ONE WEEKS ONLINE CERTIFICATE PROGRAM ON
SOLAR ANALYTICS: PLANT DATA MODELLING WITH
MACHINE LEARNING USING PYTHON
SOLAR PLANT DATA ANALYSIS APPLYING DESCRIPTIVE ANALYTICS, DIAGNOSTIC ANALYTICS & PREDICTIVE ANALYTICS IN ASSESSING PLANT CONDITION AND FUTURE OUTPUT WITH REAL TIME ANALYTICS OF BIG DATA (PLANT PARAMETERS, RADIATION, SENSORS, SCADA ETC) APPLYING MACHINE LEARNING PRINCIPLES

About NISE
National Institute of Solar Energy (NISE), an autonomous center of excellence of Ministry of New and Renewable Energy, Government of India, is conducting national skill development programs to meet the needs and upgrade the technical expertise of solar professionals.

About PRAGYA SOLAR
Pragya Solar, is a social startup in solar with the vision to bring solar adoption awareness in India aligned with National Solar Mission principles. Pragya Solar has conducted Entrepreneurial development workshop for 250 individuals and 1500 students across the nation of which 25 individuals are standing on their own feet. Pragya Solar is represented by profession from IIT/NIT & Harvard University Alumni. Pragya is a step towards innovation & transformation with niche offering aimed at social upliftment thru skill enhancement and opportunity creation.

Learning Objectives

- How to Gain intelligence on plant data and analyze the output with descriptive modelling to understand the current operation
- Understand the parameters which contribute to the variable generation and diagnostics analytics on assessing their impacts
- Explore the methods of Statistical analysis to analyze the data quality from different sources and making it ready for exploratory and inferential analysis
- Understand the basics of plant sustainability with predictive modelling to assess solar plant output, solar cell efficiencies and degradation, inverter outputs and cables /joints impacts
- How to achieve the optimization at the plant level and parameters contributing to same

PROGRAM DATE: 14th December to 18th December & 15th FEBRURY to 19TH FEBRURY
PROGRAM SCHEDULE: 10:30 AM TO 12:00 NOON & 2:30 PM TO 4:00 PM
Training Mode: Online
About the Program

Solar Sector is growing at a tremendous pace with government aiming to achieve 100GW target till 2022. This initiative has seen government directive on solar adoption as grounds up, roof top system across longitude and latitude of India. Solar system works with solar radiation, which create impact on the output energy depending on the quality radiation, cloud cover, ambient temperature, and module technology. Today there is need of knowledge of weather forecasting / solar generation forecasting as it helps the utility professionals with long terms analysis on solar energy generation, O&M, with its relevance and impact on the grid stability, load balancing, addressing peak power demands, creation of power portfolio within utility power purchase basket on renewable energy. Energy Audit of Solar plant is the key objective looked upon for already installed facilities when they are looked upon their quality generation.

Like other energy operations SOLAR too generate BIGDATA (radiations, plant parameters etc) which need to be studied for effective operation as large utility power output impacts power evacuation and grid balancing perspective for state as well as central utility.

**SOLAR ANALYTICS** is aimed at Developing CoE (Centre of Excellence) on analytics for organization as well as developing skills for managing the same. The program encompass the combination of solar domain with the technology like Internet of things (IOT), Machine Learning, predictive modelling, forecasting, optimization which has to be understood by utility/solar plant engineers and decision makers to carve differentiator for their utility operations in resolving day to day problems. For private sector solar generators Analytics in today's scenario is used by organization in creating a competitive edge, wherein market share is getting limited and margins are shrinking with each passing day as well as address long term perspective of operational efficiency, Energy Audit, Financial return on investment. In today's scenario organizations are preferring to onboard professional who are prepared in taking responsibility at business with less project deployment expenses/learning. This program would help professional/organization carve a difference for themselves at workplace and help establish a foundation of deep analytics for organization they are part of.

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**Training Mode:** Online
# Solar Analytics: Plant Data Modelling with Machine Learning Using Python

<table>
<thead>
<tr>
<th>Session</th>
<th>Area</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1</td>
<td>Why Solar Analytics Introduction with 48 MW Ground Mounted Case Study</td>
<td>Challenges of Data Handling in Solar Environment</td>
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<tr>
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<td>Solar Industry Data Roof Top &amp; Ground Mounted Data. Know your data - What kind of data is important for Analysis (ground mounted/roof top). Data types (structured, unstructured, real time, discrete etc) How does analytics play the role in Solar segment</td>
</tr>
<tr>
<td>Session 2</td>
<td>Solar Analytics Introduction to Python &amp; Installation</td>
<td>What is usefulness of Advanced Analytics for Solar Fundamentals of Python Background of the Tool What is IDE, Familiarization with the IDE</td>
</tr>
<tr>
<td>Session 3</td>
<td>KRA and KPI in Solar Industry</td>
<td>How to develop Key Result area(KRA) in Solar Key Performance Indicator (KPI) in relevance with descriptive, diagnostic predictive and prescriptive modelling</td>
</tr>
<tr>
<td>Session 4</td>
<td>Introduction to Semantics of Python</td>
<td>Working on building block of python on IDE (jupyter notebook) working with Solar Plant Data</td>
</tr>
<tr>
<td>Session 5</td>
<td>Descriptive Analytics</td>
<td>Using solar plant data Descriptive Analytics, dashboard development</td>
</tr>
<tr>
<td>Session 6</td>
<td>Solar Data Management &amp; How do we get the data Data cleaning and joining/merging</td>
<td>Solar Radiation data- HOW to get the data - data sources/databases, FIELD sensors/instruments/SRRA/data logger</td>
</tr>
</tbody>
</table>

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**Program Coverage**
## Solar Analytics

### Session 7: Diagnostic Analytics
- Solar data sources/parameters/variables: solar irradiance (direct, diffused, reflected, refracted), impact of weather parameters (wind, humidity, precipitation, cloud etc) & Data Management and Data Quality
- Energy efficiency data: Solar Energy generation, data PR & CUF data analysis for the solar plant

### Session 8: Solar Statistical Modelling
- Data management & Statistical modelling: Measure of central tendency (Mean, median, mode, standard deviation, variance), Correlation

### Session 9: Solar Analytics
- Solar Analytics: Machine Learning – Application of finding the weakest inverter in the plant using relation with application Ground mounted to 48 MW plant

### Session 10: Solar Analytics
- Solar Analytics: Machine Learning – Application of linking the weakest inverter with different variables in the plant using relation with application Ground mounted to 48 MW plant

**Note:** No prior technical or programming background is required.

**Past Participants:**
- State Utility – DISCOM
- State Nodal Agency –
- Academicians/Researchers
- Entrepreneur
- Solar EPC player
- Solar Developer

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**Training Mode:** Online
Batch Size: Batch size max of 100 participants for better interactions

Target Audience:

This Program is focused towards solar industry data and take into account the audience from technical /Non-technical background

Delivery Team
SOLAR ANALYTICS

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Working Team

Sumit Gupta
Sumit has been a solution evangelist for Smart Grid, Renewable Energy and Power Management in past. He brings in over 20 years of industry experience spanning over Domain of Energy & Utility, currently provide direction to PRAGYA SOLAR as Founder and CEO, a startup, focusing on solar transformation.

Sumit has been associated with AT Kearney, PricewaterhouseCoopers, SAS, in the past.
• BE in Material Science and Metallurgy (NIT, Rourkela)
• Post Graduation in Supply Chain Management (IMT, Ghaziabad) and
• One year certificate Program in Leadership from Harvard Business Publishing (affiliate of Harvard Business School, Boston, Massachusetts, USA)

Navin Kumar
Navin has been a seasoned, result-oriented professional with proven success in solving clients’ problems, increasing business growth and improving efficiencies. He brings in over 10 years of industry experience spanning over area of Predictive Modelling, Data Mining, Machine Learning Big Data and Business Analytics in various domains like Public Sector, Banking, CPG, Retail, Telecom and IPR. He has been associate with Assetplus Consulting, a start-up, focusing on end to end offering for Analytics clients i.e. Consulting, Services and Continued management.
• Navin has been associated with TCS in the past.
• He holds B.Tech in Computer science from JIT, Noida
• Post Graduation in Management (FMS, Delhi)
SOLAR ANALYTICS

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Program Perspective:

● Open source Softwares like Python, Anconda, Jupyter notebook will be installed prior to the program
● Laptop with 2 GB ram is sufficient to work
SOLAR ANALYTICS

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Contact information:

Sumit Gupta
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www.nise.res.in

PROGRAM CERTIFICATE

[Image of the certificate]

Award of Certificate
to Biswajit Dutta
(Gurugram)
for successfully completing the
5 days Skill Development Program on Solar Analytics
Organized by
National Institute of Solar Energy
(An Autonomous Institute of Ministry of New and Renewable Energy, Govt. of India)
Gurugram, Haryana-122003, India
(17th December - 21st December, 2018)

Dr. Chandra Banerjee
Dy. Director General, NISE

Dr. Arun K. Tripathi
Director General, NISE
SOLAR ANALYTICS

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Program Fees:

<table>
<thead>
<tr>
<th>Training Fee per participant</th>
<th>Rs 5,000 plus GST @ 18 % (Rs 5,900/-) in favor of “National Institute of Solar Energy – Capacity Building” Gurugram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>Rs 5,000 plus GST @ 18 % (Rs 5,900/-)</td>
</tr>
<tr>
<td>Fees Includes</td>
<td>Access all the lectures, online certification will be provided</td>
</tr>
</tbody>
</table>

Faculty subjected to change based on availability.

How to Apply?

Participants may kindly make the Payment of Rs 5,000 plus GST @ 18 % (Rs 5,900/-) through RTGS/NEFT/ in favor of:

Account details are as follows:

ACCOUNT HOLDER NAME: NATIONAL INSTITUTE OF SOLAR ENERGY (NISE)
ACCOUNT TYPE: CURRENT ACCOUNT
BANK NAME: STATE BANK OF INDIA, DLF QUTAB ENCLAVE, SHOP NO.: 109-110 QUTUB PLAZA, SHOPING C, GURGAON HARYANA,

(SBI BRANCH CODE: 6604)

ACCOUNT NO. 37266665652

IFSC CODE: SBIN0006604

Submit your payment details on http://training.nise.res.in/ by 11/12/2020.

Dushyant Kumar Dwivedi, Consultant (Solar Analytics Trainings)
National Institute of Solar Energy (NISE)
Gurgaon Faridabad Road, Gwalpahari, Gurugram-122003, Haryana

Note: The participants must clearly indicate and send their bank transfer details through the above link in advance by 11/12/2020, so that the participants are allowed to attend the online training program.
**SOLAR ANALYTICS**

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**Number of Seats:**

<table>
<thead>
<tr>
<th>No. of Seats</th>
<th>Selection criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>First come First serve basis</td>
</tr>
</tbody>
</table>

Note: If you require invoice against your organization it is mandatory to mention GSTN number of your organization. Otherwise your invoice will be generated as an individual.

**Coordinator at NISE**

For any queries please contact between 10:00 am to 17:30 pm during weekdays:

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Contact Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Vikrant Sharma</td>
<td>Dy. Director (Skill Development Division) – NISE</td>
<td><a href="mailto:sharma.vs1982@gmail.com">sharma.vs1982@gmail.com</a> (0124-2853035)</td>
</tr>
<tr>
<td>Mr. Dushyant Kumar Dwivedi</td>
<td>CONSULTANT – NISE</td>
<td><a href="mailto:itcell@nise.res.in">itcell@nise.res.in</a> (0124-2853075)</td>
</tr>
<tr>
<td>For Payment/Accounts</td>
<td>Mr. Himanshu, Accounts Phone No.: 0124-2853049</td>
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