AI Summer Camp — Week 1

Introduction to Artificial Intelligence & Machine Learning

Dates: July 27 – July 31 (Mon–Fri)

Instructor: Prof. Yinxin Wan, Department of Computer Science, University of Massachusetts Boston

Format: Hybrid — 2 in-person days (Mon & Fri) + 3 remote days (Tue–Thu)

From Curious Beginner to Confident AI Builder — in Five Days

Artificial Intelligence is transforming every industry, from healthcare and self-driving cars to the apps in your pocket. In **Week 1** of our summer camp, students don't just learn *about* AI. They **build their own AI tools, improve them, and present them**.

This week is the **foundation** of the full 5-week journey:

- **Week 1 — Introduction to AI & Machine Learning** *(this week)*
- Week 2 — Neural Networks & Computer Vision
- Week 3 — Natural Language Processing
- Week 4 — Generative AI & Creativity
- Week 5 — Inside Intelligence: A Journey into Minds & Machines

Everything students learn in Week 1, how machines learn from data, how models are evaluated, and how to think critically about AI, powers the rest of the summer.

What Students Will Walk Away With

By Friday afternoon, every student will have:

1. **A trained machine-learning model** of their own design
2. **A portfolio-ready presentation** delivered live
3. **A written reflection** usable for school projects, competitions, and college applications
4. **Confidence to keep building**

Learning Outcomes

By the end of Week 1, students will be able to:

- Explain foundational AI and Machine Learning concepts in their own words
- Describe and apply the complete Machine Learning pipeline
- Train and evaluate a supervised learning model from end to end
- Improve model performance through structured experimentation and basic hyperparameter tuning
- Analyze model limitations, data bias, and generalization
- Use AI productivity tools ethically to strengthen their presentation
- Communicate technical ideas clearly to a non-technical audience

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Week at a Glance

Day	Date	Theme	Location
Mon	Jul 27	Foundations of AI & the ML Pipeline	On Campus
Tue	Jul 28	Supervised Learning & Your First Model	Remote
Wed	Jul 29	Model Improvement & Evaluation	Remote
Thu	Jul 30	Build with AI: Coding Agents & Final Project Sprint	Remote
Fri	Jul 31	Capstone Day: Final Integration & Showcase	On Campus

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Detailed Daily Schedule

Day 1 (Mon, Jul 27) — IN-PERSON

Foundations of AI & the Machine Learning Pipeline

Lecture

- Welcome, icebreakers, and meet your camp team

- What is AI, really? Live demos and a visual journey from chess-playing computers to ChatGPT
- Clear, sticky definitions: AI vs. Machine Learning vs. Deep Learning
- The Machine Learning Pipeline: Data → Features → Model → Evaluation → Deployment
- Supervised vs. unsupervised vs. reinforcement learning, with real-world examples

Lab

- Train your first model: a live image classifier
- Learn the model's limitations
- Teams pick a project track and draft an ML pipeline diagram

End-of-Day Deliverables

- A working personal Teachable Machine model (warm-up)
- ML pipeline diagram

Day 2 (Tue, Jul 28) — REMOTE

Supervised Learning & Your Baseline Model

Lecture

- The anatomy of supervised learning: features, labels, and the training process
- Why we split data into train/validation/test sets
- Accuracy, precision, recall
- Your first real algorithms: decision trees, k-Nearest Neighbors, logistic regression
- Intuition for loss, fitting, and generalization

Lab

- Guided walk-through: train and test a classifier with scikit-learn
- Project time: load your team's dataset, train a baseline model, and inspect the confusion matrix

End-of-Day Deliverables

- Working baseline model on your project dataset
- Initial accuracy + confusion matrix

Day 3 (Wed, Jul 29) — REMOTE

Improving & Evaluating Your Model

Lecture

- Why models fail: overfitting vs. underfitting, the "memorize vs. understand" story
- Bias in data: real-world case studies (recruiting tools, facial recognition)
- What a confusion matrix really tells you
- Making models better: feature engineering, hyperparameter tuning, and cross-validation
- A sneak peek of neural networks

Lab

- Guided tuning workshop: change *one* thing at a time and plot learning curves
- Project time: try at least two improvement strategies and measure before/after accuracy
- Produce one clear "results" chart comparing baseline to improved model

End-of-Day Deliverables

- Improved model with measurable gain over baseline
- Before/after performance visualization

Day 4 (Thu, Jul 30) — REMOTE

Build with AI: Coding Agents & Final Project Sprint

This is the tool that's changing how software gets built in 2026. Today, students learn to set up and collaborate with AI coding agents, the same tools used by professional engineers at Google, Microsoft, and Meta, and then use them to take their team project to the next level.

Lecture

- What AI agents are: from chatbot → copilot → autonomous agent

- What an agent actually does: Read → Plan → Act → Verify
- Tour of the tool landscape: ChatGPT, Claude, Gemini, Cursor, Claude Code, GitHub Copilot, etc.
- Prompting agents like a pro: clear goal + rich context + tight feedback loop
- Debugging *with* an agent, and when to trust vs. verify (hallucinations, made-up APIs)
- Live demo: prompts an agent to write, run, and debug a Python script end-to-end
- Final project decisions: each team picks the final shape of their showcase artifact and drafts a plan

Lab

- Agent setup and warm-up
- Build with your agent for the final showcase project
- Keep a log of what you asked, what worked, and what you had to correct

End-of-Day Deliverables

- Final project scope locked in
- Measurable progress on final showcase artifact (e.g., working prototype of app)

Day 5 (Fri, Jul 31) — IN-PERSON

Capstone Day: Final Integration & Showcase

Friday is our all-day on-campus capstone.

Morning

Capstone Integration

- Continue building your final project *with* your AI agent from Day 4
- Build and polish the presentation slides, using AI tools and agents to improve the presentation quality
- Plan and rehearse the live presentation and demo

Afternoon — Project Showcase

- Teams set up demo stations in the presentation hall and run final tech checks

- Each team delivers the presentation (problem, dataset, model approach, results, improvements, limitations), live demo, and Q&A

How This Week Strengthens Student Portfolios

Students leave Week 1 with three tangible advantages:

1. Demonstrated Initiative: Defined an original AI problem and delivered a working model
2. Technical Portfolio: A reproducible project
3. Strong Personal Narrative: what they built and what they learned

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About the Instructor

Prof. Yinxin Wan is Assistant Professor in the Department of Computer Science at UMass Boston. He obtained his Ph.D. from Arizona State University and B.E. from University of Science and Technology of China. His current research interests include secure and trustworthy AI, AI-driven networked systems, cybersecurity, network measurement, IoT, and quantum networking.