



A 5-DAY SHORT TERM COURSE

UNDER NATIONAL EDUCATION POLICY (NEP) PROGRAMME

(ONLINE MODE)

On

Understanding Complex Fluids: Theoretical & Experimental Techniques

29th November – 3rd December, 2021



Organised by
Department of Physics
National Institute of Technology Manipur
Imphal, Manipur, India, 795004



Understanding Complex Fluids

Theoretical & Experimental Techniques

About NIT Manipur

National Institute of Technology, Manipur, a centrally funded institution is set up to impart quality technical education at various levels of higher learning. It is one of the ten new NITs established and developed as "Institute of National Importance" by an act of Parliament in 2007. NIT Manipur started its first session with the three branches of Engineering: Electrical & Electronics Engineering, Electronics & Communication Engineering, and Computer Science Engineering. The functioning of the institute was started at its temporary campus at Takyelpat, Imphal under the mentorship of NIT, Agartala. As one of the National Institutes of Technology (NIT), the Institute has the responsibility of providing high-quality education in Engineering, Technology, and Sciences to produce competent technical and scientific manpower for the country. The Institute offers BTech, MTech, MSc, MBA, and Ph.D. programs in several disciplines of Engineering, Technology, and Sciences. The institute has acquired 341.5 acres of land in lush green areas of Langol, Imphal. The Institute being accorded the status of "An Institute of National Importance" aspires to be a knowledge hub for the region. The Institute through its academic and research activities would act as incubation center for aspiring "technopreneurs". The Institute provides an



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ideal platform for national integration through emotional integration as half the students are from outside the state. It envisions being an institute producing human resource of the world class standard who will contribute significantly in the well being of mankind.

About the Course

Materials which can be easily deformed by thermal fluctuations and external forces are categorized as complex fluids or soft matter. Not only do these materials have many industrial applications, they are also related to biological systems which put complex fluid at the center of a wide range of disciplines. Given the importance, it is necessary to understand and share the physics of this fascinating fluid to a wider audience.

Course Objectives

1. Starting from simple liquids this course will introduce to a wide variety of materials which are categorized as complex fluids.
2. Physics of complex fluids: Theoretical description, experimental methods, and computational methods to explore.
3. Applications in industry and future outlook.



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ABOUT THE SPEAKERS

Dr. Rajesh Kumar Bhushan



He is presently the Dean (Academics) and professor in the Department of Mechanical Engineering, NIT Manipur. He is also a Certified Energy Manager and Energy Auditor by Bureau of Energy Efficiency, Ministry of Power Government of India. He has a broad area of interest such as design of bio-enabled structures, high performance computational modelling of engineered systems, multi-disciplinary design optimization, cybersecurity in design, additive manufacturing of complex and composite materials, anti-reverse engineering technologies, artificial, fabrication, characterization and machining of composites, micro manufacturing, nano-materials, and application of optimization techniques.

Dr. Shagolsem Lenin Singh



He is an assistant professor in the Department of Physics, NIT Manipur. In 2013, he received his Ph.D. from Leibniz Institute of Polymer Research Dresden, Germany, and was a postdoctoral fellow at Bar-Ilan University, Israel (2014-2015). He has, under his name, DST-INSPIRE Faculty Award in Physics (2015) and ECAMP-IGS Fellowship (2011). His primary research interest is in the broad area of soft-matter physics, where Physics, Chemistry, and Biology often meet. His major focus has been to investigate various equilibrium and non-equilibrium properties of polymeric systems (nanocomposites,



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thin-films, cyclic polymers, etc.) which have huge potential for modern technological devices. Another direction of research is on biologically motivated physical problems. He develops simple models for these systems and employs computer simulations as a tool to explore polymer-nanoparticle interactions, polymers in non-equilibrium, multi-component fluids, modeling intra-cellular transport.

Dr. Bibhu Prasad Swain



He is an Associate Professor & (HOD) in the Department of Physics, NIT Manipur. He received his Ph.D. from IIT Bombay. He was awarded JSPS Fellow (Govt. of Japan), Brain Korea 21 Fellow (Materials Research, Seoul National University) and NRF Fellow (University of Cape Town, South Africa) in his postdoctoral career. His broad areas of research interests include large bandgap semiconductors, mechanical hard-materials, nanostructured materials, graphene based super-capacitor, photovoltaic materials, biocompatible coating, modeling of advanced MOSFET. He has published 110 SCI/SCIE/Scopus indexed international journals, 15 book chapters and 1 Book in his credit.

Dr. Dushyant Singh



He is an assistant professor in Mechanical Engineering Department at NIT Manipur, India since Oct. 2015. He received his Ph.D. from IIT Delhi in 2014. Prior to joining NIT Manipur, he was working as a postdoctoral researcher in



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joint industrial research work "Ultra-super critical power plant" with BHEL industry in IIT Delhi. His area of interest includes experimental and numerical analysis of heat transfer enhancement, use of new experimental techniques in fluid flow and heat transfer, turbulent flows and computational fluid dynamics (CFD) to mention a few.

Course Registration

Registration fee (Including GST)

1. ₹ 750/- for Faculty/Professionals
 2. ₹ 500/- for Research Scholar/Ph.D. Students
 3. ₹ 300/- for PG/UG
- *No registration fee for students and faculty of NIT Manipur.

Bank Details

Name: Director NIT Manipur IRG
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After payment, please fill your personal details at: <https://forms.gle/pEmpfuVLdEprVobM6>

Last date of registration

November 28, 2021

Course coordinators

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2. Dr. Bibhu Prasad Swain
 Associate Professor, Department of Physics




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SCHEDULE

	MORNING SESSION		EVENING SESSION	
	10:15 am – 11:45 am		01:00 pm – 02:30 pm	02:45 pm – 05:00 pm
Day 1 (29/11/21) Monday	<i>Brief outline of NEP – 2020</i> Dr. Rajesh Kumar Bhusan		<i>A brief overview on simple and complex fluids</i> Dr. Shagolsem Lenin Singh	<i>Discussion/Hands-on session</i>
Day 2 (30/11/21) Tuesday	<i>Physics of macromolecules: Static, dynamics & complex structure formation</i> Dr. Shagolsem Lenin Singh		<i>Computer simulations in soft matter – 1</i> Dr. Shagolsem Lenin Singh	
Day 3 (1/12/21) Wednesday	<i>Computer simulations in soft matter – 2</i> Dr. Shagolsem Lenin Singh		<i>Structure determination of polymer nanocomposites by small-angle scattering</i> Dr. Bibhu Prasad Swain	<i>Discussion/Hands-on session</i>
Day 4 (2/12/21) Thursday	<i>Polymer Materials of Energy and Electronic applications</i> Dr. Bibhu Prasad Swain		<i>Polymer nanofibers for biomedical and biotechnological applications</i> Dr. Bibhu Prasad Swain	<i>Discussion/Hands-on session</i>
Day 5 (3/12/21) Friday	<i>Modelling of fluid flow in industry – 1</i> Dr. Dushyant Singh		<i>Modelling of fluid flow in industry – 2</i> Dr. Dushyant Singh	<i>Closing</i>