



Introduction to Responsible AI Use

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Comp 1310

AI in Computer Science Journey

Artificial Intelligence: Learn, Understand, and Use Responsibly

AI is changing how we learn, communicate, create content, develop computer systems, and solve problems.

As Computer Science students, you will encounter AI throughout your studies and future careers.

LEARN | **UNDERSTAND** | **VERIFY** | **TAKE RESPONSIBILITY**

Use AI to support your learning — not to replace it.

What Is Artificial Intelligence?

- AI systems can recognize images and speech, process language, identify patterns (أنماط), make predictions (تنبؤات), provide recommendations (توصيات), and support decision-making (اتخاذ القرار).

- AI refers to computer systems designed to perform tasks that normally require aspects of human intelligence.

YouTube, Netflix & Online Shopping

Recommendation systems (أنظمة التوصية): suggest videos, movies, or products based on interests and previous activity.

Google Maps

Predicts traffic and suggests suitable routes.

Face Recognition (التعرف على الوجوه)

Recognizes or verifies a person's face.

Email

Detects spam (البريد المزعج) and suspicious messages.

Voice Assistants (المساعدات الصوتية)

Recognize speech and respond to spoken requests.

Games (الألعاب)

Control intelligent characters, adapt difficulty, and respond to player behavior.

Think about it: How many AI systems have you already interacted with today?

What Is Generative AI?

Generative AI (GenAI) — الذكاء الاصطناعي التوليدي

- Generative AI is a type of AI that can generate new content based on patterns learned from large amounts of data.
- It can generate text, images, audio, video, and computer code.

Traditional AI

Classifies • Predicts • Detects • Recommends

Generative AI

Generates • Creates • Produces new content

Traditional AI: **“Is this email spam or not spam?”**

Generative AI: **“Write a polite email asking my instructor for an appointment.”**

Generative AI is part of AI — AI and Generative AI are not synonyms.

How Does AI “Learn”?

Machine Learning (التعلّم الآلي): learning useful patterns from data

When we say AI “learns,” we do not mean that it learns like a human. It adjusts a model using examples so it becomes better at a task.

1 DATA بيانات

Many labeled examples

→

2 TRAINING التدريب

Compare predictions with correct examples

→

3 PATTERNS الانماط

Adjust internal parameters to reduce errors

→

4 MODEL النموذج

A learned mathematical representation

→

5 PREDICTION التنبؤ

Apply the model to new data

Training vs Using the Model (Inference)

Training: Training Data → Learning Algorithm → Trained Model. It require large datasets, repeated calculations, and computing resources
Inference: New Input → Trained Model → Prediction / Output.

Example — Spam Detection

Training examples: Email A → Spam • Email B → Not Spam • … many examples. During training, the system adjusts the model so its predictions better match the examples.
Later, given new email → it estimates whether this new email spam.

AI learning = using data and feedback to adjust a model so it performs a task better.

How Can Generative AI Create Different Types of Content?

Same general idea: learn patterns → generate new content • Different data types → different generation methods

Generative AI is not limited to predicting words. The model learns patterns in the type of data it was trained on, then generates a new representation appropriate to that content.

TEXT النص

Language patterns → tokens

IMAGES الصور

Visual patterns → often iterative denoising

AUDIO الصوت

Speech / sound patterns → audio representations

VIDEO الفيديو

Visual + motion + time → video representations

3D نماذج ثلاثية الأبعاد

Shape + depth + space → geometry / 3D representations

Example: Image Generation

Many image models start from noise (ضوضاء) and repeatedly refine it using learned visual patterns and the text prompt.

Example: Video / 3D

Video must model change over time. 3D generation must model geometry, depth, texture, and spatial relationships.

Generative AI = learned patterns + a generation process suited to the type of content.

How Does Generative AI Generate Text?

Large Language Model (LLM) — نموذج لغوي كبير• Next-token prediction — التنبؤ بالوحدة النصية التالية

During training, a language model learns statistical patterns (أنماط إحصائية) in very large amounts of text: which tokens tend to occur together and in what contexts.

A Simplified Prediction

Prompt: “The capital of France is …”

Possible next token:
Paris 96% Lyon 2%
France 1% Other 1%

The percentages are illustrative, not actual model values.

Generation Happens Step by Step

“AI can help students …”
→ learn
→ learn new
→ learn new concepts
→ learn new concepts by …

Each new token becomes part of the context for predicting the next one.

Prompt → predict next token → add it → predict again → … → generated response

Prediction can produce useful, intelligent-looking text — but prediction does not guarantee truth.

How Does Generative AI Work? A Simple View

A conceptual view

PROMPT التعليمات /الأمر

Your question or instruction

→

AI MODEL نموذج الذكاء الاصطناعي

Uses learned patterns

→

GENERATED RESPONSE الاستجابة المُولَّدة

Produces a likely response

Remember

- Training data (بيانات التدريب): large collections of data used to learn patterns.
- A prompt (الأمر/ التعليمات) guides what the model generates.
- The response may be useful, but it is not guaranteed to be true, complete, or appropriate.

Generate ≠ Know ≠ Verify

From AI Assistants to AI Agents

Some AI systems can do more than generate an answer — they can take actions to complete a task.

Simple Definition

An AI agent is an AI system that can decide what steps to take and use tools to work toward a goal.

1 Traditional AI / ML

Makes predictions or classifications.

Example: "Is this email spam?" → Spam

2 Generative AI

Creates new content such as text, images, audio or code.

Example: "Write a reply to this email." → Generates a reply

AI can predict → Generative AI can create → AI Agents can act

3 AI Agent

Works through multiple steps and can use tools to achieve a goal.

*Example: **"Organize a meeting with my team."***

The agent might:

Check calendars → Find available times → Suggest a time → Create the meeting → Send invitations

Simple Agent Idea

GOAL → Decide what to do → Use a tool → Check result → Next action → TASK COMPLETED

Tools: Web • Email • Calendar • Files • Code

MORE CAPABILITY → MORE RESPONSIBILITY

If AI can take actions—not just give answers—we must be more careful about permissions, privacy, verification, and human approval.

One Big Picture

- DATA → TRAINING → LEARN PATTERNS / ADJUST PARAMETERS → MODEL.
- Predictive/Traditional AI: New Input → Model → Prediction / Classification / Recommendation.
- Generative AI: Prompt/Input → Model → New Content.
- Generated content may be Text | Image | Audio | Video | 3D.

Data builds the model; the trained model is then used for prediction or generation

Final Mental Model

ideas should leave with

1. AI — systems performing tasks requiring aspects of intelligence.
2. Machine Learning — systems learn useful patterns from data rather than relying only on explicitly programmed rules.
3. Training — repeatedly adjust model parameters to improve performance.
4. Model — the learned mathematical structure resulting from training.
5. Inference — use the trained model on new input.
6. Generative AI — use learned patterns to create new content.
Content-specific examples: Text → tokens; Images → visual generation/diffusion; Audio → sound generation; Video → visual + temporal generation; 3D → spatial/geometric generation.
7. An AI agent is an AI system that can decide what steps to take and use tools to work toward a goal.

Closing question: If AI learns patterns rather than simply storing answers, what advantages — and what problems — might this create?

AI Can Be Useful — But It Can Also Be Wrong

Hallucination (هلوسة الذكاء الاصطناعي): plausible-looking output that may be inaccurate or invented

Possible Problems

- Incorrect or outdated information
- Made-up facts or nonexistent references
- Biased (متحيز) or incomplete responses
- Misleading explanations that sound convincing

Example

Example: Ask AI for three academic references. It may produce professional-looking citations, but one or more may not actually exist.

A confident answer is not necessarily a correct answer.

Ask → Understand → Verify (تحقّق)

AI Across Computer Science

AI is becoming a tool across many Computer Science areas

Software Development

Assisting developers in designing and building software.

Data Science (علم البيانات)

Finding patterns and insights in data.

Cybersecurity (الأمن السيبراني)

Detecting suspicious activities and potential threats.

Web & Mobile

Chatbots, recommendations, search, and intelligent services.

HCI — Human–Computer Interaction

More natural and adaptive interaction with technology.

Games, VR & AR

Intelligent characters, adaptive environments, and content generation.

Computer Vision (الرؤية الحاسوبية) & Robotics

Helping computers understand images, objects, and the physical environment.

AI is not only a subject you may study — it is becoming a tool across Computer Science.

AI as Learning Assistant

Use AI to strengthen understanding, practice, and independent thinking

AI can help you…

- Explain a difficult concept in simpler language.
- Give additional examples or compare two concepts.
- Explain an idea step by step.
- Create practice questions or a short quiz.
- Ask questions to test your understanding.
- Give hints that help you reach the answer yourself.
- Suggest topics you need to review.

Example Learning Prompt

Example prompt:

“Explain the difference between RAM and storage to a first-year Computer Science student. Give me a simple real-life analogy, then ask me two questions to check my understanding.”

Use AI as a learning assistant — not an answer machine.

Learn With AI — Don’t Let AI Learn for You

Understanding vs. simply getting the answer

✓ Use AI to

- Understand
- Explore
- Practice
- Ask questions
- Get explanations
- Receive hints
- Test yourself

✗ Don’t use AI simply to

- Get ready-made answers
- Complete your work for you
- Submit AI-generated work as your own
- Avoid thinking or learning

After using AI, can you explain the idea yourself without AI?

Ask AI to Help You Think

Prompt (الأمر/ التعليمات) for learning, not just for answers

Instead of: "Give me the answer."	**Better learning prompt** Try: "Don't give me the answer. Explain what I need to understand, then ask me questions that help me reach it myself."
Instead of: "Solve this for me."	**Better learning prompt** Try: "Give me one hint at a time. Let me try before giving another hint."
Instead of: "Write my answer."	**Better learning prompt** Try: "Here is my explanation. Tell me what I misunderstood, but don't rewrite the answer for me."
For practice	**Better learning prompt** "Create five practice questions about this topic. Don't show the answers until I try."

Good AI use should increase your thinking — not remove it.

First Rule: Follow Your Course Policy

Course Policy (سياسة المساق) comes before AI use

There is NO general permission to use AI in all courses.

Always check first

- Each instructor (مدرّس) and course may define different AI-use rules.
- Rules may differ between assignments, projects, quizzes, exams, and other assessed activities.
- AI may be allowed, allowed with restrictions, require disclosure, or be prohibited.
- Always check the instructor's instructions BEFORE using AI for assessed work.

This lecture introduces responsible AI use. It does NOT give permission to use AI in other courses or assessments.

Disclosure & Academic Integrity

Disclosure (الإفصاح) • Academic Integrity (النزاهة الأكاديمية)

Disclosure

- When AI use is permitted, follow the instructor's disclosure requirements.
- Disclosure may include the AI tool used, how it was used, and which parts of the work it supported.
- Never assume that disclosure alone makes an AI use acceptable.

Example

Example disclosure: "I used ChatGPT to help me understand the difference between RAM and storage and to generate practice questions. I wrote the submitted answer myself."

Permission first → Disclosure follows. Disclosure does NOT make prohibited AI use acceptable.

Responsible & Ethical AI Use

Responsible AI Use — الاستخدام المسؤول للذكاء الاصطناعي

Accuracy (الدقة)

AI can make mistakes. Verify important information.

Privacy (الخصوصية)

Do not enter passwords, personal information, private student data, confidential university information, or sensitive documents.

Bias & Fairness (التحيز والعدالة)

AI may reproduce biases. Question assumptions and consider different perspectives.

Intellectual Property (الملكية الفكرية)

Respect authorship, copyright, sources, and course/ institutional requirements.

Transparency (الشفافية)

When disclosure is required, be clear about how AI contributed.

Responsibility (المسؤولية)

You are responsible for the work you submit — not the AI tool.

Responsible use means more than getting a useful answer.

You Decide: Is This Acceptable?

Discuss: ✓ Acceptable • ✗ Not acceptable • ? Depends on the policy

A — Learning

A student does not understand a concept and asks AI to explain it in simpler words and give another example.

B — Getting the Answer

An instructor asks students to answer a question individually. A student asks AI for the complete answer, copies it, and submits it.

C — Permitted Use + Disclosure

The instructor allows AI and requires disclosure. The student uses AI to understand concepts, writes independently, verifies information, and discloses the use.

D — Disclosure but Prohibited Use

The instructor explicitly prohibits AI. A student uses AI to complete the assignment but discloses that AI was used.

Does disclosure make every AI use acceptable? No — permission and course policy come first.

Your Responsible AI Checklist

A simple sequence to remember throughout your studies

1	**CHECK**	Is AI allowed for this course and this specific task?
2	**LEARN**	Use AI to understand and learn — not simply to obtain answers.
3	**THINK**	Do not let AI replace your own thinking.
4	**DISCLOSE**	When AI use is permitted, follow the instructor's disclosure requirements.
5	**VERIFY**	Check important information. AI can be wrong.
6	**PROTECT**	Do not share private, confidential, or sensitive information.
7	**TAKE RESPONSIBILITY**	You are responsible for the work you submit.

Your goal is not only to get the answer. Your goal is to learn how to reach it.

Learning Programming with AI: Learn First, Accelerate Later

AI is a powerful learning assistant — but it should not replace the mental work required to become a programmer.

Use AI to strengthen learning

Explain difficult concepts using different examples.

Explain compiler/runtime errors and possible causes.

Ask for hints before asking for a complete solution.

Trace code step-by-step and explain program state.

Write your solution first; then request review or improvement.

Compare algorithms, implementations and trade-offs.

Generate extra exercises, edge cases and test cases.

The dependency risk

If AI repeatedly writes the complete solution, the student practices less.

1. Less practice weakens decomposition, coding, debugging and problem-solving.
2. Weaker foundations make AI-generated code harder to evaluate.
3. The student may complete assignments without developing the competence they were designed to build.

Knowing how to prompt AI to generate a program ≠ knowing how to program.

Before accepting AI code, ask

Can I explain how it works?

Why was this solution chosen?

Can I modify it when requirements change?

Can I find and debug an error?

Can I test it properly?

Could I solve a similar problem myself?

Use AI to help you understand how to solve the problem — not simply to avoid solving the problem.

Use AI to accelerate learning — not to skip learning. Become a programmer who can use AI, not an AI user who depends on it to program.

Professional AI-Assisted Programming: You Own the Code

AI can greatly increase productivity, but generated code remains the programmer's responsibility.

AI can accelerate

- Code generation & boilerplate
- Refactoring and documentation
- Debugging assistance
- Unit-test generation
- API/library exploration
- Alternative implementations
- Repetitive development work

But generated code may be

- Syntactically correct but logically wrong
- Wrong on edge cases
- Insecure or inefficient
- Based on obsolete/inappropriate APIs
- Incompatible with project architecture
- Difficult to maintain
- Different from the real requirements

To use AI-generated code effectively, you need sufficient knowledge of:

Foundations become MORE important

- Programming language knowledge
- Algorithms & data structures
- Software design / architecture
- Testing and debugging
- Security and performance reasoning
- Enough knowledge to judge the output you accept

Human understands & designs → AI assists → Human reviews → Test & verify → Debug / modify → Integrate → Human takes responsibility

- **AI can generate code, but it but YOU own the software (responsible).**
- **Do not accept code you cannot understand, explain, test, debug, modify and maintain.**
- **Learn programming first and use AI to amplify your competence—not to substitute for it**

Academic Learning vs Professional AI-Assisted Development

The same tool can have very different value depending on the user's knowledge, purpose, and responsibility.

During learning

Use AI to explain concepts and error messages

Ask for hints before full solutions

Compare your solution with alternatives

Ask AI to generate tests for code you wrote

Explain generated code before accepting it

Follow the course policy for assessed work

In professional work

Define requirements and architecture

Use AI selectively to accelerate implementation

Review generated code as untrusted code

Test security, correctness and performance

Integrate with project conventions and dependencies

Maintain ownership of the final software

What becomes MORE important

Problem decomposition

Algorithms & data structures

Software architecture

Testing & debugging

Security & performance reasoning

Code review and domain knowledge

Integration

……

AI Use in COMP1310

AI can support your learning — but it must not replace your learning.

✓ Allowed

Explain concepts

Generate practice questions

Simplify difficult texts or explanations

Review grammar and language

Get feedback on ideas

⚠ AI Disclosure Rule

If AI is used in any submitted work, you must clearly disclose it.

State:

- Which AI tool you used
- How you used it
- Which parts were supported by AI

Example: “I used ChatGPT to clarify loops and review the grammar of my explanation. The final solution and code are my own.”

✕ Not Allowed

Using AI in work where is mentioned it is not allowed completely

Submit fully AI-generated answers as your own

Using AI-generated code or reports without understanding them or ability to modify them

Use AI in quizzes/exams

Use AI in submitted work without disclosure

Claim AI-generated work as entirely your own

You are responsible for understanding and being able to explain everything you submit.

Optional Extension Slides

We can Use these when additional class time is available.

Hallucination • Prompt Engineering • Verification • Privacy • Bias • AI as a Study Tutor

Protect Your Data When Using AI

Before you upload anything to an AI tool, think: Should I really share this?

✕ Never Upload

- Your password or login details
- Your classmates' personal information
- Student records or grades
- Exam or quiz materials or any information that you don't have permission to share
- Confidential university documents

⚠ Before You Share

Ask yourself:

- Is this information private?
- Does it identify me or someone else?
- Am I allowed to share it?
- Is all of this information really needed?

When in doubt, don't upload it.

✓ Protect Yourself

- Remove names and identifying details
- Share only what is necessary
- Follow university privacy rules
- Check your file before uploading it

Remember: You are responsible for what you share.

Once you share data with an AI tool, you may lose control over how it is processed or stored.

AI Hallucination: When AI Sounds Right but Is Wrong

Hallucination (هلوسة الذكاء الاصطناعي) = generated information that may be false, invented, or unsupported

What can hallucination look like?

- A fact that is simply wrong
- A book, article, or website that does not exist
- A quotation attributed to the wrong person
- A confident explanation built on a false assumption
- Details added when the model does not actually know

Why is it dangerous?

The response may be fluent, detailed, and confident — so the error can be difficult to notice.

Generative AI is designed to generate plausible responses, not to guarantee truth.

Fluent ≠ Factual. Confident ≠ Correct.

Hallucination: A Classroom Example

Learn to verify before trusting or submitting AI-generated information

Student asks AI

“Give me three academic references about the effect of virtual reality on student learning.”

AI returns three realistic-looking references with authors, titles, journals, years, and page numbers.

What should the student do?

1. Search for each reference in a reliable academic source.
2. Check that the title, authors, year, and publication really exist.
3. Read the source before using or citing it.
4. Do not cite a source only because AI generated it.

Discussion: What other AI outputs should you verify?

AI can help you find a direction — verification is still your responsibility.

AI Hallucination

AI can sound confident and convincing — even when the information is false.

1 Ask AI

Example prompt:

“Give me a research paper published in 2025 showing that using ChatGPT improves students’ C programming grades.”

The request sounds simple and academic.

2 AI May Hallucinate

AI may confidently invent:

- A paper that does not exist
- Authors or journal names
- A DOI or publication date
- Statistics and conclusions

The answer may look completely credible.

3 Verify Before Use

Do not trust a source only because AI provides it.

Check:

- Does the paper really exist?
- Is it from a reliable source?
- Does it actually support the claim?

Never cite an unverified AI reference.

A confident AI answer ≠ a correct answer. Verify important facts, citations, and sources.

Prompt Engineering

Prompt Engineering (هندسة الأوامر): designing clear instructions that help AI produce a more useful response

1. Give Context

Who are you?
What are you learning?
What level should the explanation use?

Example:
“I am a first-year Computer Science student…”

2. State the Task

Be clear about what you want AI to do.

Example:
“Explain the concept using a simple analogy…”

3. Add Constraints

Tell AI what NOT to do and how to respond.

Example:
“Do not give me the final answer. Ask me two questions afterward.”

A good learning prompt guides AI toward teaching — not doing the work for you.

From a Weak Prompt to a Learning Prompt

Better prompts can improve both the response and the learning process

Weak Prompt

“Explain RAM.”

Problems:
- No student level
- No context
- No preferred explanation style
- No check for understanding

Learning Prompt

“I am a first-year Computer Science student. Explain RAM in simple language. Compare it with storage using a real-life analogy. Give one example, then ask me two questions to check my understanding. Do not answer the questions until I try.”

Context + Clear Task + Constraints + Learning Check

A Simple Prompt Formula for Students

A reusable structure — not a magic formula

1	**ROLE / CONTEXT**	“I am a first-year CS student…”
2	**GOAL**	“Help me understand…”
3	**DETAILS**	“Use simple language and an analogy…”
4	**BOUNDARY**	“Do not give me the final answer…”
5	**CHECK**	“Ask me questions to test my understanding.”

Prompt engineering improves communication with AI — it does not remove the need to verify.

How to Verify AI Output

Verification (التحقق) depends on what kind of information AI gives you

Facts

Check reliable textbooks, course material, or trustworthy sources.

References

Search for the original publication; confirm authors, title, year, and source.

Calculations

Redo the calculation or use an independent method/tool.

Explanations

Compare with lecture material and ask whether the reasoning is consistent.

Current Information

Check a current authoritative source — AI knowledge may be incomplete or outdated.

Your Own Work

Make sure you understand and can explain what you submit.

The more important the claim, the more important the verification.

Think Before You Paste

Privacy (الخصوصية) and Confidential Information (المعلومات السرية)

Do NOT casually paste

- Passwords or login information
- Student records or grades
- Personal IDs or private information
- Confidential university documents
- Private messages or emails
- Sensitive research or company data

Ask yourself first

- Do I have permission to share this information?
- Does the AI tool need the real data?
- Can I remove names and identifying details?
- Is there a university or course rule about this data?

If the information should remain private, do not assume it is safe to paste into an AI tool.

AI Bias and Fairness

Bias (التحيز): AI output can reflect limitations or biases in data, design, or context

Possible signs of bias

- Stereotypes about groups or professions
- One-sided assumptions
- Different quality of responses across languages or contexts
- Recommendations that ignore important perspectives

What can a student do?

- Ask what assumptions the answer makes
- Compare more than one source or perspective
- Check whether important groups or contexts are missing
- Avoid treating AI output as neutral by default

AI output should be questioned, not automatically treated as neutral or complete.

Optional Activity: Turn AI into a Study Tutor

A 5-minute practice activity for students

Step 1 — Choose

Choose one concept from today's course that you find difficult.

Step 2 — Prompt

Ask AI to explain it simply, give an analogy, and NOT give ready-made assignment answers.

Step 3 — Test

Ask AI to quiz you. Answer without help, then ask for feedback on your understanding.

The success measure is not the AI response — it is what YOU can explain afterward.