UNIVERSITY OF ŽILINA
Faculty of Management Science and Informatics

Topics of Doctoral Thesis

Academic year 2019/2020

Doctoral Study

Study Program: **Inteligent Information Systems**

Field of Study: 9.2.6 Information Systems

Form of Study: Full-time

Study Program: **Applied Informatics**

Field of Study: 9.2.9 Applied Informatics

Form of Study: Full-time

Content

Topic of Doctoral Thesis

Assessment of innovative solutions for the European electricity market

Advisor: **Assoc. Prof. Ľuboš Buzna, PhD.**

Study Program: Inteligent Information Systems
Field of Study: 9.2.6 Information Systems

Study Program: Applied Informatics
Field of Study: 9.2.9 Applied Informatics

Form of Study: ☑ full-time ☐ part-time

Compulsory study units:

Mathematical Pronciples of Informatics
Theory and Methodology of Inteligent Information System
Subject of Specialisation

Specification of the topic

Problem Description:
To achieve the Energy Union's objectives, the electricity consumers are expected to become more active players in the energy markets; the retail and wholesale electricity markets are to be better linked; the feasibility of new market arrangements (including e.g. nodal pricing schemes) needs to be assessed and system adequacy should be met in the face of growing integration of renewable energy sources.

Considering this background, the PhD candidate is expected to assess options, challenges and merits of innovative market schemes for the European electricity wholesale market. S/he is expected to carry out desktop-based research and develop methods and tools to study nodal pricing solutions for the integrated electricity market and/or assess the adequacy of the power system via optimization and probabilistic approaches.

Expected scientific contribution:
- new methods/algorithms/tools to analyse pricing mechanisms for integrated electricity market, assessment and comparison of pricing schemes.

Recommended methods:
- formulation of optimisation and simulation models,
- assessment and comparison of pricing schemes via simulation experiments.

Research information

Type of Research:

Basic Research

A research project that will include a solved topic:
PhD topic will be developed within the framework of the collaborative doctoral partnership between the Joint Research Center of the European Commission (JRC) and the University of Žilina. It is expected that the student will start and finish PhD studies at the University of Žilina and will spend a considerable part of the study (up to 24 months) at the JRC in Ispra (Italy). During this time the student will be paid by the JRC. The JRC will also associate with the topic JRC advisor and will provide relevant data and access to the necessary research infrastructure.

Previous results:
1. R. Carvalho, L. Buzna, F. B. F, M. Masera, D. K. Arrowsmith, and D. Helbing, Resilience of natural gas networks during conflicts, crises and disruptions, PLoS ONE 9, e90265 (2014)

2. M. Cebecauer, K. Rosina, Ľ. Buzna: Effects of demand estimates on the evaluation and optimality of service centre locations, International Journal of Geographical Information Science, Vol. 30, Issue 4, 2016

3. M. Cebecauer, L. Buzna A versatile adaptive aggregation framework for spatially large discrete location-allocation problems, Computers & Industrial Engineering , Vol. 111, p. 364-380, 2017