Doctoral Thesis Theme 2024/2025
Study programme: **SYSTEM ENGINEERING AND INFORMATICS**

Supervisor: Prof. Petr Hájek, PhD. (petr.hajek@upce.cz)

1. Modelling Data from Text Documents using Fuzzy Sets
The aim of the dissertation is to summarize the current approaches to text mining using fuzzy sets, to collect a corpus of text documents, to propose a model using fuzzy sets to effectively consider uncertainty in the text, and to validate the proposed model on the corpus.

2. Predicting Innovation Performance of European Regions using Fuzzy Systems
The aim of the dissertation is to review existing research in innovation performance prediction, to propose a set of innovation performance indicators, to collect a dataset on European regions, to propose a fuzzy rule-based system trained using the dataset, and to validate the obtained results using existing performance criteria.

3. Assessment and Selection of Sustainable Smart City Projects
The aim of the dissertation is to summarize existing approaches to assessment and selection of sustainable smart city projects, to propose a multi-criteria group decision-making method considering a high level of uncertainty needed for the evaluation of sustainable smart city projects, to validate the method on a real-world case study, and to compare the resulting rankings with existing approaches used in this domain.

Supervisor: Assoc. Prof. Miloslav Hub, Ph.D. (miloslav.hub@upce.cz)

1. Usability of Adaptive User Interfaces
The aim of this work is to design and verify a new way to evaluate the usability of adaptive user interfaces. The student is expected to search for adaptive user interfaces, existing methods of user interface usability evaluation, design of own model of adaptive user interface usability evaluation and verification of the model on experimental data.

2. Evaluation of the Usability through Models
The aim of this work is to design and verify a new way of evaluating the usability of user interfaces through models. The student is expected to search the current user interface usability evaluation through models, design their own user interface usability evaluation model and verify the model on experimental data.

3. Use of Computational Intelligence in Biometric Authentication
The aim of this work is to design and verify a new method of biometric authentication using computational intelligence. The student is expected to search for existing methods of biometric authentication through computational intelligence, design their own model of biometric authentication using computational intelligence and verification of the model on experimental data.

+ one theme upon agreement with an applicant

Supervisor: Prof. Jitka Komárková, Ph.D. (jitka.komarkova@upce.cz)

1. Geoinformatics Approaches Suitable for Evaluation and Modelling of Sustainable Development

The work will focus on selected spatially oriented problems of public administration (e.g. landscape management, optimization of the occurrence of phenomena and objects in the territory,...). The thesis will identify suitable data sources, propose a data model, and will search for new and innovative methods of advanced analysis and visualization.

2. Infrastructure of Smart Cities to Support E-Participation of Citizens

The work will focus on the design of a scalable architecture and e-infrastructure, with any necessary links to the architecture and services of the national e-infrastructure and taking into account current trends, such as the use of data from sensor networks, participatory technologies, or the principles of maintaining full control of the owner over the data or data reuse.

+ one theme upon agreement with an applicant

Supervisor: Assoc. Prof. Hana Kopáčková, Ph.D. (hana.kopackova@upce.cz)

1. Modeling the Dynamics of the Behavior of Socio-Technical Systems

The aim of the thesis is to propose ways of modeling the behavior dynamics of the selected socio-technical system. Verify these models and perform simulations in the selected environment.

+ one theme upon agreement with an applicant

Supervisor: Assoc. Prof. Jiří Křupka, PhD. (jiri.krupka@upce.cz)

1. Group Decision Making in the Smart City Concept

The dissertation focuses on group decision-making modelling for a selected problem within the smart city concept. It summarises and analyses available information and methods for working with uncertainty. The proposed model is based on a systems approach and utilises soft case-based reasoning, fuzzy and rough sets. A case study will be used to verify the model.

+ one theme upon agreement with an applicant

Applicants can propose their own themes of dissertation theses. Such themes will be accepted upon agreement of a supervisor and advisory board of a particular study programme.