RAG 🧠 AI Literature Review Assignment

10 Points Possible

1/21/2026

Attempt 1

In Progress

NEXT UP: Submit Assignment

Add Comment

Unlimited Attempts Allowed

1/15/2026 to 1/28/2026

Details

Build a Reproducible, Local Research Assistant with RAG + Zotero + LLM

🎯 Assignment Purpose

In this assignment, you will create a personal AI research assistant — a system that helps you semantically search your assigned readings, identify relevant papers, ask research questions, and generate meaningful output (e.g., literature reviews, gaps, hypotheses). This is a tool you will use across this course and your doctoral training. You will combine:

- 📚 Zotero (to store, organize, and verify papers/citations)
- 🧠 RAG (Retrieval-Augmented Generation) using Python and ChromaDB
- 🤖 LLMs (ChatGPT or Claude) to answer research questions and generate output
- ✅ A metadata mapping tool to track and verify citations

> 📝 You are free to use an AI assistant (like ChatGPT or Claude) for help writing or debugging Python code, so long as **you understand what the code does**.

Why This Is Important:

🔎 1. **Accuracy of Citations**

LLMs often generate incorrect, incomplete, or entirely fictional citations. This system ensures your citations are real and grounded in *your* curated library, using Zotero as the final check. This protects your academic integrity and reduces manual errors.

⚡ 2. **Efficiency of Literature Review**

Instead of reading 50–100 papers manually for every new topic, you will use semantic search to rapidly surface only the most relevant ones — saving dozens of hours per semester.

📉 3. **Reduced Hallucinations**

Because you will feed the LLM only the PDFs selected by your RAG, the LLM's outputs are grounded in actual content — not guesses, not abstracts, and not random web text. This reduces hallucination risk dramatically.

🔁 4. **Reusability and Scaling**

Once set up, this system can grow with your research. You can scale it to 1,000+ papers, reuse it for your dissertation, and even use it for group collaborations or co-authored publications. It's a durable skill and tool for your entire career.

🧠 5. **Critical Thinking + Coding Practice**

You'll engage both computational thinking (building and customizing a tool) and critical analysis (interpreting outputs, verifying claims, improving workflows). You'll also build confidence in working with Python, AI tools, and automation.

🧰 Tools You Will Use

Tool	Purpose
Zotero	Reference manager to store and verify all papers and citations
RAG Starter Pack	Python code to search your readings by meaning (semantic indexing)
ChatGPT / Claude	Generate lit reviews, gaps, and hypotheses from selected papers
Zotero-to-CSV	Script to extract metadata from your Zotero library for citation tracking

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📦 Starter Files (Download Provided)

You will receive one ZIP file:
Full_RAG_Assignment.zip (https://uta.instructure.com/courses/255203/files/41153842?wrap=1) ⬇
(https://uta.instructure.com/courses/255203/files/41153842/download?download_frd=1)

Unzip it and follow the instructions inside. It includes:

- All necessary Python code (RAG Starter Pack)
- Citation tracking script
- Step-by-step instruction file (also below)

✅ Assignment Instructions — 7 Steps

🔷 Step 1: Create and Organize Your Zotero Library (30–60 min)

What to do:

1. Create a free Zotero account at **https://www.zotero.org/ (https://www.zotero.org/)**
2. Install Zotero desktop and the browser connector
3. Create a Zotero collection called `Seminar Readings`
4. Add the reading list papers (via DOI, PDF, or manual entry)
5. Add Zotero add-in to Word.

Why this matters:
Zotero is your **citation source of truth**. It helps you track, verify, and reuse papers across the semester and beyond. Even for working papers without DOIs, Zotero can store author, title, and year.

🔷 Step 2: Download PDFs to a Folder (30–60 min)

What to do:

1. Download the same reading list PDFs from your Zotero library or from DOI sources
2. Save them into a local folder:
   Example: `your_project/RAG/zotero_library/`

Why this matters:
Zotero's internal folders aren't easily readable by Python. Having a separate, clean folder allows the RAG tool to read and index all files.

🔷 Step 3: Build Your Local RAG System (1–2 hours)

What to do:

1. Unzip the starter pack
2. Open the `README.md` and follow the steps:
   - Install Python (if needed)
   - Create a virtual environment
   - Install required packages (`pip install -r requirements.txt`)
   - Place PDFs in the `/zotero_library/` folder
   - Run `build_index.py` to create the semantic index

Why this matters:
You are now building a **semantic search engine** that understands the *meaning* of your papers — not just their keywords.

🔷 Step 4: Ask a Research Question (30–45 min)

What to do:

1. Run `query.py`
2. When prompted:
   - Enter your research question (e.g. "How does investor sentiment affect asset pricing?")
   - Choose the number of papers to retrieve (e.g., `top_k = 10`)
   - Optionally set a relevance score threshold (e.g., `min_score = 0.45`)
3. RAG will place the most relevant papers into a folder like `/query_outputs/`.

Why this matters:
This step lets you narrow from 70+ papers to the **most relevant 5–15 (or more or less - depends)**. You can adjust how selective RAG is:

- `top_k`: how many papers to return
- `min_score`: how strict the match must be (try 0.3–0.7)

🔷 Step 5: Use ChatGPT or Claude to Analyze Papers (30–60 min)

What to do:

1. Go to ChatGPT or Claude (Pro access may be required)
2. Upload the PDFs selected by RAG
3. Use the following prompts:

Prompt A — Literature Review

> Based only on these papers, write a literature review about the relationship between X and Y. Include in-text citations by author and year.

Prompt B — Research Gaps

> Based on these papers, what gaps exist in the literature?

Prompt C — Hypothesis Development

> Propose 1–2 testable hypotheses based only on the uploaded papers.

Why this matters:
LLMs can now generate summaries and insights from the right subset of papers — without hallucinations from the open web.

🔷 Step 6: Verify Citations with Zotero (30–60 min)

What to do:

1. Check all citations used by the LLM
2. Look them up in Zotero
3. Replace incorrect/missing citations using the correct metadata

Why this matters:
LLMs can *still* get citations wrong. Zotero is your tool to verify and correct any citation issues before you submit.

🔷 Step 7: Export Zotero Citation Log (15 min)

What to do:

1. Run `zotero_to_csv.py` in the assignment folder
2. This script will export a file like `zotero_paper_map.csv`
3. Review it and include it with your submission

Why this matters:
This citation log helps verify the origin of every paper you use and serves as a reproducibility log.

📂 Your Final Submission Should Include:

- ✅ Your original research question(s)
- ✅ Folder of PDFs selected by RAG
- ✅ Literature review (as PDF)
- ✅ Gap identification write-up (PDF)
- ✅ Hypothesis development write-up (PDF)
- ✅ Zotero-generated citation log (CSV)

💡 Notes & Tips

- You may use AI (ChatGPT, Claude) to help you write, troubleshoot Python, or summarize.

- Don't skip verifying citations — this is your scholarly responsibility.
- You can reuse the RAG system all semester for your group project or dissertation work.
- Other tools - like Scispace do a good job explaining difficult papers.

✅ Done!

You've now built a **career-long AI assistant** that helps you analyze and extract meaning from hundreds or even thousands of papers.

Absolutely — explicit instructions are essential to prevent the LLM from hallucinating or referencing outside sources.

Below is the **refined and fully explicit prompt template**, designed to force the LLM to work **only with the uploaded PDFs**, with stronger language and structure for accuracy and reproducibility.

📄 LLM Prompt Template: AI Literature Review Based Only on Uploaded PDFs

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🔷 STEP 1: CONTEXT SETUP (Required First Message)

> You are acting as a research assistant for a doctoral student in financial economics.
>
> The user has uploaded a small set of academic papers (PDFs).
> These were pre-selected using a local RAG (retrieval-augmented generation) system.
>
> **You must use only the uploaded PDFs** for all answers.
> ❌ Do not include knowledge from outside the uploaded files.
> ❌ Do not infer or hallucinate information not clearly supported in these PDFs.
> ✅ Base all responses on the actual content of the uploaded PDFs.

🔷 STEP 2: TASK PROMPTS

✳️ Prompt A: Literature Review

> Based **only** on the uploaded PDFs:
>
> 1. Write a structured literature review on the following research question:
>
>    ```
>    [INSERT RESEARCH QUESTION HERE]
>    ```
>
> 2. Organize the review by key themes, findings, or methodological approaches.
> 3. Identify consensus, disagreement, or tensions in the literature.
> 4. Use **in-text citations** in the form `(Author, Year)` — but **only** for documents among the uploaded PDFs.
> 5. Do not reference any article unless it is one of the uploaded files.

✳️ Prompt B: Identify Research Gaps

> Based **only on the uploaded PDFs**, identify **2–4 research gaps** that remain unresolved or underexplored in the literature. For each gap:

- Briefly explain the gap
- Reference at least one uploaded study that highlights or contributes to the gap
- Do not speculate based on outside sources

Prompt C: Hypothesis Development

Based on your review of the uploaded PDFs and the identified gaps:

- Propose **1–3 testable hypotheses** grounded in the existing literature
- Explain which specific findings from the uploaded PDFs motivate each hypothesis
- Do not include speculative or general hypotheses that are not traceable to the provided documents

Prompt D (Optional): Annotated Bibliography

For each uploaded paper, provide:

- A brief (3–5 sentence) summary
- Explanation of how it relates to the central research question
- Citation in APA format (but only if the metadata is visible in the PDF — otherwise, indicate that citation details are incomplete)

📌 FINAL REMINDER TO ADD:

✅ **Reminder:** Work only with the uploaded PDFs.
❌ Do not include any paper, idea, author, or finding that is not clearly visible in the uploaded files.
⚠️ If citation metadata (author, year, etc.) is not visible in the file, note that clearly.
🧠 Your job is to generate grounded, reproducible research outputs based only on this limited library.

Keep in mind, this submission will count for everyone in your Project Group group.

Choose a submission type

Upload | Studio | More

Choose a file to upload

or

Webcam Photo

Canvas Files

(https://uta.instructure.com/courses/255203/modules/items/10714187)

Assignment

(https://uta.instructure.com/courses/255203/modules/items/10