Use of AI for Literature Review

Course Overview and Philosophy

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Why this course?

The Current Landscape

AI & LLM: Between Hype and Reality

- **The buzz:** Revolutionary promises for research and productivity
- **The reality:** Mixed experiences, from enthusiasm to frustration
- **The concerns:** Quality, reliability, intellectual property, ethics

The AI design space is vast - many approaches, tools, and philosophies

The Challenge

A Dynamic and Complex Domain

- New model classes emerging every few months
- Overwhelming choice of tools and platforms
- Need for clarity on what's actually happening "under the hood"

AI is a flexible tool - but like any tool, it needs:

- Clear purpose
- Awareness of capabilities and limitations
- Thoughtful application to your specific needs

How we’ll approach this

Our Philosophy

AI as a Learning Companion

- **Not** a tool for delegating cognition
- **But** a partner for better and faster learning
- Goal: Stay in control while enhancing our capabilities

Counter-intuitive insight: AI saves time on boring tasks, but you'll spend *more* time on tasks you love - and do them better

Course Structure

Interactive and Hands-On Approach

Short lectures

- Just enough theory
- Focus on methodology over tools

Collaborative sessions

- Capture pain points & expectations
- Share experiences
- Build collective knowledge

Extensive hands-on practice - because understanding comes through doing

What we’ll cover

5-Day Journey

Day 1: Foundations & Getting Started

- Course overview and philosophy
- How LLMs are trained (high-level intuition)
- **Collaborative session:** Expectations, fears, ethical concerns
- **Introduction to prompt engineering** for scientific papers

Day 2: Deep Dive into Prompting

- **Morning:** Advanced prompt engineering techniques
- Data extraction and summarization
- **Hands-on practice:** Working with real papers

5-Day Journey (cont.)

Day 3: Methodology & Workflows

- Literature review workflows and organization
- LLM evaluation and iterative improvement
- **Collaborative session:** Pain points and solutions

Day 4: Tools & Advanced Applications

- Tools comparison: mindsets and approaches
- RAG systems (IAEA Monaco example)
- Agentic literature review approaches

5-Day Journey (final)

Day 5: Integration & Future

- **Collaborative synthesis:** Building our methodological framework
- Intellectual property and ethical guidelines
- Individual consultation planning

Topics in Detail

LLM Fundamentals

Understanding What's Under the Hood

- How are LLMs trained? (High-level intuition)
- Why do they work? Why do they sometimes fail?
- **The three gulfs of AI system design:**
  - → Gulf of understanding
  - → Gulf of specification
  - → Gulf of generalization

Key insight: Understanding the fundamentals helps you use AI more effectively

Prompt Engineering

From Basic to Advanced Techniques

- Summarizing scientific papers effectively
- Data extraction with precision and consistency
- **IP-aware prompting** (IAEA Monaco case study)
- Iterative refinement and evaluation

Hands-on focus: You'll practice with real papers from your domains

Evaluation & Iterative Improvement

Making AI Work Reliably for Research

- **LLM as a judge:** How to evaluate AI outputs systematically
- Error analysis and failure mode identification
- Iterative improvement cycles
- Simple evaluation tools (Excel-based approaches)

Central principle: Evaluation is not optional - it's essential for research quality

Literature Review Workflows

Systematic Approaches to AI-Assisted Research

- Crafting effective LLM context for literature review
- Organizing and maintaining consistency over time
- Collaborative research strategies
- **From overwhelmed to organized**

Real challenge: How do we stay in control while leveraging AI capabilities?

Tools & Mindsets

Beyond the Hype: Choosing the Right Approach

- **Copilot vs. ChatGPT vs. Claude vs. DeepSeek**
- Platform comparison: NotebookLM, Elicit, specialized research tools
- **The SolveIt approach:** Maintaining control and transparency
- Agentic AI vs. collaborative AI philosophies

Key question: What mindset and level of control do you want?

Advanced Applications

Real-World Implementation Examples

- **RAG systems:** IAEA Monaco marine radioactivity database
- Agentic literature review demonstrations
- Scaling from individual papers to comprehensive reviews
- Integration with existing research workflows

Live demos: See these approaches in action with real research scenarios

Ethical & Epistemological Questions

The Big Questions We Must Address

- **What do we expect from AI in research?**
- What should we delegate vs. what should we keep?
- Will AI help us do *better* research, or just *faster* research?
- **Authorship and attribution:** New challenges, new solutions

Intellectual Property considerations:

- Copyright and fair use in AI-assisted research
- Institutional policies and journal guidelines
- Data ownership and sharing protocols

Collaborative Framework Building

Creating Our Methodological Approach

- Synthesizing our collective insights and concerns
- Building practical guidelines for AI use in research
- **Goal:** A methodological document we can all use
- Individual consultation opportunities (6 additional days available)

Our aim: Leave with a clear, ethical, and effective approach to AI in your research

Demo Preview

A Taste of What's Possible

Let's see AI-assisted literature review in action:

- **Live demonstration:** From research question to synthesized insights
- Real scientific papers, real workflows
- Multiple AI approaches compared side-by-side

What you'll notice:

- The importance of good prompting
- How evaluation catches errors
- Why methodology matters more than tools

Questions & Discussion

Ready to Begin?

Your Turn

- What are your biggest hopes for AI in your research?
- What concerns you most about using AI tools?
- What specific literature review challenges do you face?

Let's start the conversation - this course is as much about your insights as mine