

NS 220 World Energy Outlook

Fall 2022

Course Instructor: Değer Saygın

E-mail: degersaygin@sabanciuniv.edu

Office Hours: Please contact via email for any questions/meeting requests

Course Schedule: Online only, Wednesday, 08:40 – 10:30 & Friday 08:40-09:30

Teaching Assistant: Belkıs Güneş; belkis.gunes@sabanciuniv.edu

Course description, objectives & outcomes

Course description: The course will focus on the global trends in transformation of the energy system with renewable energy, energy efficiency, widespread electrification and digitalisation/ICT in realising the seventh energy goal of the Sustainable Development Goals and the Paris Climate Agreement. The course will provide insights from country experiences in energy transition, the current trends in the case of Turkey and will elaborate on how the transformation of Turkey's energy system can be accelerated. Special attention will be paid to the technology, economic and policy aspects of energy transition.

Course objectives and learning outcomes: The main objective of this course is to provide students with the latest knowledge on the current global and country energy transition trends and teach carrying out basic energy analysis research to calculate the potential, cost and benefits as well as answer key policy questions related to accelerating the transition of the energy system. Students who successfully complete this course can use this knowledge in the private and public sectors as well as in research organisations.

Keywords: Energy transition. Renewable energy. Energy efficiency. Electrification. Energy policy. Climate policy. Decarbonisation and climate change mitigation. Costs, benefits and investments. Stranded assets. Global, country and Turkey experiences. System integration of renewables. Innovation.

Suitable background of the students: knowledge of physics and natural sciences and basic background on economics and/or energy and climate policy principles

Course Policies, Assignments, and Grading

Course grading will be based on;

- 1) 2 midterms and 1 final exam, each contributing 25%: in total 75%
 - 2) Quizzes: in total 25%
- All exams and quizzes will be held during class hours in accordance with the rules and regulations online teaching requires. Exact dates will be announced at the start of the course. Quizzes will be repeated every week. The lowest graded two quizzes for each student will be dropped from consideration. Beyond this, there will be no make-up opportunity for quizzes.
 - Attendance will be taken. Attendance and active participation in lectures may affect the final grade, especially for borderline cases. Participation will be evaluated based on the in-class performance of students in lectures and recitations. Passive participation will not count towards participation credit even if you are present in class and sign the attendance sheet.

- One make-up examination, covering the whole course material, will be given after the final exam date for the students who missed the exams due to a valid excuse approved by the faculty/university. If you miss an exam due to a health problem, you can take the make-up only if you have a valid report approved by the University Health Services. (Please note that, if you get a report from an outside health center, you need to send it to University Health Services for approval within three days.)
- No extra homework/exam/project/etc. will be given to increase your grade at the end of the semester. If you attend classes, go over the problems solved in class yourself, read the reference material that will be provided and complete your any homework assignments, you won't have trouble in the exams and in your grade.
- All solutions (exams and quizzes) must be written in a professional manner in accordance with the rules and regulations online teaching requires. You may lose points for poorly written answers. There will be no multiple-choice questions.
- All announcements will be made through SUCourse+, students are responsible from following the announcements. Any questions should be asked via email to the instructor.

Tentative schedule

WEEK 1: An introduction to the global energy landscape

WEEK 2: Basic concepts in technical and economic aspects of energy analysis 1

WEEK 3: Basic concepts in technical and economic aspects of energy analysis 2

WEEK 4: Technology trends and needs for the global energy transition

WEEK 5: The costs, investment needs and stranded assets of energy transition

WEEK 6: Midterm 1

WEEK 7: The social and economic benefits of energy transition

WEEK 8: Country experiences in energy transition

WEEK 9: Experiences of Turkey's energy transition

WEEK 10: Midterm 2

WEEK 11: Power system transformation with renewables and challenges

WEEK 12: Transforming Turkey's power system

WEEK 13: Innovation and R&D opportunities for energy transition

WEEK 14: Review and Q&A

Final exam date to be announced.

Powerpoint slides will be used during the courses prepared by the instructor. They will be made available after the class on SUCourse+.

Key references

OECD/IEA (2021). Net Zero by 2050. A Roadmap for the Global Energy Sector. International Energy Agency, Paris. <https://www.iea.org/reports/net-zero-by-2050>

IRENA (2021). The World Energy Transitions Outlook. 1.5C Pathway. IRENA, Abu Dhabi. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Jun/IRENA_World_Energy_Transitions_Outlook_2021.pdf

Additional references and reading material will be provided ahead of each class. Access links will be provided on SUCourse+.