

# Syllabus

## Design & Optimization of Energy Systems

|                          |                                      |  |                                  |      |                  |                  |
|--------------------------|--------------------------------------|--|----------------------------------|------|------------------|------------------|
| Course Name              | Course type (credit/hours)           |  | 전선(3/3)                          |      | Course code      |                  |
|                          | Target students Division/major/grade |  | /                                |      | Opening semester |                  |
|                          | Class time and classroom             |  | 목1(전109) 목2(전109) 목3(전109)(전109) |      |                  |                  |
| Reference to this course | Related basic courses                |  |                                  |      |                  |                  |
|                          | Recommended concurrent courses       |  |                                  |      |                  |                  |
|                          | Related advanced courses             |  |                                  |      |                  |                  |
| Instructor               | Name (title/division)                |  |                                  |      |                  |                  |
|                          | Office Room Number                   |  | Office phone Number              | 2695 | e-mail           | jjung@ajou.ac.kr |
|                          | Office hours                         |  | Homepage address                 |      |                  |                  |
| Teaching Assistant       | Name (title/division)                |  |                                  |      |                  |                  |
|                          | Office Room Number                   |  | Office phone Number              |      | e-mail           |                  |

### 1. Introduction

This course describes fundamental concepts related with the development of Microgrids, as novel distribution network structures that unlock the full potential of Distributed Energy Resources (DER) and thus form building blocks of future Smartgrids. This course focus on the power system issues associated with the development of Microgrids and Smartgrids, including its operation, control, protection, and etc.

### 2. Course Objectives

### 3. Class types and activities

#### 4. Teaching Method

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| Lecture (ppt) and discussion |
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#### 5. Knowledge and ability required for taking this course

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#### 6. Method of Evaluation

| Evaluation Item | The Number of Times | Evaluation Proportion | Remarks |
|-----------------|---------------------|-----------------------|---------|
| Attendance      |                     | 20                    |         |
| midterm exam    |                     |                       |         |
| final exam      |                     | 50                    |         |
| quiz            |                     |                       |         |
| presentation    |                     |                       |         |
| discussion      |                     |                       |         |
| homework        |                     | 30                    |         |
| etc             |                     |                       |         |

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| Term Project (30%)<br>Homework and Attendance (20%)<br>Final exam (50%) |
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## 7. Textbooks

| Main/Sub | Title   | Writer               | Publisher        | Publication year |
|----------|---|----------------------|------------------|------------------|
| 주교재      | Microgrids: Architectures and Control                 | Nikos Hatziaargyriou | Wiley-IEEE Press | 2014             |
| 주교재      | Advanced Smartgrids for Distribution System Operators | Marc Boillot         | Wiley-ISTE       | 2014             |

## 8. Lecture Schedule

| Week | Lecture contents   | Lesson type     | Remark |
|------|--|-----------------|--------|
| 1    | Introduction of Microgrids and Smartgrids  | Lecture         |        |
| 2    | The Existing Distribution Networks: Design and Operation                                       | Lecture         |        |
| 3    | Main Drivers and Functions of Advanced Smartgrids  | Lecture         |        |
| 4    | Main Drivers and Functions of Advanced Smartgrids  | Lecture         |        |
| 5    | The Microgrids Concept   | Lecture         |        |
| 6    | Microgrids Control Issues  | Lecture         |        |
| 7    | Microgrids Control Issues  | Lecture         |        |
| 8    | Term Project   | Exam or Seminar |        |
| 9    | Intelligent Local Controllers  | Lecture         |        |
| 10   | Intelligent Local Controllers  | Lecture         |        |
| 11   | Microgrid Protection   | Lecture         |        |
| 12   | Microgrid Protection   | Lecture         |        |
| 13   | Operation of Multi-Microgrids  | Lecture         |        |
| 14   | Operation of Multi-Microgrids  | Lecture         |        |
| 15   | Quantification of Technical, Economic, Environmental and Social Benefit of Microgrid Operation | Lecture         |        |
| 16   | Final Exam   | Exam            |        |

9. Others

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