ADVANCE TRAINING ON SPACE WEATHER AND ITS EFFECT

DAY-1 :8 DECEMBER 2025

Time	TOPIC	Expert's name
0930-1100	**Inauguration, Group Photograph and Welcome address by Director IIST**	
1100-1130	Tea Break	
1130-1300	**Introduction to Space Weather** ● Overview of space weather phenomena ● Sources of space weather (solar flares, coronal mass ejections, solar wind) ● Importance of studying space weather	**Dipankar Banerjee, IIST**
1300-1400	Lunch Break	
1400-1600	**Practical** - **Space Weather Observation Techniques** ● Ground-based observations (e.g., radio telescopes, magnetometers) ● Space-based observations (e.g., satellites, space probes)	

DAY-2 : 9 DECEMBER 2025

Time	TOPIC	Expert's name
0930-1030	**Solar Activity and its Cycles** ● The solar cycle and its phases ● Solar dynamics and magnetic field ● Sunspots	**Dipankar Banerjee, IIST**
1030-1045	Tea Break	
1045-1145	**Earth's Magnetosphere** ● Structure and dynamics of the magnetosphere ● Interaction between solar wind and the magnetosphere ● Magnetospheric substorms.	**Ankush Bhaskar, VSSC**
1145-1200	Tea Break	
1200-1300	**Ionosphere and its Variability** ● Layers of the ionosphere ● Effects of solar activity on the ionosphere ● Ionospheric disturbances and their implications.	**Tarun Pant**
1300-1400	Lunch Break	
1400-1600	**Practical - Magnetometer Data Analysis** ● Using magnetometer data to study geomagnetic storms ● Identifying patterns and anomalies	**Ankush Bhaskar, SPL**

DAY-3 : 10 DECEMBER 2025

Time	TOPIC	Expert's name
0930-1030	**Space Weather and Climate** ● Long-term effects of space weather on Earth's climate Current research findings	**Dibyendu Nandi** **IISER Kolkata**
1030-1045	Tea Break	
	Advanced Topics in Space Weather ● **Heliospheric Physics** - Understanding the heliosphere, Its influence on space weather ● **Cosmic Rays and Space Weather** - Sources of cosmic rays, Their impact on space weather	**Ankush Bhaskar, VSSC**
1045-1200	Tea Break	
1200-1300	**Space Weather Modeling and Simulation: Focus on CMEs** ● Advanced modeling techniques ● Simulation of space weather scenarios	**Bhargav Vaidya**
1300-1400	Lunch Break	
1400-1600	**Space Weather Simulation Tools** ● Using simulation software for space weather forecasting ● Case study analysis	**Bhargav Vaidya**

DAY- 4 : 11 DECEMBER 2025

Time	TOPIC	Expert's name
0930-1030	**Future Directions in Space Weather Research** ● Emerging technologies and methodologies Collaborative efforts in space weather research	**Dibyendu Nandi** **IISER Kolkata**
1030-1045	Tea Break	
1145-1200	Tea Break	
1200-1300	**Developing Space Weather Prediction Model** ● Techniques for space weather forecasting Model validation and reliability	**Dibyendu Nandi,** **IISER Kolkata**
1300-1400	Lunch Break	
1400-1600	**Practical - Advanced Data Analysis Techniques** ● Big data and machine learning in space weather research Practical applications	**Bhargav Vaidya**

DAY-5 : 12 DECEMBER 2025

Time	TOPIC	Expert's name
0930-1030	**Data Collection and Analysis** ● Overview of coronagraphs. ● Techniques for data collection ● Analysis methods for tracking solar eruptions: Observations and numerical simulations I have moved my talk to 1st talk. I believe first we can tell what all instruments (national+international)methods are available for tracking solar eruptions primarily from an observational perspective. Then Dibyendu can talk about Real-time space weather monitoring and then we can talk about collaborations in space weather and how private industry can help us. Finally, after lunch, I can give hands-on pn the CME drag model and arrival time estimates. I think this will fit best to their interests.	**Vaibhav Pant** **ARIES , Nainital**
1030-1045	Tea Break	
1045-1145	**Real-Time Space Weather Monitoring Systems** ● Overview of current monitoring systems ● Importance of real-time data	**Dibyendu Nandi** **IISER Kolkata**
1145-1200	Tea Break	
1200-1300	**Collaboration in Space Weather Research** ● Importance of international cooperation ● Major collaborative initiatives.	**Dibyendu Nandi** **IISER, Kolkata**
1300-1400	Lunch Break	
1400-1600	**Practical** - **Solar Observation** ● Hands-on session for predicting arrival times of solar eruptions ● Analysing solar images and CMEs	**Vaibhav Pant** **ARIES Nainital**

DAY-6 : 13 DECEMBER 2025

Time	TOPIC	Expert's name
0930-1100	**Developing a National Space Weather Strategy** ● Components of a national strategy ● Implementation and coordination.	**Dibyendu Nandi**
1030-1045	Tea Break	
1045-1145	**Space Weather and Navigation Systems** ● GPS and GNSS signal degradation ● Impact on accuracy and reliability	
1145-1200	Tea Break	
1200-1300	**Historical Case Studies of Space Weather Impacts** ● Analysis of past space weather events and their effects ● Lessons learned from historical incidents. **Space Weather Resilience in Military Systems** ● Designing resilient military systems ● Strategies for operational continuity	VK Hariharan
1300-1400	Lunch Break	
1400-1600	**Space Weather Effects on Satellites** ● Radiation effects on satellite electronics ● Satellite communication disruptions Satellite navigation errors	VK Hariharan

DAY 7 : 14 DECEMBER 2025 (SUNDAY - HOLIDAY)

DAY-8 : 15 DECEMBER 2025

Time	TOPIC	Expert's name
0930-1030	**Space Weather Effects on Ground-Based Systems** ● Geomagnetically induced currents (GICs) ● Effects on power grids ● Impacts on pipelines and railways	Dr. SV Sharma
1030-1045	Tea Break	
1045-1145	**Space Weather and Communication and Navigation Systems** ● Impact on HF, VHF, and satellite communications and navigation	Dr. Venkatesh, PRL
1145-1200	Tea Break	
1200-1300	**Space Weather Effects on Aviation** ● Radiation exposure at high altitudes ● Communication and navigation system disruptions ● Mitigation strategies for aviation	Dr. SV Sharma
1300-1400	Lunch Break	
1400-1600	**Practical** Case studies of communication and navigation failures	Dr. Venkatesh, PRL

DAY-9 : 16 DECEMBER 2025

Time	TOPIC	Expert's name
0930-1030	**Case Study** ● Analysing a major space weather event ● Presenting findings **International and Indian Space missions**	**Kushgra Upadhaya**
1030-1045	Tea Break	
1045-1145	**Future Challenges in Space Weather** ● Anticipating future space weather challenges ● Preparing for extreme space weather events	**Kushgra Upadhaya**
1145-1200	Tea Break	
1200-1300	**Integrating Space Weather Data into Military Operations** ● Using space weather data for operational planning ● Real-time decision-making.	Saikat Majumder, Digantra
1300-1400	Lunch Break	
1400-1600	**Practical - Leveraging AI/ML for Enhanced Space Weather Forecasting and Military Operational Resilience** ● Introduction to AI/ML for space weather prediction, data pre-processing, building predictive models, hands-on practical using Python for solar flare prediction, and integration into military systems	Saikat Majumder, Digantra

DAY-10 : 17 DECEMBER 2025

Time	TOPIC	Expert's name
0930-1030	**Space Weather Effects on Military Systems** ● Impact on military communication systems ● Navigation and positioning challenges Vulnerability of space-based assets	Chandrasekar
1030-1045	Tea Break	
1045-1145	**Mitigation Strategies for Communication Systems** ● Designing resilient communication systems ● Adaptive technologies and strategies.	**Chandrasekar**
1145-1200	Tea Break	
1200-1300	**Mitigation Strategies for Navigation Systems** ● Improving GNSS accuracy during space weather events Alternative navigation methods	**Chandrasekar**
1300-1400	Lunch Break	
1400-1600	**Practical - Communication System Testing** ● Simulating space weather impacts on communication systems ● Analysing signal degradation and recovery	Chandrasekar

DAY-11 : 18 DECEMBER 2025

Time	TOPIC	Expert's name
0930-1100	Examination / Test (Objective / Short Q/A) - for 1 hour	
1100-1115	Tea Break	
1130-1300	**Military Operations and Space Weather** ● Impact on reconnaissance and surveillance ● Challenges in military communication and navigation	Chandrasekar
1300-1400	Lunch Break	
1400-1600	**Campus tour with selective lab visits**	

DAY-12 : 19 DECEMBER 2025

Time	TOPIC	Expert's name
0930-1030	**Workshop Summary and Final Discussions**	**Prof. Dipankar Banerjee, IIST**
1030-1045	Tea Break	
1045-1130	Feedback Discussion	
1130-1300	**Closing Ceremony and distribution of certificates**	
1300-1400	Lunch and Departures	