A Three Week Online National Certificate Course on

Google Earth Engine With Python For Climate Smart Agriculture

June 07-27, 2021

About

The project entitled "Centre for Advanced Agricultural Science and Technology (CAAST) on Climate Smart Agriculture and Water Management (CSAWM)" is functional at the Mahatma Phule Krishi Vidyapeeth (State Agricultural University), Rahuri, Maharashtra since 2018 under the World Bank sponsored, National Agricultural Higher Education Project (NAHEP) of Indian Council of Agricultural Research (ICAR), New Delhi, Government of India. The major objectives of CAAST-CSAWM project is to develop the capacity amongst the faculties and students of MPKV, Rahuri and others for the development and adoption of the climate smart agriculture and water management technologies as well as to conduct on the-job training programmes, case study-based learning to enhance self-employment, business and entrepreneurship opportunities.

Background

Google Earth Engine platform and Python programming are emerging fields and there is a great demand for geo-informatics and data science professionals due to its application potential in several fields such as ecological mapping, agriculture, rural and urban planning, environmental monitoring, natural resources management, natural hazards and disasters management. Google earth engine platform and Machine learning programming deal with acquisition, storage, processing, forecasting and dissemination of spatial information. Climate Smart Agriculture is a continuing education programme that intends to familiarize learners with the Google Earth Engine cloud platform and python programming language to process and analyze geospatial data. The google earth engine platform and algorithms can help detect cropping pattern, land use mapping, soil moisture, land surface temperature, flood, weed and disease, and perform efficient irrigation water management and predict yield and crop quality. This certificate course aims to provide conceptual and practical knowledge of advanced GIS and remote sensing skills such as accessing, downloading processing, analyzing, and visualizing big data based on the Python and JavaScript programming language with GEE cloud platform. Considering the importance of Google Earth Engine with Python on Climate smart agriculture and water management the three week online national certificate course is being organized from **June 07- 27, 2021** by the CAAST-CSAWM with following objectives.

Objectives

1. To learn accessing and understanding the earth observation data in the cloud platform.

2. To learn common pre-processing and GIS techniques in Google Earth Engine platform.

3. To acquaint learners with the use of advanced geo-informatics technology and programming language for analyzing spatial data.

4. To learn processing and analyzing large volume of remotely sensed satellite data using Google Earth Engine cloud computing.

5. To widen opportunities of learners for higher studies and developing careers in different sectors of employment involving machine learning programming and google earth engine platform.

6. To use google earth engine, algorithms, geoinformatics techniques and models for climate smart agriculture and water resource management.

Methodology for conduct of course:

Pre and Post Evaluation:
Pre and post certificate course evaluation will be carried out to evaluate the impact of the certificate course.

Conduct of the Certificate course:
The certificate course will consist of online lectures-cum-discussions, demonstrations, tutorials, case studies, experience sharing from students and scientists in relation to remote sensing, GIS, google earth engine, python programming, water management, climate and technologies in GEE platform and machine learning programming languages.

Project Report:
The candidates are required to complete the case study-based project reports and submit online.

Evaluation:
There will be evaluation of the candidates at the end of each week, and final evaluation towards the end of the course. The evaluation will be in the form of MCQs, descriptive questions and power point presentation.

Feedback:
Candidates need to provide the feedback towards the end of certificate course.

Duration:
June 07-27, 2021 (Twenty one days)

No. of seats: Approximately 100 seats on "First-Come-First-Serve" basis (However, 50% seats are reserved for MPKV Students, Faculties and Scientists)

Course fee: (Non refundable)
Registration fee: Rs. 100 /-
Course fee: Rs. 4000 /- (Course fee includes registration fee) Students from constituent colleges of MPKV, Rahuri are exempted from course fee; however, they need to pay the registration fee.

Important dates:
Last date of application: June 04, 2021.

Confirmation of participation to the candidates: June 01 to June 04, 2021
Language: English

Who can apply?
Students, Faculty Members, Scientists, Progressive farmers, Govt. Officers, NGO Personnel, Extension personnel, KVK Officers, Industry persons or any individual who is working and/or is interested in the field of agriculture water management.

Minimum Eligibility: Graduate/Diploma (3 years) or final year students (registered for at least 7th semester or fourth year) from the bachelor degree program in Agricultural Science, Social Science, Agricultural Engineering and Engineering.

Mode of Application:

Interested candidates should visit following link to register for the certificate course.
http://www.mpkv-caast.ac.in/page/certificatecourses

Documents required while applying:
MPKV Candidates: The office reference number of "No Objection Certificate" in case of students and "Permission Letter" in case of staff in the box provided in the form; and email the scan copy of the "No Objection Certificate" or "Permission Letter" as the case may be to "mpkvcaast@gmail.com".

Non MPKV candidates:
The documents in support of minimum eligibility for attending the certificate/module based course to be emailed to "mpkvcaast@gmail.com".

It will be the responsibility of the concerned candidate to obtain the permission of the concerned organisation, if necessary (in case of non MPKV candidate)

For details, refer guideline by clicking here 👉

Expected Outputs

Trainees will be able to

1. Understand the basic and advanced concepts of GEE platform, hyperspectral remote sensing, python, java and machine programming languages, accosted with the google earth engine platform and python language for climate smart agriculture.

2. Develop the image classification classifier algorithm, prepare the small programming, RS models and tools to address the social and engineering problems.

3. Design algorithm and multi-criteria GEE and machine learning programming for decision making to seek job opportunities in the field of geo-informatics and data science.

Experts

Mr. Nicholas Clinton, Developer Advocate, Google Earth Engine, Mountain View, CA, USA

Mr. Bipin Charles, Director – RSGIS & AFOLU Support Services, KMS Group, Bangalore, India

Mr. Varun Tiwari, Remote Sensing and Geoinformation Analyst – SERVIR, Geospatial Solutions,Khumaltar, Lalitpur, Nepal

Mr. Sukant Jain, Research Scientist, National Institute of Hydrology, Bhopal Former Junior Scientist, Jharkhand Space Application Centre, Ranchi, India

Mr. Rohit Pansare, Independent Consultant and Trainer, Mumbai,India

Lakmal Deshapriya, Research Associate / Team Leader, Geoinformatics Center Asian Institute of Technology Klong Luang, Pathumthani, Thailand

Frank Yrle, Senior Research Associate, Geoinformatics Center Asian Institute of Technology Klong Luang, Pathumthani, Thailand

Rajitha Athukorala, Research Associate, Geoinformatics Center, Asian Institute of Technology, Klong Luang, Pathumthani, Thailand

Sasanka Madawalagama, MSc (Cartography), Technical University of Munich, Germany, Former Research Associate, Geoinformatics Center, Asian Institute of Technology, Klong Luang, Pathumthani, Thailand

Er. Sachin Shinde, Research Scholar (SWCE), Dept. of. Soil and Water Conservation Engineering, Dr.ASCAET, MPKV, Rahuri

Patron

Dr. P. G. Patil, Hon'ble Vice-Chancellor, MPKV,Rahuri

Dr. R. C. Agrawal, National Director (ICAR-NAHEP) and DDG (Edn.), ICAR, New Delhi

Advisors

Dr. A. L. Pharande, Dean (F/A) and Director of Instruction, MPKV, Rahuri

Dr. S. R. Gadakh, Director of Research & Director of Extension Education, MPKV, Rahuri

Dr. Prabhat Kumar, National Coordinator (CAAST), ICAR- National Agricultural Higher Education Project, New Delhi

Dr. D. D. Pawar, Associate Dean, Dr. A. S. College of Agril. Engg. & Technology, MPKV, Rahuri

Dr. P. N. Rasal, Associate Dean, Post Graduate Institute, MPKV, Rahuri

Convener

Dr. S. D. Gorantiwar, Principal Investigator, CAAST-CSAWM and Head, Dept. of Agil. Engg. MPKV Rahuri

Co-convener

Dr. M. G. Shinde, Co-Principal Investigator, CAAST-CSAWM & Professor of SWCE, MPKV, Rahuri

Course Director

Dr. A. A. Atre, Procurement Officer, CAAST-CSAWM & Professor of SWCE, Dr.ASCAE&T, MPKV, Rahuri

Joint Course Director

Dr. V. P. Patil, CAAST-CSAWM Team Member & Associate Professor, MPKV, Rahuri

Course Coordinators

Dr. C. B. Pande, Research Associate (Geoinformatics) CAAST-CSAWM, MPKV, Rahuri

Dr. J. Rajesh, Research Associate (RS & GIS) CAAST-CSAWM, MPKV, Rahuri

Dr. M. A. Patil, Research Associate (IDE), CAAST-CSAWM, MPKV, Rahuri

Er. M. A. Tamboli, Research Associate (Com. Science) CAAST-CSAWM, MPKV, Rahuri

A Three Week Online National Certificate Course on

Google Earth Engine With Python For Climate Smart Agriculture

June 07-27, 2021

Tentative Schedule

Date: 07/06/2021
Time: 10:00 to 11:30hrs
Inaugural Session
Time: 11:30 to 13:00hrs
Theory: Introduction of Google Earth Engine (GEE) Platform and Raster and Vector Data Types
Time: 14:00 to 17:00hrs
Practical: Basic functions of GEE Declaring Variables, Centering the Map, Displaying Metadata etc.
Date: 08/06/2021
Time: 10:00 to 13:00hrs
Theory: Google Earth Engine Explorer, Data Catalog and Workspace
Time: 1400 to 1700hrs
Practical: Setting visualization parameters: Data Band Display, Single-Band Grayscale, Three-Band True Color, Three-Band False Color.
Date: 09/06/2021
Time: 10:00 to 13:00hrs
Theory:Contrast, brightness, and opacity: Data Range, Gamma, Opacity, Palette, Visualizing Change Over Time.
Time: 14:00 to 17:00hrs
Practical: Managing Data Layers: Adding Data Layers, Layer Visibility, Adjusting Data Layer Date, Adding Multiple Layers, Duplicate Datasets, Reordering Layers, Removing Layers.
Date: 10/06/2021
Time: 10:00 to 13:00hrs
Theory:Declaring geometries: Points, Multi points, Line String, Multi-line String, Linear Ring, Rectangle, Polygon, Multi-Polygon etc.
Time: 1400 to 1700hrs
Practical: Accessing and Visualizing Images with Mathematical Operations
Date: 11/06/2021
Time: 10:00 to 13:00hrs
Theory: How to Download the satellite real time data from Google Earth Engine and Understanding the Band Combinations of Satellite Images
Time: 14:00 to 17:00hrs
Practical: Extracting and Exporting Satellite Data for Particular Area from Google Earth Engine Using Algorithms.
Date: 12/06/2021
Time: 10:30 to 13:00hrs
Case Study: Working with Different Satellite Image Collections in GEE Algorithms.
Time: 14:00 to 16:00hrs
Case Study: Working with Different Satellite Image Collections in GEE Algorithms (Contd.).
Time: 16:00 to 17:00 hrs
Practical: Allotment of Individual Projects
Date: 13/06/2021 – Holiday

Date: 14/06/2021
Time: 10:00 to 13:00hrs
Theory/Practical: Remote Sensing Processing in GEE: Export to CSV, Export rasters, Night Light Application Image Reduction, Linear Fit Image Reduction, Spectral Signature Visualisation over space and time, Extract and visualise time series
Time: 14:00 to 17:00hrs
Practical /Tutorial: How to Visualize the FCC, RGB, NIR, and True Color Images in GEE.
Date: 15/06/2021
Time: 10:00 to 13:00hrs
Theory: Introduction of Python Language and Java Script variables
Time: 14:00 to 17:00hrs
Practical/Tutorial : Google Earth Engine - Working with Vector and Raster Data Reading and Visualization
Date: 16/06/2021
Time: 10:00 to 13:00hrs
Theory/Practical : Built-in Data Structures using Python Language and Java Script
Time: 14:00 to 17:00hrs
Practical / Tutorial: Scripts to using in GEE- Downloadable Scripts for GEE Platform
Date: 17/06/2021
Time: 10:00 to 12:00hrs
Theory: Functions and Libraries, Control Program Flow and Working with Charts and time series plots
Time: 12:00 to 13:00hrs
Evaluation of Individual Projects
Time: 14:00 to 16:00hrs
Practical/Tutorial: Mapping over Image Collection from Google Earth Engine and Compositing and mosaicking in GEE
Time: 16:00 to 17:00hrs
Evaluation of Individual Projects
Date: 18/06/2021
Time: 10:00 to 12:00hrs
Theory: Reduction over Image Collections and Band Stacking.
Time: 12:00 to 13:00hrs
Evaluation of Individual Projects
Time: 14:00 to 16:00hrs
Practical/Tutorial: GIS Processing in GEE: Buffer Operator, Clip Image on a vector, Raster Values Categorisation, Filter feature data, Filter raster data, Filter Landsat images based on path and row etc..
Time: 16:00 to 17:00hrs
Evaluation of Individual Projects
Date: 19/06/2021
Time: 10:00 to 12:00hrs
Practical/Tutorial: Advanced GIS Processing in GEE: Detect Edges using the Canny Filter, Resampling of Raster data, Change the spatial resolution of raster data, Raster Arithmetic or Bands Math, Thresholding, Vector to Raster conversion
Time: 12:00 to 13:00hrs
Evaluation of Individual Projects
Time: 14:00 to 16:00hrs
Practical/Tutorial: Band Math – NDVI, EVI, GCVI Calculations Using Machine Learning Programming
Time: 16:00 to 17:00hrs
Evaluation of Individual Projects
Date: 20/06/2021
Time: 10:00 to 12:00
Allotment of Group Projects

Date: 21/06/2021

Time: 10:00 to 13:00hrs

Theory/Practical: Image classification in GEE Supervised Classification using Machine Learning Algorithms, Types of Classifier, Accuracy Assessment , training , testing and validation.

Time: 14:00 to 17:00hrs

Theory/Practical: Image classification in GEE Unsupervised Classification-K Means Clustering and Using Machine Algorithms, SVM classification, Accuracy Assessment, training, testing and validation.

Date: 22/06/2021

Time: 10:00 to 13:00hrs

Theory/Practical: Working with optical data -Landsat: Principles behind collection of optical Remote Sensing data, why do we need preprocessing of Landsat data, Different Landsat sensor

Time: 14:00 to 17:00hrs

Theory/Practical: Working with optical data -Landsat: Apply Atmospheric Correction to Landsat Data, Pan Sharpening Landsat Images, More Pan-Sharpening, Create a Landsat Composite, Compute Texture Indices from an Image, Spectral Unmixing for Mapping, etc.

Date: 23/06/2021

Time: 10:30 to 17:00hrs

CASE STUDY : Working on the DEM Data and Preparation of Various Maps such as Slope, Hill-shade, Aspect etc. in Google Earth Engine

Date: 24/06/2021

Time: 10:00 to 13:00hrs

CASE STUDY: Working with SAR data and Applications in Google Earth Engine

Time: 14:00 to 17:00hrs

Evaluation of Group Projects

Date: 25/06/2021

Time: 10:00 to 13:00hrs

CASE STUDY: Working on the Cropping, and Population data etc. in Google Earth Engine.

Time: 14:00 to 17:00hrs

Evaluation of Group Projects

Date: 26/06/2021

Time: 10:00 to 13:00hrs

CASE STUDY: Working with MODIS data and Applications in Google Earth Engine

Time: 14:00 to 17:00hrs

Evaluation of Group Projects

Date: 27/06/2021

Time: 10:00 to 11:30hrs

Evaluation of Group Projects

Time: 11:30 to 13:00hrs

Participants Interaction with Experts about Google Earth Engine

Time: 14:00 to 15:30hrs

Feedback

Time: 15:30 to 17:00hrs

Valedictory Session

Contacts

Course Director
Dr. A. A. Atre-Mobile No. +91 9860593836, E-mail:atreatul@gmail.com

Joint Course Director
Dr. V. P. Patil- Mobile No. +91 9420639636, E-mail: vikram.patil1967@gmail.comm

Course Coordinators
Dr. C. B. Pande - Mobile No. +91 9890549435, Email:chaitanay45@gmail.com
Dr. J. Rajesh - Mobile No. +91 9751693758, Email: drjrajesh89@gmail.com
Dr. M. A. Patil - Mobile No. +91 9890328688, E-mail: mangalpatil43@gmail.com
Er. M. A. Tamboli - Mobile No. +91 9860646586, E-mail: mohasin.ayub@gmail.com

Organized by
ICAR-National Agricultural Higher Education Project (NAHEP)
The Centre for Advanced Agricultural Science and Technology (CAAST)
for Climate Smart Agriculture and Water Management (CSAWM)
Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri-413 722