

# Modeling, Simulation, Performance Evaluation and Biological Safety for Medical Devices for Respiratory and Cardiovascular Assistance

## Overview

Medical Devices and Technologies research and development requires a thorough knowledge of various disciplines and a network of multi-disciplinary researchers. In India state of the art medical device development is in its early stage. There is a perceived lack of approved regulations for evaluation of safety and performance of medical devices in India. Software play a significant role in ascertaining the safety and evaluating the performance of medical devices. The coordination among professionals developing medical devices from different multi-disciplinary fields need to be encouraged and enhanced both nationally as well as internationally. The state of the art tools are needed for design, development and performance evaluation of medical devices for the trouble free operation of such devices over a long duration. The time is right for incorporation of state of the industrial concepts such as digital twinning into the condition monitoring of such systems. The medical devices developed should be cost effective and work with high efficiency with appropriate safety considerations. This course will be beneficial for manufactures of medical devices, officers of regulatory bodies in India, biomedical engineers clinicians, doctors and researchers in the relevant fields.

The optimal performance of any medical device depends on a number of variables which need to be ascertained through state of the art analysis and the design features embedded in the device. By using a testing protocol which is supported through software simulation in these processes, it would be possible to attain twin objectives at lower cost and higher efficiency. It is hoped that the trained professional will be able to design and develop medical devices through a considered use of software simulations with appropriate testing regimes.

<b>Modules</b>	<ol style="list-style-type: none"> <li>1. Introduction to Medical devices</li> <li>2. Safety and Performance Evaluation and Standards of Medical devices</li> <li>3. Modeling and Simulation of human Arterial Stenosis</li> <li>4. Modeling and Simulation of ventricular assist devices</li> <li>5. Biological safety features of ventricular assist devices</li> <li>6. Performance evaluation of ventricular assist devices</li> <li>7. Fault features diagnostics and control in ventricular assist device Modeling</li> <li>8. Design analysis of stent</li> <li>9. Optimal design of stents</li> <li>10. Biological safety of stents</li> <li>11. Modeling and simulation of flow through inhalers and human airway modeling</li> <li>12. Performance evaluation and fault evaluation in the effective use of inhalers through simulations</li> <li>13. Biological Performance evaluation and safety features for effective use of inhalers</li> <li>14. Digital twinning of biological systems</li> <li>15. Safety analysis of medical devices</li> </ol> <p><b>Dates: March 22 - April 02, 2018</b>  <b>Number of participants for the course will be limited to 40.</b></p>
<b>Who should attend</b>	<ul style="list-style-type: none"> <li>• Executives, engineers and researchers from healthcare, 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 and technical institutions.</li> </ul>
<b>Fees</b>	<p>The participation fees for taking the course is as follows:</p> <p><b>Participants from abroad : US\$300</b>  <b>Industry/ Research Organizations: INR 5,000.00</b>  <b>Faculty from Academic Institutions: INR 1,000.00</b>  <b>Students: INR 100.00</b></p> <p>The above fees include all instructional materials, computer usage for tutorials and assignments, and free internet facility. The participants will be provided with boarding and lodging in campus on payment basis subject to availability.</p> <p>All course registrations will processed via the national GIAN portal (<a href="http://gian.iitgp.ac.in">gian.iitgp.ac.in</a>), where a Rs. 500/- one-time fee is payable in addition to the above amount.</p> <p>Registration fee can be directly deposited through NEFT to the designated account as given below or can be sent in the form of demand draft (D.D.) drawn on any nationalized bank in favor of <b>“GIAN-Modeling 2017”</b> payable at Allahabad.</p> <p><b>Account Name: GIAN-Modeling 2017</b>  <b>Account No. 718400301000286</b>  <b>Bank: Vijaya Bank, MNNIT Branch, Allahabad-211004, UP, INDIA</b>  <b>IFSC Code: VIJB0007184</b>  <b>Last Date of Registration: 12 March, 2018</b></p>

# The Foreign Faculty



**Prof. Rakesh Mishra** is Professor of Fluid Dynamics at University of Huddersfield. Professor Mishra's main teaching area is Thermo-fluids and various modules taught by him include Aerodynamics, Thermodynamics, Automotive Power Units and Computational Fluid Dynamics. Professor Mishra leads the 'Energy Emission and the Environmental research

group' within the Centre of Efficiency and Performances Engineering of the University. Professor Mishra also contributes to highly successful IMechE accredited Mechanical, Automotive and Energy Engineering courses at different levels. These courses recruit students from all over the world. Professor Mishra is a chartered Engineer and a Fellow of Institution of Mechanical Engineers as well as a Fellow of Higher Education Academy.

Prof. Mishra is an active consultant to many Thermo-fluid industries and has run a number of knowledge transfer partnerships successfully. Prof. Mishra is very active in renewable energy research and is involved with many renewable energy organizations. Prof. Mishra is also a member the Fluid Mechanics & Fluid Power Society of India which promotes effective use of fluid power in developing economies. Prof. Mishra has published more than 150 papers in various journals and conference proceedings of repute and has been invited to give key note lectures in various conferences. Prof. Mishra has also organised and chaired a number of conference sessions dealing with green issues.



**Dr. R.P. Tewari** is Associate Professor in the Department of Applied Mechanics at Motilal Nehru National Institute of Technology, Allahabad, India. He is a life member of ISTE, New Delhi and Biomedical Society of India. His research interests include Biomechanics, Biomaterials, Bio-instrumentation and Rehabilitation Engineering.

## Course Coordinator

**Dr. R.P. Tewari**  
Coordinator  
Phone No. 09450603682  
Email: [rptewari@mnnit.ac.in](mailto:rptewari@mnnit.ac.in)

---

## Local Coordinator

**Dr. G.P. Sahu**  
Local Coordinator  
Phone No. 09305508002  
Email: [gsahu@mnnit.ac.in](mailto:gsahu@mnnit.ac.in)

---

<http://www.gian.iitgp.ac.in>