科目ナンバリング	G-LAS15 80034 LE28　G-LAS15 80034 LE14						
授業科目名<英訳>	From Carbon Neutral to Carbon Negative From Carbon Neutral to Carbon Negative	担当者所属職名・氏名	エネルギー科学研究科 教授 MCLELLAN, Benjamin エネルギー理工学研究所 講師 ARIVAZHAGAN RAJENDRAN エネルギー理工学研究所 特定講師 CRAVIOTOCABALLERO, Jordi				
群	大学院横断教育科目群	分野(分類)	複合領域系	使用言語	英語		
旧群		単位数	2単位	週コマ数	1コマ	授業形態	講義（対面授業科目）
開講年度・開講期	2026・前期	曜時限	金2	配当学年	修士課程	対象学生	全学向

（エネルギー科学研究科の学生は，全学共通科目として履修登録できません。所属部局で履修登録してください。）

[授業の概要・目的]

To deepen the knowledge of carbon neutrality and the potential to move even further beyond to carbon negative societies. To understand and discuss the relevant sectoral and national barriers and strategies.

[到達目標]

By the end of the course, students will have advanced knowledge and a high-level understanding of carbon neutrality and carbon negative solutions from technological, environmental, policy and socio-economic perspectives.

[授業計画と内容]

The course will cover the following topics over 15 weeks, including feedback. The order will be announced on the first day of class.
(Introduction)
1. Definition of carbon neutrality and carbon negative

(Measurements)
2. Life Cycle Assessment (LCA) and carbon neutrality
3. Carbon footprints - standards and methods

(Technology)
4-8. Technology for zero-carbon energy (I) (Non-carbon fuels and power)
i) Solar energy
ii) Wind energy
iii) Geothermal energy
iv) Biomass energy
Materials for carbon-free energy production and conservation
9. Technology for zero-carbon energy (II) (CCS)
10. Negative-emissions technology (BECCS)
11. Energy Efficiency

(Policy and promotion mechanisms)
12. Carbon offsets, carbon pricing
13. Sectoral approaches for net-zero emissions (ZEH, ZEB)
14. Policy for institutional innovation (National; International)
15. Feedback

From Carbon Neutral to Carbon Negative(2)へ続く↓↓↓

From Carbon Neutral to Carbon Negative(2)

[履修要件]

特になし

[成績評価の方法・観点]

The evaluation is based upon these factors. Out of a possible 100 points:
1. Essays (60 points).
2. Class participation and short exercises (40 points).

[Evaluation Policy]
Will be evaluated according to the grade evaluation policy of the Graduate School of Energy Science and Institute for Liberal Arts and Sciences.

[教科書]

No textbook will be specified, but reading material is provided on LMS.

[授業外学修（予習・復習）等]

Students may have some requirement for pre-class preparation and short exercises to complement and reinforce the class learning.

[その他（オフィスアワー等）]

Instructors may be contacted by e-mail (provided in class).
Students who previously took "Carbon Neutrality" or the course "From Carbon Neutral to Carbon Negative" from the Graduate School of Energy Science in 2024 cannot take this class.
*Please visit KULASIS to find out about office hours.

[主要授業科目（学部・学科名）]