

SPECIAL CENTRE FOR NANOSCIENCES

Special Centre for Nanoscience (SCNS) is a newly created inter-disciplinary research and teaching centre at JNU. The Nanoscience related research topics pursued currently include ferromagnetic nanostructures, magnetic nano composites, microwave absorbers and nano-devices, magnetic nano particles based target-specific drug-delivery & treatment of cancer cells by radio-frequency-(RF) Hyperthermia, nano-biotechnology, bio-sensors, hybrid nanomaterials, anti-bio films, Electron microscopy, ferroelectric /multiferroic nanocomposites, soft condensed matter, nanoscale interface, etc.

The Centre has faculty members with background in Physics, Electronics, Biology, Materials Science, and Electron Microscopy.

Presently, Common Instrumentation Facility (CIF) of the Centre has nanomaterial synthesis and nano-biosynthesis labs consisting of all basic characterization facilities including UV-vis, Raman spectrophotometer, BOD incubator, Laminar Hood, Dynamic Light Scattering, Zeta Potential Measurement, UV-NIR Spectrophotometer, Viscometry, Tensiometry, Potentiostat-Galvanostat, Cell culture facility, Fluorescence Spectrophotometer, Contact Angle Measurement, Elisa Reader, etc.

The Nano-electronics and microwave laboratory consists of DC and microwave probe-stations, microwave nano-devices testing facilities like; Vector Network Analyzer (Keysight Inc. PNA - 44 GHz), Spectrum Analyzer (Rohde and Schwarz Inc. - 40 GHz), Microwave Power Amplifier (Marki microwave inc.) for absorber testing, angle and temperature dependent variable-frequency Ferromagnetic Resonance (FMR) system. For nanostructure deposition we have multi-target RF Sputtering and thermal evaporation system. For in-vivo and in-vitro study we have automated Radio-Frequency Hyperthermia system (MSI AUTOMATION, INC.) on mouse model and human cell-lines.

The Ferroelectrics and Multiferroics Characterization laboratory consists of Impedance Analyzer (20-120 MHz, Keysight Technologies), Sawyer Tower Ferroelectric/Multiferroic Hysteresis Loop Measurement Setup; Liquid Nitrogen Cryostat (77 – 800K) etc.

Nanobio lab consists of human cell culture and storage facility (-20oC). We also have Fluorescence Microscope to monitor nanotoxicity and nanobiointerface. We have Multichannel Electrochemical analyzer to get electrochemical response of multianalytes on a single electrode. Beside this, we have Electrospinning setup for synthesis of nanofibres for biomedical application.

Thin-film laboratory has a RF-DC magnetron sputtering system. Presently thin-films and bulk materials of functional oxides are being synthesized using mixed oxide and wet chemistry methods. Lead-free ferroelectrics and antibiofilms are currently being investigated. TEM investigations are an integral part of the research which will be carried out at AIRF of the university. Ion milling machine for preparing TEM samples is being installed at AIRF.

A wide range of analytical facilities including XRD, Transmission Electron Microscopy, Scanning Electron Microscopy, PPMS, Confocal Microscope, and other on-line cell imaging facilities are available at the Advanced Instrumentation and Research Facility (AIRF), which is a central facility of the JNU.

PROGRAMME OF STUDY

(i) Admission to Ph.D. programme in Nanoscience

Suitable courses may be prescribed for candidates admitted to the Ph.D. programme.

(iii) M.Tech. programme in Nanoscience /Nanoelectronics

M.Tech. Degree Credit Requirements:

No student admitted to the program shall be eligible for the award of M.Tech. degree unless he/she secures 55 credits in all out of which at least 45 credits shall be for course work and 10 credits for the dissertation and final presentation. Students securing minimum required CGPA as per ordinance will be eligible for M. Tech. degree.

M.Tech Programme in Nanoscience (NS) & Nanoelectronics (NE)

Sl. No.	Name of Centre	Sub. Code & Sub. Code Number	Eligibility	Additional Information
1	Special Centre for Nano Sciences	Nanoscience – NNST (182)	Master Degree in any branch of Science, or B.E/B.Tech in any branch of engineering & Technology with 55% marks	<p>The admission to M.Tech program will be based on an All India Examination, conducted by the University at different centres spread all over the country, followed by an interview. M.Tech student have to work in the chosen field under the guidance of a faculty for the Minor and the Major project and has to submit a dissertation at the end of the fourth semester. The students will be encouraged to work in an industry or research institution for their Major Project.</p> <p>The courses designed this program are well organized to provide a wide spectrum of choices to the students. The faculty and the student's interests include a wide area. Elective courses in NS and NE allow the students to choose a particular field according to their areas of interest.</p> <p>Admission will be through entrance examination. Candidates must appear in the written examination conducted by the University. Based on the written test, short-listed candidates will have to appear in the interview. Admission is offered to candidates finally selected on the basis of their performance in the written test and the interview.</p> <p>P.G. holders of AYUSH related subjects are also eligible to apply.</p>
2		Nanoelectronics – NNET (190)	B.E./B.Tech in Electronics & Communication/Electrical Engineering or M.Sc. Electronics with 55% marks.	

Ph.D.

Sl. No.	Name of Centre	Sub. Code & Sub. Code Number	Eligibility
1	Special Centre for Nano Sciences	Nano Sciences – NNSH (908)	<p>Candidates shall be considered for admission to the Ph.D. programme on the following basis:</p> <p>(a) Obtained M.Phil Degree with 55% marks of a recognized University/Institution with one publication and Master's Degree/BE/B.Tech with 55% marks or equivalent Grade 'B' in UGC 7-point scale (or an equivalent Grade in a point scale wherever Grading system is followed).</p> <p align="center">OR</p> <p>(b) Master's degree in the relevant field with 55% marks of a recognized University/Institution or equivalent Grade 'B' in UGC 7-point scale (or an equivalent Grade in a point scale wherever Grading system is followed).</p> <p>Relaxation to SC/ST/OBC (Non creamy layer)/Differently abled as per the UGC Regulations 2016</p>