KAIST Business School, 2017 Fall
GG589: Introduction to Green Transportation Systems

Seong Hoon Kim (김성훈)

W, 19:00 – 21:50, Room: TBD

for MS in Green Business & Policy Program and Green MBS Programs

Version 1.0

1. Course Overview

This course explores a set of emerging concepts, technologies, applications and business models, and the related trade-off decisions involved green transportation systems.

Specifically, the course coverage include vehicular mechanical systems, electric propulsion systems, and Li-ion battery systems for ground vehicles.

The particular focus of this course is the electric-drive vehicle(EV) include hybrid, plug-in-hybrid, all-battery EVs.

This course will examine not just the green technological vehicles, but the charging strategy of the green transportation.

2. Textbook and References

Primary Readings

1. 한근호, 손인환, 전기자동차의 원리와 응용, 미학사, 2005
2. 정용욱, 박재림, 김성현, 친환경 전기자동차, 미전사이언스, 2014
3. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003

References

1. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004

3. Contact

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4. Assessment Summary

4.1 Class Activity (30%)

- Read the assigned articles and cases before the class hour. Preview questions will be given in advance on the class folder to guide the reading.
- Post self-introduction by the 2nd week of the semester including interesting areas. Self-introduction will help in finding your project partners with common interest. You may update your interesting area as it develops.
- Class Participation is a MUST. Absence will be penalized by 2% point; late appearance or leaving the class early by 1% point.
- Case and Role Discussion and Presentations are encouraged. Active contribution will get extra credit.
- Join the evaluation of term project presentations of other teams, and suggest constructive critiques for them.

4.2 Homework Assignments (10%)

- Every lecture start with summary presentation of the previous lecture by student (3~5page ppt., 5minutes, 1 lecture/1 student, order will be given)

4.3 Mid-term Report (30%)

- Motor Show Report : Oct. 11th

4.4 Term Project (30%)

- **Project Team**:
  - A project may be conducted by a team of two members at most or individually
  - Each member should contribute equally to the team.

- **Project Subjects**: Benchmark report of leading company, Case development, Business plan development with justifications.

5. Lecture Schedule Outline

Week 1. Overview: Course Objectives and Syllabus

- Objectives of Green transportation system
- Megatrend in ground transportation and changes in OEMs
- Market perspective in Green transportation

Week 2 . Green Transportation

- Hybrid, PHEV, BEV
- Impact of different transportation technologies on environment

Week 3. Mechanical Drivetrain Engineering

- DC Motors drives and their principle of operatio
- Induction motors, their configurations and optimization for PHEV/BEV

Week 4. Introduction to Power Eelectronics

- Concept and definition of PCU(power control unit)
- Invertor and Power transistor (IGBT)

Week 5. Mid-Term Report

- In class PT : Oct. 11th

Week 6. Batteries and Energy Storages

- Battery characterization, math modeling and designs
- Battery monitoring and charging control

Week 7. Charging management strategies and its general architecture

- Type of EV Charging device and value chain of charging industry
- EV Charging management strategies and its general architecture

Week 8. Term Project: Team Presentations

- 15 minutes presentation and 5 minutes discussion
- All students participate in the comments and scoring

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