### Course Title: Smart Power Grid Management

**ECTS Credits:** 7.5

**Department:** Engineering

**Semester:** Fall, Spring

**Prerequisites:** None

**Type of Course:** Required

**Field:** Oil, Gas and Energy Engineering

**Language of Instruction:** English

**Level of Course:** 2nd Cycle

**Year of Study:** 1st

**Lecturer(s):** Dr. Stelios Hirodontis

**Co-requisites:** None

**Mode of Delivery:** Face-to-face

**Work Placement:** N/A

### Objectives of the Course:

The main objectives of the course are to:

- Introduce students to cutting-edge technologies for connecting the power infrastructure to modern computerized communications networks
- Provide solid knowledge on standardization, applications, protocols, automation, architecture, and management of grids
- Develop the tools for quantitative and qualitative performance analysis of bidirectional communication, automation, renewable energy integration, and wireless sensor networks
- Provide solid technical knowledge on renewable energy sources and their integration into smart grids

### Learning Outcomes:

After completion of the course students are expected to:

- Explain the main characteristics, differences, advantages, and disadvantages of smart grid networks
- Analyze and evaluate the performance and efficiency of smart grids and microgrids
- Evaluate the Multiple distributed smart microgrids with a self-autonomous, energy harvesting wireless sensor network
- Perform calculations for Wireless sensor networks for consumer applications in the smart grid
- Describe low-voltage, DC grid–powered LED lighting system with smart ambient sensor control for energy conservation in green building

### Course Contents:

- Demand-side energy management
- The modernization of distribution automation featuring intelligent FDIR and
- Volt-variation optimization
- Advanced asset management
- Wide-area early warning systems
- The integration of renewable energy sources into smart grids
- The micro-grid in the electric system transformation
- Enhancing the integration of renewable in radial distribution networks through smart links
- Voltage-based control of DG units and active loads in smart micro-grids
- Electric vehicles in a smart grid environment
- Low-voltage, DC grid–powered LED lighting system with smart ambient sensor control for energy conservation in green building
- Multiple distributed smart micro-grids with a self-autonomous, energy harvesting wireless sensor network
- Wireless sensor networks for consumer applications in the smart grid
- ZigBee-based wireless monitoring and control system for smart grids

**Learning Activities and Teaching Methods:**
- Lectures, Projects, Discussion

**Assessment Methods:**
- Homework, Project assignments, exams, final exam.

**Required Textbooks/Reading:**

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<tr>
<th>Authors</th>
<th>Title</th>
<th>Publisher</th>
<th>Year</th>
<th>ISBN</th>
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<tbody>
<tr>
<td>Krzysztof Iniewski</td>
<td>Smart Grid Infrastructure &amp; Networking</td>
<td>McGraw-Hill</td>
<td>2012</td>
<td></td>
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</tbody>
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**Recommended Textbooks/Reading:**

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