



Wrocław University
of Science and Technology

Ensure yourself a plain sailing for the future with SPINAKER

– take part in free on-line international programme at WUST!

www.summerschools.pwr.edu.pl

October 25-29, 2021



Choose one of our courses and earn 3 ECTS points:

- Computer Aided Mechanical and Power
- Nuclear Power Engineering
- Refrigeration and Cryogenics
- Renewable Sources of Energy

About WUST's Winter Schools

Our courses are designed to provide an intensive, in-depth look at the selected topic. You will engage in discussions with a unique international group of peers.

COMPUTER AIDED MECHANICAL AND POWER ENGINEERING

This Winter School is an international programme, which aims to provide foreign students with basic knowledge and skills in the key fields pertaining to computer-aided mechanical and power engineering. It offers a few specialized courses, including lectures, laboratories, and projects, covering a wide range of topics from high-level structured language, mechanical, thermal–flow simulations in ANSYS software, and artificial intelligence to control the operation of energy. During the laboratories and projects, students are involved in some experiments and problem solving tasks activities associated with the subject of the courses. The programme is realised in collaboration with various departments of Wrocław University of Science and Technology.

Skills and knowledge obtained by the participant of the school after its completion

- Basic knowledge on selected issues in the key fields of analytical techniques for solving the fluid flow in a rotating frame, the methods of discretization of first and second-order derivatives, the explicit and implicit scheme, and the Crank-Nicolson scheme.
- Basic knowledge on multiphase flow structures under conditions associated with micro- and hypergravity, the dimensionless numbers describing the flow structures.
- The knowledge on turbomachinery energy conservation in a single stage of steam turbine; influence of velocity triangle on load conditions of a steam turbine blade; finite element method in strength analysis of turbine blade system.
- Practical implementation in Ansys software of the numerical techniques for solving the fluid flow in a rotating frame, the methods of geometry, and numerical mesh creation; description of the numerical methods used to model fluid flows in a rotating frame of reference.
- Basic capability of applying artificial intelligence and other techniques in PYTHON software for analysing and studying the results obtained from field experiments.

Prerequisites

Knowledge of mathematical analysis II and algebra, thermodynamics; Strength of materials and solid mechanics, fundamentals of thermodynamics and fluid mechanics



REFRIGERATION AND CRYOGENICS

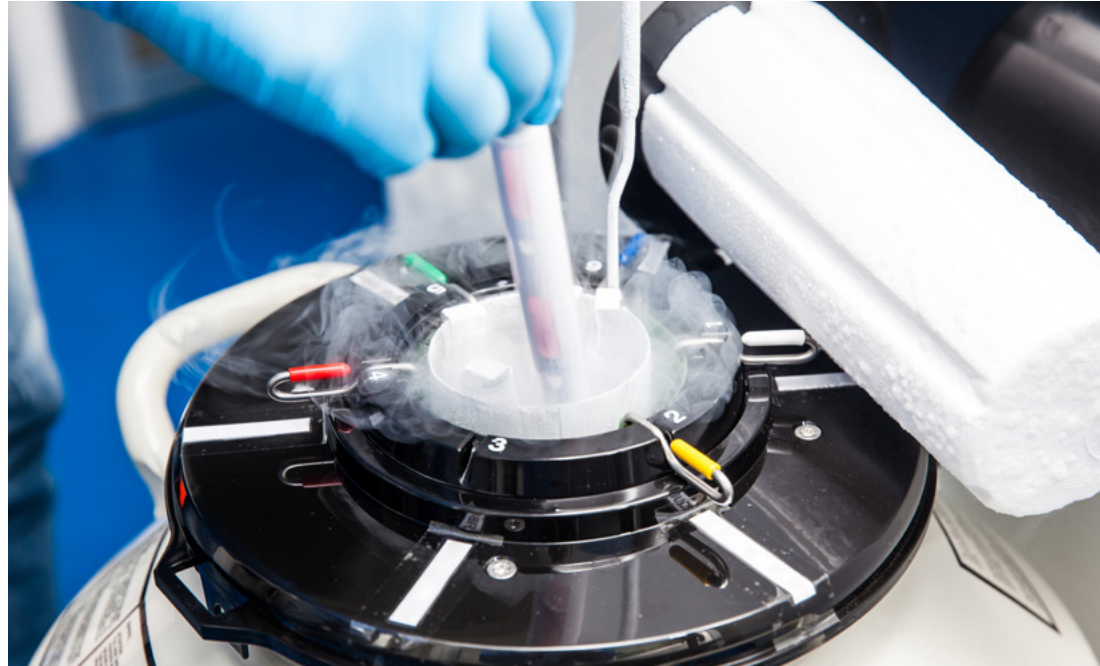
The Refrigeration and Cryogenics winter school deals with the methods and technologies of obtaining below ambient temperatures. Refrigeration includes technologies used in such popular devices as domestic refrigerators and freezers, air conditioners or heat pumps, but also in industrial installations with high cooling capacity, e.g. in food processing. Some specialised refrigeration devices can reach temperatures as low as -80oC. Cryogenics comprise the methods of obtaining the temperatures below 120K (-153oC), down to a mile Kelvin above absolute zero. It provides a permanent gas liquefaction technology, economical storage and transport of large amounts of gases, e.g. LNG, high-capacity gas mixtures separation or thermal stabilisation of the superconducting devices. The winter school introduces a theoretical and practical knowledge on how to lower the temperature of a different objects or how to handle substances with extremely low temperature. It covers selected issues related to design of heat pumps, methods of natural cooling, calculation of cryogenic cycles, or heat transfer at cryogenic temperatures.

Skills and knowledge obtained by the participant of the school after its completion

- Knowledge of designing and operation of heat pump.
- Knowledge of thermodynamic processes used for natural cooling.
- Knowledge of properties of cryogenic fluids and materials, their transport, storage and safety handling.
- Skills to prepare the simulation to calculate the basic cryogenic refrigeration cycles with DWSIM software.
- Basic knowledge of the selected heat transfer mechanisms in cryogenic systems

Prerequisites

Competence in basics of thermodynamics and fluid mechanics, heat transfer, knowledge of the Mollier diagram.



WUST in a nutshell

- one of the best technical universities in Poland
- over 26 000 students
- 2 165 academic staff
- 33 distinguished educational programmes, including courses taught in English and MBA programmes
- Campus located in the center of Wrocław – modern and dynamic city with rich history and culture

Winter School in a nutshell

- 30 hours of specialised courses in a friendly atmosphere
- 5 days of great experience
- possibility to earn 3 ECTS points
- crash-course in Polish culture and history
- participants from different parts of the world
- on-line
- free of charge

What is included?

- 30 hours on-line tuition
- Polish culture and history course

NUCLEAR POWER ENGINEERING



This winter school is an international programme which aims to provide foreign students with a basics knowledge and skills in the key fields pertaining to nuclear energy. It offers a few specialized courses, including lectures, laboratories and projects, covering a wide range of topics from nuclear reactor physics, thermal hydraulics and radiation protection to fusion, and nuclear power plant operation and safety. During the laboratories and projects students are involved in some experiments and problem solving tasks activities associated with the subject of the courses. The programme is realized in collaboration with various Departments of Wrocław University of Science and Technology.

Skills and knowledge obtained by the participant of the school after its completion

- Basic knowledge on selected issues in the key fields of nuclear energy including nuclear physics, heat transfer in nuclear reactor, design and operation of nuclear reactor, nuclear safety and radiation protection.
- Basic knowledge on selected issues related to nuclear fusion.
- Skill to solve selected problems related to nuclear power engineering.
- Basic skill to analyse an operational characteristics of NPP during transients and selected accident conditions.
- Basic ability to calculate the effective dose and to select a proper shield against ionising radiation.
- Basic ability to calculate heat transfer related to nuclear and fusion reactors.

Prerequisites

Competence in mathematics, physics, thermodynamics and fluid mechanics, basic mathematics and chemistry, including radioactivity phenomenon, heat transfer, nuclear power plants, chemistry.

RENEWABLE SOURCES OF ENERGY

This winter school is an international program which aims to provide foreign students with a basics knowledge and skills in the key fields pertaining to renewable energy. It offers a few specialised courses, including lectures, laboratories and projects, covering a wide range of topics such as: explosive properties of sewage sludge, biofuels and alternative fuels, production of high purity hydrogen and its consumption in profuel cells, experimental and numerical performance analysis of a liquid heating flat-plate solar collector, PV panels - characteristics and operational conditions. During the laboratories and projects students are involved in some experiments and problem solving activities associated with the subject of the courses. The programme is realized in collaboration with various Departments of Wrocław University of Science and Technology.

Skills and knowledge obtained by the participant of the school after its completion

- Basic knowledge on selected issues in the key fields of renewable energy including physics of renewable energy conversion, properties of biofuels and experimental methods of bio-fuel characterization, hydrogen techniques in industry, heat transfer processes occurring during flat-plate solar collector operation and analysis of the operational parameters for PV panel.
- Skill to solve selected problems related to renewable sources of energy.
- Basic skills to analyse operational characteristics of PV cells.
- Basic skills with the TRNSYS software and numerical analysis of flat-plate solar collectors.

Prerequisites

Competence in mathematical analysis II, basic physics course, basics of electrochemistry, heat transfer.

Application details at summerschools.pwr.edu.pl