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CENTRAL UNIVERSITY OF ANDHRA PRADESH
Ananthapuramu, Andhra Pradesh



CONNECT, UNITE, ASPIRE, PERSIST



TWO-DAY NATIONAL WORKSHOP ON “ESSENTIAL MATHEMATICS FOR AI: THEORY AND APPLICATIONS”



Organised By
Department of Mathematics & Computing
Central University of Andhra Pradesh



April 23-24, 2025

OBJECTIVE:

The main objective of this workshop is to explore the latest mathematical tools in Artificial Intelligence (AI) and Machine Learning (ML). These mathematical tools are essential for developing accurate algorithms and reducing system development costs, ultimately enhancing the efficiency and effectiveness of AI and ML applications.

ABOUT THE UNIVERSITY:

The Central University of Andhra Pradesh holds a special place in the Indian University System. It was born out of a promise made by the Government of India to fulfil the aspirations of the people of Andhra Pradesh on the eve of the bifurcation of the erstwhile composite state of Andhra Pradesh into Telangana and Andhra Pradesh. The University was established in 2018 in the district headquarters town of Ananthapuramu in the Rayalaseema region of Andhra Pradesh. The establishment of the Central University of Andhra Pradesh heralded a new era in higher education. With innovative socially and culturally relevant academic programmes, CUAP experienced rapid growth in just six years. The University offers eight undergraduate programmes and seventeen postgraduate programmes, including innovative programmes that play a crucial role in nation-building. In addition, the University has started PhD programme in 6 disciplines. Further, CUAP has adopted learning outcomes-based curricula following the UGC Guidelines and the National Credit Framework (NCrF) for all its programmes. As a result, the University secured the 32 position in the IIRF (Indian Institutional Ranking Framework) Ranking 2024. Student strength has risen from less than a hundred students from seven Indian states to more than a thousand from twenty-three states.

ABOUT THE DEPARTMENT:

The Department of Mathematics and Computing was established in the academic year 2021-22 and offers a two-year M.Sc. in Mathematics and Computing. This programme is an evolution of the traditional M.Sc. Mathematics programme, redesigned to reflect the growing importance of the intersection between mathematics and computing in diverse fields such as science, engineering, finance, and technology. The curriculum is thoughtfully designed to provide a balanced blend of core mathematics and computer science courses, covering theoretical, computational, and practical aspects. Furthermore, the foundational mathematics courses aim to build strong analytical and problem solving skills, while laboratory based components offer exposure to application oriented, hands on learning experiences. Students are exposed to advanced research topics through electives and a mandatory one-semester project work. It concentrates on areas where mathematics and computing are most relevant to each other.

ABOUT THE WORKSHOP:

The most important mathematical tools for developing algorithms in Artificial Intelligence (AI) and Machine Learning (ML) include Calculus, Linear algebra, Optimization techniques and Statistical methods. In this workshop, we explore the theory and applications of these mathematical tools to build strong foundations towards research in the field of AI and ML. The goal of this workshop is to familiarize master's students, research scholars, and faculties with the important concepts and computational techniques in these essential mathematical tools useful for AI and ML applications.

The sessions on the first day of the workshop will focus on applications of graph theory and linear algebra in AI and ML. Some of the important concepts to be covered on the first day of the workshop are lattices, graphs, hypergraphs, role of discrete mathematics in AI, applications in hierarchical clustering, reasoning systems, and explainable AI. Furthermore, some topics in linear algebra such as eigen values, eigen vectors, diagonalizability of symmetric matrices, and canonical forms will also be explored. These concepts are highly significant in developing the primary algorithms in AI as well as ML.

The second day will emphasize various advanced numerical techniques and advanced probabilistic distributions in AI. Discussions will cover the essential numerical methods for solving large linear systems, techniques for finding approximate solutions to highly nonlinear differential equations. The concept of generative models using standard probability distributions and their role in AI frameworks will also be discussed.

This workshop offers valuable insights into advanced mathematical tools and their applications in AI and ML, making it highly beneficial for undergraduate and postgraduate students in Mathematics and Computer Science, as well as research scholars and faculty members looking to deepen their understanding of AI-related programming techniques and mathematical foundations.

REGISTRATION INFORMATION AND ELIGIBILITY:

REGISTRATION LINK:

<https://docs.google.com/forms/d/e/1FAIpQLSeKdROE37OTkAr2yP7FqNxT08cvnh5PXLcnvp2Xg9INfr5FkQ/viewform?usp=sharing>

REGISTRATION FEE: FREE

Last date for the Registration: 22/04/2025

Eligibility: Master's students, research scholars, and faculties in the Department of Mathematics and Computer Science, across India

OTHER IMPORTANT INFORMATION:

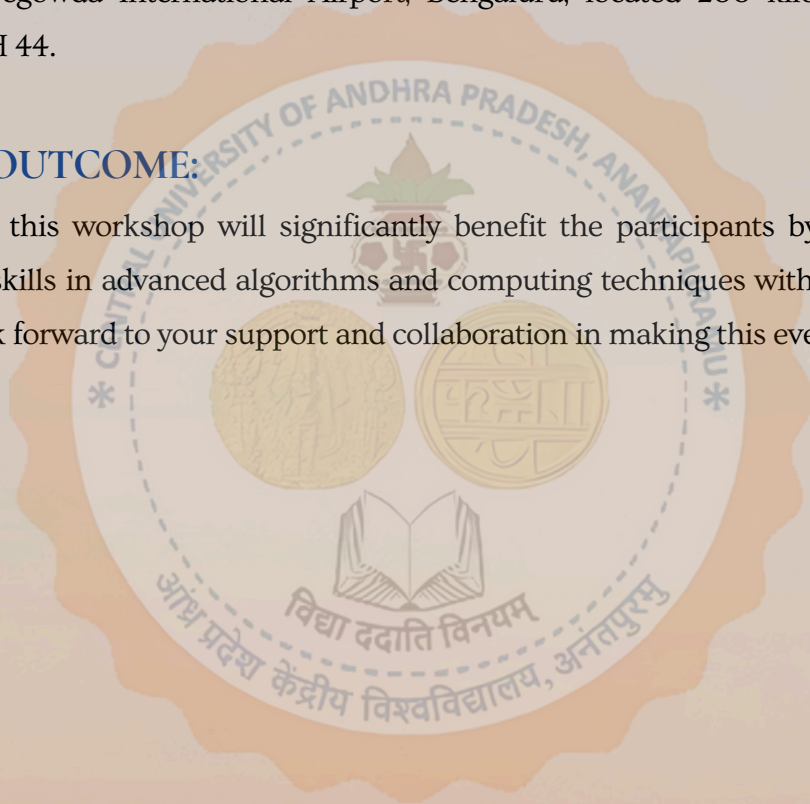
No TA/DA will be provided for the participants. However, the accommodations in the university hostel are available for the interested registered participants on the payment basis during the workshop.

HOW TO REACH UNIVERSITY:

The Central University of Andhra Pradesh is located in Jantluru Village, 14 kilometers from Ananthapuramu. It is well-connected by road through National Highway (NH 44), with bus services from major towns like Bengaluru, Chennai, and Hyderabad. The nearest railway station is Anantapur (ATP), 15 kilometers away, offering connections to major cities. The nearest airport is Kempegowda International Airport, Bengaluru, located 200 kilometers from the university via NH 44.

EXPECTED OUTCOME:

We believe that this workshop will significantly benefit the participants by enhancing their knowledge and skills in advanced algorithms and computing techniques within the fields of AI and ML. We look forward to your support and collaboration in making this event a success.



WORKSHOP SCHEDULE:

DAY 1: APRIL 23, 2025 (WEDNESDAY)

10:00 AM – 10:30 AM: Inaugural Session		
Time	Session	Topic and Speaker
10:30 AM – 12:30 PM	Lecture 1	Lattices, Graphs and Hypergraphs: Bridging Discrete Mathematics and AI by Dr. Sachin Ballal, Associate Professor, School of Mathematics and Statistics, University of Hyderabad
12:30 PM – 1:30 PM: Lunch Break		
1:30 PM – 3:30 PM	Lecture 2	Matrix Analysis Behind Machine Learning and AI by Prof. K. M. Bhanu, Department of Mathematics, Sri Venkateswara University
3:30 PM – 4:00 PM: Refreshments		

DAY 2: APRIL 24, 2025 (THURSDAY)

Time	Session	Topic and Speaker
10:00 AM – 12:00 PM	Lecture 3	Role of Mathematics in Science and Technology by Dr. G. Janardhana Reddy, Associate Professor and Head, Department of Mathematics, School of Physical Sciences, Central University of Karnataka
12:00 PM – 1:00 PM: Lunch Break		
1:00 PM – 3:00 PM	Lecture 4	Advanced Probability Distribution Models in AI by Prof. K. M. Bhanu, Department of Mathematics, Sri Venkateswara University
3:00 PM – 3:30 PM: Closing Ceremony		
3:30 PM – 4:00 PM: Refreshments		



Chief Patron

Prof. S. A Kori
Hon'ble Vice Chancellor



Patron

Prof. C Sheela Reddy
Dean & Registrar I/c , CUAP



Patron

Prof. G. Ram Reddy
DSW, CUAP



Speaker

Prof. K.M. Bhanu (retired),
Department of Mathematics.
Sri Venkateswara University



Speaker

Dr. G Janardhana Reddy,
Associate Professor, Head,
Department of Mathematics,
School of Physical Sciences,
Central University of Karnataka



Speaker

Dr. Sachin Ballal,
Associate Professor, School
of Mathematics and
Statistics,
University of Hyderabad

ORGANISING MEMBERS:



Convenor

Dr. Thota Siva
Assistant Professor (T&C)
Department of Mathematics, CUAP



Co-Convenor

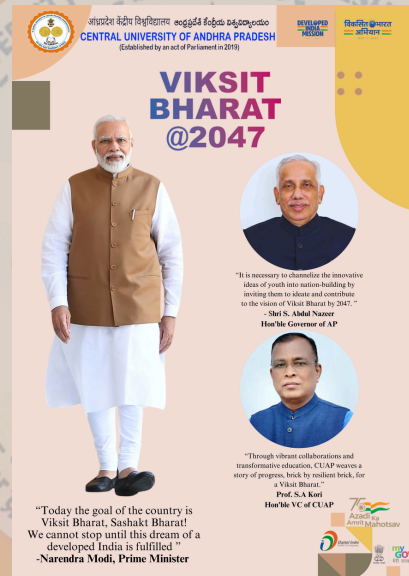
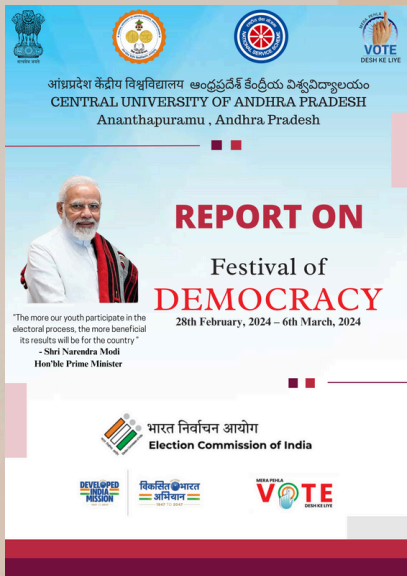
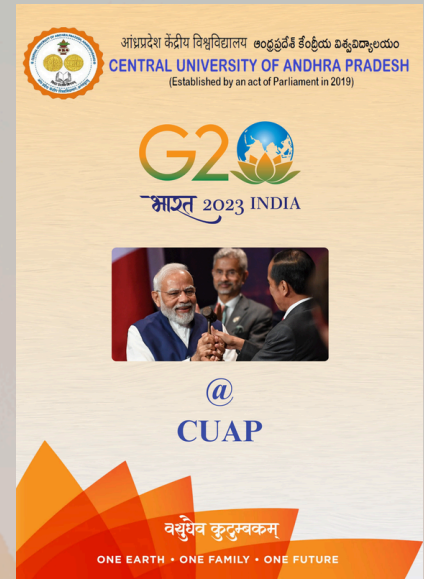
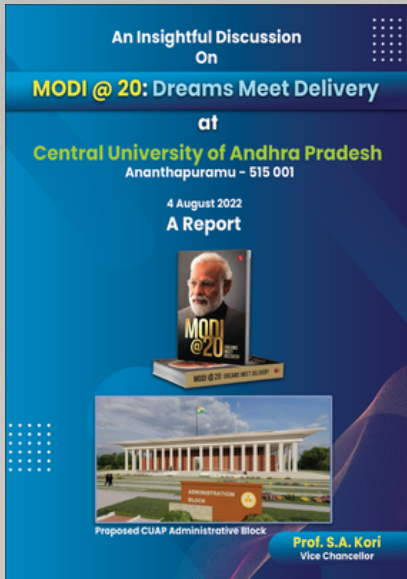
Dr. G. Neeraja
Assistant Professor (T&C)
Department of Mathematics, CUAP



Organising Co-ordinator

Dr. A. Naresh
Assistant Professor (T&C)
Department of Mathematics, CUAP

CUAP Event Souvenirs



Find us in Social Media :



ADDRESS: Neelampalli Road, Janthaluru
Opposite 14th APSP Battalion
Ananthapuramu - 515701
Andhra Pradesh
India

E-Mail : contact@cuap.edu.in

WEBSITE : www.cuap.ac.in

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