Course Syllabus

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| **Course Title** | Artificial Intelligence Applications for Energy Systems | **CRN**  (Course Reference Number) | EE5105 |
| **Subtitle** | - | **Credit** **hour**  (Lecture hours – Lab hours – Credit hours) | 3-0-3 |
| **Course Format** | Lecture ■ Discussion □ Laboratory □ Practicum □  Blended □ Online □ (Add)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |
| **Course Description** | *[The description briefly and clearly explains the purpose of a basic summary of the course. the description should be 250 words or fewer]*  Learn computer science and artificial intelligence techniques applicable to energy systems. The class is divided into two stages. In the first stages, important computing systems and artificial intelligence techniques are introduced. The techniques include, wireless networking, wires sensor networks, IoT, basic neural networks and deep neural networks. In the second stages, students select research papers and discuss the ideas and methodologies. | | |

**P1. Course Information**

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| **Instructor** | Prof. Chong-Kwon Kim | **Office** | The Class 538 | |
| **Office Hours** | *9:00AM TO 10:00 AM on Fridays*  TBD | **Office Telephone** | 061-330-9654 | |
| **E-mail** | ckim@kentech.ac.kr | |
| **Discipline** | Energy AI | **Prerequisite** | - Python, Basic computer science such as abstraction, computer architecture, OS, and computer networks | |
| **Target Audience** | Graduate Students |
| **Course Reading & Resources** | | | | |
| **Required Materials** | **None** | | | |
| **Other Recommended Materials (optional)** |  | | | |
| **Course Access** | This is an offline course. However, it may be changed to an on-line course if the situation due to COVID-19 does not allow off-line meeting. | | |
| **Technical & Academic Support** | If you need any technical/academic assistance at any time during the course, please contact your instructor and/or course TA  - Instructor: Prof. Chong-Kwon Kim  - Course Teaching Assistant: TBD | | |

**P2. Course Objectives**

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| **Course Learning Objectives** | Through this course you will:  - Understand computer science and machine learning techniques  - Forster the capability to apply computer science and machine learning techniques to various problems in energy systems |
| **Course Learning Activities** | To meet the objectives, you will:  - Read related research papers every week  - Check-in tests to check the progress  - Read and summarize research papers in a selected research area |

**P3. Topic Outline/Schedule**

**Important note**: Refer to the course calendar for specific dates and times. Activity and assignment details will be explained in detail within each week’s corresponding learning module. If you have any questions, please contact your instructor.

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| **Module 01**  **(Week 01~04)** |  | | |
| **Week 01** | ***Title/Topics***  **Energy systems** | *Contents*  Renewable energy sources, Sector coupling |
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| **Week 02** | **Energy systems 2** | VPP, DR |
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| **Week 03** | **Networking** | Wireless networks, WSN (Wireless Sensor Network), IoT |
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| **Week 04** | **Networking 2** | AI applications for computer network, Data center |
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| **Module 02**  **(Week 05~07*)*** |  | | |
| **Week 05** | **Networking 3** | AI applications for computer network, MEC |
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| **Week 06** | **AI Techniques** | MLP, CNN, RNN, ISTM |
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| **Week 07** | **AI Techniques 2** | Autoencoder, GAN |
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| **Module 03**  **(Week 08~09)** | **Optoelectronic Devices** | | |
| **Week 08** | **Survey presentation 1** | Selected topics |
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| **Week 09** | **Monitoring** | xEMS |
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| **Module 04**  **(Week 10~15)** |  | | |
| **Week 10** | **WSN** | Data collection, analyses |
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| **Week 11** | **GNN** | Nowcasting |
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| **Week 12** | **Safety** | Fire detection, |
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| **Week 13** | **Control** | Reinforcement learning, DRL |
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| **Week 14** | **Control 2** | Policy gradient, MADRL |
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| **Week 15** | **Survey presentation** |  |
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| - | **Week 16** | **Summary** |  |
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**P4. Grading Policy**

Graded Course Activities

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| **Activity** | **Percentage** |
| Participation | 15 |
| Midterm | 15 |
| Presentation | 35 |
| Survey | 35 |
| **Total** | **100%** |