DCT'S DHEMPE COLLEGE OF ARTS & SCIENCE
MIRAMAR – GOA

DEPARTMENT OF BIOTECHNOLOGY

Report on a Two- day Interdisciplinary State Level Workshop for Undergraduate Students on "Future Scape: Exploring the Next Frontiers of Science and Technology"

A Two-day Interdisciplinary State Level Workshop for Undergraduate Students on *"Future Scape: Exploring the Next Frontiers of Science and Technology"* commenced on 12th January 2026 at venue Goa Science centre organised by DCT's Dhempe College of Arts and Science, Miramar, Panaji, Goa, under DBT Star College scheme in collaboration with Atria University, Bengaluru, and the Goa Science Centre. Registration was held from 8:30 a.m. to 9:30 a.m., following which the inaugural session was conducted in the presence of esteemed dignitaries. The dais was graced by Mrs. Pallavi S. Dempo, Trustee, Dempo Charities Trust; Prof. Suman Kundu, Director, BITS Pilani, K K Birla Goa Campus; Shri Rajesh R. Bhatikar, Administrator; Prof. P. S. Ramu Murthy, Principal of the host institution, Dr. Akshara Kaginalkar, Professor of practice of Atria University and Dr. Swati Pawar, Vice-Principal and Head of the Department of Physics and the Convener of this two day interdisciplinary State level workshop.

The inaugural ceremony began a keynote address by Prof. Ramu Murthy. Sir provided an overview of the institution and highlighted its academic standing, including its placement in the 151–200 NIRF band at the national level. Sir emphasised the relevance of the workshop theme in fostering interdisciplinary innovation and nurturing scientific temper among undergraduate students, while acknowledging the collaborative efforts of Atria University and other dignitaries present. This was followed by the invocation song by the students of Dhempe College and traditional lighting of the lamp symbolising the commencement of the academic deliberations.

The Convener of the workshop, Dr. Swati Pawar, addressed the gathering and outlined the objectives of the programme, highlighting its alignment with the National Education Policy (NEP) through a holistic, multidisciplinary approach. She briefly introduced the diverse themes covered during the workshop, including battery technology, bioinformatics, climate change, and emerging technologies. Dr. Akshara Kaginalkar, Professor of Practice from Atria University, elaborated on the interconnectedness of technology, climate change, and humanity, underscoring the importance of strong foundations in basic sciences for addressing complex global challenges.

Mrs. Pallavi S. Dempo, Trustee, Dempo Charities Trust, shared her thoughts on contemporary teaching pedagogies under the NEP framework and stressed the importance of multidisciplinary and interdisciplinary learning in higher education. The Chief Guest, Prof.

Suman Kundu, was formally introduced by Dr. Suchana Amonkar, Associate Professor and HOD of the department of Zoology. In his keynote address, Prof. Kundu appreciated the institution's academic initiatives and spoke extensively on the role of interdisciplinary science in shaping the future, with insights into artificial intelligence in healthcare, quantum science, biotechnology, climate science, energy sustainability, and space research. He also reflected on the challenges and responsibilities of teaching, highlighting ethical and social dimensions of scientific advancement. The inaugural session concluded with a vote of thanks proposed by Dr. Miskil Naik, organising secretary and treasurer of the workshop. The compere for the inaugural function was Dr. Akshata Bhat, Assistant Professor of the department of English. This was followed by a high tea break.

The technical sessions of the day began with the Physical and Chemical Sciences session, moderated by Prof. P. S. Ramu Murthy. The first talk, introduced by Mrs. Varsha Virginkar, Associate Professor, Department of Chemistry, was delivered by Dr. Radha Shivaramaiah on *"Battery Recycling Technologies: From Waste to Resource."* The lecture covered battery usage trends in India, recycling pathways, generation of black mass, pyrometallurgical and hydrometallurgical processes, and the concept of a circular battery economy, with emphasis on sustainable lithium-ion battery management. The second talk, introduced by Mrs. Manisha Mashelkar, Assistant Professor, Department of Chemistry, was delivered by Dr. Ravikumar on *"Electrochemical Energy Storage and Conversion Systems."* He discussed fuel cells and electrolyser technologies, traced historical developments from the Agastya battery to modern electrochemistry, and highlighted advances such as graphite oxide-based proton exchange membranes.

The Biological Sciences session followed, with Prof. K. G. Hiremath as the moderator. Mr. Abhed Suresh, Assistant Professor of the Department of Zoology, introduced the first speaker of the session, Dr. Asha Velayudhan Nair. Dr. Nair delivered a lecture on *"Antimicrobial Resistance at the Health and Environment Interphase: Risks, Drivers and Consequences,"* focusing on the global burden of AMR, misuse of antimicrobials, resistance mechanisms, and emerging strategies such as phage therapy, microbiome modulation, AI-based genomic antimicrobial susceptibility testing, and the One Health approach. The final lecture of the session was delivered by Dr. Baramurli G. S. on *"Tiny Brains, Big Minds: The Cognitive World of Insects – From Darwin's Marvelous Atoms to Bio-inspired AI".* Dr. Baramurli was introduced by Ms. Swizel Quadros, Assistant Professor of the Department of Zoology. The talk explored insect cognition, landmark studies by Darwin and Karl von Frisch, neuroethology, and bio-inspired computational models such as sparse coding and visual processing systems.

Post lunch, hands-on training sessions were conducted at DCT's Dhempe College of Arts and Science. Tutorial 1, titled *"Biology and You in the Age of AI,"* was conducted by Dr. Saurabh Mahajan, who introduced AI-driven platforms used in modern biology, including protein structure prediction and AI-based research tools. Dr. Mahajan was introduced by Dr. Pratibha Prabhugaonkar, Assistant Professor at the Department of Botany. Participants were divided into interdisciplinary teams to work on problem-solving exercises using AI. Tutorial 2, *"From*

Components to Cells: Fabricating Electrolysers and Batteries," was conducted by Dr. Radha and Dr. Ravikumar who focused on the working principles of fuel cells and the fabrication of lithium-ion and metal-ion batteries, offering participants practical exposure to electrochemical energy systems. With these engaging academic and hands-on activities, the first day of the workshop concluded on a highly enriching and interactive note.

Building upon the strong interdisciplinary foundation laid on Day 1, the sessions on Day 2 on 13th January 2026 focused on climate change, sustainability, artificial intelligence, and quantum computing, emphasizing the integration of scientific knowledge with policy, technology, and societal needs.

The day commenced with the session on *Climate and Sustainability*, by Dr. Sarath Gutticunda moderated by Dr. Swati Pawar. Dr. Preethi Pandit, Assistant Professor at the department of Biotechnology, introduced the first speaker, Dr. Sarath Gutticunda, Founder/ Director/ Researcher at UrbanEmissions.Info. Sir delivered an insightful lecture on *"Air Quality in Indian Cities: Connecting Science and Policy."* The talk highlighted the APnA City Program, Lung care foundation, different pollutants in the environment and their consequences, India's AQI Trends and air quality forecast. Dr. Gutticunda effectively bridged the gap between research and governance, emphasizing the need for public awareness, and collaborative efforts to address air quality challenges.

The second lecture of the session was delivered by Prof. Rajiv Kumar Chaturvedi, Associate Professor, BITS Pilani Goa- campus and Associate Head and Incharge of School of Interdisciplinary research and Entrepreneurship. Ms. Anishka Khandeparker, Assistant Professor at the department of Zoology introduced the speaker. In his talk titled *"Climate Change: Risk for Goa,"* Prof. Chaturvedi presented a trend in rise of temperature and annual rainfall in Goa and India, global emissions, emerging challenges under changing climate. Sir also emphasised on the reasons for cyclones in Arabian Sea, rainfall induced landslides. He also developed the early earning system for landslide in Goa.

Following a brief tea break, the session continued with a session by Dr. Akshara Kaginalkar, Professor of Practice from Atria University. The speaker was introduced by Dr. Shilpa Bhonsle, Assistant Professor in Botany. The talk on *"Digital Twin: Next Generation Urban Environmental Modelling"* introduced participants to cutting-edge digital technologies that enable real-time simulation and analysis of urban environments. Dr. Kaginalkar illustrated the relation between global mean surface temperature and sustainability development goals, weather and climate computational models and integrated modelling systems.

The next engaging session on *Artificial Intelligence and Quantum Computing* was moderated by Dr. Santosh Kumar Das, Associate Professor, School of Physical Sciences, IIT-Goa. Ms. Siddhi Parsekar, Assistant Professor at the department of Physics introduced the speaker Prof. Sanjay Sahay, Associate Professor in the department of Computer science and information systems, BITS-Pilani Goa campus. Sir delivered a compelling lecture on *"Risk and Challenges of AI in Cybersecurity."* He addressed the growing complexity of cyber threats in the digital

era and discussed about cybercrime index, cyber risks in finance, malware attacks, malware detection models and emphasised on the critical need for human oversight in AI-driven security systems.

The session continued with a lecture by Dr. Ananda Gopal Maity, Assistant Professor, School of Physical Sciences, IIT, Goa introduced by Dr. Kapil Salkar, Assistant Professor at the department of Physics. Dr Ananda delivered a lecture on *"Information Processing under the Second Quantum Revolution."* Dr. Maity provided an accessible yet profound overview of quantum information science, explaining the formulation of quantum information theory, Einstein's theories, and important quantum mechanics concepts in information processing, quantum cryptography and finally gave some highlights on recent achievements in quantum domain.

Post lunch, the final session of the day featured Dr. Varsha Venkatsubramanian, Assistant Professor in AI and Decentralised technologies, Atria University. The speaker was introduced by Dr. Shilpa Bhonsle, Assistant Professor of the Department of Botany. Dr. Varsha delivered two engaging talks titled *"Learning in the Age of AI"* and *"AI as a Teammate."* These sessions focused on the evolving landscape of education and professional learning in the era of artificial intelligence. In the first talk, Dr. Varsha emphasised on understanding the relation between AI and bloom's taxanomy and the use of prompt engineering for higher order thinking skills.

A total of 132 Undergraduate students from State Colleges such as Ravi Naik's PES College of Arts and Science, Parvatibai Chowgule College of Arts and Science (Autonomous), Government College of Arts, Science and Commerce, Quepem and DCT's Dhempe College of Arts and Science participated in the workshop.

The workshop concluded by inspiring undergraduate students to think beyond disciplinary boundaries and to engage as informed, responsible contributors to a rapidly evolving scientific landscape.

Number of beneficiaries: 132

Learning outcomes:

1. Participants gained an interdisciplinary perspective by understanding the integration of physical, chemical, biological, environmental, and computational sciences in solving real-world problems.
2. Students were introduced to emerging technologies such as energy storage systems, battery recycling, AI-driven biological tools, digital twin modelling, cybersecurity, and quantum information science.
3. The workshop enhanced awareness of climate change, air quality, and sustainability challenges, with specific insights into regional and national environmental concerns.
4. Hands-on sessions enabled students to apply theoretical concepts to practical problem-solving using AI tools and electrochemical systems.

5. Participants developed an understanding of the ethical, societal, and policy dimensions of science and technology, including responsible AI and public health considerations.
6. The programme strengthened scientific temper, critical thinking, and future-ready skills essential for interdisciplinary research and innovation.

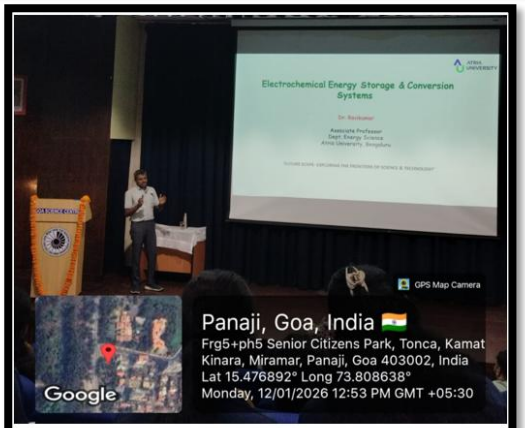
PHOTOS OF THE WORKSHOP

Prof. (Dr). P. S. Ramu Murthy, Principal, DCT's Dhempe College of Arts and Science addressing the gathering for the inaugural function

Lighting of the lamp by the dignitaries for the inaugural function

Keynote address by the Chief Guest, Prof. Suman Kundu

Dr. Radha Shivaramaiah delivering a talk on "Battery Recycling Technologies: From Waste to Resource".



Dr. Ravikumar delivering a talk on "Electrochemical Energy Storage and Conversion Systems"

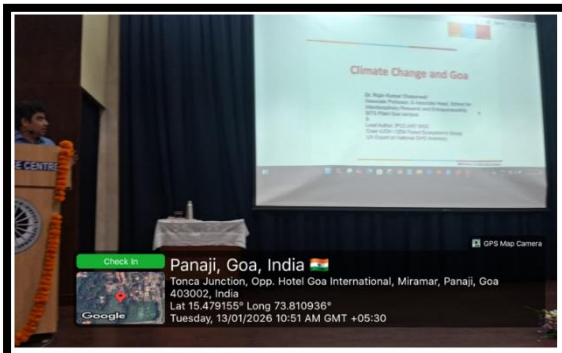
Dr. Asha Velayudhan Nair delivering a session on "Antimicrobial Resistance at the Health and Environment Interphase: Risks, Drivers and Consequences"

Dr. Baramurli G. S. delivering a session on "Tiny Brains, Big Minds: The Cognitive World of Insects – From Darwin's Marvelous Atoms to Bio-inspired AI".

Dr. Saurabh Mahajan conducting a hands-on tutorial on "Biology and You in the Age of AI".

Dr. Ravikumar conducting a hands-on tutorial on "From Components to Cells: Fabricating Electrolysers and Batteries".

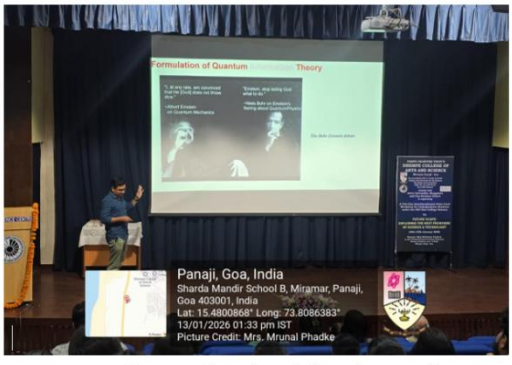
Dr. Sarath Guttikunda delivering a session on "Air quality in Indian cities: Connecting science and policy".



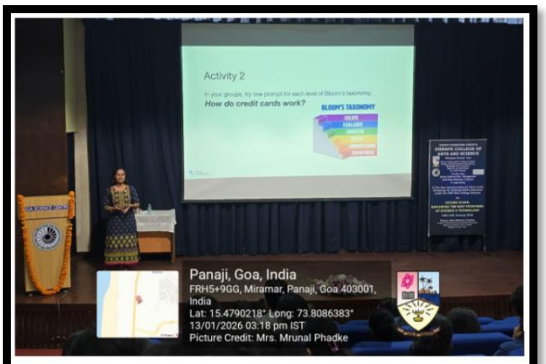
Dr. Rajiv Kumar Chaturvedi delivering a talk on "Climate Change: Risk for Goa".

Dr. Akshara Kaginalkar delivering a talk on "Digital Twin: Next Generation Urban Environmental Modelling".

Prof. Sanjay Sahay delivering a talk on "Risk and Challenges of AI in Cybersecurity".



Dr. Ananda Gopal Maity delivering a talk on "Information Processing under the Second Quantum Revolution".



Dr. Varsha Venkatsubramanian delivering engaging session on "Learning in the Age of AI and AI as a Teammate".

Prof. Ramu Murthy
Principal

Dr Swati Pawar
Convenor & H.o.D. Physics