

CS 5001: AI-Augmented Software Engineering

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State of the World: 2026



World ▾ Business ▾ Markets ▾ Sustainability ▾ Legal ▾ Commentary ▾ Technology ▾ Investigations

AI startups revolutionize coding industry, leading to sky-high valuations

By Anna Tong and Krystal Hu

June 3, 2025 6:46 PM PDT · Updated June 3, 2025



As AI transforms the economy, Massachusetts needs a plan for its workforce

Without guardrails and strategic thinking, these fast-moving changes will leave many people behind

TECH

MIT study finds AI can already replace 11.7% of U.S. workforce

PUBLISHED WED, NOV 26 2025-10:00 AM EST | UPDATED WED, NOV 26 2025-12:16 PM EST

HEALTH TECH, ARTIFICIAL INTELLIGENCE PROVIDERS,

Healthcare's Next Workforce Shift: Making AI 'Hireable'

Agentic AI is emerging as "hireable" digital labor in healthcare, according to Nvidia's Kimberly Powell. She argued that once health system leaders stop viewing AI as software and start treating it as a workforce asset, the technology could rapidly reduce burnout and expand access to care.

By Katie Adams on January 04, 2026 8:31 pm



FINANCIAL TIMES

IS COMPANIES TECH MARKETS CLIMATE OPINION LEX WORK & CAREERS LIFE & ARTS HTSI

Opinion **Artificial intelligence**

At work, a quiet AI revolution is under way

Bad News

“~95% of our code is written using Windsurf’s agent Cascade and the passive coding feature, Windsurf Tab.”

- Windsurf team

Anthropic's CEO says that in 3 to 6 months, AI will be writing 90% of the code software developers were in charge of

Google chief scientist predicts AI could perform at the level of a junior coder in a year

MAJOR	UNEMPLOYMENT RATE	UNDEREMPLOYMENT RATE	MEDIAN WAGE EARLY CAREER	MEDIAN WAGE MID-CAREER	SHARE WITH GRADUATE DEGREE
ACCOUNTING	1.9%	17.9%	\$60,000	\$88,000	32.9%
ADVERTISING AND PUBLIC RELATIONS	3.5%	34.1%	\$56,000	\$89,000	20.7%
AEROSPACE ENGINEERING	1.4%	18.8%	\$76,000	\$125,000	51.5%
AGRICULTURE	1.2%	42.4%	\$50,000	\$75,000	19.9%
ANIMAL AND PLANT SCIENCES	1.0%	53.2%	\$43,000	\$70,000	35.6%
ANTHROPOLOGY	9.4%	55.9%	\$42,000	\$70,000	46.7%
ARCHITECTURE	4.3%	30.8%	\$52,000	\$80,000	40.8%
ART HISTORY	3.0%	46.9%	\$45,000	\$71,000	47.9%
BIOCHEMISTRY	3.3%	44.4%	\$52,000	\$89,000	70.8%
BIOLOGY	3.0%	45.6%	\$47,000	\$80,000	63.4%
BUSINESS ANALYTICS	2.4%	27.2%	\$70,000	\$100,000	25.6%
BUSINESS MANAGEMENT	4.0%	51.3%	\$55,000	\$80,000	25.3%
CHEMICAL ENGINEERING	2.0%	16.5%	\$80,000	\$120,000	47.8%
CHEMISTRY	6.1%	40.6%	\$55,000	\$90,000	65.5%
CIVIL ENGINEERING	1.0%	20.2%	\$71,000	\$100,000	39.9%
COMMERCIAL ART & GRAPHIC DESIGN	7.2%	34.7%	\$48,000	\$75,000	11.3%
COMMUNICATIONS	4.5%	52.3%	\$52,000	\$85,000	23.5%
COMPUTER ENGINEERING	7.5%	17.0%	\$80,000	\$122,000	40.0%
COMPUTER SCIENCE	6.1%	16.5%	\$80,000	\$115,000	32.8%

Good News

- Software developers have the potential to be more productive than they have ever been
- You won't be replaced by AI. You'll be replaced by a competent engineer who knows how to use AI

AI-generated code contains more bugs and errors than human output

News By [Craig Hale](#) published December 18, 2025

AI-generated code produces 1.7x more issues than human code

One in five security breaches now thought to be caused by AI-written code

News By [Craig Hale](#) published October 23, 2025

AI code is still filled with vulnerabilities, experts warn

AI-authored code contains worse bugs than software crafted by humans

CodeRabbit review of pull requests shows meatbags beat clankers

[Thomas Claburn](#)

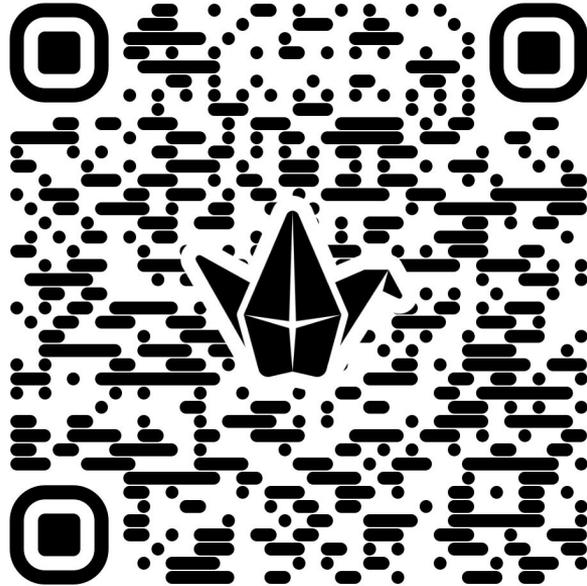
Wed 17 Dec 2025 / 16:00 UTC

 JANUARY 2, 2026

A new worst coder has entered the chat: vibe coding without code knowledge

In the age of AI, being able to make applications and create code has never been easier. But is it any good? Here's what vibe coding is like for someone without technical skills.

What do you think this course would be about?



16 weeks in 1 slide

- Focus on the skills that are not yet replaced by AI systems
 - Think like how would you instruct a team of software developers under you and build agents to perform those duties
- **LLMs are only as good as you are**
 - Good context leads to good code
 - If you can't understand your codebase, neither will an LLM
- Read and review a lot of code
 - Learn to discern good from bad, wrong software
- Experiment aggressively
 - There are no established “definite” AI agents patterns yet
- Everyone is still figuring it out
 - This class will introduce some workflows and tools
 - You need to figure out what works for you

Course Prerequisites

- Either CS 4090 or CS 3100
- This is a mandatory requirement

Those who has not taken CS 4090/CS 3100 but registered in this course for some reason and I DID NOT permit, please deregister.

Course Logistics

- Everything will be in canvas
- Deliverables
 - Up to week 8/9
 - In-class activities
 - Reading
 - 7-8 weeks: paper reading on relevant topics
 - Week 8/9 onwards
 - Paper presentation (10%) (individual presentation)
 - Select 2-3 relevant papers
 - Open-ended Project (50%)
 - Last half of the semester would completely focus on project
 - On the final 1-2 weeks, presentation in class
 - **NO FINAL EXAM, NO MID TERM**

Course Logistics

- Core Topics:
 - Prompt Engineering
 - MCP (Model Context Protocol)
 - Agentic AI
- Applied Topics:
 - AI-Assisted Code generation, Debugging, Code Review, Documentation, Code Refactoring, Test Generation, RAG-Assisted Prompting/Agent for SE, etc
- Selected Topics
 - AI Ethics, Responsible AI Usage, Human-AI Collaboration

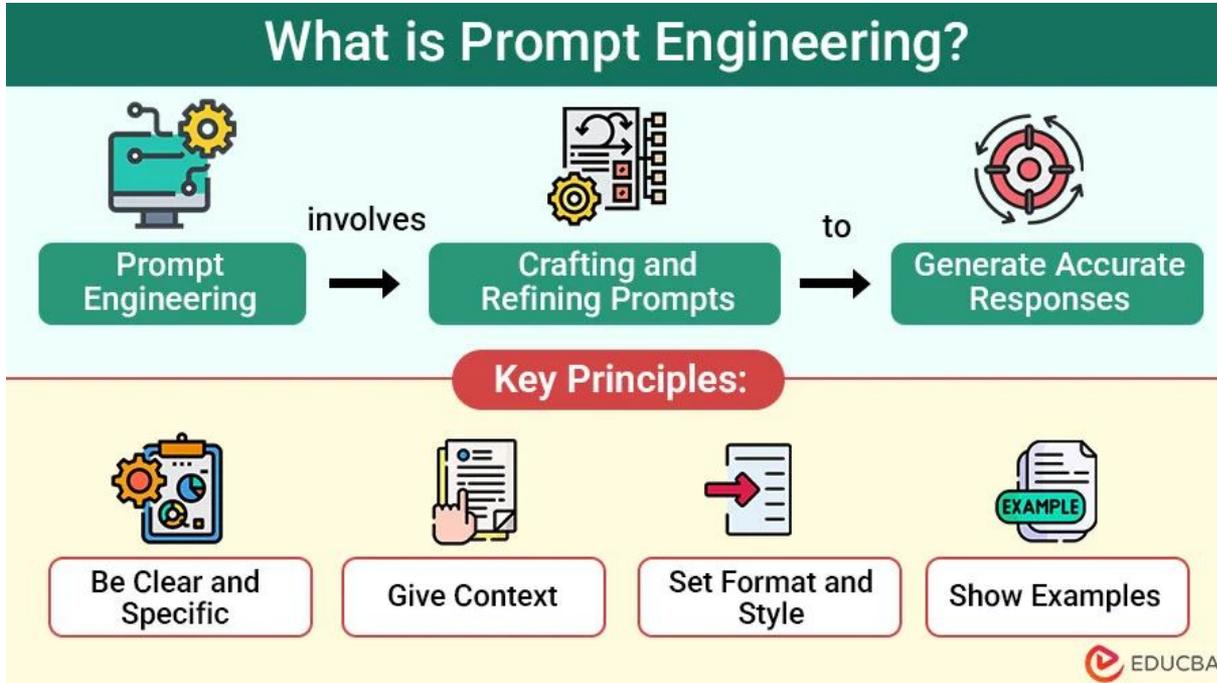
Course Logistics

- First 8/9 weeks:
 - Tuesday: Lecture
 - Thursday: Hands on activities
 - Peer evaluation
- Week 9/10 onwards:
 - Paper presentation
 - Project updates
 - Some advanced topics

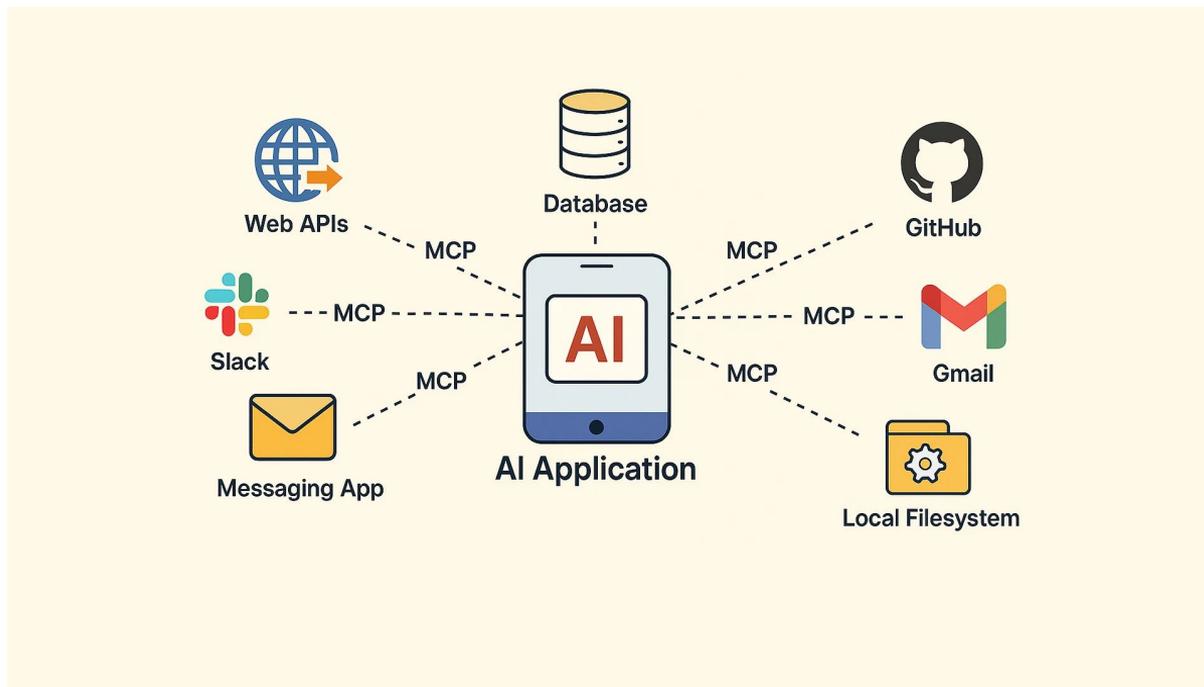
Grading

- Project - 50%
 - You should start the projects early (around at 4th/5th week of the semester)
- Readings/In-class activities: 50%
 - In-class activities
 - Weekly paper review
 - Paper presentation

Prompt Engineering

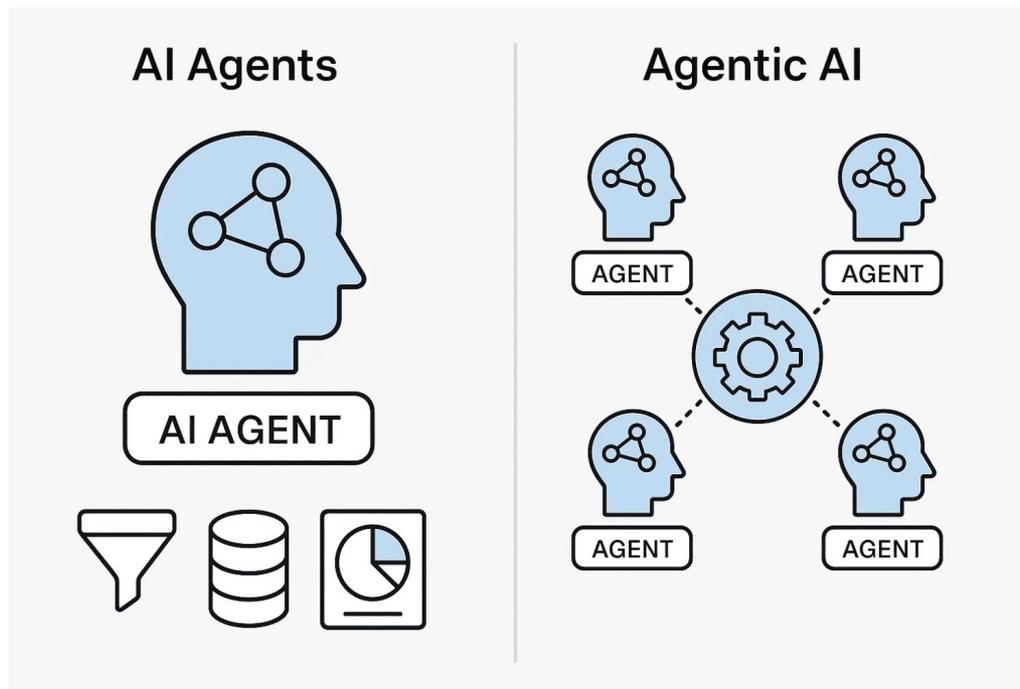


MCP (Model Context Protocol)



Agentic AI

What is the difference between **AI agent/generative AI** vs **Agentic AI**?



Course Logistics: Tools

- You would be expected to learn various tools by yourself!
- **IDE:** Antigravity, Cursor, Copilot, VS Code plugins, etc (or any IDE of your choice)
- **Terminals:** Warp, Wave terminal, Aider (or you can customize your own terminal!)
- **Relevant AI agents:** you can use any relevant AI agents in your projects/in-class activities
- **Libraries/Frameworks:** Ollama, LangChain, LangSmith, etc

Course Logistics: Project

- 2 person/single team
- You would be expected to build AI Agents and integrate them in your projects
 - You would be expected to use the concepts you learned in this course (Prompting, MCP, Agentic AI, etc)
- Evaluation: the main focus would be how you apply the concepts covered in the classes in your projects, rather than the project itself

Text Books

Not Necessary! In case interested -

- **"Agentic Design Patterns: A Hands-On Guide to Building Intelligent Systems" by Antonio Gullí**
 - **PDF updated in Canvas**
- You would be expected to learn various topics/running AI agents by self-study

Communicate: Email Title Start with [CS 5001]

- Clear subject lines drive attention and relevance
- Include course code [CS 5001] at the start of the title
 - Emails will be ignored otherwise.
- Avoid vague phrases such as 'Important' or 'Question'
- Example: [CS 5001] Assignment 2 Submission Deadline Clarification
- Emails generally will be replied by next working day