, contributing to national priorities in healthcare, biotechnology, sustainability, and innovation.



#### **4. Vision**

To keep abreast of the developments taking place in the field of nanobiotechnology by fostering interdisciplinary research in emerging domains, aimed at delivering innovative, sustainable, and translational solutions for agriculture, environmental sustainability, medicine, and healthcare.

#### **5. Mission**

The mission of the Center is to advance interdisciplinary research, innovation, and translation by leveraging nanotechnology to address pressing challenges in environmental sustainability, antimicrobial resistance, and climate-resilient agriculture, while fostering scientific excellence and societal impact.

#### **6. Specific Objectives of the center**

##### **6.1 Develop Sustainable Nano-Enabled Solutions for Environmental Challenges**

- i) Design nano-assisted bioremediation technologies for degradation of plastics, xenobiotics, and environmental pollutants.
- ii) Harness microbial and enzymatic systems are integrated with nanomaterials for efficient and eco-friendly waste management.
- iii) Translate laboratory-scale innovations into field-deployable technologies through partnerships with industries, municipalities, and government agencies.

##### **6.2 Combat Antimicrobial Resistance Through Omics and Nanotechnology**

- i) Establish comprehensive AMR surveillance systems utilizing genomics, metagenomics, transcriptomics, proteomics, and bioinformatics.
- ii) Discover and characterize novel antimicrobial resistance determinants and mechanisms.
- iii) Develop nano-enabled diagnostics and therapeutic platforms to overcome multidrug resistance.

##### **6.3 Enhance Agricultural Sustainability and Climate Resilience**

- i) Investigate molecular mechanisms governing crop stress tolerance.
- ii) Develop nanocarrier-based delivery systems for genes, RNA molecules, nutrients, and agrochemicals.
- iii) Design nano sensors and nano fertilizers for precision agriculture and sustainable crop production.

##### **6.4 Promote Translation, Innovation, and Entrepreneurship**

- i) Transform scientific discoveries into technologies, products, patents, and start-up ventures.
- ii) Facilitate industry-academia partnerships and technology transfer activities.
- iii) Contribute to evidence-based policy development in health, agriculture, and environmental management.



#### **6.5 Build Human Resource Capacity**

- i. Train students, researchers, clinicians, and technologists in emerging areas of nanobiotechnology and nanomedicine.
- ii. Promote interdisciplinary education, research training, and professional development programs.

#### **6.6 National and International Collaboration**

- i) Foster collaborative research with academic institutions, hospitals, research laboratories, industries, and governmental agencies.
- ii) Participate in national missions and international research initiatives.

#### **6.7 Societal Impact and Outreach**

- i) Address national priorities related to environmental sustainability, public health, antimicrobial resistance, and food security.
- ii) Promote community engagement and dissemination of scientific knowledge.

### **7. Outreach activities**

The Amity Centre for Nanobiotechnology and Nanomedicine (ACNN) is committed to disseminating scientific knowledge and promoting awareness of emerging technologies among students, researchers, industry stakeholders, policymakers, and the wider community. The Centre shall undertake a comprehensive outreach program aimed at bridging the gap between scientific research and societal needs through educational, awareness, and capacity-building initiatives. Outreach activities will include organization of workshops, seminars, conferences, science exhibitions, public lectures, training programs, and awareness campaigns focusing on nanotechnology, antimicrobial resistance (AMR), environmental sustainability, plastic pollution, climate-resilient agriculture, and healthcare innovations. The Centre will actively engage with schools, colleges, farmers, healthcare professionals, municipal bodies, industries, and local communities to promote scientific literacy and adoption of sustainable technologies.

### **8. Infrastructure and facilities**

The Centre will utilize existing infrastructure and resources available at Amity University Rajasthan and shall progressively strengthen facilities to support its activities.

### **9. Expected Outcomes and Impact of the Amity Centre for Nanobiotechnology and Nanomedicine (ACNN)**

ACNN will focus on strengthening its organizational framework, enhancing laboratory infrastructure, and establishing interdisciplinary research groups in nanobiotechnology, nanomedicine, environmental biotechnology, antimicrobial resistance, and agricultural nanotechnology. The Centre will identify key research priorities, develop standard operating procedures, and establish collaborative networks with academic institutions, research organizations, industries, and healthcare partners. Faculty members and researchers will submit research proposals to national funding agencies such as DBT, DST, ANRF, CSIR, ICMR, and ICAR. The long-term impact of ACNN will extend beyond academic research and contribute directly to national development priorities, sustainable development goals, and societal well-being.



The development of nano-assisted bioremediation technologies will support circular economy initiatives and environmental sustainability. In the healthcare sector, ACNN's work on antimicrobial resistance, disease diagnostics, nanomedicine, and targeted drug delivery systems is expected to improve disease surveillance, enable early diagnosis, and facilitate the development of next-generation therapeutic interventions. These advancements will support public health systems, strengthen infection control measures, and contribute to the global fight against antimicrobial resistance under the One Health framework.

The Centre's research on crop stress tolerance, nano fertilizers, nano sensors, and precision agriculture technologies will contribute to climate-resilient agriculture, improved crop productivity, and enhanced food security. These innovations are expected to reduce dependence on conventional agrochemicals, improve resource-use efficiency, and support sustainable agricultural practices that benefit farmers and rural communities.

From an economic perspective, the Centre will foster innovation, entrepreneurship, and technology commercialization, leading to the development of new products, startup ventures, and industry partnerships. The resulting knowledge-based economy will generate employment opportunities, strengthen industry-academia linkages, and enhance regional and national competitiveness in biotechnology and nanotechnology sectors.

Academically, ACNN will establish Amity University Rajasthan as a recognized hub for excellence in nanobiotechnology and nanomedicine. The Centre will attract talented researchers, foster international collaborations, increase research visibility, and contribute to institutional rankings and reputation. Through education, outreach, and stakeholder engagement, the Centre will promote scientific awareness and evidence-based decision-making among policymakers, industries, healthcare professionals, and society at large.

## **10. Five-Year Activity Plan (2026–2031)**

### **Year 1: Infrastructure Strengthening and Capacity Building**

ACNN will focus on strengthening its organizational framework, enhancing laboratory infrastructure, and establishing interdisciplinary research groups in nanobiotechnology, nanomedicine, environmental biotechnology, antimicrobial resistance, and agricultural nanotechnology. The Centre will identify key research priorities, develop standard operating procedures, and establish collaborative networks with academic institutions, research organizations, industries, and healthcare partners. Faculty members and researchers will submit research proposals to national funding agencies such as DBT, DST, ANRF, CSIR, ICMR, and ICAR. Training programs, workshops, and seminars on nanotechnology, omics technologies, bioinformatics, and scientific writing will be organized for students and researchers.

### **Year 2: Research Expansion and Collaborative Networking**

The Centre will focus on expanding research activities and strengthening national and international collaborations. Major emphasis will be placed on projects related to plastic degradation, environmental bioremediation, antimicrobial resistance surveillance, nano-enabled diagnostics, and climate-resilient agriculture. The Centre will establish omics-



based platforms for metagenomics, transcriptomics, and proteomics studies and strengthen industry-academia partnerships for translational research.

### **Year 3: Technology Development and Innovation**

ACNN will focus on converting laboratory research into prototype technologies. Research efforts will concentrate on developing nano-enabled drug delivery systems, biosensors, antimicrobial nanoparticles, nanofertilizers, nanosensors, and plastic degradation technologies. Industry collaborations will be strengthened for validation and pilot-scale testing of technologies. Intellectual property generation and entrepreneurship development will become major priorities.

### **Year 4: Translation, Commercialization and Societal Outreach**

ACNN will focus on translating research output into products, services, and field applications. Pilot demonstrations of environmental remediation technologies, AMR diagnostic systems, and nano-agricultural products will be conducted in collaboration with industries, healthcare institutions, and farming communities. Outreach activities will be expanded through farmer training programs, school and college outreach, public awareness campaigns, and stakeholder engagement workshops.

### **Year 5: Centre of Excellence and Global Engagement**

The Centre will focus on establishing ACNN as a nationally recognized Centre of Excellence with strong international visibility. The Centre will expand international collaborations, participate in global research consortia, and pursue large multidisciplinary projects addressing One Health, antimicrobial resistance, environmental sustainability, and precision agriculture. The Centre will also develop long-term strategic partnerships with industries and governmental agencies for sustainable growth.

Submitted by

**Dr. Pushpender Kumar  
Sharma Associate  
Professor – AIB**

Recommended by

**Dr. Nitin Bhardwaj  
Registrar**



Approved by

**Prof. Amit Jain  
President**