Smart Grids: Electricity for the Future

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Founder and President
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Technical Lead
Modern Grid Solutions

Course Information
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The Smart Grid Series from IEEEx
Course 1: Smart Grids: Electricity for the Future (Available Now)
Course 2: Distributed Energy: Smart Grid Resources for the Future (Available Now)

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Instructors’ Biographies .................................................................................................................. 2
Syllabus ......................................................................................................................................... 3
Course Outline ............................................................................................................................... 4
Discussion Guidelines .................................................................................................................... 5
Dr. Mani Vadari
Founder and President
Modern Grid Solutions

Dr. Vadari is Founder and President of Modern Grid Solutions, delivering consulting and training services to a global set of smart grid companies (utilities and vendors) seeking deep subject matter expertise in setting the business, technical and strategic direction to develop the next-generation electric/energy system. Dr. Vadari is also the Technical Consultant to the New York State Smart Grid Consortium participating in an architecture role in the core team for the REV effort and Director of Sector Services at the Global Smart Cities Council. Dr. Vadari is a frequent keynoter at industry events in US and abroad and also provides advice to several companies and industry groups.

Mrudhula Balasubramanyan
Technical Lead
Modern Grid Solutions

Mrudhula is technical lead at Modern Grid Solutions and brings more than 15 years of product/service design, development, engineering, and delivery experience in the Power Systems industry. She provides expertise in the areas of Smart Grid, Electric Wholesale Markets, System Operations, Market Operations, Power system modeling, analysis, design, and development. A Power Systems Engineer by profession and an ardent researcher, her deep understanding of Power Systems and Information Technology, bring valuable insights to the table. As a principal at Modern Grid Solutions, Mrudhula uses her business and technical domain expertise to solve her clients’ critical problems in technical architecture, product/ service design, development, and project engineering.
About this course

Ever wondered why you hear the term “smart grid” so often these days, and what it’s all about? This engineering course will explain the essential nature of the smart grid, an electricity network based on digital technology, and the importance of grid modernization.

This course will provide high-level insight into a smart grid’s many aspects such as distributed energy, energy storage, transmission and distribution automation, microgrids, demand response, data analytics, and cyber security.

This course builds an understanding of key smart grid technologies both from a utility and customer perspective. It delivers a business perspective through cost-benefit analysis, market adoption, and industry mega trends.

It concludes by laying out a typical roadmap for the progression of smart grids, along with an implementation methodology for realizing it.

No previous power systems or utility industry knowledge needed. Simply sit back and enjoy your journey through the world of Smart Grid.

Level

Introductory

Time Commitment

4 weeks, approximately 4 hours per week

Deadlines

All coursework, assignments, and tests must be complete by 4 April, 23:30 UTC

What you’ll learn

- Key Drivers and Dimensions of Smart Grid
- Cost-Benefit Analysis and Smart Grid Adoption Worldwide
- Core Utility Technology Solutions
- Smart Grid Roadmap and Implementation Methodology
- Major Smart Grid Projects around the World

Grading

To qualify for a certificate for this course, students must average 65% on course assignments, counted as follows:

<table>
<thead>
<tr>
<th># Droppable</th>
<th># of Attempts</th>
<th>% of Overall Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly Quiz</td>
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<td>60</td>
</tr>
<tr>
<td>Final Test</td>
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Course Outline

Course Introduction
- Grading Policies
- DemoX
- Discussion Guidelines
- Discussion
- Week 1: Overview of Smart Grid
- Current State of Electric Industry
- Smart Grid: Definition, Key Characteristics, Dimensions, Drivers, Benefits
- Smart Grid Architecture, Top Utility Executive Concerns
- Week 1 Quiz

Week 2: Smart Grid Value Proposition
- Smart Grid Cost-Benefit Analysis, Smart Grid Adoption Worldwide
- Major Smart Grid Projects around the World
- Mega-Trends in the Power Industry, Key Smart Grid Players and Areas of Focus
- Week 2 Quiz

Week 3: Smart Grid Dimensions
- Distributed Energy, Energy Storage, Electric Transportation, Microgrids
- T&D Automation, Operational Systems, Communications, AMI
- Demand Response, Smart Homes, Analytics, Security
- Week 3 Quiz

Week 4: Smart Grid Roadmap
- Smart Grid Implementation
- Smart Grid Solutions & Benefits
- Smart Grid Roadmap & Business Case Tool-Kit
- Week 4 Quiz

Final Exam
Discussion Guidelines

We ask you to build community and share, in your own words, your thoughts about the course content and any about news or research related to the class. We ask that you use the discussion space as:

- A forum for discussing topics raised in the course and demonstrate your understanding or application of the course material
- A medium to discuss questions about assignments, readings, and course content with peers and course staff
- A medium for collaboration and the exchange of ideas.
- An online meeting place for social interaction among peers.

Discussion boards are moderated by the course instructional team.

For more information on discussion boards, please see below and refer to the discussion board details [https://www.edx.org/blog/getting-most-out-edx-discussion-forums](https://www.edx.org/blog/getting-most-out-edx-discussion-forums).

In order for discussion boards to run smoothly, please refer to the guidelines below for basic discussion board etiquette. How you phrase your posts is important. Please remember that the participants in the course come from all over the world, representing a variety of cultures and speaking many different languages. Be respectful of others and be aware of the tone of your posts. Think through and re-read your posts before posting! A few guidelines are outlined below.

- Please limit your posts/responses to 200 words or less (by request of EdX). In other words, be concise in your posts/responses.
- Reflect on and respond to Discussion Board questions and post your contribution, in your own words.
- To build community, we ask that you review 1-2 items posted by your classmates and respond to at least one of those postings.
- Before posting, read what others have previously posted to avoid repeating comments. You can always upvote good posts. Click on the green “plus” button so that good posts and/or responses can be found more easily. You can search by votes to find the most interesting posts.
- Never use derogatory language or make insensitive comments. (You should flag inappropriate posts!)
- Do not personally attack people. It’s fine to disagree, but use facts and reasons to back up an argument, not personal attacks.
- Stick to the topic of the discussion board.
- Remember that humor is often difficult to convey in text – avoid it if people might not understand what you are trying to say.
- Avoid slang and use appropriate spelling – given the diversity in the class, what might mean something to you will not mean the same thing to someone else. Correct spelling and grammar will help others to understand you and provide useful responses. Avoid using ALL CAPS, abbr of wrds (abbreviation of words), and excessive punctuation!!!!!!!!!
- Use correct grammar.
- If you reference something, provide everyone with the link or reference.
- Notify the course staff of bugs. Include [STAFF] at the beginning of your post’s title – this will help us identify your question or problem and respond to it.