AI Labs with ChatGPT - Detailed Guide (Lab 1 to Lab 6)

# Lab 1: Introduction to ChatGPT

Objective: Understand how ChatGPT works internally and explore its real-world use cases.  
  
Explanation:  
ChatGPT is built on the Transformer architecture, which uses a mechanism called "self-attention" to understand relationships between words in a sentence. It was trained using large datasets (books, articles, web content) through unsupervised learning, where it learns to predict the next word in a sentence.  
  
Later, it is fine-tuned with Reinforcement Learning from Human Feedback (RLHF), where human reviewers rate its responses and guide improvement.  
  
Key Components:  
- Self-Attention: Helps the model focus on relevant words in a sequence.  
- Positional Encoding: Since Transformers don’t have recurrence, this tells the model the position of each word.  
- Multi-head Attention: Multiple attention layers work in parallel to capture different aspects of the sentence.  
  
Examples of Use Cases:  
(a) Education: AI tutors, automated grading tools, and personalized learning apps.  
(b) Healthcare: Medical Q&A bots, appointment scheduling, and initial symptom triage.  
(c) Business: Customer support automation, meeting summarization, and market trend analysis.

# Lab 2: Types of Prompts and Prompt Engineering Basics

Objective: Learn how different types of prompts affect ChatGPT's responses.  
  
1. Zero-shot Prompt:  
Definition: You ask the model to do something without giving examples.  
Example: “Translate to French: ‘I love artificial intelligence.’”  
Output: “J'aime l'intelligence artificielle.”  
  
2. Few-shot Prompt:  
Definition: You provide a few examples to show the task format.  
Example:  
‘Hello’ → ‘Bonjour’  
‘Goodbye’ → ‘Au revoir’  
Now translate: ‘Thank you’  
Output: “Merci”  
  
3. Instructional Prompt:  
Definition: A direct instruction to perform a task.  
Example: “List three benefits of AI in healthcare.”  
Output:  
1. Faster diagnosis  
2. Reduced costs  
3. Better patient monitoring  
  
4. Interrogative Prompt:  
Definition: A question-based prompt that elicits factual or analytical responses.  
Example: “What are the advantages of few-shot prompting?”  
Output: “It improves model accuracy by providing examples that guide the response.”  
  
Task:  
Write 5 of each type and compare the detail, tone, and correctness of the responses.

# Lab 3: Precision Prompting for Information Extraction

Objective: Use ChatGPT to extract structured data from unstructured text.  
  
Prompt:  
“Extract contact info and skills from this text and return in JSON format:  
‘John Doe is a software engineer. You can reach him at john.doe@example.com or call +1‑555‑1234. He’s skilled in Python, JavaScript, and SQL.’”  
  
Expected Output:  
{  
 "name": "John Doe",  
 "email": "john.doe@example.com",  
 "phone": "+1-555-1234",  
 "skills": ["Python", "JavaScript", "SQL"]  
}  
  
Explanation:  
This task demonstrates how to use ChatGPT for named entity recognition (NER) and conversion to a structured format like JSON. This is useful for data extraction in resumes, web scraping, and automated form-filling.

# Lab 4: Summarization and Text Transformation

Objective: Learn to shorten long text and adjust tone or formality using ChatGPT.  
  
1. Summarization Prompt:  
“Summarize the following article in three sentences.”  
  
Example Input:  
“Artificial Intelligence is evolving rapidly. Its applications span across industries from healthcare to finance. Researchers predict major breakthroughs in the next decade.”  
  
Output:  
“AI is advancing quickly and is used in many sectors. Experts believe more progress is coming soon. It could reshape major industries.”  
  
2. Tone Transformation Prompt:  
“Rewrite the email informally: ‘Dear Mr. Smith, I am writing to confirm our meeting scheduled for Monday. Please let me know if this still works for you.’”  
  
Informal Output:  
“Hey! Just checking if we’re still on for our Monday meeting. Let me know!”  
  
Explanation:  
Summarization is useful in news, research, and meetings. Tone transformation adapts messages to different audiences (e.g., formal for workplace, informal for friends).

# Lab 5: ChatGPT in Code Generation and Debugging

Objective: Use ChatGPT to generate and fix code.  
  
1. Code Generation Prompt:  
“Write a Python function to check if a string is a palindrome.”  
  
Output:  
def is\_palindrome(s: str) -> bool:  
 """Check if the string is a palindrome (ignoring punctuation and case)."""  
 import re  
 s = re.sub(r'[^A-Za-z0-9]', '', s.lower())  
 return s == s[::-1]  
  
Explanation:  
The function uses regex to remove non-alphanumeric characters and then checks if the cleaned string is the same forward and backward.  
  
2. Debugging Prompt:  
Fix this buggy C program:  
  
Original Code:  
#include <stdio.h>  
void reverse(char \*s) {  
 int i = 0, j = strlen(s) - 1;  
 while (i < j) {  
 char tmp = s[i];  
 s[i] = s[j];  
 s[j] = tmp;  
 i++; j--;  
 }  
}  
int main() {  
 char str[] = "Hello";  
 reverse(str);  
 printf("%s\n", str);  
 return 0;  
}  
  
Fix:  
Add `#include <string.h>` at the top to avoid undefined reference to `strlen`.  
  
ChatGPT helps spot missing libraries, logic bugs, or incorrect syntax.

# Lab 6: Domain-Specific Applications

Objective: Apply ChatGPT to real-world, domain-specific problems.  
  
Example – Medical Domain Chatbot:  
Prompt:  
“A patient says: ‘I have an itchy red rash on my arms for three days, no fever, but it burns when I scratch it.’”  
  
Expected ChatGPT Response:  
Follow-up Questions:  
- “Have you used any new skincare products recently?”  
- “Does the rash have any blisters or pus?”  
  
Suggestions:  
1. Apply over-the-counter hydrocortisone cream.  
2. Use an oral antihistamine like cetirizine for itchiness.  
  
Advice:  
“If symptoms worsen, spread, or persist for more than 5 days, consult a dermatologist.”  
  
Explanation:  
Domain-specific prompts simulate real-world roles—doctor, lawyer, teacher—and can guide, diagnose, or instruct. This makes ChatGPT a valuable tool in industry and education.  
  
Other Examples:  
- Legal: Draft contracts or explain laws.  
- Education: Create quizzes, tutor students.  
- Business: Analyze reports, write summaries.