Programme:

Faculty

Experts from the host institution (TU Dresden, Dresden, Germany)

1. Prof. Jakob Kather (Professor for Clinical Artificial Intelligence, Clinician)
2. Dr. Narmin Ghaffari Laleh (AI engineer)
3. Dr. Jan Clusmann (Clinician, Data Scientist)
4. Prof. Carolin V. Schneider (Professor for Metabolic liver diseases, Clinician)

Experts from collaborating institution (Henri Mondor Hospital, Créteil, France)

1. Prof. Julien Calderaro (Pathologist)
2. Prof Mamatha Bhat, Toronto - Hepatology

Online part

Part 1 self-study (materials provided by the course organizers)

- Good practice in data science (study setup including training, testing, validation
- Basics of AI for image analysis
- Basic skills in programming and hepatology (respectively for clinicians, data scientists)

Part 2 consolidation of self study (virtual seminar with the whole group and break-out sessions)

- Online discussions with the whole group to make sure everyone is at the required level of understanding
- Breakout-sessions with separate discussions for technical and medical participants

In person session at TU Dresden, Germany

Day 1 (full day)

- 09:00: Welcome session, course introduction, ice-breaker (Jakob Kather, Jan Clusmann)
- 09:30: Introductory lecture on AI literacy for clinicians, LLMs, agents, what the future holds (Jakob Kather - 20 min talk, 10 min discussion)
- 10:00:Participants receive clinical challenges* (Narmin Ghaffari, Jan Clusmann)
- 10:15: Coffee Break
- 10:30: Hands-on working time (Narmin Ghaffari, Jan Clusmann)
- 12:00: Lunch Break
- 13:00: Keynote 1: AI in clinical hepatology today (Mamatha Bhat - 30 min talk, 15 min discussion)
- 13:45: Hands-on working time
- 15:00: Coffee Break
- 15:20: Interactive session 1 "Challenges on the path to safe clinical AI systems" (Jan Clusmann - 20 min talk, 40 min discussion)
- 16:20: Housekeeping for second day (Jan Clusmann)
- 16:30: Informal continuation of hands-on work / recreational time / exploring Dresden
- 19:00: Networking Dinner

* The actual project will be highly dependent on the development of the field over the next year (two years ago none of today's Large Language Models, vision-language models, foundation/generalist models were available). Some potential experimental ideas include:

- *Understanding Bias in ML: Participants will work with clinical data from both European, American and Asian patient populations, aiming to replicate machine learning models that have the goal of predicting future HCC diagnosis. The primary objective is for participants to actively explore how model performance and feature importance can vary across different demographic groups to develop a sense of how these work and what challenges there are. Participants will analyse the reasons behind these variations and discuss ways to mitigate bias in real-world clinical settings.*
- *Building a guideline-support app: Participants obtain a collection of EASL guidelines with the task to develop a ready-to-use mobile-app (with a template readily available) that can be chat-queried and provides individual guideline-based feedback, incorporating essential concepts such as "Retrieval-augmented generation" and evaluate*
- *Evaluating diagnostic accuracy of computational pathology vision-language models in on rare liver diseases: Participants will be provided with digitised histopathological slides of rare liver disease cases, and vision-language models as software that generate pathological reports. They will benchmark the performance of these models. The focus will be on replicating published benchmarks and comparing model performance on common vs. rare liver diseases, offering insights into where current models succeed or fail in handling rare pathologies.*

For all three projects, participants will be provided with readily available computing resources, data in structured format, and all necessary packages installed to minimise delay.

Day 2 (half day, split in two groups)

- 09:00: Presentation of results /concept from hands-on round
- 10:00: Coffee Break / Faculty evaluates presentations
- 10:15: Winner announcement

- 10:30: Keynote 2: Diagnostic medicine in the era of AI (Julien Calderaro)
- 11:15: Interactive session 2: From personal paths to precision-prevention: Next steps to transform healthcare (Carolin V. Schneider, all faculty)
- 12:00 Debriefing, feedback/ open evaluation session and goodbye

Debriefing

- Possibility for anonymous evaluation (online)
- Networking (online)
- Group work debriefing (virtual seminar where the groups have the opportunity to meet again with their mentor after two weeks of reflection time for some final discussion, question, potential pursuit of their project for publication)