



The Curriculum

Introduction

The curriculum outline comprises 6 modules, to be delivered in hybrid format, blending online classes with experiential learning on-site. Each module is designed to impart the equivalent of 1.5-credit hours, comprising 30 hours of cumulative learning time. Twenty one hours (21) of real-time online classes, anchored by the WePOWER SAR 100 Regional Knowledge Hub (RKH) at Yunus Center AIT (YCA), will be hosted by the Sustainable Energy Transition (SE) department at AIT Bangkok, with international faculty participating from a variety of locations. Nine (9) hours of supervised onsite practical learning assignments will be facilitated by experts in the home-country, working closely with the YCA core team. A one-week on-campus capstone event at AIT will conclude the program.

The curriculum primarily focuses on:

- Operation of regionally integrated power systems with high penetration of renewable energy, including hydropower
- Power markets for regional integration and scaling-up renewable energy, including hydropower. SAR-100 also includes a module on soft skills that help build gender awareness and mitigate unconscious bias and boosts everyday leadership.

The duration of the program is 6 months. Classes will be 3 hours a day for five days every four weeks. There are ten modules plus a capstone in Bangkok. Every module spans a three-week cycle.

- Week 1: Online classes (12:00 - 15:45 Bangkok time)
- Week 2: On-site supervised practicum
- Week 3: Completing assignments and down time

Coursework Details for Module 2

Module 2: Renewable Energy Integration in Power Systems

Course Objective:

To provide in-depth knowledge on integrating renewable energy sources into traditional power systems, focusing on emerging technologies, forecasting, data analytics, and cybersecurity.

Learning Outcomes : By the end of the course, the participants would be able to,

- Gain a comprehensive understanding of the global energy transition, sustainable practices, and various renewable energy sources (wind, solar, hydro, biomass, geothermal).
- Equip participants with knowledge of the challenges of integrating intermittent renewable energy, grid balancing techniques, load forecasting, and smart grid technologies.
- Learn about the crucial role of energy storage in renewable energy integration, advancements in battery storage, and alternative storage technologies (e.g., thermal storage, CAES).



- Explore the applications of AI, ML, and IoT in grid management, blockchain for energy trading, predictive analytics, and cybersecurity solutions within renewable-integrated power systems.
- Learn methods to enhance power system flexibility, the impact of demand response programs, and the integration of Vehicle-to-Grid (V2G) infrastructures.



Schedule

Lecture Session

DAY 1: 6 January, 2025 Monday (3 hrs)

Time	Topic	Facilitator
11:50-12:00 (10 mins)	Opening message	Dr. Jai Govind Singh
12:00-13:30 (90 mins)	Session 1: Energy transition and sustainability practices	Prof. S Kumar
13:30-13:45	Break (15 mins)	
13:45-15:15 (90 mins)	Session 2: Wind, solar, hydro, biomass, and geothermal power	Prof. S Kumar

DAY 2: 7 January, 2025 Tuesday (3 hrs)

Time	Topic	Facilitator
12:00-13:30 (90 mins)	Session 3: Challenges of intermittent renewable energy	Prof. Francisco Gonzalez-Longatt
13:30-13:45	Break (15 mins)	
13:45-15:15 (90 mins)	Session 4: Grid balancing, load forecasting, and smart grid technologies	Prof. Francisco Gonzalez-Longatt



DAY 3: 8 January, 2025 Wednesday (3 hrs)

Time	Topic	Facilitator
12:00-13:00 (60 mins)	Session 5: Role of storage in renewable energy integration	Prof. Francisco Gonzalez-Longatt
13:00-13:15	Break (15 mins)	
13:15-14:15 (60 mins)	Session 6: Technological advancements in battery storage and their applications	Prof. Francisco Gonzalez-Longatt
14:15-14:30	Break (15 mins)	
14:30-15:30 (60 mins)	Session 7: Energy storage beyond batteries (LDES, thermal storage, CAES, etc.)	Prof. Francisco Gonzalez-Longatt

DAY 4: 9 January, 2025 Thursday (3 hrs)

Time	Topic	Facilitator
12:00-13:30 (90 min)	Session 8: Role of artificial intelligence (AI), machine learning (ML), and IoT in grid management	Dr. Rupendra Kumar Pachauri
13:30-13:45	Break (15 mins)	
13:45-15:15 (90 mins)	Session 9: Predictive analytics for grid management	Dr. Rupendra Kumar Pachauri



DAY 5: 10 January, 2025 Friday (3 hrs)

Time	Topic	Facilitator
12:00-12:15 (15 mins)	Opening message	Dr. Jai Govind Singh
12:15-13:15 (60 mins)	Session 10: Methods for increasing flexibility in power systems	Abhishek Ranjan
13:15-13:30	Break (15 mins)	
13:30-14:30 (60 mins)	Session 11: Demand response programs and their impact on grid stability	Abhishek Ranjan
14:30-14:45	Break (15 mins)	
14:45-15:45 (60 mins)	Session 12: Successful renewable energy integration in South Asia and globally (Case Study)	Abhishek Ranjan

DAY 6: 13 January, 2025 Monday (3 hrs)

Time	Topic	Facilitator
12:00-12:15 (15 mins)	Opening message	Dr. Jai Govind Singh
12:15-13:45 (90 mins)	Session 13: Cybersecurity threats and solutions for renewable-integrated power systems	Ankush Sharma
13:45-14:00	Break (15 mins)	
14:00-15:30 (90 mins)	Session 14: Blockchain for decentralized energy trading and grid security	Sanath Prabhu



DAY 7: 14 January, 2025 Tuesday (3 hrs)

Time	Topic	Facilitator
12:00-13:00 (60 mins)	Session 15: Addressing barriers to women's participation in renewable energy (e.g., access to training, finance, and decision-making roles) (Case Study)	Dr. Tripta Thakur
13:00-13:15	Break (15 mins)	
13:15-14:15 (60 mins)	Session 16: Case studies highlighting successful inclusion of women in renewable energy projects in South Asia (12:00-13:00) (Case Study)	Dr. Tripta Thakur
14:15-14:30	Break (15 mins)	
14:30-15:30 (60 mins)	Session 17: Grid-to-Vehicle and Vehicle-to-Grid infrastructures	Akhileshwar Mishra

Practicum Session

DAY 8: 15 January, 2025 Wednesday (3 hrs)

Time	Topic	Facilitator
12:00-13:30 (90 mins)	Session 1: Business intelligence and Data visualization	Dear Dr. Mudit Kulshrestha
13:30-13:45	Break (15 mins)	
13:45-15:15 (90 mins)	Session 2: Data visualization and Data Sciences- intro to ML supervised and unsupervised techniques	Dear Dr. Mudit Kulshrestha