INO AI LAB

[ AI EDUCATION • COURSE MATERIAL ]

# AI Fundamentals: From Zero to Hero

*Neural networks, ML basics & practical AI*

| LEVEL | DURATION | LESSONS |
| --- | --- | --- |
| **Beginner** | **6 hours** | **12** |

Innovation AI Lab — Tools, Prompts & Performance

// 2026 EDITION

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[ LESSON 01 ]

# What Is AI, Really?

Artificial Intelligence is not magic — it is a stack of mathematical techniques that let computers find patterns in data and use those patterns to predict, generate, or act. Today's wave is dominated by Large Language Models (LLMs) like GPT-5, Claude Opus 4.5, and Gemini 2.5 Pro, which are trained on trillions of tokens of text and code. They don't 'understand' the way humans do, but their statistical grasp of language is good enough to write production code, draft contracts, and tutor students.

The field splits into three useful layers: narrow AI (everything deployed today, doing one task well), general AI (still theoretical), and generative AI (the explosion that started with ChatGPT). Treat modern AI as an extremely capable intern — fast, tireless, occasionally wrong, and always needing supervision on high-stakes tasks.

// KEY TAKEAWAYS

- Narrow AI is the only AI deployed today.
- LLMs predict the next token; they don't 'know' facts.
- Always verify high-stakes output.

[ LESSON 02 ]

# Machine Learning in Plain English

Machine Learning is the engine under AI. Instead of writing if/else rules, you show the computer thousands of examples and let it learn the rules itself. Supervised learning uses labeled data (spam vs not-spam). Unsupervised learning finds hidden structure (customer segments). Reinforcement learning learns through trial, error, and rewards — the technique behind AlphaGo and most modern robotics.

The most useful mental model is the 'function approximator'. You have inputs X and want outputs Y. ML finds the function f(X)=Y that fits your data. A linear regression is the simplest version; a 400-billion-parameter transformer is the most extreme. Start simple — small models are faster, cheaper, and explainable. Reach for deep learning only when simpler tools genuinely fail.

// KEY TAKEAWAYS

- Three paradigms: supervised, unsupervised, reinforcement.
- Start with simple models — they often beat deep nets on tabular data.
- More data usually beats a fancier model.

[ LESSON 03 ]

# Neural Networks Without the Math Headache

A neural network is a stack of matrix multiplications wrapped in non-linear activation functions. Each layer transforms its input, and the final layer produces a prediction. During training, the network compares its prediction to the right answer, calculates the loss, and nudges every weight slightly in the direction that reduces error. Repeat this billions of times and you get GPT.

The breakthrough powering modern AI is the Transformer, introduced by Google in 2017. Transformers use 'attention' to let every token in a sequence look at every other token in parallel. This is why training scales on GPUs and why context windows have grown from 2,048 tokens in GPT-2 to over a million in Gemini 2.5 Pro. Understanding attention conceptually — 'which words matter for predicting this one?' — is enough to follow most AI news.

// KEY TAKEAWAYS

- Neural nets learn via gradient descent on a loss.
- Transformers + attention power every major LLM.
- Context window directly limits what a model can see at once.

[ LESSON 04 ]

# Your First 30 Days With AI

Pick one weekly workflow that involves writing, summarizing, or analyzing. Replace 30 minutes of it with an AI-assisted version. Track time saved and quality delta in a simple spreadsheet. After two weeks you'll have data, not opinions, about where AI actually helps you. This beats reading ten more articles about AI strategy.

Then expand: add a second workflow, learn one new tool per week, and join one community (r/LocalLLaMA, Hacker News AI threads, a Discord around your favorite tool). The people who get the most out of AI aren't the ones with the best prompts — they're the ones who run the most experiments and share what works. Build the habit before optimizing the technique.

// KEY TAKEAWAYS

- One workflow, measured, beats ten articles read.
- Add one tool and one community per week.
- Experiments beat theorizing.

[ NEXT ]

# Keep Going

You've completed this course material. The real learning starts when you apply what you've read. Pick one idea from this PDF and run a small experiment this week. Document what worked and what didn't. Share your findings with the community.

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Have feedback or want to suggest a topic? We read every message.

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**— Innovation AI Lab Team —**

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