

# Zgłoszenie tematu pracy dyplomowej :: STUDIA II STOPNIA ::

rok akademicki 2025/26

<b>Promotor:</b>	<b>dr hab. Jozef Kapusta, prof. UKEN</b>
Temat pracy magisterskiej (j. polski, j.angielski):	Neural Network Model Development for Flood Hazard Mapping <i>Rozwój modelu sieci neuronowej do wyznaczania zagrożenia powodziowego</i>
Zakres pracy i oczekiwane rezultaty praktyczne:	<p>Accurate and rapid prediction of flood extent, depth, or flow velocity across different flood types is vital for effective flood-risk management. Predicting any flood event can be challenging due to computational costs and multiple sources of uncertainty, including incomplete or noisy input data, measurement errors, imperfect model calibration, model simplifications, and related factors. Alongside hydrologic–hydraulic models, machine-learning techniques have evolved over time, aiming to learn from current data and past experience to improve the understanding of flood processes. Regression and classification are fundamental tools in machine-learning-based flood prediction: while a classifier can distinguish between flooded and non-flooded areas (wet and dry regions) under varying discharge conditions, a regression function can be used to estimate flow depth within flooded areas.</p> <p>The aim of this thesis will be to design and train custom neural network models for flood-hazard mapping using multiple data sources/predictors (HAND, distance from river, roughness, SPI, TWI, NDVI, slope). The work will systematically compare architectures such as U-Net, CNN+LSTM, and potentially Graph Neural Networks. Model performance will be evaluated using a unified set of metrics (F1, ROC-AUC, precision/recall) with k-fold cross-validation and statistical testing of performance differences. It is also expected that the student will attempt to explore and apply new experimental approaches within the investigated area.</p>
Aspekt naukowy, problemowy, innowacyjny pracy:	Implementation neural networks methods, implementation machine learning methods.
*Oprogramowanie, język programowania, środowisko systemowe:	
*Środowisko uruchomieniowe	
Dodatkowe wymagania i uwagi:	English language
*Literatura:	<ul style="list-style-type: none"> <li>Fox, E., Guestrin, C. Machine Learning Specialization, University of Washington <a href="https://www.coursera.org/specializations/machine-learning">https://www.coursera.org/specializations/machine-learning</a></li> </ul>

# Zgłoszenie tematu pracy dyplomowej :: STUDIA II STOPNIA ::

rok akademicki 2025/26

---

	<ul style="list-style-type: none"><li>• Zhang, A., Lipton, Z. C., Li, M., Smola, A.J. (2024). Dive into Deep Learning. Cambridge University Press. 574 p. <a href="https://www.d2l.ai/">https://www.d2l.ai/</a></li><li>• Géron, A. (2019). Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow (2nd ed.). O'Reilly Media. 849 pp.</li><li>• Burkov, A. (2019). The Hundred-Page Machine Learning Book. Andriy Burkov Publishing. 160 pp.</li><li>• Ameisen, E. (2021). Uczenie maszynowe w aplikacjach. Projektowanie, budowa i wdrażanie. Gliwice: Helion. 224 s.</li><li>• Learning, O'Reilly Media, 332 p.</li><li>• Bentivoglio R., Isufi E., Jonkman S. N. &amp; Taormina R. (2022). Deep learning methods for flood mapping: a review of existing applications and future research directions. <a href="https://hess.copernicus.org/articles/26/4345/2022/">https://hess.copernicus.org/articles/26/4345/2022/</a></li></ul>
--	--

\*pola opcjonalne