[GitHub links](https://github.com/aishwaryanr/awesome-generative-ai-guide?tab=readme-ov-file#book-list-of-free-genai-courses)

**List of Free GenAI Courses**

**LLM Basics and Foundations**

1. [Large Language Models](https://rycolab.io/classes/llm-s23/) by ETH Zurich
2. [Understanding Large Language Models](https://www.cs.princeton.edu/courses/archive/fall22/cos597G/) by Princeton
3. [Transformers course](https://huggingface.co/learn/nlp-course/chapter1/1) by Huggingface
4. [NLP course](https://huggingface.co/learn/nlp-course/chapter1/1) by Huggingface
5. [CS324 - Large Language Models](https://stanford-cs324.github.io/winter2022/) by Stanford
6. [Generative AI with Large Language Models](https://www.coursera.org/learn/generative-ai-with-llms) by Coursera
7. [Introduction to Generative AI](https://www.coursera.org/learn/introduction-to-generative-ai) by Coursera
8. [Generative AI Fundamentals](https://www.cloudskillsboost.google/paths/118/course_templates/556) by Google Cloud
9. [5-Day Gen AI Intensive Course](https://www.youtube.com/watch?v=kpRyiJUUFxY&list=PLqFaTIg4myu-b1PlxitQdY0UYIbys-2es) by Google & Kaggle
10. [Introduction to Large Language Models](https://www.cloudskillsboost.google/paths/118/course_templates/539) by Google Cloud
11. [Introduction to Generative AI](https://www.cloudskillsboost.google/paths/118/course_templates/536) by Google Cloud
12. [Generative AI Concepts](https://www.datacamp.com/courses/generative-ai-concepts) by DataCamp (Daniel Tedesco Data Lead @ Google)
13. [1 Hour Introduction to LLM (Large Language Models)](https://www.youtube.com/watch?v=xu5_kka-suc) by WeCloudData
14. [LLM Foundation Models from the Ground Up | Primer](https://www.youtube.com/watch?v=W0c7jQezTDw&list=PLTPXxbhUt-YWjMCDahwdVye8HW69p5NYS) by Databricks
15. [Generative AI Explained](https://courses.nvidia.com/courses/course-v1:DLI+S-FX-07+V1/) by Nvidia
16. [Transformer Models and BERT Model](https://www.cloudskillsboost.google/course_templates/538) by Google Cloud
17. [Generative AI Learning Plan for Decision Makers](https://explore.skillbuilder.aws/learn/public/learning_plan/view/1909/generative-ai-learning-plan-for-decision-makers) by AWS
18. [Introduction to Responsible AI](https://www.cloudskillsboost.google/course_templates/554) by Google Cloud
19. [Fundamentals of Generative AI](https://learn.microsoft.com/en-us/training/modules/fundamentals-generative-ai/) by Microsoft Azure
20. [Generative AI for Beginners](https://github.com/microsoft/generative-ai-for-beginners?WT.mc_id=academic-122979-leestott) by Microsoft
21. [ChatGPT for Beginners: The Ultimate Use Cases for Everyone](https://www.udemy.com/course/chatgpt-for-beginners-the-ultimate-use-cases-for-everyone/) by Udemy
22. [[1hr Talk] Intro to Large Language Models](https://www.youtube.com/watch?v=zjkBMFhNj_g) by Andrej Karpathy
23. [ChatGPT for Everyone](https://learnprompting.org/courses/chatgpt-for-everyone) by Learn Prompting
24. [Large Language Models (LLMs) (In English)](https://www.youtube.com/playlist?list=PLxlkzujLkmQ9vMaqfvqyfvZV_o8EqjAk7) by Kshitiz Verma (JK Lakshmipat University, Jaipur, India)
25. [Generative AI for Beginners](https://codekidz.ai/lesson-intro/generative-a-362093) By CodeKidz, based on Microsoft's open sourced course.

**Building LLM Applications**

1. [LLMOps: Building Real-World Applications With Large Language Models](https://www.udacity.com/course/building-real-world-applications-with-large-language-models--cd13455) by Udacity
2. [Full Stack LLM Bootcamp](https://fullstackdeeplearning.com/llm-bootcamp/) by FSDL
3. [Generative AI for beginners](https://github.com/microsoft/generative-ai-for-beginners/tree/main) by Microsoft
4. [Large Language Models: Application through Production](https://www.edx.org/learn/computer-science/databricks-large-language-models-application-through-production) by Databricks
5. [Generative AI Foundations](https://www.youtube.com/watch?v=oYm66fHqHUM&list=PLhr1KZpdzukf-xb0lmiU3G89GJXaDbAIF) by AWS
6. [Introduction to Generative AI Community Course](https://www.youtube.com/watch?v=ajWheP8ZD70&list=PLmQAMKHKeLZ-iTT-E2kK9uePrJ1Xua9VL) by ineuron
7. [LLM University](https://docs.cohere.com/docs/llmu) by Cohere
8. [LLM Learning Lab](https://lightning.ai/pages/llm-learning-lab/) by Lightning AI
9. [LangChain for LLM Application Development](https://learn.deeplearning.ai/login?redirect_course=langchain&callbackUrl=https%3A%2F%2Flearn.deeplearning.ai%2Fcourses%2Flangchain) by Deeplearning.AI
10. [LLMOps](https://learn.deeplearning.ai/llmops) by DeepLearning.AI
11. [Automated Testing for LLMOps](https://learn.deeplearning.ai/automated-testing-llmops) by DeepLearning.AI
12. [Building Generative AI Applications Using Amazon Bedrock](https://explore.skillbuilder.aws/learn/course/external/view/elearning/17904/building-generative-ai-applications-using-amazon-bedrock-aws-digital-training) by AWS
13. [Efficiently Serving LLMs](https://learn.deeplearning.ai/courses/efficiently-serving-llms/lesson/1/introduction) by DeepLearning.AI
14. [Building Systems with the ChatGPT API](https://www.deeplearning.ai/short-courses/building-systems-with-chatgpt/) by DeepLearning.AI
15. [Serverless LLM apps with Amazon Bedrock](https://www.deeplearning.ai/short-courses/serverless-llm-apps-amazon-bedrock/) by DeepLearning.AI
16. [Building Applications with Vector Databases](https://www.deeplearning.ai/short-courses/building-applications-vector-databases/) by DeepLearning.AI
17. [Automated Testing for LLMOps](https://www.deeplearning.ai/short-courses/automated-testing-llmops/) by DeepLearning.AI
18. [Build LLM Apps with LangChain.js](https://www.deeplearning.ai/short-courses/build-llm-apps-with-langchain-js/) by DeepLearning.AI
19. [Advanced Retrieval for AI with Chroma](https://www.deeplearning.ai/short-courses/advanced-retrieval-for-ai/) by DeepLearning.AI
20. [Operationalizing LLMs on Azure](https://www.coursera.org/learn/llmops-azure) by Coursera
21. [Generative AI Full Course – Gemini Pro, OpenAI, Llama, Langchain, Pinecone, Vector Databases & More](https://www.youtube.com/watch?v=mEsleV16qdo) by freeCodeCamp.org
22. [Training & Fine-Tuning LLMs for Production](https://learn.activeloop.ai/courses/llms) by Activeloop

**Prompt Engineering, RAG and Fine-Tuning**

1. [LangChain & Vector Databases in Production](https://www.youtube.com/redirect?event=video_description&redir_token=QUFFLUhqbVhnQW8xNDdhSU9IUDVLXzFhV2N0UkNRMkZrQXxBQ3Jtc0traUxHMzZJcGJQYjlyckYxaGxYVWlsOFNGUFlFVEdhNzdjTWpPUlQ2TF9XczRqNkxMVGpJTnd5YmYzV0prQ0IwZURNcHhIZ3h1Z051VTl5MXBBLUN0dkM0NHRkQTFua1Jpc0VCRFJUb0ZQZG95b0JqMA&q=https%3A%2F%2Flearn.activeloop.ai%2Fcourses%2Flangchain&v=gKUTDC13jys) by Activeloop
2. [Reinforcement Learning from Human Feedback](https://learn.deeplearning.ai/reinforcement-learning-from-human-feedback) by DeepLearning.AI
3. [Building Applications with Vector Databases](https://learn.deeplearning.ai/building-applications-vector-databases) by DeepLearning.AI
4. [Finetuning Large Language Models](https://learn.deeplearning.ai/finetuning-large-language-models) by Deeplearning.AI
5. [LangChain: Chat with Your Data](http://learn.deeplearning.ai/langchain-chat-with-your-data/) by Deeplearning.AI
6. [Building Systems with the ChatGPT API](https://learn.deeplearning.ai/chatgpt-building-system) by Deeplearning.AI
7. [Prompt Engineering with Llama 2](https://www.deeplearning.ai/short-courses/prompt-engineering-with-llama-2/) by Deeplearning.AI
8. [Building Applications with Vector Databases](https://learn.deeplearning.ai/building-applications-vector-databases) by Deeplearning.AI
9. [ChatGPT Prompt Engineering for Developers](https://learn.deeplearning.ai/chatgpt-prompt-eng/lesson/1/introduction) by Deeplearning.AI
10. [Advanced RAG Orchestration series](https://www.youtube.com/watch?v=CeDS1yvw9E4) by LlamaIndex
11. [Prompt Engineering Specialization](https://www.coursera.org/specializations/prompt-engineering) by Coursera
12. [Augment your LLM Using Retrieval Augmented Generation](https://courses.nvidia.com/courses/course-v1:NVIDIA+S-FX-16+v1/) by Nvidia
13. [Knowledge Graphs for RAG](https://www.deeplearning.ai/short-courses/knowledge-graphs-rag/) by Deeplearning.AI
14. [Open Source Models with Hugging Face](https://www.deeplearning.ai/short-courses/open-source-models-hugging-face/) by Deeplearning.AI
15. [Vector Databases: from Embeddings to Applications](https://www.deeplearning.ai/short-courses/vector-databases-embeddings-applications/) by Deeplearning.AI
16. [Understanding and Applying Text Embeddings](https://www.deeplearning.ai/short-courses/google-cloud-vertex-ai/) by Deeplearning.AI
17. [JavaScript RAG Web Apps with LlamaIndex](https://www.deeplearning.ai/short-courses/javascript-rag-web-apps-with-llamaindex/) by Deeplearning.AI
18. [Quantization Fundamentals with Hugging Face](https://www.deeplearning.ai/short-courses/quantization-fundamentals-with-hugging-face/) by Deeplearning.AI
19. [Preprocessing Unstructured Data for LLM Applications](https://www.deeplearning.ai/short-courses/preprocessing-unstructured-data-for-llm-applications/) by Deeplearning.AI
20. [Retrieval Augmented Generation for Production with LangChain & LlamaIndex](https://learn.activeloop.ai/courses/rag) by Activeloop
21. [Quantization in Depth](https://www.deeplearning.ai/short-courses/quantization-in-depth/) by Deeplearning.AI

**Evaluation**

1. [Building and Evaluating Advanced RAG Applications](https://learn.deeplearning.ai/building-evaluating-advanced-rag) by DeepLearning.AI
2. [Evaluating and Debugging Generative AI Models Using Weights and Biases](https://learn.deeplearning.ai/evaluating-debugging-generative-ai) by Deeplearning.AI
3. [Quality and Safety for LLM Applications](https://www.deeplearning.ai/short-courses/quality-safety-llm-applications/) by Deeplearning.AI
4. [Red Teaming LLM Applications](https://www.deeplearning.ai/short-courses/red-teaming-llm-applications/?utm_campaign=giskard-launch&utm_medium=headband&utm_source=dlai-homepage) by Deeplearning.AI

**Multimodal**

1. [How Diffusion Models Work](https://www.deeplearning.ai/short-courses/how-diffusion-models-work/) by DeepLearning.AI
2. [How to Use Midjourney, AI Art and ChatGPT to Create an Amazing Website](https://www.youtube.com/watch?v=5wdCev86RYE) by Brad Hussey
3. [Build AI Apps with ChatGPT, DALL-E and GPT-4](https://scrimba.com/learn/buildaiapps) by Scrimba
4. [11-777: Multimodal Machine Learning](https://www.youtube.com/playlist?list=PL-Fhd_vrvisNM7pbbevXKAbT_Xmub37fA) by Carnegie Mellon University
5. [Prompt Engineering for Vision Models](https://www.deeplearning.ai/short-courses/prompt-engineering-for-vision-models/) by Deeplearning.AI

**Agents**

1. [Building RAG Agents with LLMs](https://courses.nvidia.com/courses/course-v1:DLI+S-FX-15+V1/) by Nvidia
2. [Functions, Tools and Agents with LangChain](https://learn.deeplearning.ai/functions-tools-agents-langchain) by Deeplearning.AI
3. [AI Agents in LangGraph](https://www.deeplearning.ai/short-courses/ai-agents-in-langgraph/) by Deeplearning.AI
4. [AI Agentic Design Patterns with AutoGen](https://www.deeplearning.ai/short-courses/ai-agentic-design-patterns-with-autogen/) by Deeplearning.AI
5. [Multi AI Agent Systems with crewAI](https://www.deeplearning.ai/short-courses/multi-ai-agent-systems-with-crewai/) by Deeplearning.AI
6. [Building Agentic RAG with LlamaIndex](https://www.deeplearning.ai/short-courses/building-agentic-rag-with-llamaindex/) by Deeplearning.AI
7. [LLM Observability: Agents, Tools, and Chains](https://courses.arize.com/p/agents-tools-and-chains) by Arize AI
8. [Building Agentic RAG with LlamaIndex](https://www.deeplearning.ai/short-courses/building-agentic-rag-with-llamaindex/) by Deeplearning.AI
9. [Agents Tools & Function Calling with Amazon Bedrock (How-to)](https://www.youtube.com/watch?app=desktop&v=2L_XE6g3atI) by AWS Developers
10. [ChatGPT & Zapier: Agentic AI for Everyone](https://www.coursera.org/learn/agentic-ai-chatgpt-zapier) by Coursera
11. [Multi-Agent Systems with AutoGen](https://www.manning.com/books/multi-agent-systems-with-autogen) by Victor Dibia [Book]
12. [Large Language Model Agents MOOC, Fall 2024](https://llmagents-learning.org/f24) by Dawn Song & Xinyun Chen – A comprehensive course covering foundational and advanced topics on LLM agents.
13. [CS294/194-196 Large Language Model Agents](https://rdi.berkeley.edu/llm-agents/f24) by UC Berkeley

**Miscellaneous**

1. [Avoiding AI Harm](https://www.coursera.org/learn/avoiding-ai-harm) by Coursera
2. [Developing AI Policy](https://www.coursera.org/learn/developing-ai-policy) by Coursera

⛳ Evaluation  
- Building and Evaluating Advanced RAG Applications by DeepLearningAI  
- Evaluating and Debugging Generative AI Models Using Weights and Biases by DeeplearningAI  
  
⛳Multimodal  
How Diffusion Models Work by [DeepLearning.AI](http://deeplearning.ai/)

**1. LLM (Simple Question-Answering System):**

* **Workflow**:
  + The user provides a **prompt**.
  + The **LLM** processes the prompt using its pre-trained knowledge base.
  + It generates an **answer** based solely on its training data.
* **Use Case**: Suitable for straightforward Q&A without external references.

**2. RAG (Retrieval-Augmented Generation):**

* **Workflow**:
  + The user provides a **prompt**.
  + The **LLM** accesses external **context** (e.g., PDFs, databases) to enrich its response.
  + Combines retrieved data with the LLM’s reasoning to generate an **answer**.
* **Use Case**: Effective for tasks requiring accurate and context-aware responses by referencing external knowledge.

**3. Agent:**

* **Workflow**:
  + The user provides a **prompt**.
  + The **LLM** uses external **context** and **tools** (e.g., search engines, APIs) for dynamic interaction.
  + Includes **memory** for storing prior interactions and **planning** for multi-step tasks.
  + Generates an **answer** and can perform **actions** (e.g., scheduling, calculations).
* **Use Case**: Ideal for complex tasks that require reasoning, external tools, and execution.

Would you like to explore this concept further or see its applications?

4o

**You said:**

Yes

**ChatGPT said:**

ChatGPT

Let’s dive deeper into the applications and differences of these frameworks and their real-world implementations.

**1. LLM (Simple Question-Answering System)**

**Key Features:**

* Relies entirely on pre-trained knowledge.
* Doesn't use external tools or memory.
* Fast and straightforward but limited to its training data.

**Examples:**

* Chatbots for FAQs (e.g., answering “What is the weather like?” without connecting to live weather data).
* Generating summaries, explanations, or stories based on internal knowledge.

**Limitations:**

* Cannot provide up-to-date or external information.
* May "hallucinate" (generate plausible but incorrect answers).

**2. RAG (Retrieval-Augmented Generation)**

**Key Features:**

* Combines the power of an LLM with an external knowledge base.
* Retrieves relevant data (like PDFs, databases, or web pages) for context.
* Ensures more accurate and context-aware answers.

**Examples:**

* **Customer Support**: Pulling information from company documents (e.g., manuals, policies) to answer customer queries.
* **Legal or Medical AI**: Referencing research papers, regulations, or medical guidelines to provide reliable insights.
* **Data Analysis**: Extracting and interpreting data from structured sources.

**Advantages:**

* Improved accuracy and relevance due to external context.
* Scales well for dynamic datasets.

**Limitations:**

* Dependence on the quality of retrieved data.
* Slower due to the retrieval process.

**3. Agent**

**Key Features:**

* Fully interactive and action-oriented.
* Uses memory for maintaining context over multiple interactions.
* Connects to external tools (e.g., APIs, search engines, or scheduling apps) for executing tasks.
* Handles multi-step planning (e.g., analyzing data, planning schedules).

**Examples:**

* **Personal Assistant**: Booking a flight, checking availability, and adding it to a calendar.
* **Automation in Enterprises**: Analyzing business metrics and generating reports dynamically.
* **Coding Assistant**: Fetching library documentation, generating code, and testing it.

**Advantages:**

* Can perform tasks autonomously by combining planning, reasoning, and execution.
* Adapts to complex workflows requiring external systems and multi-step solutions.

**Limitations:**

* Requires robust integration with APIs, tools, and memory systems.
* Potentially slower due to complexity.

**Key Differences Between RAG and Agents**

| **Aspect** | **RAG** | **Agent** |
| --- | --- | --- |
| **Focus** | Retrieval + Answering | Action-oriented and Execution |
| **Tools Used** | Knowledge bases (e.g., PDFs, DBs) | Tools, APIs, memory, planning |
| **Use Cases** | Accurate Q&A | Complex workflows, task automation |
| **Memory** | Not typically used | Stores and recalls session data |
| **Execution** | Answer generation only | Executes actions based on planning |

**Real-World Use Cases**

1. **LLM**:
   * Quick Q&A on educational platforms like Duolingo or Quizlet.
   * Writing assistants like Grammarly.
2. **RAG**:
   * AI-powered search engines like **Google Bard**.
   * Systems like **Kyndi** or **iManage RAVN** in legal tech for document search.
3. **Agent**:
   * Advanced AI assistants like **OpenAI’s ChatGPT with Plugins** or **Auto-GPT**.
   * Workflow automation tools, e.g., Zapier integrations powered by AI.

