University: University of Žilina in Žilina	
Faculty: Faculty of Mechanical Engineering	
Subject code: 2Y010	**Subject name:** Alternative energy sources
Profile subject: no	
Type, scope and method of educational activities:	
Weekly number of teaching hours in the form of lectures, exercises, seminars, clinical practice.	2 - 2 - 0 (lectures-exercises-laboratory exercises) hours
The method by which the educational activity is carried out	The teaching takes place in person.
Methods of achieving educational results	**Lectures:** systematic theoretical problem interpretation of the issue, problem-oriented teaching, interactive lecture with multimedia support, semester written work, consultations in connection with feedback **Exercises:** model examples, motivational demonstration, explanation, problem-based teaching, continuous written examination
Number of credits: 4.0	
Student workload: *4h * 13 (full-time teaching) + 52h (self-study) = 104 hours*	
Recommended semester / trimester study: summer semester	
Degree of study: 1. degree	
Prerequisites:	

Conditions for passing the subject:
The subject Alternative energy sources is evaluated by points. The resulting points are the sum of the points that the student gets during the semester in the exercises and the points that he gets in the exam. It is possible to get max. 100 points, of which 30 points in the exercises and 70 points in the exam.
During the semester, there will be two written tests of 10 points each, and then the student will prepare a paper on a selected topic in the field of alternative energy sources. At the end of the semester, he will prepare a presentation from the report in which he will defend the knowledge gained during the preparation of the report for 10 points.

Final rating:
The exam consists of a written part, which includes the elaboration of a theoretical question with a maximum number of points 30. The oral part of the exam is evaluated for a maximum of 40 points. The sum of the points obtained during the exam and during the semester determines the final evaluation of the completed course.

The resulting classification of the subject:
Rating A: 93 - 100 points
Rating B: 85 - 92 points
Rating C: 77 - 84 points

Rating D: 69 - 76 points
Rating E: 61 - 68 points
FX rating: less than 61 points.

The specific method of evaluating the student's work during the semester and the exam will be specified at the beginning of the semester by the subject teacher. The final evaluation of the student's study results for completing the course - expressed by a grade - is governed by Art. 9 Directive no. 209 Study Regulations for the first Degree of University Studies at the University of Žilina in Žilina.

Learning Outcome Scoreboard:

Forms and methods of evaluation	Scale	Area of knowledge, skills, competences
2 tests	20	Professional knowledge, independent work with professional literature
Written semester work	10%	Professional knowledge, independent work with professional literature
Written part of the exam	30%	Professional knowledge
Oral examination	40%	Professional knowledge

Learning outcomes:

By completing the course Alternative energy sources, the student will be able to:

- distinguish between primary and secondary sources of energy,
- classify individual types of renewable energy sources and the possibilities of their use,
- assess the impact of renewable energy sources on reducing the burden on the environment,
- interpret knowledge about the use of secondary energy sources as a significant energy potential,
- assess the economic and ecological aspects of the use of these types of energy.

Course contents:

Lectures

- Objectives of the energy policy of the European Union.
- Classification of alternative energy sources (AES).
- Solar heat, its variability in history and its potential.
- Design of a thermal solar system.
- Use of the Sun for the production of electricity.
- Photovoltaics and the physical principle of the photo voltaic phenomenon, materials.
- Wind energy, potential performance and utilization in Europe and Slovakia.
- Devices for converting the kinetic energy of the wind into electrical energy.
- Geothermal energy, origin of the form of manifestation and distribution.
- Geothermal technologies. Use of geothermal energy in Slovakia.
- Biomass, its sources and its distribution. Biomass potential in the EU and Slovakia.
- Energy use of biomass for heat and electricity.
- Combined production of electricity and heat from biomass.
- Fuel cells and AES. Areas of application of fuel cells.

- Secondary energy sources. Utilization of the energy potential of waste heat.

Exercises

- Design of a thermal solar system
- Use of the Sun for the production of electricity.
- Wind energy, potential performance and utilization in Europe and Slovakia.
- Devices for converting the kinetic energy of the wind into electrical energy.
- Geothermal technologies. Use of geothermal energy in Slovakia.
- Energy use of biomass for heat and electricity.
- Combined production of electricity and heat from biomass.
- The exercises follow up thematically on the content of the lectures

Recommended reading:

IMRIŠ, I., KLENOVČANOVÁ, A.: Zdroje a premeny energie. 1. vyd. Prešov: ManaCon, 2006, 492 s., (Edícia vedeckej a odbornej literatúry) Vydavateľ: Strojnícka fakulta TU v Košiciach (odborná knižná publikácia)
JANDAČKA, J., HOLUBČÍK, M., KANTOVÁ, N.: Zdroje a premena energie, . vyd. - V Žiline : Žilinská univerzita, 2019, ISBN 978-80-554-1533-8 (učebnica)
Kol. autorov: Energy Conversion. CRC Press. Taylor & Francis Group, 6000 Broken Sound Parkway NW, Suite 300, 2008 (knižná publikácia)
JANDAČKA, J., MALCHO, M., MIKULÍK, M.: Biomasa ako zdroj energie. Žilina, 2007(knižná publikácia)
JANDAČKA, J., HOLUBČÍK, M., PATSCH, M., VANTÚCH, M.: Moderné zdroje tepla na vykurovanie. EDIS, Žilinská univerzita v Žiline, 2016 (knižná publikácia)
MALCHO, M., GAVLAS, S., PAPUČÍK, Š., KADUCHOVÁ ,K.: Spätné získavanie tepla z technologických procesov - 1. vyd. , Žilina - Žilinská univerzita v Žiline, 2018, ISBN 978-80-554-1415-7 (knižná publikácia)
D. ZOGI GOSWAMI AND FRANK KREITH: Energy conversion. ISBN 978-1-4200-4431-7. III.Title, Taylor a Francis Group, LLC 2007 (knižná publikácia)
ČARNOGURSKÁ, M.: ZDROJE A PREMENA ENERGIE. Skriptá TU Košice 2001 (skriptá)
GAJDOŠÍ, M.: Energetická bezpečnosť Slovenskej republiky v kontexte členstva v EÚ, DP Banská Bystrica 2011 odborná knižná publikácia)
BP Energy Outlook: 2021 edition, © BP p.l.c. 2021

A language whose knowledge is required to complete the course: english

Notes:

Course evaluation

Total number of evaluated students: 0

A	B	C	D	E	FX
0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Person securing the subject (subject guarantor): prof. Ing. Radovan Nosek, PhD.	
Teaching:	
Name and surname of the teacher, titles	**Organizational form provided by the university teacher** (Lectures, exercises, laboratory work, field exercises)
prof. Ing. Radovan Nosek, PhD.	Lectures
Ing. Peter Pilát, PhD.	exercises
Date of last change: 16.11.2021 10:05	
Approved: prof. Ing. Jozef Jandačka, PhD.	