Tripura University
(A Central University)

GLOBAL INITIATIVE OF ACADEMICNETWORK

GIAN Course on

BIOLOGICAL CELL IMAGING for DIAGNOSIS & EARLY PREDICTION of CANCER

Organized by

Department of Computer Science & Engineering
Tripura University (A Central University)

From 27 - 31 October, 2025
(in virtual mode)

OVERVIEW

Cancer is one of the leading causes of death. So many researchers have made great efforts to improve cancer management. An early cancer diagnosis provides the most efficient and effective management of cancer treatment with the use of surgical methods or chemotherapeutic agents. Therefore, techniques for detecting cancer at early stages have been developed to improve the detection accuracy. Biological cell imaging techniques have undergone explosive growth over the past several decades and are important tools for cancer diagnosis and prognosis in the clinic. Biological cellular imaging techniques can identify the cancer mass on the basis of its physical and morphological properties, which may have major benefits for personalized diagnosis and for the prediction and monitoring of the response to therapy. This series of lectures will cover the involvement of biological molecule's in cancer related disease thereby enabling the visualization of cellular function and the characterization and measurement of molecular processes in living organisms at the cellular and molecular levels for diagnosis of cancer. The teaching will be reinforced using hands-on practical laboratory work using the AGMC-TU Pap-Smear Cytological Image Dataset of cervical cancer patients.

OBJECTIVES

The primary objectives of the course are as follows:

i) Exposing participants to the importance of biological cellular imaging for early diagnosis of cancer.

ii) Providing an overview of more advanced computer aided techniques for mitigating the cellular images for early detection of cancer.

iii) Providing practical laboratory exercises to reinforce understanding of basic concepts and to provide problem solving algorithms capability using images from the AGMC-TU Pap-Smear Cytological Images for their future use in their theses work or in their post-university working lives.

iv) Impart research skills to the beginners and quality development of researchers in writing various research reports, thesis, dissertation, research papers, articles, essays in the domain of medical imaging.

WHO CAN ATTEND

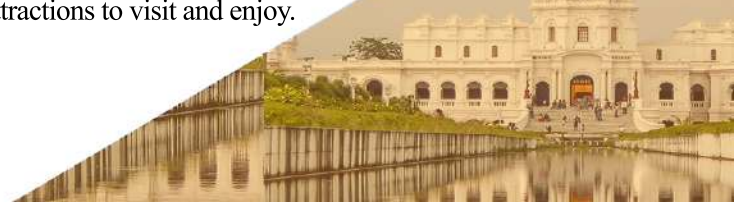
- Engineers and researchers from manufacturing, service and government organizations including R&D laboratories.
- Students at all levels (B.Tech/M.Sc/M.Tech/Ph.D) or Faculty from reputed academic institutions and technical institutions.

ABOUT TRIPURA UNIVERSITY

Tripura University, established in 1976 as the Post-Graduate Wing of Calcutta University, became a state university in 1987 and a Central University in 2007. Dedicated to academic excellence, it plays a vital role in advancing education, research, and technological innovation in Tripura. With a serene, pollution-free campus, the university provides an ideal learning environment. It emphasizes contemporary knowledge, tribal studies, and vocational education to enhance employment opportunities. Currently, it has 52 affiliated colleges and offers a diverse range of doctoral, postgraduate, diploma, and undergraduate programs across various disciplines.

ABOUT THE CITY

Agartala, the capital city of Tripura is located in the north eastern region of the country. It covers 10,491 km^2 and is bordered by Bangladesh to the north, south, and west, and the Indian states of Assam and Mizoram to the east. Tripura has a picturesque surrounding covered with hills and dales, sprawling green valleys and hilly brooks. The popular Tripura attractions are Kamalasagar Lake, Dumboor Lake, Ujjayanta Palace, Neermahal, Kunjaban Palace, Tripura Government Museum, Jampui Hill, Dumboor Lake etc. The famous Tripureswari Kali Temple is situated in Udaipur city and is about 60 km away from the capital city.The weather condition of Agartala city is moderate with temperature between 21°C to 36°C during summer season and between 8°C to 25°C in winter. Tripura is adorned with a large number of attractive tourist sites. The northeastern state of Tripura is famous all over the world for its rich cultural heritage, beautiful palaces, wildlife sanctuaries, temples, museums. The city has a number of interesting tourist attractions to visit and enjoy.



REGISTRATION FEES

- **Participants from abroad :** USD 300
- **Industry/ Research Organizations:** Rs. 5000/-
- **Faculty from Academic Institutions:** Rs. 3000/-
- **Research Scholars/ Students:** Rs. 1000/-

REGISTRATION PROCEDURE

Please follow the following steps for registration:

- Candidate should apply to the course using the following Application form link:
  https://forms.gle/mVZXiP717KkKXjAC6
- The candidates must pay the applicable fees by online bank transfer/wire transfer/ internet banking to the given bank account. Please upload the online payment receipt for proof of transfer.
- The local candidate may also submit the registration form along with registration fee in cash to the course coordinator on hand.
- A limited number of rooms may be available in Tripura University Guest House on a first-come-first serve basis. Extra charges are needed for room and board.

Number of participants for the course is limited to 40.

Last date for registration is 26th September, 2025.

Payment Details

Institution's Account Name: TRIPURA UNIVERSITY
Account No: 30371209938
IFSC Code: SBIN0010495
Bank Name: State Bank of India
Branch Name: TRIPURA UNIVERSITY CAMPUS
MICR No: 799002524

In case of any queries, you send an email to the course coordinator.

Course Coordinator:

Dr. Mrinal Kanti Bhowmik
Associate Professor and Head
Department of Computer Science & Engineering
Tripura University (A Central University)
Mobile: +91-9436129933 (M)

ABOUT THE FACULTY

Prof. Niharika Nath received a Ph. D. in biochemical engineering and biotechnology from the Indian Institute of Technology-Delhi, where she studied plasmid DNA biology; a master's degree in biotechnology from Jadavpur University; and a bachelor's degree in pharmacy from Delhi University, India. Her postdoctoral research at Columbia University focused on carcinogenesis and the interplay of signaling pathways and cell cycle regulatory proteins in mammalian cells. She specializes in research on biological cell imaging for cancer detection and prevention. Her research mainly focuses on biological cell imaging for cancer abnormality detection based on machine learning techniques. She also focuses on the regulation of signaling molecules relevant to cellular processes such as cell proliferation and cell death in cancer cells of the breast, colon, and pancreas. Prof. Nath investigates the anti-cancer potential of drugs that are synthesized to release the small gaseous signaling molecules nitric oxide and hydrogen sulfide. Prof. Nath teaches cell biology and microbiology for abnormality detection, and her students participate in her research projects and present at professional conferences. She promotes undergraduate research and scholarship at the university level and advocates for undergraduate research at the national level through her role as Councilor at the Council on Undergraduate Research (CUR), Washington, D.C. She is the health sciences divisional editor of the CUR Quarterly.

Mrinal Kanti Bhowmik received the B.E. degree in computer science and engineering from the Tripura Engineering College in 2004, the M.Tech. degree in computer science and engineering from Tripura University (A Central University), India, in 2007,and the Ph.D. degree in engineering from Jadavpur University, Kolkata, India, in 2014.

He also spent Fall 2022 as a DST-SERB International Research Experience Scholar with SIRE Fellowship, Government of India at the NYU Center for Cybersecurity (CCS), Tandon School of Engineering, New York University, New York City. He has successfully completed two Department of Electronics and Information Technology (DeitY) (Now Ministry of Electronics and Information Technology (MeitY)) funded projects, one the Department of Biotechnology (DBT)-Twinning project, one Society for Applied Microwave Electronics Engineering and Research (SAMEER) funded project, one Indian Council of Medical Research (ICMR), and one Defense Research and Development Organization (DRDO), Government of India funded project. He is currently the Principal Investigator of a DBT, Government of India funded project and Co-Principal Investigator of ICMR, Government of India funded project. Since July 2010, he has served with the Department of Computer Science and Engineering Tripura University as an Assistant Professor and from March, 2023 he has been serving with Department of Computer Science and Engineering, Tripura University as an Associate Professor. He was awarded the Short Term Indian Council of Medical Research (ICMR), Department of Health Research (DHR) International Fellowship from 2019 to 2020 as a Senior Indian Biomedical Scientist for bilateral cooperation in cross-disciplinary research area (i.e., biomedical diagnostic and inferencing systems). His current research interests are in the field of machine learning, computer vision, security and surveillance, medical imaging, and biometrics.

COURSE DETAILS

Day 1 — 27 October 2025

- What are cancer cell phenotypes suitable for imaging?; Sub-cellular events of cell shape changes; Methods of cell staining and processing of cells for individual cell image analysis.
- Cervical Cancer: Stages, precancerous cell screening techniques.; Discriminating features of normal verses precancerous or cancer cells.
- Cell profiler module, strengths and weaknesses: examining normal cells ; Practical demonstration of Histological staining and Cell Preparation for Cellular Image Analysis.

Day 2 — 28 October 2025

- How a clinical study is performed related to cervical cancer?; Overlapping cells and discrimination.
- Multimodal Cellular Imaging and Machine Learning Techniques for Early Diagnosis of Disease.
- Using accessible and free databases (Norup) 70 images each normal /abnormal with MATLAB and basic computational analysis; Demonstration on Generating the AGMC-TU Pap- Smear Cytological Image Dataset.

Day 3 — 29 October 2025

- Morphological Features based analysis for cervical cancer diagnosis using microscopic cell imaging.
- Generative Artificial Intelligence as a Revolution for Medical Imaging and Diagnosis; Shot Based Leaning Techniques for handling Unbalanced Datasets in Cervical Stage Diagnosis using Microscopic Cell Imaging.
- Hands on Practice on AGMC-TU Pap- Smear Cytological Image Dataset.

Day 4 — 30 October 2025

- Domain Adaptation and Shot Based Techniques for Rare Cervical Stage Diagnosis.
- Interpretable Machine Learning models for Microscopic Cell Imaging.
- Hands on Practice on AGMC-TU Pap- Smear Cytological Image Dataset.

Day 5 — 31 October 2025

- Discussion on writing various research reports (i.e. thesis, dissertation, research papers, articles, etc.).
- Review questions covering all material (Tutorial) and Examination (Multiple Choice Questions).

GIAN Course Entitled
"2541009 - Biological Cell Imaging for Diagnosis and Early Prediction of Cancer"
27th – 31st October, 2025

--: Organized by :--
Department of Computer Science and Engineering
Tripura University (A Central University)
Suryamaninagar-799022, Tripura (W), India

REGISTRATION FORM

1. Full Name: ----------
2. Designation: ----------
3. Department: ----------
4. Organization: ----------
5. Address for Correspondence: ----------

   Pin Code: ---------- Mobile No.: ----------

   E.mail: ----------
6. Registration Category (Please Tick)

   ☐ Faculty Member ☐ Research Scholar/ Student

   ☐ Participants from Industry ☐ International Participants

7. Accommodation Required (As per Availability): Yes/ No

8. Details of payment of course:

   Transaction No.: ---------- Date: ----------

   Bank: ---------- Amount: ----------(Rs. /USD)

Signature of Participant

Date:

Forwarding Authority:

(Seal and Signature of the Principal of Institute/Head of the Department)

Submit the Registration from to the given link: https://forms.gle/mVZXiP717KkKXjAC6