IT Department / Faculty of Applied Science

2025-2026 Fall Term

AI Prompt Engineering

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Learning Objectives: By the end of this week, students will be able to:

- Define artificial intelligence and explain its importance
- Identify AI applications in daily life
- Understand what Large Language Models (LLMs) are at a basic level
- Differentiate between AI, Machine Learning, and Deep Learning
- Create accounts on ChatGPT and Google Gemini, and more apps ☺
- Interact with AI tools for the first time
- Recognize AI's capabilities and limitations

Course assessment:

- - Quizzes (2): 10%
- - Lab Work: 10%
- - Homework (2): 10%
- - Midterm: 20%
- - Final Project: 20%

Ice Breaker Activity (5 min):

- Did you used ChatGPT before?
- For what ☺
- Who do you think Ai will take their job?

Defining Artificial Intelligence

- **Definition 1 (Simple):**
- "Artificial Intelligence is when computers can do tasks that normally require human intelligence."
- **Definition 2 (Technical):**
- "AI is the simulation of human intelligence processes by machines, especially computer systems."
- **Definition 3 (Practical):**
- "AI is making machines smart enough to see, hear, learn, reason, and make decisions."
- **In summary** "AI is NOT magic. It's mathematics, data, and algorithms working together. But it SEEMS intelligent because it can learn patterns and make decisions."

Brief History of AI

- 1950 - Alan Turing asks "Can machines think?" Creates the Turing Test
- 1956 - John McCarthy coins the term "Artificial Intelligence" First AI conference at Dartmouth College
- 1960s-1970s - Early AI programs (chess, theorem proving)
- 1980s-1990s - Expert systems, AI winter and revival
- 2000s - Machine Learning boom Big Data enables better AI
- 2010s - Deep Learning revolution AlexNet (2012) - Computer Vision breakthrough
- 2020s - Large Language Models GPT-3 (2020), ChatGPT (2022) changes everything AI becomes mainstream
- 2023-2025 - AI Everywhere Every company adopting AI New jobs: Prompt Engineers

AI in Daily Life

- Where have you seen AI today?

TYPES OF AI
AI Classification: Based on Capabilities

THREE TYPES OF AI (By Capability)

1. NARROW AI (Weak AI) ← We have this!
2. GENERAL AI (Strong AI) ← Not yet!
3. SUPER AI ← Science fiction!

1. Narrow AI (Artificial Narrow Intelligence - ANI)

Definition: AI designed for ONE specific task

Examples:

- Face recognition (can only recognize faces) - Chess AI (can only play chess) - Spam filter (can only detect spam)
- Siri (can only understand voice commands) - Self-driving cars (can only drive)
- **Summary:** ALL AI we use today is Narrow AI. **ChatGPT is Narrow AI** - it's VERY good at language, but it can't drive a car or recognize faces.
- **Characteristics:**
- ✓ Excellent at specific tasks
- ✗ Cannot transfer learning to other tasks
- ✓ Already everywhere in our lives

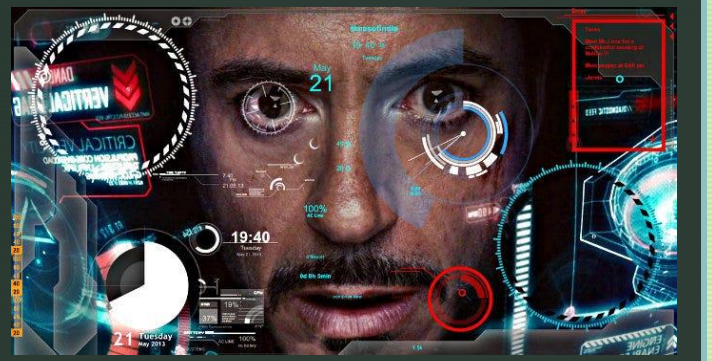
2. General AI (Artificial General Intelligence - AGI)

- **Definition:** AI that can understand, learn, and perform ANY intellectual task that a human can
- **Status:** DOES NOT EXIST YET!
- **What it would be able to do:**
- Learn ANY skill like humans -Transfer knowledge between domains. -Understand context like humans
- Show common sense. -Be creative in multiple ways
- **Timeline:** Experts disagree
- Optimists: 10 years
- Pessimists: 50 years
- Skeptics: Maybe never

3- Super AI (Artificial Superintelligence - ASI)

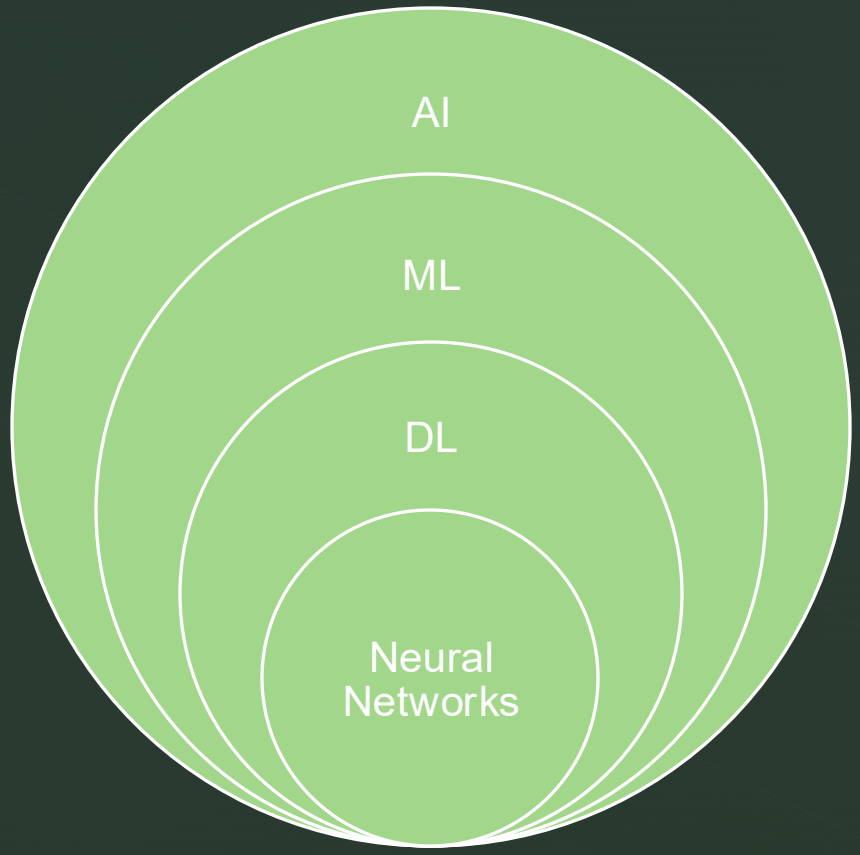
Definition: AI that surpasses human intelligence in ALL aspects

- **Status:** Pure speculation/science fiction
- **Examples from movies:**
- Jarvis (Iron Man)
- Skynet (Terminator)



- **Summary :** "When people worry about AI taking over the world, they're thinking of Super AI. We're VERY far from that. Focus on using Narrow AI well!"

AI vs Machine Learning vs Deep Learning



Artificial Intelligence (The Big Picture):

- Making machines intelligent
- Includes ALL techniques
- The ultimate goal

Machine Learning (The Method):

- Subset of AI
- Machines learn from data
- No explicit programming needed
- "Show examples, machine figures out patterns"

Example: "Instead of programming rules for spam detection (if email contains 'FREE', mark as spam), we show the machine 10,000 spam emails and 10,000 real emails. It learns the patterns itself!"

Deep Learning (The Technique):

- Subset of Machine Learning
- Uses artificial neural networks
- Inspired by human brain
- Best for complex patterns (images, speech, text)

Example: "How does face recognition work? Deep Learning! The AI looks at millions of faces and learns what makes each person unique."

INTRODUCTION TO LARGE LANGUAGE MODELS

- A Large Language Model (LLM) is a very large AI system trained on massive amounts of text from the internet. It can understand and generate human-like text.
- Imagine someone who has READ the entire internet - every book, every article, every website. That's basically what an LLM is. It has 'read' so much that it can answer questions, write essays, help with code, and much more.

How Do LLMs "Understand" Language?

Step 1: Training (Already Done Before We Use It)

- 1. Collect MASSIVE amounts of text - Books (millions)
- - Wikipedia (all languages) - Websites (billions of pages) - Code repositories - Academic papers - Social media (carefully filtered)
- 2. AI reads all this text and learns:
- - What words usually go together - Grammar and language patterns - Facts about the world - How to form coherent sentences - Context and meaning
- 3. After training (costs millions of dollars): - Model is "frozen" - Ready to use - We don't train it again

Step 2: How It Works When You Use It

You type: "What is the capital of France?"

- LLM thinks: - "I've seen this pattern millions of times"
- - "After 'capital of France' usually comes 'Paris’”
- - "This is a factual question, give confident answer" LLM responds: "The capital of France is Paris."

LLM Key Concepts

1. Pattern Matching (Not Real Understanding)

- AI has seen "Paris is the capital of France" thousands of times
- It recognizes the pattern and responds
- It doesn't "know" what a capital is
- It predicts what words make sense

2. Probability and Prediction

- For every word, AI calculates: "What word likely comes next?"
- Example: "The sky is ___"
  - High probability: blue, gray, cloudy
  - Low probability: purple, angry, delicious

3. Context Window

- AI can "remember" the conversation
- Has limited memory (like 8,000 words)
- Older parts of conversation are forgotten

Popular LLMs Today

- 1- GPT Models (OpenAI)
- 2- Claude (Anthropic)
- 3- Gemini(Google)
- 4.LLaMA(Meta)
- 5. DeepSeek

What Can LLMs Do?

1. Question Answering
2. Writing & Content Creation
3. Code Generation
4. Translation
5. Summarization
6. Creative Writing
7. Problem Solving

CRITICAL: Understanding AI Limitations

1. Hallucinations (Makes Up Facts)

- Problem: AI can confidently state FALSE information
- Example: Ask about a book that doesn't exist AI might invent a summary!
- Solution: ALWAYS verify important facts

2. Knowledge Cutoff

- Problem: Training data has a cutoff date
- Example: ChatGPT-4 knows nothing after April 2025
- Can't tell you yesterday's news!
- Solution: Use for general knowledge, not current events

CRITICAL: Understanding AI Limitations

3. No Real Understanding!
4. Biased Training Data
5. Can't Do Everything

Can't:
- Run programs
- Remember you between sessions (without memory)
- Know what's happening in the real world
- Have opinions or feelings

Can:
- Process and generate text
- Analyze patterns
- Help with reasoning
- Create content
- Code assistance

AI Interview Homework Paper-based (15 Oct 2025)

Task

- Ask **3 people** these questions about AI:

Questions

- Do you use AI? (Yes/No)
- Which AI tools do you use? (ChatGPT, Siri, Google, etc.)
- Does AI help you? How?

Submit

- Write their answers in a simple table:

Anti-Copying Rules

You MUST include:

1. **Photo with each person** (selfie while interviewing) - 3 photos total
2. **Person's first name** in the table
3. **Your signature** on the paper

OR Record a short video (1-2 minutes) asking one person the questions

Students with identical answers will receive zero points.

Submit

Write their answers in a simple table:

Person	Do they use AI?	Which tools?	How does it help?
1.			
2.			
3.			

Your opinion (2-3 sentences): What did you learn?

References

- **AI Prompt Engineering & Introduction to AI - References**
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- **Qian, Y. (2025).** "Prompt Engineering in Education: A Systematic Review of Approaches and Educational Applications." *SAGE Journals*
- **Park, J. & Choo, S. (2025).** "Generative AI Prompt Engineering for Educators: Practical Strategies." *Journal of Special Education Technology*
- **Ertel, W. (2024).** *Introduction to Artificial Intelligence* (3rd ed.). Springer
- **Russell, S. & Norvig, P. (2021).** *Artificial Intelligence: A Modern Approach* (4th ed.). Pearson