



## **ADVANCED COAL TECHNOLOGIES**

**5 ECTS**

**AGH University of Science and Technology**

**Course responsible: Jan Górski, D.Sc., Assoc Prof.**

### **Course overview**

These lectures will provide an overview of current and planned technologies for the continued use of coal in power generation. It will provide the information about the backgrounds of CCS systems and some leading technologies including their prospects for commercialization. The aim of this course is to give the students a better understanding the technical aspects and new ideas in the future more clean power generation technologies based on accessible fossil fuel resources. The class-room lectures will be supplemented by practical exercises and projects based on computer laboratory simulation tools (ASPENPlus, Thermofluids). The course consists of lectures, classes and computer laboratory.

Lectures will concern the following subjects: Fossil fuels combustion – environmental and economy factors, Coal chemistry, conversion and combustion, Review of recent energy conversion technologies, Pre- and post-combustion carbon capture and sequestration, Adsorption and absorption technologies for post- and pre-combustion capture, Pre-combustion capture technologies, Fischer-Tropsch (F-T) and chemical looping combustion (CLC) processes, Integrated gasification combined cycle (IGCC) technologies, Advanced combustion technologies – fluidized bed and oxy-coal technologies, Polygeneration and synthetic fuels production, Clean coal - environmental and economy aspects.

Classes: there are exercises in the form of classroom and home problems that are solved by groups of three students each. Some of the selected problems will be coupled to the computer laboratory simulation software.

Computer laboratory exercises are carried out by groups of two students each. By this the students can practice with the engineering software tools (ASPENPlus, Thermofluids and others), and solve some applied problems such:

1. Thermodynamic and process analysis and the selection of coal-based CHP power-plant.
2. Application of amine technology for post-combustion carbon capture and separation.
3. Effectiveness and economy penalties for analyzed carbon capture technology.

In this part each student will prepare an individual project (topics for analysis the other particular cases are accessible for demand).

**Outcome of the course**

After this course the student should be able to

- Examine new technologies for coal-fired power generation
- Identify policy considerations for coal use
- Examine new technologies for clean coal
- Analyze commercial viability of new technologies
- Compare technologies in clean coal to technologies in energy alternatives
- Identify future scenarios for coal use

**Course coordinator & teachers**

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