HSLU Lucerne University of Applied Sciences and Arts

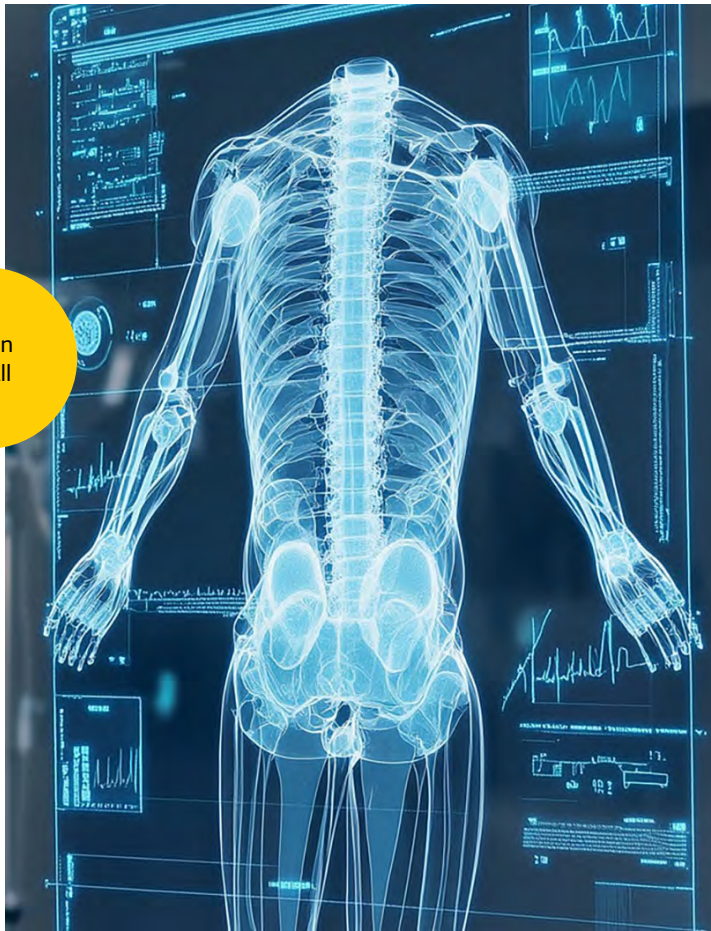
AI Application in Medical Science and Engineering

eit Tech Talent
Funded by the European Union

QUALITY CHECKED

Warsaw School of Computer Science

Open to all



FH Zentralschweiz

AI Application in Medical Science and Engineering

Course overview

This open microcredential course introduces key concepts and applications of artificial intelligence (AI) in healthcare, combining theory with hands-on practice. Modules include:

- Introduction to AI: Core concepts: AI, Machine Learning, Deep Learning, Generative AI; Differences and real-world medical applications.
- AI in Healthcare:: Use cases: medical image analysis, telemedicine, therapy recommendations, conversational agents, AI-assisted hearing devices; Real-world case studies and research insights.
- Challenges in Healthcare AI: Data scarcity, quality and annotation issues; Standardization and privacy concerns; Critical discussion through practical examples.
- Model Evaluation and Selection: Performance metrics: accuracy, precision, recall, F1 score, Dice coefficient; Overfitting, underfitting, K-Fold Cross-Validation, hyperparameter tuning.
- Neural Networks and Training: Perceptrons, activation functions (Sigmoid, Softmax, ReLU); Gradient Descent, CNNs, Transfer Learning.

Learning objectives

By the end of this course, participants will be able to:

- Identify key AI concepts such as artificial neurons and convolutional neural networks (CNNs).
- Describe how AI is applied in medical imaging, diagnostics, patient recommendations, conversational systems, medical audio, and text analysis.
- Implement simple AI models for image classification and segmentation with modern frameworks from scratch and with transfer learning.
- Compare different AI models and assess their performance using key metrics.
- Understand the limitations and challenges of AI in healthcare.
- Experiment with AI tools for automated diagnostics and patient interaction.

Learning format

- Practical exercises using Python and Jupyter Notebooks.
- Designed for learners of all levels.
- Online final exam (pass/fail) to confirm practical understanding.

Lucerne University of Applied Sciences and Arts
Werftestrasse 4
Postfach
6002 Luzern

T +41 41 228 42 42
info@hslu.ch
hslu.ch

More information and registration

21.07.2025

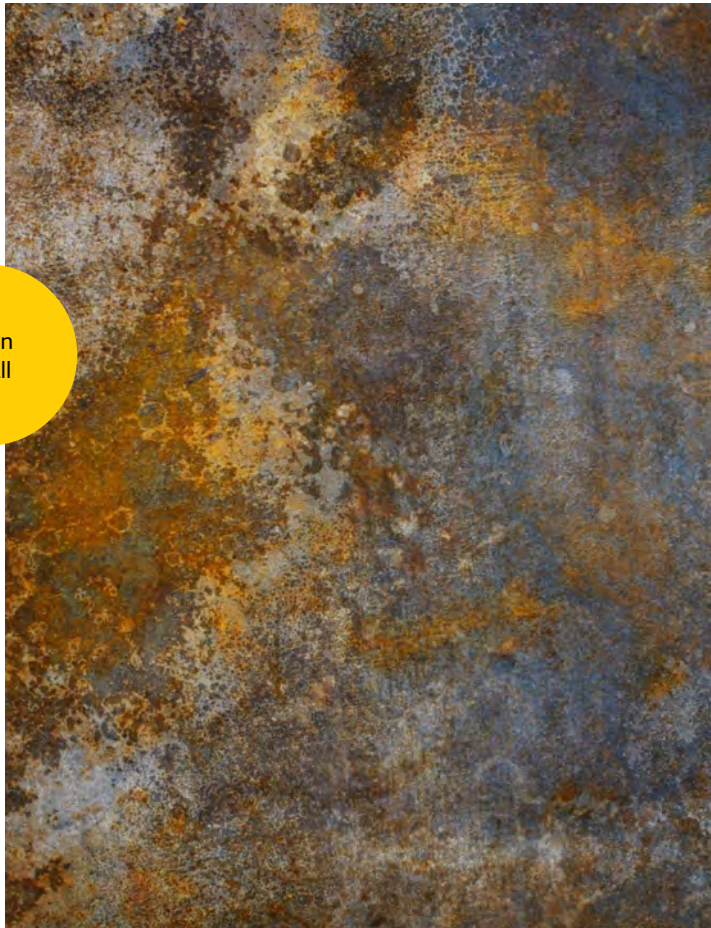
HSLU Lucerne University of Applied Sciences and Arts

AI Application in Material Science and Engineering

eit Tech Talent
Funded by the European Union

Warsaw School of Computer Science

Open to all



FH Zentralschweiz

AI Application in Material Science and Engineering

Course overview

This open microcredential course provides a practical introduction to machine learning (ML) and its application in material science and engineering. Modules include:

- Material Science Fundamentals:
  Core properties and microstructure of metals; Real-world use cases in energy, aerospace, and biomedical applications.
- Damage & Corrosion Mechanisms:
  Fatigue and crack propagation under cyclic loads; Corrosion processes and their environmental influences.
- Machine Learning Foundations:
  Model training and validation techniques; Algorithms such as decision trees, logistic regression, and neural networks.
- AI Tools & Reproducibility:
  Python programming with Scikit-learn, NumPy, and TensorFlow; Reproducible workflows using Git, GitHub, and Jupyter Notebooks.
- Applied AI in Engineering:
  Use of AI in damage detection, crack monitoring, and predictive maintenance; Final project applying ML to material-related scenarios.

Learning objectives

By the end of this course, participants will be able to:

- Describe typical metallic materials and their behavior under mechanical and environmental stress.
- Explain key machine learning concepts such as supervised learning, model training, and evaluation.
- Build and test simple AI models in Python using real or simulated datasets.
- Use tools like Git, Jupyter Notebooks, and Google Colab to document and reproduce analyses.
- Understand how AI can support monitoring, prediction, and decision-making in material engineerin.g
- Critically assess limitations and ethical considerations of AI use in engineering contexts.

Learning format

- Hands-on and example driven.
- Balanced focus on technical skills and ethical awareness.
- Online final exam (pass/fail) to confirm practical understanding.

Lucerne University of Applied Sciences and Arts
Werftestrasse 4
Postfach
6002 Luzern

T +41 41 228 42 42
info@hslu.ch
hslu.ch

More information and registration

21.07.2025

HSLU Lucerne University of Applied Sciences and Arts

AI Application in Data Science and Engineering

eit Tech Talent
Funded by the European Union

Quality Checked

Warsaw School of Computer Science

Open to all

FH Zentralschweiz

AI Application in Material Science and Engineering

Course overview

This open microcredential course introduces key concepts, methods, and ethical considerations in machine learning (ML), with real-world examples and applied techniques. Modules include:

- Introduction to ML Concepts: Everyday examples: speech recognition, image classification; Core ideas behind how ML systems learn and improve.
- Data Preparation & Processing: Cleaning, normalization, and standardization techniques; Feature engineering and selecting relevant input variables.
- Modelling & Evaluation: Overview of algorithms: decision trees, neural networks, SVMs; Evaluation methods: cross-validation, ROC curves, performance metrics.
- Deploying ML Models: Implementing models in real-world systems; Scaling, monitoring, and addressing deployment challenges.
- Ethics & Accountability: Fairness, bias, and transparency in ML decision-making; Case studies on real-world impacts and responsible use.

Learning objectives

By the end of this course, participants will be able to:

- Recognize and explain key machine learning concepts and their practical applications.
- Apply data preparation techniques, including cleaning, normalization, and standardization.
- Use a range of ML algorithms on datasets and implement appropriate evaluation methods.
- Understand deployment processes, including scaling, monitoring, and ethical considerations.
- Develop complete ML workflows, from data processing to model training and validation.
- Design ethical guidelines for fair and transparent use of machine learning models.

Learning format

- Hands-on and example driven
- Balanced focus on technical skills and ethical awareness.
- Online final exam (pass/fail) to confirm practical understanding.

Lucerne University of Applied Sciences and Arts
Werftestrasse 4
Postfach
6002 Luzern

T +41 41 228 42 42
info@hslu.ch
hslu.ch

More information and registration

21.07.2025