METACOG IN THE LLM ERA

Thinking Skills, Self-Regulation, and Cognitive Offloading

A practice-based 8-week seminar for college learners

8 WEEKS Intensive | **3 CREDITS** Seminar / Studio | **FOR** Upper-division Undergrad / Grad | **MODALITY** Discussion • Labs Reflection • Practice

COURSE DESCRIPTION

This course teaches you how to think well with—not instead of—large language models (LLMs). You'll build metacognitive skills to plan, monitor, evaluate, and adjust your thinking in an environment where cognitive offloading is easy and constant.

Each week, we explore the central question:

What thinking should remain internal, what can be safely offloaded, and what must be verified, reconstructed, or owned by the learner?

Grounded in research on metacognition, adult learning, learning science, cognitive offloading, and AI literacy, you'll practice using LLMs as tutors, coaches, critics, and tools—while protecting your judgment, memory, and agency.

THE COGNITIVE RESPONSIBILITY STACK

Use this stack every week to decide what belongs to you, what to offload, and what to verify.

1. **INTERNALIZE** — What must I be able to recall, explain, or do without AI?
2. **EXTERNALIZE** — What should I put into notes, diagrams, checklists, or maps?
3. **OFFLOAD** — What can a tool help me do faster or more broadly?
4. **VERIFY** — What must I check against evidence, sources, or my own reasoning?
5. **RECONSTRUCT** — Can I reproduce the reasoning after the tool is gone?
6. **OWN** — What is my judgment, decision, or commitment?

LEARNING OUTCOMES

By the end of this course, you will be able to:

- Use metacognitive strategies to plan, monitor, and evaluate your learning.
- Distinguish productive cognitive offloading from premature substitution of thinking.
- Use LLMs as metacognitive supports, not as unexamined answer engines.
- Build durable learning with retrieval, spacing, feedback, and desirable difficulty.
- Calibrate confidence by comparing prediction, performance, evidence, and feedback.
- Verify AI-generated outputs using source checking, reconstruction, and independent reasoning.
- Reflect on assumptions, emotions, and identity that shape your learning and AI use.
- Create a personal Metacog Operating Manual for the LLM Era.

THIS IS AN UNGRADING COURSE

Instead of grades, we use ungrading: a collaborative process of growth, feedback, and self-assessment.

- You set your learning goals.
- You collect evidence of your learning.
- You reflect, revise, and show growth.
- You receive narrative feedback from peers and instructor.
- You decide when you've met your goals.

Success = meaningful learning + metacognitive growth that transfers to your life and work.

OUR AI USE NORMS

ALLOWED & ENCOURAGED

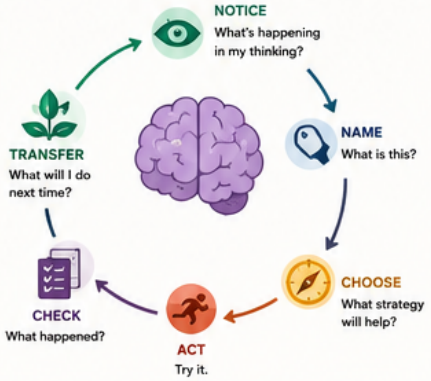
- Ask for practice questions
- Ask for counterarguments
- Ask for feedback on drafts
- Quiz me, don't answer for me
- Compare multiple explanations
- Generate examples, analogies, or cases
- Request verification checklists
- Simulate a peer coach or critic

RESTRICTED

- Submitting AI-written work as your own
- Letting AI produce final claims you can't defend
- Using AI to avoid thinking, struggle, or retrieval
- Citing AI output as if it were a source
- Using AI without disclosure

Every AI-supported assignment includes a brief disclosure: what was used, what wasn't, how it was verified, and what is your final judgment.

THE METACOG LOOP



8-WEEK JOURNEY

WEEK 1
Metacog in the Age of Offloading

When I use a tool to think, what happens to my noticing, memory, confidence, and agency?

Lecture 1: The Dashboard and the Copilot

WEEK 2
Adult Agency & Self-Regulated Learning

How do I stay self-directed when tools can plan, explain, and produce on demand?

Lecture 2: From Passenger to Driver

WEEK 3
Learning That Sticks When Answers Are Easy

If AI can retrieve and explain instantly, what still needs to be practiced inside me?

Lecture 3: The Friction That Makes Learning Real

WEEK 4
Calibration: Knowing When You Know

How do I avoid mistaking AI-assisted performance for my own understanding?

Lecture 4: Confidence Is Not Evidence

WEEK 5
Strategy Selection, Scaffolding, & Peer/AI Coaching

How do I choose the right thinking move instead of outsourcing the whole problem?

Lecture 5: Make the Thinking Visible

WEEK 6
Critical Reflection: The Stories Behind Our Offloading

What assumptions make me reach for AI too early, too late, or in the wrong way?

Lecture 6: The Stories We Learn Inside

WEEK 7
Human-AI Thinking Protocols

How can I use LLMs to strengthen thinking rather than replace it?

Lecture 7: AI as Mirror, Coach, and Risk

WEEK 8
Transfer & the Metacog Operating Manual

How will I keep my judgment, memory, and agency alive after this course?

Lecture 8: Your Operating Manual for an AI-Mediated Mind

WEEKLY PRACTICES

- Metacog Journal (notice → name → choose → act → check → transfer)
- Retrieval & Calibration Labs
- AI Offloading Audits
- Peer Coaching & Feedback
- Strategy Experiments
- Critical Reflection

We learn to think.
We think to live well.
Tools change.
Our responsibility remains.

KEY SOURCES (CLASSIC + CURRENT)

- Flavell, J. H. (1979). Metacognition and cognitive monitoring.
- Nelson, T. O., & Narens, L. (1990). Metamemory: A theoretical framework.
- Zimmerman, B. J. (2002). Becoming a self-regulated learner.
- Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness.
- Education Endowment Foundation (2021). Metacognition and self-regulated learning.
- Knowles, M. (1978). Andragogy: Adult learning theory in perspective.
- Mezirow, J. (2000). Transformative learning: Theory to practice.
- Dunlosky, J., et al. (2013). Improving students' learning with effective learning techniques.
- Roediger, H. L., & Karpicke, J. D. (2006). Test-enhanced learning.
- Risko, E. F., & Gilbert, S. J. (2016). Cognitive offloading.
- Sparrow, B., Liu, J. Y., & Wegner, D. M. (2011). Google effects on memory.
- UNESCO (2024). AI Competency Framework for Students.
- UNESCO (2023). Guidance for generative AI in education and research.
- EDUCAUSE (2024). AI literacy in teaching and learning.
- Stanford HAI (2026). AI Index Report 2026.
- NIST (2023). AI Risk Management Framework: Generative AI Profile.
- Microsoft Research & CMU (2025). The impact of generative AI on critical thinking.

THINK WITH TOOLS.
DON'T DISAPPEAR FROM YOUR OWN THINKING.

YOUR FINAL CREATION

Metacog Operating Manual for the LLM Era

A personalized guide to how you will think, learn, and use AI with wisdom—in school, work, and life.

Curiosity. Humility. Persoility.
These are your superpowers.

Metacog in the LLM Era

Thinking Skills, Self-Regulation, and Cognitive Offloading

Length	Level	Format	Assessment
8 weeks	Upper-division undergraduate or graduate elective	Seminar / studio / lab	Ungrading, portfolio evidence, self-assessment, conferences

Course Description

This course teaches adult learners how to think well in an environment where large language models can summarize, explain, draft, plan, brainstorm, tutor, simulate, and evaluate on demand. The course begins with a core claim: the future learner does not need to think without tools; the future learner needs to think **with tools without disappearing from their own thinking**.

Students practice metacognition, self-regulated learning, critical reflection, calibration, retrieval, feedback use, and transfer. At the same time, they study how cognitive offloading changes what they remember, monitor, verify, reconstruct, and own. Cognitive offloading is treated as a normal human strategy that becomes risky when it is unexamined or used too early.

Central course question: What thinking must I internalize, what can I externalize, what may I offload, what must I verify, what must I reconstruct, and what must I own?

The Cognitive Responsibility Stack

Layer	Guiding Question	Example
1. Internalize	What must I recall, explain, perform, or defend without AI?	Concepts, arguments, reasoning moves, personal reflection
2. Externalize	What should I put into notes, diagrams, checklists, calendars, or maps?	Plans, assumptions, strategy menus, source trails
3. Offload	What can a tool help me do faster, broader, or with more variation?	Examples, quiz items, counterarguments, draft feedback
4. Verify	What must I check against evidence, sources, logic, or standards?	Claims, citations, summaries, calculations, interpretations
5. Reconstruct	Can I reproduce the reasoning after the tool is gone?	Teach-back, closed-tool explanation, oral defense
6. Own	What judgment, decision, interpretation, or commitment is mine?	Final claim, learning plan, ethical stance, operating manual

Learning Outcomes

1. Explain metacognition as monitoring and regulation of thinking, learning, confidence, and strategy use.

2. Apply a self-regulated learning cycle: plan, monitor, evaluate, and revise.

3. Distinguish productive cognitive offloading from premature substitution of thinking.

4. Use LLMs as tutors, mirrors, critics, simulators, quiz partners, and feedback partners without treating them as authorities.

5. Practice retrieval, spacing, feedback, and desirable difficulty to build durable understanding.

6. Calibrate confidence by comparing prediction, performance, evidence, and feedback.

7. Verify AI-generated outputs through source checking, reconstruction, peer critique, and independent reasoning.

8. Reflect critically on the assumptions, identity stories, and emotional triggers that shape learning and AI use.

9. Produce a final Metacog Operating Manual for the LLM Era.

How Students Use the Stack Each Week

Before work
What do I already know? What should I try without AI? What can be safely externalized?

During work
What am I noticing? Am I stuck, fluent, overconfident, or avoiding? What scaffold would help without replacing the task?

After work
What did I verify? What can I reconstruct closed-tool? What judgment or commitment is mine?

Foundational research links: Flavell (1979), Metacognition and Cognitive Monitoring, Schraw & Dennison (1994), Assessing Metacognitive Awareness, Risko & Gilbert (2016), Cognitive Offloading, Education Endowment Foundation, Metacognition and Self-Regulated Learning, Stanford HAI, 2026 AI Index Report

Ungrading Model

This course uses ungrading rather than a conventional points-based system. Ungrading does not mean no standards or automatic success. It means assessment is organized around evidence of learning, feedback, revision, reflection, and student agency rather than point accumulation.

Students build a portfolio of evidence. The instructor gives narrative feedback. Students complete mid-course and final self-assessments. If the institution requires a final grade, it is determined through an evidence-based conference between student and instructor.

Research/practice source: Blum (2020) / Moya review (2021), Ungrading

Evidence Categories

Category	What Counts
Metacognitive awareness	Journals, noticing logs, reflection memos
Strategy use	Retrieval plans, calibration logs, learning experiments
AI-use judgment	Offloading audits, AI disclosures, verification records
Revision and growth	Before/after artifacts, feedback responses, revised protocols
Peer contribution	Coaching notes, feedback to others, discussion preparation
Transfer	Operating manual, future-use plan, final teach-back

Ungrading Conferences

Mid-course conference, Week 4
Students submit current portfolio evidence, a self-assessment, and a revision plan for Weeks 5-8.

Final conference, Week 8
Students submit a final portfolio and self-assessment, then propose an institutional grade if required. The instructor may accept, question, or revise the proposed mark based on evidence.

Institutional Grade Translation, If Required

Final Mark	Evidence Standard
A	Consistent, specific, revised, well-documented evidence of metacognitive growth, responsible AI use, verification, and transfer.
B	Solid completion of core practices with credible reflection and some revision, but less depth, consistency, or transfer.
C	Partial completion of practices with limited reflection, weak evidence, or inconsistent engagement.
D/F	Insufficient evidence, missing portfolio, or inability to explain submitted work.

Standing AI Policy

Encouraged uses
Generate retrieval questions; ask for feedback; request counterarguments; ask the model to quiz rather than answer; ask for one hint at a time; compare explanations; request verification checklists; simulate a coach or skeptical reader.

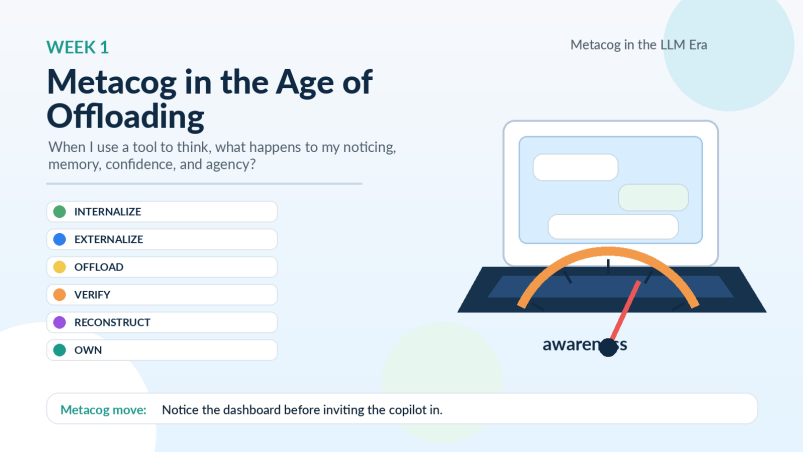
Restricted uses
Submitting AI-generated reflection as personal reflection; submitting AI-written analysis that cannot be reconstructed; letting AI produce final claims that cannot be defended; citing AI output as if it were a source; using AI to avoid first-draft thinking, retrieval, or calibration.

Every AI-supported assignment includes this disclosure: I used AI for... I did not use AI for... I verified the output by... The final judgment that is mine is...

AI literacy sources: UNESCO, AI Competency Framework for Students, UNESCO, Guidance for Generative AI in Education and Research, EDUCAUSE (2024), AI Literacy in Teaching and Learning, NIST, Generative AI Risk Management Profile

Week 1 - Metacog in the Age of Offloading

Guiding question: When I use a tool to think, what happens to my noticing, memory, confidence, and agency?



Brief multimedia lecture: The Dashboard and the Copilot
Runtime: 7-8 minutes

Lecture flow

1. Hook: dashboard beside an AI copilot.
2. Key idea: Metacog means watching your thinking while you think.
3. AI tension: LLM fluency can hide whether you understand.
4. Introduce the Metacog Loop and the Cognitive Responsibility Stack.
5. Micro-prompt: What did the tool do, what did you still do, and what did you fail to check?

Core topics

- Metacognition as monitoring and regulation
- Cognitive offloading
- LLMs as external cognitive partners
- Help vs. substitution

Readings and links

Risko & Gilbert (2016), Cognitive Offloading; Education Endowment Foundation, Metacognition and Self-Regulated Learning; Stanford HAI, 2026 AI Index Report; Flavell (1979), Metacognition and Cognitive Monitoring

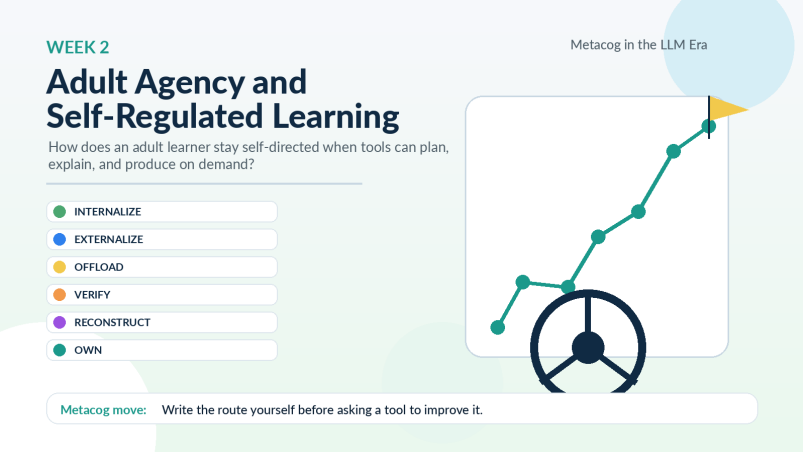
Lab
Offloading Inventory: map current use of phones, notes, search, peers, and LLMs; classify each as memory support, comprehension support, production support, planning support, decision support, or avoidance.

Assignment
Baseline Metacog + AI Use Inventory: describe current learning habits, AI habits, and one real challenge to use throughout the course.

Ungrading evidence
- Baseline memo
- Offloading inventory
- First reflection on what you internalize, externalize, offload, verify, reconstruct, and own

Week 2 - Adult Agency and Self-Regulated Learning

Guiding question: How does an adult learner stay self-directed when tools can plan, explain, and produce on demand?



Brief multimedia lecture: From Passenger to Driver
Runtime: 8 minutes

Lecture flow

1. Hook: a GPS can suggest a route, but it cannot decide where you should go.
2. Adult learning frame: adults bring experience, goals, constraints, and relevance needs.
3. Self-regulated learning cycle: plan, monitor, reflect, revise.
4. AI tension: AI can critique a plan, but should not manage your learning.
5. Prompt: What must I do before I ask an LLM?

Core topics

- Adult learning and agency
- Self-regulated learning
- Goal setting and evidence standards
- AI as coach vs. AI as manager

Readings and links

Zimmerman (2002), Becoming a Self-Regulated Learner; Knowles (1978), Andragogy: Adult Learning Theory in Perspective; FHWA, Knowles Adult Learning Principles; UNESCO, AI Competency Framework for Students

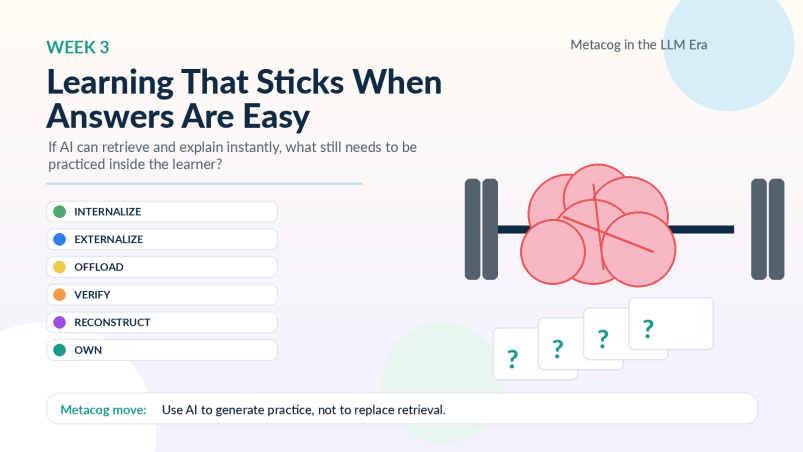
Lab
Learning Contract Studio: draft a learning contract first; only then ask an LLM to critique it and compare its critique with your own priorities.

Assignment
Learning Contract with AI Boundary: define challenge, criteria, practice plan, feedback sources, and a section titled What I must do before I ask an LLM.

Ungrading evidence
- Learning contract
- AI critique comparison
- Revision note explaining what you accepted, rejected, and why

Week 3 - Learning That Sticks When Answers Are Easy

Guiding question: If AI can retrieve and explain instantly, what still needs to be practiced inside the learner?



Brief multimedia lecture: The Friction That Makes Learning Real
Runtime: 8 minutes

Lecture flow

1. Hook: highlighted notes beside a blank recall page.
2. Mini-demo: see 10 terms, hide them, recall from memory, then rate confidence.
3. Key idea: retrieval strengthens memory rather than merely measuring it.
4. AI tension: AI can generate practice, but it cannot retrieve for you.
5. Course rule: AI may generate practice; the learner must perform recall.

Core topics

- Retrieval practice
- Spacing
- Desirable difficulty
- Fluency illusion
- Recognition vs. recall
- AI as quiz generator

Readings and links

Dunlosky et al. (2013), Improving Students Learning With Effective Techniques; Roediger & Karpicke (2006), Test-Enhanced Learning; Cepeda et al. (2006), Distributed Practice in Verbal Recall Tasks; Bjork & Kroll (2015), Desirable Difficulties in Vocabulary Learning; Sparrow, Liu & Wegner (2011), Google Effects on Memory

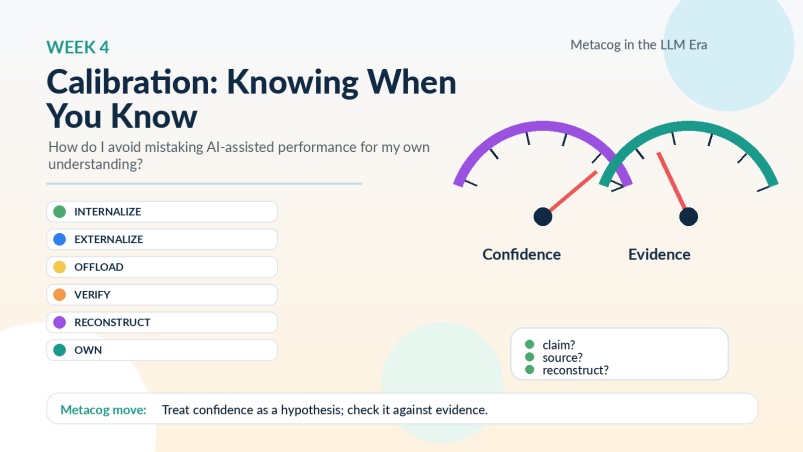
Lab
AI Quiz Lab: ask an LLM to generate retrieval questions, close the tool, answer from memory, then reopen sources to check and revise.

Assignment
Learning Strategy Experiment, Part 1: run a 7-day comparison between your default strategy and a Metacog strategy using retrieval and spacing.

Ungrading evidence
- Retrieval plan
- Practice log
- Evidence of closed-tool recall
- Reflection on what felt fluent but was not durable

Week 4 - Calibration: Knowing When You Know

Guiding question: How do I avoid mistaking AI-assisted performance for my own understanding?



Brief multimedia lecture: Confidence Is Not Evidence
Runtime: 8 minutes

Lecture flow

1. Hook: confidence gauge vs. evidence gauge.
2. Key idea: confidence is a feeling; evidence is a check.
3. AI tension: polished AI language can inflate confidence.
4. Calibration drill: predict performance, perform, check, compare.
5. Prompt: Could I explain this without the tool?

Core topics

- Confidence calibration
- Judgment of learning
- Feeling of knowing
- Verification
- AI-assisted overconfidence

Readings and links

Nelson & Narens (1990), Metamemory; Schraw & Dennison (1994), Assessing Metacognitive Awareness; Hattie & Timperley (2007), The Power of Feedback; Microsoft Research / CMU (CHI 2025), Generative AI and Critical Thinking; NIST, Generative AI Risk Management Profile

Lab
Human vs. AI Calibration Drill: answer a question alone, then with AI, then without AI again; compare confidence and performance across all three stages.

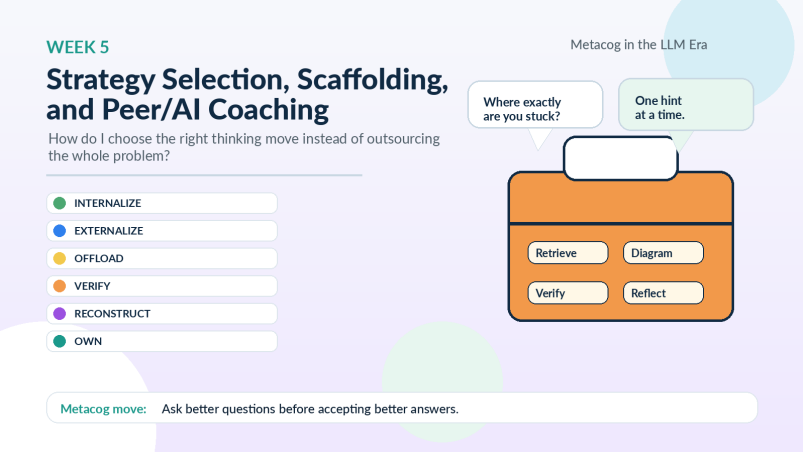
Assignment
Calibration Log: record three moments when you were confident, uncertain, or stuck. At least one entry must involve AI.

Ungrading evidence
- Calibration log
- Mid-course self-assessment
- Evidence of changed strategy after feedback

Mid-course ungrading conference: submit current portfolio evidence, a self-assessment, and a revision plan for Weeks 5-8.

Week 5 - Strategy Selection, Scaffolding, and Peer/AI Coaching

Guiding question: How do I choose the right thinking move instead of outsourcing the whole problem?



Brief multimedia lecture: Make the Thinking Visible
Runtime: 8 minutes

Lecture flow

1. Hook: you cannot imitate thinking you cannot see.
2. Instructor think-aloud: narrate decisions while revising a paragraph or solving a problem.
3. Strategy toolbox: retrieve, diagram, compare, slow down, explain aloud, verify.
4. AI tension: a good LLM prompt scaffolds; a bad one replaces the task.
5. Practice prompt: Do not solve this. Ask diagnostic questions and give one hint at a time.

Core topics

- Strategy repertoires
- Cognitive apprenticeship
- Scaffolding and fading
- Peer coaching
- LLMs as temporary supports

Readings and links

Collins, Brown & Holum (1991), Cognitive Apprenticeship: Making Thinking Visible; Hattie & Timperley (2007), The Power of Feedback; Education Endowment Foundation, Metacognition and Self-Regulated Learning; EDUCAUSE (2024), AI Literacy in Teaching and Learning

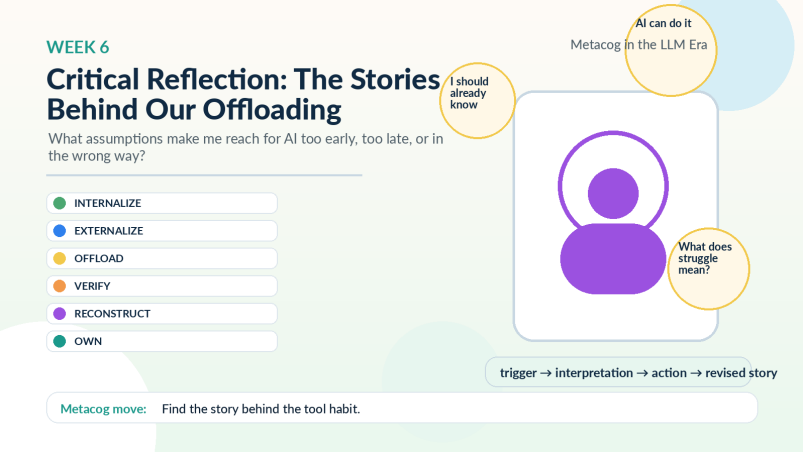
Lab
Triad Coaching + AI Comparison: rotate through learner, peer coach, and observer roles, then compare the peer coach with an LLM coach.

Assignment
Strategy Menu for the LLM Era: create a one-page menu for confusion, procrastination, shallow understanding, overconfidence, low confidence, AI dependence, and transfer failure.

Ungrading evidence
- Coaching notes
- Strategy menu
- Reflection on which scaffolds should be faded

Week 6 - Critical Reflection: The Stories Behind Our Offloading

Guiding question: What assumptions make me reach for AI too early, too late, or in the wrong way?



Brief multimedia lecture: The Stories We Learn Inside
Runtime: 9 minutes

Lecture flow

1. Hook: inner monologues such as I should already know this and If AI can do it, why should I struggle?

2. Key distinction: reflection vs. rumination.

3. Assumption map: trigger, interpretation, emotion, action, result, revised story.

4. AI tension: efficiency can be useful, but it can also become avoidance.

5. Prompt: When I reach for AI, I often assume that...

Core topics

- Reflection vs. rumination
- Identity narratives
- Productive discomfort
- Efficiency as value and trap
- Transformative learning
- Self-trust and AI dependence

Readings and links

Mezirow (1997), Transformative Learning: Theory to Practice; Brookfield (1998), Critically Reflective Practice; Microsoft Research / CMU (CHI 2025), Generative AI and Critical Thinking; Knowles (1978), Andragogy: Adult Learning Theory in Perspective

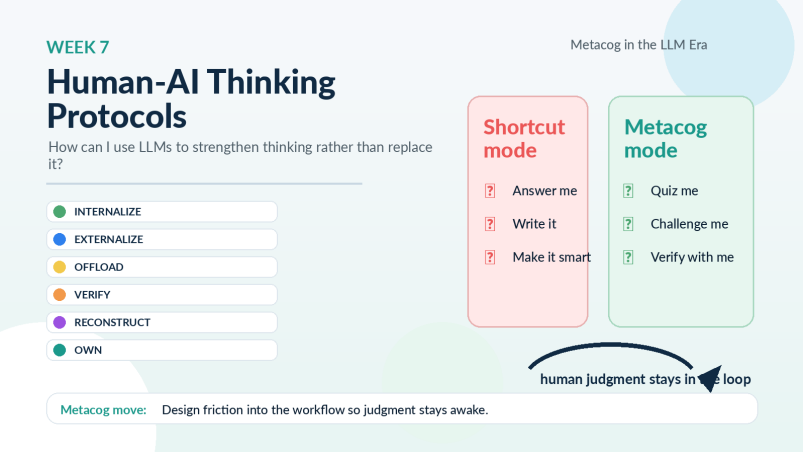
Lab
AI Dependence Reflection Map: analyze one moment when you used or wanted to use AI and map trigger, interpretation, emotion, action, result, and alternative interpretation.

Assignment
Critical Reflection Essay: identify one assumption that shapes your learning or AI use and design an experiment that could revise it.

Ungrading evidence
- Reflection map
- Critical reflection essay
- Revision experiment

Week 7 - Human-AI Thinking Protocols

Guiding question: How can I use LLMs to strengthen thinking rather than replace it?



Brief multimedia lecture: AI as Mirror, Coach, and Risk
Runtime: 9 minutes

Lecture flow

1. Hook: AI as autopilot vs. AI as training wheels.
2. Shortcut mode: Give me the answer. Write this for me. Make it sound smart.
3. Metacog mode: Ask what I know, quiz me first, challenge assumptions, help me verify.
4. Verification rule: fluent output is not the same as reliable output.
5. Protocol prompt: What must I try before AI, and what must I verify after AI?

Core topics

- AI as tutor, mirror, coach, critic, simulator, editor, and verifier
- Prompting for metacognition
- Human-centered AI literacy
- Verification and source discipline
- Disclosure
- Designed friction

Readings and links

UNESCO, AI Competency Framework for Students; UNESCO, Guidance for Generative AI in Education and Research; EDUCAUSE (2024), AI Literacy in Teaching and Learning; NIST, Generative AI Risk Management Profile

Lab
Protocol Design Studio: test a workflow that includes a closed-tool first attempt, AI coaching, independent verification, closed-tool reconstruction, and disclosure.

Assignment
Personal AI Use Protocol: create a protocol for using LLMs in academic, professional, or creative work.

Ungrading evidence
- Tested AI workflow
- Protocol draft
- Verification record
- Disclosure example

Week 8 - Transfer and the Metacog Operating Manual

Guiding question: How will I keep my judgment, memory, and agency alive after the course?

Brief multimedia lecture: Your Operating Manual for an AI-Mediated Mind
Runtime: 8 minutes

Lecture flow

1. Hook: this course was a lab; the subject was your own thinking.

2. Portfolio montage: baseline, contract, experiment, calibration log, strategy menu, reflection, AI protocol.

3. Transfer bridge: course to work, study, and life.

4. Future-self memo: When I feel __, the signal I should notice is __, and the AI boundary is __.

5. Closing line: Think with tools; do not disappear from your own thinking.

Core topics

- Transfer across domains
- Durable habits
- Personal operating manuals
- Human-AI collaboration principles
- Final calibration
- Portfolio presentation

Readings and links

Education Endowment Foundation, Metacognition and Self-Regulated Learning; Zimmerman (2002), Becoming a Self-Regulated Learner; Stanford HAI, 2026 AI Index Report

Lab
Final Teach-Back: present a 5-minute case study about what you offloaded, what you internalized, where AI helped, where it weakened thinking, and what protocol remains.

Assignment
Metacog Portfolio and Operating Manual for the LLM Era.

Ungrading evidence
- Complete portfolio
- Final self-assessment
- Final conference
- Operating manual
- Teach-back presentation

Final Portfolio and Operating Manual

The final portfolio is the evidence base for the final ungrading conference. It should show not only what the student produced, but how the student noticed, revised, verified, reconstructed, and transferred thinking over time.

Required portfolio artifacts

1. Baseline self-assessment
2. AI use inventory
3. Learning contract
4. Learning strategy experiment
5. Calibration log
6. Strategy menu
7. Critical reflection essay
8. AI use protocol
9. Transfer plan
10. Personal operating manual

The Operating Manual Should Answer

- What are my common thinking traps?
- When do I reach for AI too early?
- When do I avoid AI even though it could help?
- What must I try before I offload?
- What can I safely delegate?
- What must I always verify?
- What must I be able to reconstruct without the tool?
- What signals tell me I am confused, avoiding, rushing, or overconfident?
- What strategies work best for me?
- What feedback do I need?
- How will I keep practicing Metacog after the course?

Weekly Course Rhythm

- Brief multimedia lecture
- Retrieval and calibration warm-up
- Concept discussion
- AI-offloading tension
- Studio/lab practice
- Peer coaching
- Reflection and portfolio evidence

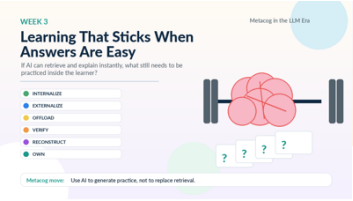
Notice what is happening. Name it clearly. Choose your next move. Check what happens. Decide what to internalize, what to externalize, what to offload, what to verify, what to reconstruct, and what to own.

Visual Appendix

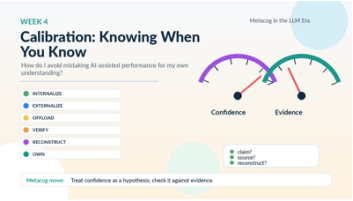
Weekly multimedia lecture title cards are embedded at the start of each week. This contact sheet gives a one-page overview of the visual sequence.

Week 1
Metacog in the Age of Offloading

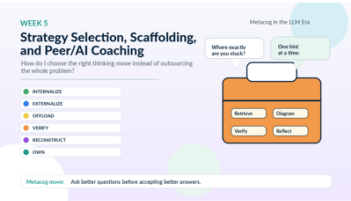
Week 2
Adult Agency and Self-Regulated Learning



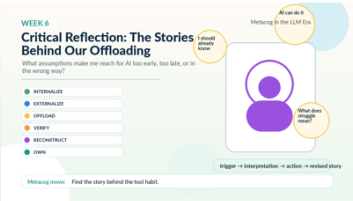
Week 3
Learning That Sticks When Answers Are Easy



Week 4
Calibration: Knowing When You Know



Week 5
Strategy Selection, Scaffolding, and Peer/AI Coaching



Week 6
Critical Reflection: The Stories Behind Our Offloading

Week 7
Human-AI Thinking Protocols

Week 8
Transfer and the Metacog Operating Manual

Image placement guide

- Use the course poster as the LMS landing image or first slide of the course overview.
- Use each weekly title card as the first slide of the weekly multimedia lecture.
- Use the contact sheet as a course map in Week 1 or as a portfolio appendix in Week 8.

Clickable Source Directory

All required and optional source links used in the syllabus are collected here. Link labels in the weekly readings are also clickable.

Source and URL
Flavell (1979), Metacognition and Cognitive Monitoring https://doi.org/10.1037/0003-066X.34.10.906
Schraw & Dennison (1994), Assessing Metacognitive Awareness https://www.sciencedirect.com/science/article/pii/S0361476X84710332
Nelson & Narens (1990), Metamemory https://www.sciencedirect.com/science/article/pii/S0079742108600535
Zimmerman (2002), Becoming a Self-Regulated Learner https://doi.org/10.1207/s15430421tip4102_2
Education Endowment Foundation, Metacognition and Self-Regulated Learning https://educationendowmentfoundation.org.uk/education-evidence/guidance-reports/metacognition
Risko & Gilbert (2016), Cognitive Offloading https://pubmed.ncbi.nlm.nih.gov/27542527/
Sparrow, Liu & Wegner (2011), Google Effects on Memory https://pubmed.ncbi.nlm.nih.gov/21764755/
Clark & Chalmers (1998), The Extended Mind https://doi.org/10.1093/0198238329.003.0002
Dunlosky et al. (2013), Improving Students Learning With Effective Techniques https://www.psychologicalscience.org/journals/pspi/1529100612453266/
Roediger & Karpicke (2006), Test-Enhanced Learning https://journals.sagepub.com/doi/10.1111/j.1467-9280.2006.01693.x
Cepeda et al. (2006), Distributed Practice in Verbal Recall Tasks https://doi.org/10.1037/0033-2909.132.3.354
Bjork & Kroll (2015), Desirable Difficulties in Vocabulary Learning https://pmc.ncbi.nlm.nih.gov/articles/PMC4888598/
Hattie & Timperley (2007), The Power of Feedback https://doi.org/10.3102/003465430298487
Knowles (1978), Andragogy: Adult Learning Theory in Perspective https://journals.sagepub.com/doi/abs/10.1177/009155217800500302
FHWA, Knowles Adult Learning Principles https://fhwaapps.fhwa.dot.gov/nhit/LearnersFirst/knowles-adult-learning-principles.htm
Mezirow (1997), Transformative Learning: Theory to Practice https://onlinelibrary.wiley.com/doi/10.1002/ace.7401
Brookfield (1998), Critically Reflective Practice https://doi.org/10.1002/chp.1340180402
Collins, Brown & Holum (1991), Cognitive Apprenticeship: Making Thinking Visible https://www.aft.org/ae/winter1991/collins_brown_holum
Blum (2020) / Moya review (2021), Ungrading https://edintegrity.biomedcentral.com/articles/10.1007/s40979-021-00077-7
Stommel, How to Ungrade https://www.jessestommel.com/how-to-ungrade/
Stanford HAI, 2026 AI Index Report https://hai.stanford.edu/ai-index/2026-ai-index-report
UNESCO, AI Competency Framework for Students https://www.unesco.org/en/articles/ai-competency-framework-students
UNESCO, Guidance for Generative AI in Education and Research https://www.unesco.org/en/articles/guidance-generative-ai-education-and-research
EDUCAUSE (2024), AI Literacy in Teaching and Learning https://www.educause.edu/content/2024/ai-literacy-in-teaching-and-learning/defining-ai-literacy-for-higher-education
NIST, Generative AI Risk Management Profile https://www.nist.gov/publications/artificial-intelligence-risk-management-framework-generative-artificial-intelligence
Microsoft Research / CMU (CHI 2025), Generative AI and Critical Thinking https://www.microsoft.com/en-us/research/publication/the-impact-of-generative-ai-on-critical-thinking-self-reported-reductions-in-cognitive-effort-and-confidence-effects-from-a-survey-of-knowledge-workers/