

**WMO OMM**

World Meteorological Organization
Organisation météorologique mondiale
Organización Meteorológica Mundial
Всемирная метеорологическая организация
المنظمة العالمية للأرصاد الجوية
世界气象组织

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21 May 2024

Annexes: 3 (available in English only)

Subject: WMO Development of Competency in Weather Forecasting course

Action required: For information and appropriate action, as necessary

Dear Sir/Madam,

The WMO Regional Training Centre Pune (RTC Pune), India designed in collaboration with WMO a training course for competency development in weather forecasting as a support to the EW4All initiative. The training course will enable current forecasters from WMO Regional Association II (RA II) to follow tested forecast procedures, in line with the required WMO competencies as support to the implementation of the EW4All initiative.

The training will run for a duration of five weeks from Monday, 26 August to Friday, 27 September 2024. [Annexes I](#) and [II](#) to this circular letter contain a brief description of the course, its format, expected learning outcomes, and qualifications to be attained.

You are invited to submit the application of an interested and qualified candidate for consideration. All applications will be reviewed by WMO in collaboration with RTC Pune, India. Selection for this course will be made on a competitive basis.

Any interested candidate from WMO RA II should first apply to RTC Pune, India and forward a duly completed application form ([Annex III](#)) with the relevant attachments to Dr Geeta Agnihotri (g.agnihotri@imd.gov.in) with a copy to tra@wmo.int no later than **1 July 2024**. Selected candidates will be notified by RTC Pune, India, and will be contacted by WMO to prepare the logistics for the travel. Please note that while we encourage Members to cover the expenses of their participants to attend the course, WMO is prepared to support one participant from selected Members. When completing the application form ([Annex III](#)), you are requested to provide information on how the participation of your candidate will benefit your service. After the selection process, they will receive a Request for Financial Assistance (RFA) form to complete and send back to WMO along with the admission letter and copy of their passport no later than **10 July 2024**.

May I take this opportunity to assure you of my unwavering commitment to capacity-development-related activities in support of competency development and EW4All and thank you for your continued cooperation in this endeavour.

Yours faithfully,

Prof. Celeste Saulo
Secretary-General

To: Permanent Representatives of Regional Association II with WMO

Cc: Hydrological Advisers



**JOINT METEOROLOGICAL TRAINING INSTITUTE (IMD)
AND WMO TRAINING COURSE
ON DEVELOPMENT OF COMPETENCY IN WEATHER FORECASTING**

REGIONAL TRAINING CENTRE (RTC) - PUNE INDIA

26 August 2024 to 27 September 2024

(25 working days = 100 Sessions)

In person on-campus

Every day there will be four sessions, two discussion sessions in the morning and two performance sessions in the afternoon

Target Audience: National Meteorological and Hydrological Services forecasters in RA II

Pre-requisite: Participants must have already completed BIP-M compliance training course successfully with working experience of five or more years in the weather forecasting.

Module / Duration		Key elements for discussions	Tasks to be performed by the participants
1.	Monitoring and analysis of weather systems (2 days)	<ul style="list-style-type: none"> • Analysis of different synoptic weather charts on screen /on hard copies and to bring out the evolution of synoptic features. • Use of climatology. • Analysis of thermodynamic diagrams and to bring out different levels, thermodynamic features and stability analysis. • Analysis of different Numerical Weather Prediction (NWP) products, direct or derived, their interpretation and operational application for specific weather phenomenon. • Visualization, analysis and interpretation of including images and different satellite products, like Spatial Analysis and Satellite Imagery in a GIS, Lightning Mapper and Ground Networks Lightning Detection, etc. for different weather phenomenon. • Visualization, analysis and interpretation of radar images and products (base are derived) for different weather phenomenon. 	<p>Following performance should be repeated for selected cases of high-impact weather phenomenon, such as extreme weather caused by extreme hot and cold conditions, heavy rainfall, strong winds, etc.:</p> <ul style="list-style-type: none"> • Participants will be provided with different weather charts showing time evolution of selected weather phenomena and will be asked to analyse different scalar fields (pressure, geopotential, temperature, humidity, etc.) and vector fields (wind). • After analysis the participants will be asked to bring out different synoptic features with their time evolution. • Participants will also be asked to attribute the observed change in weather patterns to concerned change in synoptic features. • Participants will also be asked to attribute the observed change in weather patterns to concerned satellite images and products. • Participants will also be asked to attribute the observed change in weather patterns to concerned radar images and products. • Participants will also be asked to use appropriate NWP products to substantiate the observed change in weather.

Module / Duration		Key elements for discussions	Tasks to be performed by the participants
2.	Weather forecasting techniques (3 days)	<p>Forecasting of different meteorological and hydrological situation, by analysing the products available from different sources. For that, participants must be aware of the following:</p> <ul style="list-style-type: none"> • Application of conceptual models; • Different forecast methods, like, synoptic, statistical, deterministic and ensemble NWP; • Broad features of NWP models, like resolution, global or regional, deterministic or ensemble (if ensemble, then number and details of member models); • Use of climate information in the forecast process; • Concept of forecast uncertainty, information about the performance and forecast uncertainty of different models for different weather over different regions during different seasons. <p>In the case of more than one deterministic model to be used, they must know weightage to be assigned;</p> <ul style="list-style-type: none"> • How to pick up the information from right model with appropriate weightage; • Must be aware of the availability of different NWP forecast products, direct or derived; • Must be able to bring a synergy among all information; • Daily discussions on current weather, past weather, all available synoptic features and thermodynamic features, all NWP forecast products, satellite products, Radar products, etc., over one window to bring into a consensus; • Issue of consensus forecasting; • Meteogram, Epsgram; • Forecast verification; • Use of social media. 	<ul style="list-style-type: none"> • Participants will be asked to thoroughly examine the available information on past weather, present weather, all available NWP products, analysed synoptic weather chart, thermodynamic diagram, satellite imagery and products, radar imagery and products. • Will be asked to carry out discussions on above to bring out a consensus forecast. • They will be asked to use Meteogram, EPSgram for local forecast, etc. • Each group will be asked to prepare forecast verification statistics, using given information on weather forecast and realized.

Module / Duration		Key elements for discussions	Tasks to be performed by the participants
3.	High-Impact Weather caused by extreme hot and cold temperature conditions (3 days)	<ul style="list-style-type: none"> • Different Hazardous weather phenomena due to extreme temperature condition. • Classification of hazard associated with high-impact weather phenomena due to extreme temperature conditions, following national practice. Use of colour codes. • Warnings based on fixed meteorological thresholds/using relevant thresholds agreed with users/practitioners/with spatial and temporal variation in thresholds. • Country level Standard Operating Procedures and its use for warning of hazardous weather phenomena. • Weather forecasts and warnings/impact-based forecasts and warnings/impact forecasts and warnings. • Application of Common Alert Protocol (CAP) to issue warnings related to hydrological hazards. 	<ul style="list-style-type: none"> • Participants will be asked to examine analysed weather charts/NWP products and identify synoptic features to give rise to extreme temperature related weather conditions. • Each group will provide selected cases of Meteorological hazardous weather due to extreme temperature condition. • They will be asked to prepare warnings based on fixed meteorological thresholds, based on a relevant threshold agreed with stakeholders and based on spatial and temporal variation in thresholds. • They will be asked to make use of country level SOP, if it is there, while preparing warnings. • They will be asked to prepare a risk matrix with a colour code for a given set of hazardous weather phenomena. • They will be asked to prepare warnings using the CAP for a given set of Hazardous weather phenomenon.
4.	High-Impact Weather (Severe local storm/Severe thunderstorm (Squall-line, Multi-cell, Super-cell)) (4 days)	<ul style="list-style-type: none"> • Structure and different stages of a severe thunderstorm. • Dynamical and thermo dynamical features associated with thunderstorms. Convective dust-storms in Northwest India, hail storms, tornados, squalls, sea breeze induced thunderstorms- meso-high, gust fronts, down-bursts and microbursts. • Checklist for forecasting thunderstorms and hailstorms. • Different derived NWP generated stability indices, their interpretation and operational application. • Use of Radar products for nowcasting local severe storms. 	<ul style="list-style-type: none"> • Participants will provide analysed weather charts, thermodynamic diagrams and different NWP products. • To identify areas where conditions are favourable for thunderstorms to take place. • Based on specific pre-storm environmental characteristics, to diagnose the environment's potential to support severe convective weather (large hail, damaging winds, and heavy precipitation).

Module / Duration		Key elements for discussions	Tasks to be performed by the participants
5.	High-impact weather-Asian summer monsoon rainfall (4 days)	<ul style="list-style-type: none"> • Rain producing weather systems during the Asian summer monsoon. • Their movement and intensity changes. • Analysis, monitoring, forecasting and warning of heavy rainfall. Use of different NWP products as a forecast and warning guidance. • Impact-based forecasts and warning of heavy rainfall. 	<ul style="list-style-type: none"> • Weather Charts, Satellite picture will be provided. Monitoring day to day cross equatorial flow, outgoing longwave radiation, etc., to identify monsoon onset and progress/hiatus etc. • Identifying semi-permanent synoptic scale features, like Mascarene high, Somali jet, monsoon trough, Tibetan high, heat low, tropical easterly jet. • They will be asked to analyse the South Asian summer monsoon rainfall condition vis-à-vis the strength and position of these features from the analysed mean sea level and upper air charts. • Mapping of the position of a monsoon trough with active/break monsoon situation. • From the analysed weather charts and with the help of satellite pictures, diagnosis of rain producing weather systems and prognosis of movement and intensity of such systems. • To communicate relevant Monsoon weather information to all stakeholders.
6.	High-impact weather-Cyclonic storm (5 days)	Tropical cyclone (TC) classifications, TC structure, different phases, Genesis criteria, genesis potential, dynamics and conceptual models; synoptic factors that affect the intensity including shear, ocean temperatures, upper-level flow, stability, landfall, vorticity and low to mid-level moisture; intensification and movement. Different available techniques for monitoring, predicting, warning.	<ul style="list-style-type: none"> • Analyse the synoptic environment to assess the likely influence on the disturbance in a range of situations. • Determine location of centre and current movement in accordance with standard procedures in a range of situations. • Determine intensity in accordance with standard procedures in a range of situations. • Determine structure in accordance with standard procedures in a range of situations. • Interpret NWP-predicted broad scale environment to assess the likely influence on the disturbance in a range of situations.

Module / Duration		Key elements for discussions	Tasks to be performed by the participants
			<ul style="list-style-type: none"> • Determine forecast track in accordance with standard procedures in a range of situations. • Determine forecast intensity in accordance with standard procedures in a range of situations. Determine forecast structure in accordance with procedures and timelines in a range of situations. Determine associated storm surges. • Determine potential weather impacts on/at risks areas: Forecast extent of cyclonic winds (e.g. squall, gales, and storm force) and onset times for key locations/ areas using available guidance in a range of situations. • Forecast rainfall using available guidance in a range of situations and liaise with hydrology to determine potential flooding. • Forecast waves and swell using standard techniques. • Forecast storm tide potential considering various track and intensity scenarios and confidence levels (worst case, most likely, alternate track/intensity). Forecast coastal inundation (height and area) considering various track, intensity scenarios and confidence level using NWP products. • Preparation of weather inference, forecasting and warning dissemination to different agencies. • To communicate relevant TC information to internal and external stakeholders: • To prepare logically structured briefings and presentations to contain relevant, accurate and complete information. • To deliver briefings, presentations and interviews to suit the intended audience explaining technical information in concise, clear and easy to understand language.

Module / Duration		Key elements for discussions	Tasks to be performed by the participants
7.	Communication of meteorological and hydrological information to internal and external users (2 days)	<ul style="list-style-type: none"> Standards, procedures and dissemination methods for the presentation of forecast and warning information to the public across all relevant media, including impact information as required. Protocols for presenting warning information to emergency management partners, including information on likely impacts and mitigation activities, if relevant. User needs for, and use of, meteorological and hydrological information. The application of meteorology and hydrology to human activities and specific users. 	<ul style="list-style-type: none"> Ensure that all forecasts and warnings are disseminated through the authorized communication means and channels to designated user groups, as specified in relevant standard operating procedures. Explain meteorological and hydrological data and information, including uncertainties, where required. Deliver briefings and provide consultations to meet specific user needs as required.
8.	Quality management of meteorological and hydrological information and services (2 days)	<ul style="list-style-type: none"> Standard operating procedures and also contingency procedures. Techniques and technology commonly used in forecast offices. Validation and verification procedures relevant to meteorological and hydrological forecasts and warnings. Methods used in developing case studies and feedback to improve the quality of forecasts and warnings. 	<p>Participants will be asked to</p> <ul style="list-style-type: none"> Apply the respective organization's quality management system and procedures Validate meteorological and hydrological data, products, forecasts and warnings (timeliness, completeness, accuracy) Assess the impact of known error characteristics (bias, achievable accuracy of observations and sensing methods) Monitor operational systems and take contingency actions where appropriate Contribute to case studies and post-reviews as required, including assimilation of user feedback and impact information Mentor junior colleagues and provide support and advice as required.

**THE METEOROLOGICAL TRAINING INSTITUTE (MTI),
INDIA METEOROLOGICAL DEPARTMENT (IMD)
PUNE – REGIONAL TRAINING CENTRE (RTC)**

PUNE, INDIA

Course description

This Development of Competency in Weather Forecasting course at the Meteorological Training Institute (MTI), India Meteorological Department (IMD) Pune – Regional Training Centre (RTC) Pune, India is a face-to-face course.

This programme is divided into a couple of modules within the framework of WMO Public Weather Services (PWS) forecast competency. In each module there are two activities:

- (i) Discussion on key elements for acquiring competencies, led by a team of expert facilitators, followed by a demonstration from the participants showing the competency acquired;
- (ii) After the demonstration, students will have sufficient time to practise issuing operational forecast products showing correct forecast procedures learned and using relevant significant weather case study data/simulations.

The case studies will be used by learners to demonstrate high-impact public weather forecaster competencies.

Course format

This will be a face-to-face course. It will run from Monday, 26 August to Friday, 27 September 2024 and will be delivered in the classrooms at RTC Pune, India.

The students must show satisfactory attendance, progress and timely and satisfactory completion of tasks/quizzes as per submission deadlines. They are expected to bring their own laptop.

Expected learning outcomes

By the end of the course, the students will be able to:

- Analyse different weather charts and diagrams and to highlight features;
- Monitor and analyse weather events and meteorological parameters;
- Interpret and operate the application of NWP, radar and satellite products;
- Use techniques for forecasting high-impact weather;
- Provide warnings of high-impact weather caused by extreme temperatures, heavy rain, strong winds, etc.;
- Produce Public Weather Service products and services according to the prescribed WMO competencies.

Competencies attained and certificates issued

After successful completion of the course, the candidates will receive a certificate stating relevant competencies achieved in public weather forecasting.

Target audience

Officials, specialists and experts working in relevant fields at National Hydrological and Meteorological Services (NMHSs) or equivalent institutions that can work as a competent weather forecaster in their NMHS.

Instructors

The RTC Pune, India staff are competent and experienced instructors with most staff having more than 10 years' training experience along with operational forecasting experience. The RTC Pune, India staff are experienced with using blended learning techniques and all hold relevant outcome-based training qualifications. Additional content experts will be brought in for specific portions/subjects of the course if needed.

Working language

The course will be conducted in English. Thus, good skills in English reading, writing and speaking (language comprehension) are essential to be successful in the course.

Entry requirements

- Academic qualifications: Relevant qualification in Meteorology related to BIP-M
- Good computer literacy for using different weather analysis software
- All this needs to be verified by proof of CV and qualifications.

Forecaster work experience: Relevant work experience in weather forecasting will be an added advantage but is not essential.

Materials for the course

- A laptop or desktop computer with Microsoft Office or equivalent (Word processor, PowerPoint Presentation, Excel Worksheet etc.) good memory capacity and storage (an external storage is advised) as well as internet connectivity. A laptop would be preferable as it can be used during the face-to-face phase as well, especially if COVID-related restrictions are enforced.

Procedure for application

The applications must include:

- Application form
- A letter of motivation in English limited to 200 words:
- A CV
- Relevant certified qualifications
- Nomination letter from the relevant Permanent Representative.

All applications will be handled according to protection of private information requirements.

Application for consideration should be forwarded to:

Dr Geeta Agnihotri
MTI, IMD – RTC Pune, India
g.agnihotri@imd.gov.in

Dr R. K. Giri
Organization, IMD, New Delhi, India
rk.giriccs@gmail.com

Clearly mark the subject of the email as: **IMD – India – Forecaster competency course 2024**

Copy to: Education and Training Office, WMO, tra@wmo.int

Deadline for application: **1 July 2024** to RTC India

Deadline for submission of the Request for Financial Assistance (RFA) form with a copy of the admission letter and passport is **26 July 2024**.

Only successful applications will be notified by email by IMD – RTC India and WMO.

APPLICATION FORM

WMO DEVELOPMENT OF COMPETENCY IN WEATHER FORECASTING COURSE

PUNE, INDIA

26 August to 27 September 2024

Note: Please read the [notes and instructions](#) on the last page before completing this application form

A. PERSONAL	
1. First name	
2. Family name	
3. Country	
4. Date of birth (<i>DD/MM/YYYY</i>)	
5. Gender	M / F
6. Passport number	
7. Passport validity	
8. Do you have a disability	Yes / No
If yes, please specify	
9. Permanent home address (<i>number, street, postal code, town</i>)	
10. Telephone (<i>mobile</i>)	
11. Email	
12. Professional contact	
Name	
Telephone (<i>office</i>)	
Professional links	
13. Would you request financial assistance to participate in the course? Yes / No	

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B. GENERAL

1. Give details of working experience in meteorology

Name of organization	Starting and end date	Brief description of role and responsibilities	Reason for leaving

2. Write a brief statement setting out clearly why you have chosen this course and how you intend to use it after graduation

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I declare that to the best of my knowledge all the information on this form is true and correct.

Signature

Date

C. PERMANENT REPRESENTATIVE ENDORSEMENT

Signature

Date

Notes and instructions

Please read these notes and instructions carefully before completing this application form. Be sure to read every section and that the information you provide is accurate.

1. Applications received after **1 July 2024** will not be considered;
2. Applications received without the endorsement of the Permanent Representative will not be considered;
3. Incomplete application forms will not be considered;
4. Closing dates for the application dates are published and will be strictly adhered to;
5. A copy of the valid passport must be included in the application;
6. Successful candidates will be contacted by email. Please ensure that your contact details are correct and clearly written.
