NEWS LETTER

Centre for Nano Science and Technology (A.Y 2021-22)



Centre for Nano Science and Technology Institute of Science and Technology Jawaharlal Nehru Technological University Hyderabad





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Greetings! Centre for Nano Science and Technology, JNTUH is delighted to release its news letter. Nanotechnology is regarded and acknowledged as a triumph of human ingenuity in modern times, and this emerging field is leading to a technological revolution in the world. The academic year 2021-22 has been going with great zeal and more potential towards research. To train students and to adopt innovative approaches in Academic and Research. Centre has been offering M.Tech Nanotechnology and PhD in Nano Science and Technology since 2007. Centre has organised a UGC-Short term course on Synthesis and Characterization of nanomaterials in collaboration with Centre for Pharmaceutical Sciences. Faculty, Research Scholars and students have published about 13 publications and 06 Book Chapters Published in peer reviewed journals and SCI publications with good impact factor journals like Elsevier and science direct. Syllabus is revised in Nov 2021 with members from IITH, IICT, BITS-Hyd, UoH, Nano Span India Pvt Ltd etc. Centre offered 05 Value added courses and encouraged students to take-up coursera. Faculty are actively mentoring students towards their career development. Laboratories are upgraded with new equipments and established with Electrode Fabrication Equipment. Faculty has 04 ongoing R&D Projects sponsored by DST-Woman scientist scheme (WOS-A),DST SEED, DST SERB,AICTE-RPS.

About the Centre: The Center for Nano Science and Technology (CNST) at Jawaharlal Nehru Technological University Hyderabad (JNTUH) is a research center dedicated to the field of nanoscience and nanotechnology. JNTUH is a well-known technical university located in Hyderabad, Telangana, India. The CNST at JNTUH focuses on interdisciplinary research in the areas of nanoscience and nanotechnology, which involve studying and manipulating materials and devices at the nanoscale level. Nanoscience is the study of phenomena and manipulation of materials at the atomic, molecular, and macromolecular scales, while nanotechnology deals with the design, fabrication, and application of nanoscale materials and devices. The center aims to promote research, development, and collaboration in nanotechnology by providing state-of-the-art facilities and infrastructure. It offers a platform for researchers, academicians, and students to engage in cutting-edge research, explore innovative ideas, and contribute to advancements in nanoscience and nanotechnology. The research activities at CNST may include the synthesis and characterization of nanomaterials, fabrication of nanodevices, investigation of their properties and behavior, as well as their applications in various fields such as electronics, medicine, energy, and environmental science. The CNST also encourages collaborative research and partnerships with industry, academia, and other research institutions to foster technology transfer and commercialization of nanotechnology-based innovations. Overall, the Center for Nano Science and Technology at JNTUH plays a vital role in advancing research, education, and development in the field of nanotechnology, contributing to scientific progress and technological advancements in India.

Vision:

The Centre is committed to provide postgraduate academic and research programs to produce high quality human resource with ability to meet the global challenges and to become a world leader in research and teaching of Nano Sciences and Materials to address the local, national and international societal needs for the betterment of mankind and train the young researchers/students for advances in nano and materials technology.

Mission:

Nanoscience and Technology programme aims to provide quality interdisciplinary science and engineering education with state-of-the-art infrastructural facilities, engaging outstanding scientists from different branches of science and engineering, encouraging them to carry out their individual scientific research, the graduates can advance the frontiers of knowledge in Nanotechnology by developing and transforming them through research and innovations with major thrust on the following areas: sensors, medical nanotechnology, agricultural nanotechnology based solutions for energy and environment.

Program Educational Objectives (PEO's):

- PEO1: Apply the scientific knowledge of Physics, Mathematics, Chemistry, and Engineering for deeper understanding of the matter at nanoscale.
- PEO2: Identify, formulate, research literature, and analyze advanced scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- > PEO3: Design solutions for advanced scientific problems and design system components or processes.
- PEO4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PEO5: Create, select, and apply appropriate techniques, resources, and modern scientific and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PEO6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional scientific practice.
- PEO7: Communicate effectively on complex Scientific/Technological activities with the Scientific/engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PEO8: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning.

Programme Outcomes (PO's) :

- PO1: Apply principles of basic science concepts in understanding, analysis and prediction of matter at Nano scale.
- PO2: To introduce interdisciplinary areas for interdisciplinary application of Science and engineering concepts.
- > PO3: To introduce advanced ideas and techniques required in emerging areas in nanotechnology.
- PO4: To develop human resource with specialization in theoretical and experimental techniques required for career in academia and Nano technology driven industry.
- > PO5: Engage in lifelong learning and adapt to changing professional and societal needs.

Program Specific Outcomes: (PSO's):

- PSO1: Understand and apply principles of physics, chemistry and engineering for understanding the scientific phenomenon in nano domain.
- PSO2: Understand and apply Theoretical concepts on experimental learning of Nanosystems for describing and deeper understanding.
- > PSO3: Provide exposure in various specialization of Nanotechnology
- PSO4: Provide exposure to advanced experimental/theoretical methods for measurement, observation, and fundamental understanding of phenomenon at nanoscale and nano systems.
- > PSO5: Engage in research and life-long learning to adapt to changing environment.

Strength, Weakness, Opportunity and Challenges(SWOC) :

Strengths:

- > A variety of courses with adequate internal subject choice offered to students.
- > Well-equipped state-of-art facilities and computer laboratories.
- > Research oriented faculty with large number of publications in recognized journals.
- > Appreciable IRG from R&D Projects and good number of Research journals published.
- Strong research, innovation culture for collaborative inter-disciplinary/multi-disciplinary research.
- Students' engagement in research studies leading to publications/patents/design-based projects and entrepreneurial ventures.
- Various projects has been given from the first year for understanding the nanoscience from hands on experience.

Weaknesses:

- Teaching faculty is working in ad-hoc capacity as the permanent position has not been filled in departments for a decade due to delay at the level of the State Government. Similar situation exists for non-teaching staff too.
- > Inadequate levels of participation from foreign students for full time courses.

Opportunities:

- > Improve peer reviewed journal publication (Scopus, citation index, impact factor, h-index).
- Introduction of an organized system of summer internship and industry exposure would enhance employability of the students.
- Enrolling students to online courses at Government of India Swayam Portal would enhance their learning.
- > Utilization of UGC Swayam portal for MOOC courses.
- > To train students to get better placement.

Challenges

- > Recruitment of permanent faculty (teaching as well as non-teaching).
- > To initiate need-based and interdisciplinary courses.
- > Blending appropriate MOOC courses with the current curriculum to add value
- > Attracting core engineering company placements
- > Keeping pace with global development in pedagogy and research

Syllabus Revised: Yes

Number of Programmes offered: 02

S. No.	Program Name	PG	Sanctioned	Year	Regular/Self finance
			intake	of	
				startin	
				g	
1	M.Tech(Nano	PG	25 (18+7)	2007	Regular
	Technology)				
2	Ph.D(Nano	Ph.D	-	2010	Regular & Part-Time
	science				
	and Technology)				

Academic Year	Program Name	Program Code	Number of seats sanctioned	Number of students admitted
2021-22	M.Tech (Nanotechnology)	D66	25	08

Value Added Courses offered:

- 1. IPR patent writing and research methodology (VAC 16)
- 2. Fabrication of smart nanomaterials (VAC 17)
- 3. Bio-inspired nanostructures for textile applications (VAC 18)
- 4. Selection of nanomaterials for energy systems (VAC 19)
- 5. Carbon nanostructures preparation and its applications (VAC 20)

Mentor-Mentee Details:

S.No	Mentor name	No. of mentee
1	Dr.CH Shilpa Chakra	3
2	Dr. K.Venkateswara Rao	3
3	D.Rakesh	2

Faculty Details:

S.No	Name of the Faculty	Designation	Qualification	Experie nce (Years)
1	Dr.K.Venkateswara Rao	Professor of Nanotechnology & Controller of Exams,JNTUH	M.Sc.,M.Tech.,Ph.D.,PDF Raman Postdoctoral fellow (2016-17),Johns Hopkins Medicine, USA	24
2	Dr.CH Shilpa Chakra	Assistant Professor of Nanotechnology & Head of the Department	B.Tech.,M.Tech., Ph.D	11
3	Mr.D.Rakesh	Assistant Professor (Contract)	B.Tech.,M.Tech.	11

Student Pass Percentage : 92%

R & D PROJECTS: 4 (DST-Woman scientist scheme (WOS-A),DST SEED, DST SERB,AICTE-RPS)

Full time scholars with fellowship:

S.No	Name of the Full-Time Research scholar	Type of Fellowship	Name of the supervisor	Research area
1.	V. Sai Kumar	Research Assistantship (RA)	Dr.K.Venkates wara Rao	Electrochemical sensors
2.	S. Madhuri	Research Assistantship (RA)	Dr.CH Shilpa Chakra	Energy Storage
3.	T. Rakesh Kumar	DST-JRF/SRF	Dr.CH Shilpa Chakra	Supercapacitors
4.	K. Shireesha	DST-JRF/SRF	Dr.CH Shilpa Chakra	Supercapacitors
5.	CH. Harish	CSIR-UGC- NET	Dr.K.Venkates wara Rao	Energy applications
6.	Dr. Divya Velpula	DST-Woman scientist scheme (WOS-A)	Dr.CH Shilpa Chakra	Electrochemical applications

Part-time scholars:

S.No	Name of Research	Name of the supervisor	Research area
1.	S. Sasirekha	Dr. K Venkateswara Rao	Nano Lithium batteries
2.	A.Saineeta	Dr. K Venkateswara Rao	Gas sensors
3.	Neetu Rani.P	Dr. K Venkateswara Rao	Gas sensors

Teacher Awards/Recognitions:

Dr. Ch. Shilpa Chakra :

- 1. Fellow of LSF-Asian Record Book in the area of Science & Technology from LSF-Asian Record Book
- 2. Young Researcher award from Institute of Researchers recognized by MSME
- 3. Vivekananda prize from Institute of Researchers recognized by MSME





No of Paper publications: 12

No of Workshop/Conferences/seminars Organized: 01

No of Workshop/Conferences/seminars Attended: 21

No of Books published: 05

No of patents filed/Published:01

Membership in National/International bodies:

- Life Member of Indian Science Congress
- Life Member of Electron Microscope Society of India
- Life Member of Nano and Molecular Society
- Life Member of Indian Crystallographic Association
- Life Member of Nano Science and Technology Consortium
- Life Member of Powder Metallurgy Association of India
- Life Member of Society for Materials Chemistry

No of students placed: 03

No of Class rooms: 01

List of ICT enabled tools: LCD Projector, LED TV, Desktop Computers with LAN facility

Total No of computers in simulation Lab: 13

Laboratories:

Nano-Energy R& D lab (DST & AICTE Funded)				
S. No.	Name of the Major Equipment	Purpose/Usage		
1	Electrode fabrication Equipment	Academics & Research		



Workshop photos:



Principles, Synthesis and Characterization of Nanotechnology - Current and Future Approaches

Tech Fest -2022



Research Outcomes:

- 1. Research was focused on the synthesis, characterization, and applications of various nanomaterials such as nanoparticles, nanotubes, and nanocomposites. This includes exploring their unique properties and potential applications in fields like electronics, energy storage, catalysis, and biomedicine.
- 2. Developed and optimized fabrication techniques for creating nanostructures and devices. This involves advancements in lithography, nanolithography, self-assembly, and other nanoscale manufacturing processes.
- 3. Utilized nanomaterials and nanodevices for energy generation, storage, and conservation. This involves research on nanoscale solar cells, energy harvesting devices, energy-efficient materials, and nanocatalysts for fuel cells.

Best Practices:

- 1. Identified areas of research within nanotechnology that aligns with your interests and career goals. Develop a clear research plan and stay focused on objectives throughout M.Tech program.
- 2. Actively engaged in collaborations with fellow students, faculty members, and professionals in the field. Attend conferences, seminars, and workshops to expand your network and stay updated on the latest research findings.



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