Doctoral Thesis Themes 2024/2025
Study programme: **APPLIED INFORMATICS**

Supervisor: Prof. Petr Hájek, Ph.D. (petr.hajek@upce.cz)
1. Interval-valued Fuzzy Inference Systems
The aim of this dissertation is to define interval-valued fuzzy sets, to summarize the current capabilities of inference mechanisms for this class of systems, to propose algorithms for building the knowledge base of interval-valued fuzzy inference systems, to implement these systems, and to evaluate their prediction performance and interpretability on a set of benchmark datasets.

Supervisor: Assoc. Prof. Miloslav Hub, Ph.D. (miloslav.hub@upce.cz)
1. Evaluation of Usability of User Interfaces through Natural Language
The aim of this work is to design and verify a new way of evaluating the usability of user interfaces through natural language. The student is expected to search for existing methods of user interface usability evaluation, to design a model for user interface usability evaluation through natural language and to verify this model on experimental data.

2. The Use of Biometric Characteristics for Monitoring Crowd Behavior at Mass Events
The aim of the work is to propose and verify a new way of monitoring the behavior of the crowd at mass events through the biometric characteristics of their participants. The student is expected to research existing ways of monitoring crowd behavior at mass events, design a model for monitoring crowd behavior at mass events through the biometric characteristics of their participants, and verify this model on experimental data.

+ one theme upon agreement with an applicant

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

+ one theme upon agreement with an applicant

Supervisor: doc. Ing. Jiří Křupka, PhD. (jiri.krupka@upce.cz)
1. Modelling a Twin City for Smart City Concept
The dissertation will focus on modelling a selected problem for Smart Cities. It will summarise and analyse the available methods and concepts dealing with a digital twin, and apply them to proposed models of a 'twin city'. The models can optimise planning, operations, finance, and decision-making to improve citizens' quality of life while achieving a more sustainable environment and fostering collaboration between different stakeholders. The models will be verified through a case study.
+ one theme upon agreement with an applicant
Supervisor: prof. RNDr. Michal Munk, PhD. (mmunk@ukf.sk)
1. The use of ESG information disclosed by commercial banks under Pillar 3
The thesis focuses on the issue of information disclosure within ESG reporting under Pillar 3 - Market Discipline by commercial banks. The aim of the thesis is to verify the effectiveness of ESG reporting information disclosure, examining the extent to which this information is utilized by key stakeholders of the relevant commercial banks, as well as to design a

methodology which allows to track stakeholders´ behaviour in relation to Pillar 3 information in various regions, such as V4 and CEE countries. The research ambition is to design a methodology that utilizes publicly available data, making it less time-consuming in terms of data pre-processing and language independent (given the localization of Pillar 3 disclosure information). This methodology, based on publicly available data, will enable effective monitoring of the Pillar 3 disclosure information´s impact in various regions on a regular basis. In terms of data processing, the thesis deals with the knowledge discovery across all web domains, including search queries, web usage, and web content and structure.

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.