



**COURSE TITLE:** Steam and Gas Turbines

**Number of contact hours:** 45

**Duration:** 1 semester (spring)

**ECTS credits:** 4

**Programme description:**

This course explores the principles, design, and operation of steam and gas turbines. Topics include thermodynamic cycles, performance analysis, turbine stage operation analysis and design.

**Learning Objectives:** a) Understand the working principles and components of steam and gas turbines. b) Analyze thermodynamic cycles and efficiency of turbines. c) Evaluate turbine performance metrics d) Understand the basic principles of turbine stage design. e) Gain knowledge of turbine construction, knowledge of the various components of the structure and their ranges of operation

**Course Outline:**

1. Introduction to Turbines: Overview, history, and classifications.
2. Steam Turbines: Rankine cycle, design, and operation.
3. Gas Turbines: Brayton cycle, design, and applications.
4. Thermodynamic Analysis: Efficiency, work output, and losses.
5. Turbine Components: Blades, nozzles, and rotors.
6. Combustion and Heat Transfer: Role in gas turbines.
7. Performance Evaluation: Operational characteristics and optimization.
8. Applications: Power plants, aviation, and industrial uses.

**Course type:** a) Lectures (15): Core concepts and industry applications. b) Project: Design and performance evaluation of turbines (30).

**Literature:**

1. Korpela S. A. — Principles of Turbomachinery, Hoboken, 2011, Wiley
2. Dixon L. S. — Fluid mechanics, thermodynamics and turbomachinery, Burlington, 2009, ElsevierPress.

**Assessment method:** Reports from individual project

**Lecturer:** Prof. Artur Cebula

**Contact person:** Artur Cebula (e-mail: artur.cebula@pk.edu.pl)