



This short-term course is designed to provide participants with a comprehensive understanding of how advanced machine learning techniques can be harnessed to address critical challenges in the realm of sustainability. This course offers a rigorous academic exploration of the complexities, strengths, and benefits of utilizing Machine Learning in sustainable technology applications (like as Electric Mobility, Energy Management in Renewable Sources, Cyber-Physical System, Health Monitoring of Batteries, Waste Management, Biomedical Signal Processing, Agricultural Yield Prediction etc.). Participants will grapple with the intricacies of environmental data, honing their skills in preprocessing and modeling to derive actionable insights from complex datasets. While navigating the ethical dimensions of AI, they will learn to mitigate biases and ensure fairness in algorithmic decision-making. The course empowers participants with the knowledge and practical skills required to optimize renewable energy systems, predict resource consumption trends, and enhance resource allocation efficiency, ultimately contributing to a more sustainable and responsible technological landscape. Through a blend of theoretical insights and hands-on applications, participants emerge equipped to lead in the development and implementation of eco-conscious technologies. The course is applicable for students, researchers, and engineering professionals who want to do research in fast growing and emerging renewable energy technology.

Course Coverage:

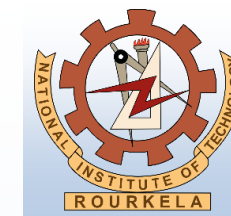
- ❖ Climate Modeling and Generative AI: Predicting and Adapting to Environmental Changes
- ❖ Waste material classification using ML techniques
- ❖ ML Applications for Sustainable Health Infrastructure
- ❖ Explore ML applications in precision agriculture and resource optimization
- ❖ Connected Societies: Societal Computing for Enhanced Disaster Recovery, Empowering Assistive Living, and Intelligent Environment Monitoring via IoT
- ❖ Linking of IoT Concept with Machine Learning Techniques in Sustainable Technologies
- ❖ AI/ML in Software Development in Sustainability
- ❖ Technology Innovations for Sustainable Environment – with case studies of Renewable Energy and Regenerative Agriculture
- ❖ AI Empowers Your Plate: Building Sustainable Food Supply chains from Farm to Fridge
- ❖ Forecasting of Solar Irradiance Using Ensemble Kalman Filter and Variable Leaky LMS Algorithms
- ❖ Multi-Agent based Cyber-Physical System
- ❖ Intelligent Power Management Scheme for Microgrid
- ❖ Electric Mobility for Sustainable Development using AI/ML
- ❖ Online Health Monitoring of Rechargeable Batteries based on Artificial Neural Network

Lab Sessions:

- ✓ Practical Applications of Societal Computing with Resource-Constrained Devices: A Hands-On Approach
- ✓ Use ML to predict Agricultural Yield in presence of impure farm data
- ✓ Experimenting with Biomedical Signals using ML and Deep Learning Techniques

Key Speakers:

- ✦ Prof. Ganapati Panda, *IIT Bhubaneswar*
- ✦ Prof. Tandra Pal, *NIT Durgapur*
- ✦ Prof. Pravat Kumar Ray, *NIT Rourkela*
- ✦ Prof. Santos Kumar Das, *NIT Rourkela*
- ✦ Prof. Yaduvir Singh, *HBTU Kanpur*
- ✦ Dr. Bhushan Jagyasi, *TSI Accenture*
- ✦ Dr. Prantik Chatterjee, *MathWorks*
- ✦ Ms. Arthi Udayakumar, *Accenture*
- ✦ Dr. Kaustuv Nag, *IIIT Guwahati*
- ✦ Dr. Punit Kumar Jain, *NIT Rourkela*
- ✦ Dr. Sujoy Saha, *NIT Durgapur*
- ✦ Dr. Dipayan Guha, *MNIT Allahabad*
- ✦ Dr. Arijit Guha, *NIT Rourkela*
- ✦ Dr. Chiranjit Sain, *GKCIET Malda*



**National Institute of Technology
Rourkela**

**Online Mode Short Term Course
& Faculty Development Programme
On**

**Applications of Machine Learning
Techniques in Sustainable
Technologies
(AMLST-2024)**

24th - 28th January 2024

Coordinators

Dr. Prasenjit Dey

Dr. Arnab Ghosh

Prof. Pravat Kumar Ray

Organized By

Dept. of Computer Science and Engg.

Dept. of Electrical Engineering

National Institute of Technology

Rourkela, Odisha - 769008

Technically Co-sponsored by:





Introduction:

The integration of Machine Learning (ML) within the domain of Sustainable Technologies presents both a promising avenue and an array of intricate challenges. Foremost among these challenges is the inherent complexity and variability of environmental data, necessitating the development of advanced ML algorithms capable of handling noisy, multidimensional, and context-dependent information. Additionally, ethical concerns such as bias mitigation and fairness in algorithmic decision-making are paramount, ensuring that sustainability efforts remain equitable and unbiased.

Nevertheless, the strengths of ML are profound. Its predictive capabilities enable the optimization of renewable energy systems, prediction of resource consumption trends, and efficient allocation of resources. This translates into tangible benefits, including enhanced energy efficiency, reduced environmental impact, and cost savings. As a dynamic and interdisciplinary field, the application of ML in Sustainable Technologies represents a cogent response to contemporary environmental challenges, leveraging advanced data-driven techniques to foster sustainable practices and responsible technological advancement.

Online Account Details:

Account No: 10138951784

Account Name: CONTINUING EDUCATION
NIT ROURKELA

IFSC No: SBIN0002109

Branch: State Bank of India, NIT Campus
Rourkela

About the Institute:

The course will be organized by the Centre of Excellence on Renewable Energy Systems at the National Institute of Technology (NIT), Rourkela. It is one of the premier national-level institutions for technical education in the country and is funded by the Government of India.

Please visit <https://www.nitrkl.ac.in/>

39 NIRF Overall	16 NIRF Engg.	24 NIRF Research	281-290 QS Asia
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About the Departments:

The department of Computer Science and Engineering is established with the vision to prepare its students for professional employment and graduate education through study and implementation of the fundamental principles of theory, abstraction, and software design. The department offers various UG and PG programmes with the mission to provide high-quality education that prepares the graduates for success in their professional practice.

Please visit <https://website.nitrkl.ac.in/CS/>

The department of Electrical Engineering is established with the vision to design technologies and nurture technologists for diverse and sustainable growth in electrical engineering, leading to wealth and welfare of humanity. The department offers various UG and PG programmes with the mission to develop a platform for forging students as technocrats in line with cutting-edge academic, research and modern industrial practices.

Please visit <https://website.nitrkl.ac.in/EE/>

Online Registration Form:

<https://docs.google.com/forms/d/1ucPtfcSm7t-M9I8MmwNleOyepUH6PJ896aliPtEIUGE>

Registration Details:

Category	Online Registration Fee in INR
Research Scholars/ PG / UG Student	500/-
Faculty from Engineering Institutes	600/-
Engineers from Industry and R&D Organizations	800/-
No registration fee for students / staffs of NIT Rourkela	

Important Dates:

Registration Deadline: 23rd January 2024

Short-term Course Date: 24th-28th January 2024

Contact us:

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National Institute of Technology Rourkela
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Applications of Machine Learning Techniques in Sustainable Technologies (AMLST-2024)

24th - 28th January 2024 at NIT Rourkela

Coordinators: Dr. Prasenjit Dey, Dr. Arnab Ghosh and Prof. Pravat Kumar Ray

Course Schedule

Day #1 (24 January 2024 Wednesday) INAUGURAL SESSION			
09:00 AM – 10:00 AM Chief Patron: Prof. K. Umamaheshwar Rao (Director, NIT Rourkela) Course Coordinators: Dr. Prasenjit Dey, Dr. Arnab Ghosh, Prof. Pravat Kumar Ray			
Day #1 (24 January 2024 Wednesday)			
Lecture Session 1: 10:00 AM – 11:30 AM	Lecture Session 2: 11:30AM – 1:30PM	Lecture Session 3: 3:00PM – 5:00PM	Industry Session 1: 5:00PM – 6:30PM
Title: Intelligent Computing and Applications Prof. Ganapati Panda, IIT Bhubaneswar	Title: Waste material classification using ML techniques Prof. Tandra Pal, NIT Durgapur	Title: Multi-Agent based Cyber-Physical System Dr. Dipayan Guha, MNIT Allahabad	Title: AI/ML in Software Development in Sustainability Dr. Prantik Chatterjee Senior Software Engineer at MathWorks PhD (CSE-IIT Kanpur) [Formal Verification & Machine Learning] Intel Research Fellow'22-23
Day #2 (25 January 2024 Thursday)			
Lecture Session 4: 09:30 HRS IST – 11:00 HRS IST	Lab Session 1: 11:00AM – 1:00PM	Lecture Session 5: 3:00PM – 5:00PM	Industry Session 2: 5:30PM – 7:00PM
Dr. Sujoy Saha, NIT Durgapur Title: Connected Societies: Societal Computing for Enhanced Disaster Recovery, Empowering Assistive Living, and Intelligent Environment Monitoring via IoT	Dr. Sujoy Saha, NIT Durgapur Title: Practical Applications of Societal Computing with Resource-Constrained Devices: A Hands-On Approach	Title: Linking of IoT Concept with Machine Learning Techniques in Sustainable Technologies Prof. Santos Kumar Das, SIEEE, FIE Associate Professor, Dept. of Electronics & Communication Engineering, National Institute of Technology Rourkela, Odisha-769008, India	Title: Technology Innovations for Sustainable Environment – with case studies of Renewable Energy and Regenerative Agriculture Dr. Bhushan Jagyasi Associate Director Technology Sustainability Innovation (TSI) Accenture, India
Day #3 (26 January 2024 Friday)			
Lecture Session 6: 09:30AM – 11:30AM	Lab Session 2: 11:30AM – 1:30PM	Lecture Session 7: 3:30PM – 5:30PM	Industry Session 3: 5:30PM – 7:00PM
Title: Explore ML applications in precision agriculture and resource optimization Dr. Prasenjit Dey, NIT Rourkela	Title: Use ML to predict Agricultural Yield in presence of impure farm data Mr. Rahul Mondal, SoA	Title: Forecasting of Solar Irradiance Using Ensemble Kalman Filter and Variable Leaky LMS Algorithms Prof. Pravat Kumar Ray, NIT Rourkela	Title: AI Empowers Your Plate: Building Sustainable Food Supply chains from Farm to Fridge Ms. Arthi Udayakumar, ML Engineering Senior Analyst, Quantum Technology Specialist, Quantum & AI R&D, Accenture Technology Innovation (NextGen Computing Group), India
Day #4 (27 January 2024 Saturday)			
Lecture Session 8: 09:30AM – 11:30AM	Lab Session 3: 11:30AM – 1:30PM	Lecture Session 9: 3:00PM – 5:00PM	Lecture Session 10: 5:00PM – 7:00 PM
Title: ML Applications for Sustainable Health Infrastructure Dr. Puneet Kumar Jain, NIT Rourkela	Title: Experimenting with Biomedical Signals using ML and Deep Learning Techniques. Dr. Puneet Kumar Jain, NIT Rourkela	Title: Online Health Monitoring of Rechargeable Batteries based on Artificial Neural Network Dr. Arijit Guha, NIT Rourkela	Title: Electric Mobility for Sustainable Development using AI/ML Dr. Chiranjit Sain, GKCIET Malda
Day #5 (28 January 2024 Sunday)			
Lecture Session 11: 09:00AM – 11:00AM	Lecture Session 12: 11:00AM – 1:00PM	Lecture Session 13: 3:00PM – 5:00PM	
Title: Intelligent Power Management Scheme for Microgrid Application Dr. Arnab Ghosh, NIT Rourkela	Title: Data Science as Engineering for Global Sustainability Prof. Yaduvir Singh, EED, HBTU, Kanpur, UP	Title: Climate Modeling and Generative AI: Predicting and Adapting to Environmental Changes Dr. Kaustuv Nag, IIIT Guwahati	
Day #5 (28 January 2024 Sunday) VALEDICTORY SESSION			
5:00PM – 5:15PM Course review, Feedback, Valedictory Session, and Vote of thanks by Course Coordinators Course Coordinators: Dr. Prasenjit Dey, Dr. Arnab Ghosh, Prof. Pravat Kumar Ray			