

**COURSE TITLE: NANOTECHNOLOGY: Insights into Properties of Materials from Computational Modeling Methods**

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## Overview

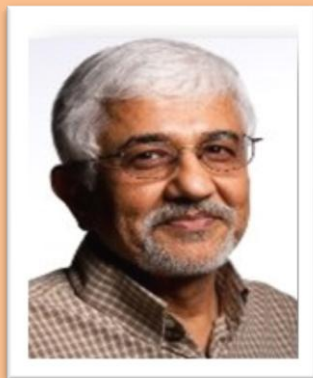
Nanotechnology is a technology that relies in the regime between one to hundred nanometers, viz. billionths of the meter. In this course, students will learn about computational modeling methods which are being used to gain insight into properties of materials for applications in nanotechnology. For example, discovery of carbon related nanostructures including fullerene, nanotubes and graphene have sparked an extraordinary amount of research activities on their unique properties and novel applications in electronics and optoelectronics. However, the gapless nature of graphene is one of the import obstacles for its applications in transistors. This is now being addressed by computer modeling methods together with experimental methods. In this course, the students will learn about quantum chemical methods based on density functional theory to determine structural, mechanical, electronic and optical properties of materials at nanoscale. Also, the students will learn how to simulate and characterize device configuration based on nano materials. The course will be planned and offered as per the norms set by Guru Jambheshwar University of Science and Technology.

<b>Modules</b>	<p><b>Module A: Nanotechnology and Computational Modeling Methods</b></p> <p><b>1. October 16, Sunday</b></p> <p><b>Inauguration: 9:00 AM</b></p> <ul style="list-style-type: none"><li>a. <b>Lecture 1:</b> 9:30 to 10:30 AM Introduction to nanotechnology</li><li>b. <b>Lecture 2:</b> 10:45 to 11:45 AM Introduction to materials</li><li>c. <b>Tutorial 1:</b> 2:00 to 4.00 PM Problem solving session with examples</li></ul> <p><b>2. October 17, Monday</b></p> <ul style="list-style-type: none"><li>a. <b>Lecture 3:</b> 9:30 to 10:30 AM Introduction to methods in modeling of materials</li><li>b. <b>Lecture 4:</b> 10:45 to 11:45 AM Introduction to methods in modeling of materials</li><li>c. <b>Tutorial 2:</b> 2:00 to 4.00 PM Problem solving session with</li></ul>
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	<p>examples</p> <p><b>3. October 18, Tuesday</b></p> <p>a. <b>Lecture 5:</b> 9:30 to 10:30 AM Recapitulating Nanotechnology and Computational modeling</p> <p>b. <b>First Exam for Participants :</b> 11:00AM to 12:30 AN</p> <p><b>Module B: Device characteristics</b></p> <p><b>4. October 19, Wednesday</b></p> <p>a. <b>Lecture 6:</b> 9:30 to 10:30 AM Introduction to electronic devices</p> <p>b. <b>Lecture 7:</b> 10:45 to 11:45 AM Introduction to theory of electron transport</p> <p>c. <b>Tutorial 3 :</b> 2:00 to 4 PM Problem solving session with examples</p> <p><b>5. October 20, Thursday</b></p> <p>a. <b>Lecture 8:</b> 9:30 to 10:30 AM Recapitulating Device characteristics</p> <p>b. <b>Second and Final Examination :</b> 10:45AM to 12:15 AN</p> <p>c. <b>Valediction :</b> 2:00 PM to 2:30 PM</p> <p><b>Number of participants for the course will be limited to fifty.</b></p>
<p><b>You Should Attend If...</b></p>	<ul style="list-style-type: none"> <li>• Executives, engineers and researchers from manufacturing, service and government organizations including R&amp;D laboratories.</li> <li>• Student at all levels (B.Tech/M.Sc./M.Tech./Ph.D) or Faculty from reputed academic institutions and technical institutions.</li> </ul>
<p><b>Fees</b></p>	<p>The participation fees for taking the course is as follows:  <b>Participants from abroad : US \$500</b>  <b>Indian Industry/ Research Organizations: Rs. 2,000</b>  <b>Indian Academic Institutions: Rs. 1,000</b></p> <p>The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis, subject to availability.</p>

## The Faculty

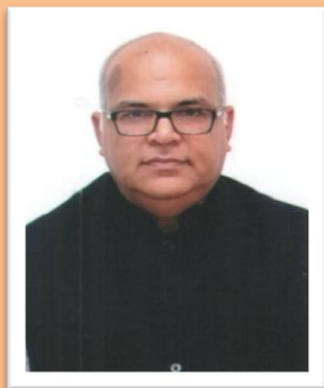
### Foreign faculty



Ravindra Pandey is Professor and Chair of Physics at the Michigan Technological University, Houghton, MI. Pandey received his education at Hari Singh Gaur University, Sagar, National Physical Laboratory, Delhi, Atomic Energy Research Laboratory, Harwell, UK and University of Manitoba, Winnipeg,

Canada. He has participated in multi-disciplinary efforts (theoretical and experimental) to build the programs in novel nanostructures, and application of chalcopyrite semiconductors as the next generation optoelectronic materials with the industrial and national laboratories, and is the author of more than 150 publications. He has also co-organized and participated in several international conferences in the areas of Materials Physics and Nanoscale Science. Pandey is Fellow of American Physical Society.

### Host faculty



Dr. Tankeshwar is Vice Chancellor of Guru Jambheshwar University of Science and Technology. He did his M.Sc and Ph.D(1990) in Physics from Panjab University, Chandigarh. He did his post-doctorate research at International Centre of Theoretical Physics, Italy in the year 1990-91. He has worked at Panjab University

as UGC Professor. The work done by Dr Tankeshwar over nearly two and a half decades makes distinct contributions to understanding of transport phenomena which finds numerous applications in various branches sciences. His scientific contribution to transport properties of liquids and fluid confined to different nano-geometries. Several exact sum rules have been derived for various dynamical time correlation functions. One of important contributions is to show that confinement at nano length scale results in local and anisotropic diffusion.

## Course Co-ordinator

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