National Institute of Technology Calicut

The Department of Physics is organizing a five day GIAN COURSE on

SOFT MATTER IN PHYSICS, BIOLOGY AND MATERIALS SCIENCES: PROGRAMMABILITY, ACTUATION AND RECONFIGURABILITY

24th to 28th November 2025

About the GIAN course

Soft Matter encompasses a broad variety of systems (colloids, polymers, interfaces, gels, complex fluids, liquid crystals, surfactants, etc.) and phenomena (wetting, adhesion, capillary phenomena, adsorption, etc.). The proposed GIAN course will explore the highly interdisciplinary nature of soft matter, ranging from physical to biological systems. Active soft matter, soft DNA nanotechnology, synthetic biology, drops and liquid marbles, programmability and actuation methods, soft surface engineering and reconfigurable photonics, are some of topics that will be presented in a unique transversal manner. Participants will be exposed to experimental soft matter systems, and will get hands-on training on fabrication as well as characterization of the same. Considering the interdisciplinary nature of the topics, it is expected that the program will be highly beneficial to the participants with Physics, Chemistry, Chemical Engineering, Biology or Materials Science backgrounds.

Resource person

Prof. Damien Baigl
Department of Chemistry, Ecole Normale Supérieure (ENS), Paris
Website: https://www.baigllab.com/

Prof. Damien Baigl is an Exceptional class Professor (PR EX2, IUF senior) at Ecole Normale Supérieure (ENS), Paris. Prof. Baigl completed his PhD in soft-matter physics at Collège de France, Paris, France (laboratory of P.-G. de Gennes). Prof. Baigl’s research area includes soft matter, synthetic biology, microfluidics, DNA nanotechnology and photo-actuated systems. He has secured prestigious awards like the JSPS in 2003, European Research Council starting grant in 2010, 2016 Soft Matter Lectureship from the Royal Society of Chemistry, Del Duca award from the Institut de France in 2016, Grand Prix Mergier Bourdeix from the French Academy of Science in 2018 and the Advanced Grant laureate from the European Research Council in 2023. Prof. Baigl has published more than 100 research articles in reputed journals like Nature Nanotechnology, Physical Review Letters, Angewandte Chemie, JACS, ACS Nano, Nano Letters, Advanced Materials, Langmuir, etc.

Objectives of the GIAN course

The primary objectives of the course are as follows:

I. To provide a unique and global view on soft matter across disciplines (physics, biology, chemistry, materials science, engineering) and systems (DNA, proteins, surfactants, colloids, interfaces, fluids, interfaces, drops and flows).

II. To expose participants to experimental soft matter, and provide hands-on training on the designing and fabrication of different soft matter systems.

Who can participate

I. Faculty from academic and technical institutions.

II. Students at all levels (B.Sc./B.Tech./M.Sc./M.Tech./PhD)

III. Executives, scientists, engineers and researchers from academia, government organizations and industry, including R&D laboratories.

Registration details

Attendees: 50 (selection based on merit and first come, first serve basis)

Registration Fee:

Student - Rs. 1,000 + 18% GST

Faculty - Rs. 5,000 + 18% GST

Industry - Rs. 10,000 + 18% GST

Participants from abroad - US $ 250 + 18% GST

How to Register:

Stage 1: Course Registration

Initially fill all the details and register for the course using the given Google form and confirm your registration. https://forms.gle/fs6czrLfe4NLtHpNA

Last date for Course Registration: 15th September 2025

Stage 2: Course Fee Payment and Complete Registration (Only selected candidates):

The Selected Candidates will be intimated through E-mail by the Course Coordinator.

Last date for fee payment will be intimated through confirmation E-mail.

Accommodation

In view of limited availability of rooms, accommodation will be provided on first come first serve basis, on payment basis. Participants will not be entitled for payment of any TA/DA.

Host faculty

Dr. Subramanyan N Varanakkottu

Assistant Professor, Department of Physics, NIT Calicut

Expertize: Optofluidics, Soft matter, Droplet Microfluidics

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Lecture Schedule

Day 1
Lecture 1: Introduction to Soft Matter and objectives of the GIAN course.
Lecture 2: Wettability switching over soft surfaces: Fundamentals to applications.
Tutorial 1: Fabrication of soft polymer surfaces and wettability studies
Day 2
Lecture 3: Programming or mimicking biological/non-biological functions: soft matter and synthetic biology.
Lecture 4: Liquid Marbles: Physics of liquid marble formation, stability criteria and applications.
Tutorial 2: Building a synthetic cell: how and what for?
Day 3
Lecture 5: Programming nanostructures: soft matter and DNA nanotechnology.
Lecture 6: Slippery surfaces: mimicking the nature for a new class of surfaces.
Tutorial 3: Behaviour of particles/drops at a liquid surface
Day 4
Lecture 7: Soft matter actuation: light- and magnet-driven microfluidics
Lecture 8: Softmatter microoptics: A potential route towards reconfigurable photonics.
Tutorial 4: Challenges in DNA nanotechnology and soft matter actuation.
Day 5
Lecture 9: Colloids at/and interface: from coffee-ring diagnostics to living photonic crystals.
Lecture 10: Curvature driven assembly in soft matter: How it works and how to make it reconfigurable?
Tutorial 5: Coffee-Ring Effect: why and what for?