

# Turbomachinery (6004-M)

5 ECTS

**Lecturer:** L. Novak, M. Hočevr

Lectures: 30h

Tutorials: 6h

Labs: 24h

Project: 0h

Lang. :



## Objectives

- To learn the principle of operation of turbine machines.
- Know the basic building blocks of turbine machines.
- Understand energy conversion in turbine machines.
- To learn how to build and operate turbine machines.

## Programme

- Introduction; history and importance of turbine machinery for society
- Fundamentals of turbine machine operation; classification of turbine machines
- The first law of thermodynamics for turbine machines; characteristic curve; efficiency; losses
- Control volume approach to turbine machine analysis
- Differential approach to turbine machine analysis
- The fluid flow of turbine machines: Euler equation; velocity triangles; velocity, enthalpy and pressure conversion; blade shape; reactivity
- Radial turbine machines
- Axial turbine machines
- Theory of similarity in turbine machines
- Water turbines: types, operation, components
- Manufacture of water turbines
- The building blocks of hydropower systems

## Prerequisites

Meeting the enrolment conditions for the Master's study programme of Mechanical Engineering  
- Research and Development program.

## Learning outcomes

After attending this course, the student will:

- Have in-depth theoretical, methodological and analytical knowledge with elements of research, which is the basis for very demanding scientific and professional work in the field of synthesis, design, use, and prediction of the operation of turbine machines.
- Be able to prepare complex experiments to demonstrate the characteristics and efficiency of turbine machines in power and process systems.
- Be able to apply modern methods for the design and analysis of the behaviour of turbine machines under real operating conditions.

## Assessment

- Participation in lab work – 80 % participation minimum
- Lab report – all reports must be submitted
- Laboratory exams – 50 %
- Exams – 50 %

## Literature

- Marko Hočevr, Introduction to turbine machinery, Faculty of Mechanical Engineering, 2019
- Eck, Bruno. Fans. 1st English ed., Pergamon Press, Oxford, 1973
- Dixon, S. L., Hall, C. A., Fluid Mechanics and thermodynamics of turbomachinery, Elsevier, 2010