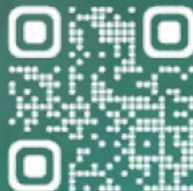


Masterclass on ChatGPT & Large Language Models: Bridging Practical Techniques with Core Foundations

Designed & Presented by Prof. Anis Koubaa

*Director of the Research & Initiatives Center
Aide to President on Research Governance
Leader of the Robotics & Internet-of-Things Lab*

chatgpt.riotu-lab.org



Masterclass on ChatGPT & Large Language Models:

Bridging Practical Techniques with Core Foundations

INSTRUCTOR BIOGRAPHY

Anis Koubaa is the Director of the Research and Initiatives Center, aide to the President on Research Governance for 5 years, and the leader and founder of the Robotics and Internet-of-Things Lab at Prince Sultan University.

He is a Full Professor in Computer Science and has worked on several R&D projects on Data Science and Unmanned Aerial Systems, Deep Learning, Robotics, and Internet-of-Things. He is a Senior Fellow of the Higher Education Academy of the UK.

Anis Koubaa received the AI Leadership Award in 2022 at the Saudi International AI and Cloud International Expo. He was shortlisted in the Leadership and Management Team of the Year in Times Higher Education Awards Asia 2022, and received the Rector's Best Teacher Award in 2016 at Prince Sultan University as well as the Best Research Award in 2012 at Al-Imam University. He is also nominated in the career-based top 2% scientists list made by Stanford University.

ChatGPT Course schedule

SPECIALIZATION 1

COURSE 1:

ChatGPT & Prompt Engineering

21 Oct, 2023 - 10 AM to 4:00PM

COURSE 2:

ChatGPT for Research, Education, & Coding

28 Oct, 2023 - 10 AM to 4:00PM

COURSE 3:

ChatGPT for Business Professionals

11 Nov, 2023 - 10 AM to 4:00PM

COURSE 4:

Lifecycle & Adaptations of LLMs

18 Nov, 2023 - 10 AM to 4:00PM

SPECIALIZATION 2

COURSE 5:

Advanced Programming with LangChain

25 Nov, 2023 - 10 AM to 4:00PM

COURSE 6:

Multilingual Tokenization & Word Embeddings - Exploring Arabic & English

2 Dec, 2023 - 10 AM to 4:00PM

COURSE 7:

Transformers: The Core Technology of LLMs

9 Dec, 2023 - 10 AM to 4:00PM

COURSE 8:

Building a LLAMA-like LLM Model with PyTorch from Scratch

16 Dec, 2023 - 10 AM to 4:00PM

Specialization 1:
Practical Applications of
ChatGPT

SPECIALIZATION 1: PRACTICAL APPLICATIONS OF CHATGPT

OVERVIEW

This specialization delves into the practical applications of ChatGPT, one of the most advanced language models in the AI domain.

Beginning with a comprehensive introduction to ChatGPT's evolution, participants will master the art of prompt engineering, gaining both foundational and advanced insights. The course then explores ChatGPT's transformative applications in diverse sectors, including business, healthcare, research, and education. Participants will learn how ChatGPT can aid in tasks ranging from startup ideation to medical research.

The specialization culminates with a deep dive into LangChain, offering hands-on experience in building memory-enhanced chatbots, ensuring participants are equipped with cutting-edge skills in AI-driven communication solutions.

To register

scan the QR code



or visit: chatgpt.riotu-lab.org/registration.php

Course 1

ChatGPT & Prompt Engineering

CHATGPT & PROMPT ENGINEERING

OVERVIEW: Course 1 delves into ChatGPT's history, unique features, and its transformative role in various industries. The workshop emphasizes prompt engineering, covering foundational concepts, advanced strategies like zero-shot and few-shot learning, and chain-of-thought techniques. Participants engage in hands-on sessions, crafting prompts and refining their approach through feedback discussions.

LEARNING OUTCOMES:

- Grasp ChatGPT's evolution and its industry impact.
- Master foundational and advanced prompt engineering techniques.
- Engage in hands-on prompt crafting and iterative refinement.

COURSE OUTLINE: CHATGPT & PROMPT ENGINEERING

21 Oct, 2023 - 10 AM to 4:00PM

Chapter 1 Introduction to ChatGPT

- **Historical Overview:** From inception to current versions
- **Key Capabilities:** What makes ChatGPT stand out?
- **Real-world Applications:** How ChatGPT is reshaping industries

Chapter 2 Basics of Prompt Engineering

- **Understanding Prompts:** Definition and importance
- **Crafting Effective Prompts:** Best practices and common pitfalls
- **Response Analysis:** Interpreting and refining based on outputs

Chapter 3 Advanced Techniques of Prompt Engineering

- **Zero-Shot Learning:** Expecting the model to generalize from its training without specific examples
- **Few-Shot Learning:** Providing multiple examples to guide the model's response
- **Chain-of-Thought:** Guiding the model through a series of logical steps
- **Generated Knowledge:** Leveraging the model's vast information base
- **Self-Consistency:** Ensuring the model provides consistent answers across queries

Chapter 4 Hands-on Session

- **Crafting Prompts:** Practical exercises for participants
- **Testing & Refinement:** Iterative process to hone skills
- **Feedback & Discussion:** Sharing experiences and insights among participants

Course 2

ChatGPT for Research, Education, & Coding

CHATGPT FOR RESEARCH, EDUCATION, & CODING

OVERVIEW: Course 2 delves into ChatGPT's multifaceted applications in research, coding, and education. Participants will learn how ChatGPT aids in refining academic papers, streamlining code generation, and shaping educational curricula. Through hands-on sessions, attendees will experience firsthand the transformative potential of ChatGPT across these domains, emphasizing practical applications and real-world impact.

LEARNING OUTCOMES:

- Enhance research papers and interpret results using ChatGPT.
- Generate, debug, and document code with ChatGPT's assistance.
- Design and align educational curricula leveraging ChatGPT's insights.

COURSE OUTLINE: CHATGPT FOR RESEARCH, EDUCATION, & CODING

28 Oct, 2023 - 10 AM to 4:00PM

Chapter 1 Research Applications with ChatGPT

- **Paper Review & Editing**
 - Collaborative Review: Using ChatGPT to provide initial feedback on academic papers
 - Editing Assistance: Leveraging ChatGPT's language capabilities to refine and polish research papers
- **Complex Latex Editing Techniques**
 - Latex Optimization: Collaborating with ChatGPT to streamline and enhance Latex documents
 - Formatting Assistance: Utilizing ChatGPT's knowledge to ensure proper Latex formatting and structure
- **Results Analysis & Interpretation**
 - Data Insights: Gleaning deeper insights from research data with ChatGPT's analytical capabilities
 - Interpretative Assistance: Collaborating with ChatGPT to understand complex research outcomes

Chapter 2 Coding Applications with ChatGPT

- **Code Writing, Debugging, & Optimization**
 - Code Generation: Using ChatGPT to generate code snippets based on requirements
 - Debugging Assistance: Leveraging ChatGPT to identify and rectify coding errors
 - Performance Enhancement: Collaborating with ChatGPT to optimize code for better performance
- **Transforming Descriptions into Code & Pseudo-code**
 - Description Translation: Converting plain language descriptions into functional code with ChatGPT's assistance
 - Pseudo-code Generation: Crafting logical pseudo-code structures with ChatGPT
- **Code Documentation & Annotation**
 - Documentation Creation: Using ChatGPT to generate comprehensive code documentation
 - Code Annotation: Collaborating with ChatGPT to annotate code for better readability and understanding

COURSE OUTLINE: CHATGPT FOR RESEARCH, EDUCATION, & CODING

Chapter 3

Teaching Applications with ChatGPT

- **Curriculum Design & Learning Outcome Formulation**
 - Course Structuring: Leveraging ChatGPT to design comprehensive course outlines
 - Learning Objectives: Collaborating with ChatGPT to define clear and actionable learning outcomes
- **Mapping Course Outcomes to Program Outcomes**
 - Alignment Strategies: Using ChatGPT to ensure course outcomes align with overarching program objectives
- **Designing Assessments & Solution Models**
 - Assessment Creation: Crafting effective assessments with ChatGPT's insights
 - Solution Frameworks: Collaborating with ChatGPT to design robust solution models for assessments

Course 3

ChatGPT for Business Professionals

CHATGPT FOR BUSINESS PROFESSIONALS

OVERVIEW: Course 3 explores ChatGPT's transformative role for business professionals, from startup ideation to strategic planning and legal documentation. Participants will harness ChatGPT's capabilities in crafting visions, analyzing markets, developing marketing strategies, and even drafting legal documents. The day culminates in creating a startup landing page, showcasing the practical application of ChatGPT in real-world business scenarios.

LEARNING OUTCOMES:

- Master the use of ChatGPT in strategic business ideation and planning.
- Understand ChatGPT's potential in legal document drafting and analysis.
- Apply ChatGPT's capabilities in digital marketing, including landing page content creation.

COURSE OUTLINE: CHATGPT FOR BUSINESS PROFESSIONALS

11 Nov, 2023 - 10 AM to 4:00PM

Chapter 1 Startup Ideation

- **Conceptualization:** Collaborating with ChatGPT to generate innovative startup ideas
- **Naming:** Utilizing ChatGPT's vast knowledge to brainstorm potential names
- **Vision & Mission:** Crafting a compelling vision and mission statement with ChatGPT's assistance
- **Objectives Setting:** Defining clear, actionable objectives in collaboration with ChatGPT
- **Core Values:** Establishing a company's guiding principles with insights from ChatGPT

Chapter 2 Strategic Plans

- **Growth Strategy:** Leveraging ChatGPT to identify potential avenues for expansion
- **Target Market Identification:** Using ChatGPT to analyze and pinpoint ideal customer segments
- **Competitive Analysis:** Gaining insights into competitors with ChatGPT's vast knowledge
- **Customer Acquisition Strategy:** Crafting effective strategies with ChatGPT to attract and retain customers
- **Pricing Strategy:** Collaborating with ChatGPT to determine optimal pricing models
- **Key Performance Indicators (KPIs):** Setting and monitoring KPIs with ChatGPT's assistance
- **Forecasting Business Growth:** Utilizing ChatGPT for predictive analytics and growth projections
- **Financial Projections:** Leveraging ChatGPT for financial modeling and predictions
- **Business Development Insights:** Gleaning actionable insights from ChatGPT to drive business development

COURSE OUTLINE: CHATGPT FOR BUSINESS PROFESSIONALS

Chapter 3 Marketing Strategy & Content Creation

- **Audience Analysis:** Using ChatGPT to understand audience demographics, preferences, and behaviors
- **Social Media Reputation Analysis:** Leveraging ChatGPT to gauge a brand's online reputation and sentiment

Chapter 4 Drafting & Reviewing Legal Documents

- **NDA & MoU Creation:** Collaborating with ChatGPT for drafting initial versions of Non-Disclosure Agreements and Memorandums of Understanding
- **Legal Content Analysis:** Gaining insights into legal documents and their implications with ChatGPT
- **Legal Drafting:** Utilizing ChatGPT's expertise for creating initial legal drafts
- **Document Review:** Ensuring legal document accuracy and completeness with ChatGPT's preliminary checks

Chapter 5 Building a Landing Page for your Startup

- Choosing a web template
- Using ChatGPT to update the content of the landing page for the business created

Course 4

Lifecycle & Adaptations of LLMs

LIFECYCLE & ADAPTATIONS OF LLMs

OVERVIEW: Course 4 delves into the lifecycle and adaptations of Large Language Models (LLMs). Participants will journey from defining use cases to deploying optimized LLMs, with a focus on fine-tuning techniques, including domain-specific adaptations and LoRA adapters. The session also emphasizes the significance and application of Reinforcement Learning with Human Feedback in enhancing LLM performance.

LEARNING OUTCOMES:

- Understand the comprehensive lifecycle of LLMs from conception to deployment.
- Master techniques for fine-tuning LLMs, including domain-specific adaptations and LoRA adapters.
- Grasp the principles and practical applications of RLHF in LLM development and optimization.

COURSE OUTLINE: LIFECYCLE & ADAPTATIONS OF LLMs

18 Nov, 2023 – 10 AM to 4:00PM

Chapter 1 Comprehensive Overview of LLMs Lifecycle

- **Define the Use Case:** Establishing the specific problem or task the LLM intends to address
- **Choose Existing LLM Model:** Selecting an appropriate pre-trained model as a starting point based on the defined use case
- **Tuning & Refinements**
 - Prompt Engineering: Crafting effective prompts to guide the LLM's responses
 - Fine-Tuning: Adjusting the LLM to better suit specific tasks or domains
 - Reinforcement Learning with Human Feedback (RLHF): Iteratively training the LLM based on human feedback to improve its performance
- **Evaluate:** Assessing the LLM's performance against benchmarks or desired outcomes
- **Optimize & Deploy:** Refining the LLM for optimal performance and preparing it for real-world deployment
- **Augment with External Sources:** Enhancing the LLM's capabilities by integrating external data or functionalities

Chapter 2 Fine-Tuning LLMs

- **Model Adaptation:** Techniques and best practices for adjusting pre-trained LLMs to specific tasks
- **Domain-Specific Fine-Tuning:** Tailoring LLMs to specialized domains, such as finance, healthcare, or legal

Chapter 3 Parameter Efficient Fine Tuning with LoRA Adapters

- **Introduction to LoRA Adapters:** Understanding the principles and advantages of LoRA for efficient fine-tuning
- **Implementation:** Practical steps and considerations when integrating LoRA adapters into fine-tuning

COURSE OUTLINE: LIFECYCLE & ADAPTATIONS OF LLMs

Chapter 4

Reinforcement Learning with Human Feedback (RLHF)

- **Principles of RLHF:** Exploring the foundational concepts behind RLHF and its importance in the LLM lifecycle
- **Application in LLMs:** Practical examples and case studies showcasing the impact of RLHF on LLM performance and adaptability

Specialization 2:
Core Foundations of
Large Language Models

SPECIALIZATION 2: CORE FOUNDATIONS OF LARGE LANGUAGE MODELS

OVERVIEW

Specialization 2 thoroughly explores the foundational principles underpinning Large Language Models (LLMs).

Participants begin with understanding LLMs' intricate lifecycle and LLMs refinement mechanisms, including parameter efficiency fine-tuning techniques and reinforcement learning.

The course delves deeper into the multilingual aspects, elucidating tokenization techniques and the nuances of word embeddings.

Central to the specialization is the study of Transformers, the backbone of modern LLMs, where participants gain hands-on experience with its architecture. The program concludes with a practical session on HuggingFace Transformers, empowering attendees to construct and evaluate their own LLMs, ensuring a holistic grasp of the subject matter.

To register

scan the QR code



or visit: chatgpt.riotu-lab.org/registration.php

Course 5

Advanced Programming with LangChain

ADVANCED PROGRAMMING WITH LANGCHAIN

OVERVIEW: Course 5 dives deep into advanced programming with LangChain. Participants will explore OpenAI's API and understand LangChain's genesis and its unique features. The day emphasizes hands-on experience, guiding attendees through creating a memory-enhanced chatbot using LangChain, ensuring a practical grasp of its capabilities and applications in real-world scenarios.

LEARNING OUTCOMES:

- Comprehend the intricacies and capabilities of OpenAI's API and LangChain.
- Understand and apply LangChain's core building blocks in programming tasks.
- Design, implement, and refine a memory-enhanced chatbot using LangChain tools.

COURSE OUTLINE: ADVANCED PROGRAMMING WITH LANGCHAIN

25 Nov, 2023 - 10 AM to 4:00PM

Chapter 1 Introduction to OpenAI API

- **API Overview:** A comprehensive look at OpenAI's API, capabilities, and functionalities
- **Limitations Exploration:** Understand the constraints and boundaries of the OpenAI API to ensure optimal utilization
- **Real-world Applications:** Discuss various use cases and scenarios where the OpenAI API has been effectively employed

Chapter 2 LangChain in Action

- **LangChain's Genesis:** Exploring the origins, motivations, and the journey of LangChain's development
- **Core Features:** A detailed examination of LangChain's standout features and what sets it apart in programming
- **Building Blocks of LangChain:**
 - Large Language Models: Understanding the foundational models power LangChain
 - ChatModels: Delving into the structures that facilitate conversational AI capabilities
 - Prompt Templates: Exploring the templates that guide and shape the outputs from LLMs
 - Output Parsers: Techniques to interpret and utilize the outputs generated by the LLMs
 - Memory: Investigating how LangChain retains and utilizes contextual information for dynamic interactions
 - LLMChain: Understanding the chaining of multiple LLMs for complex tasks
 - Agent: Exploring the orchestrator that manages interactions between various components in LangChain

COURSE OUTLINE: ADVANCED PROGRAMMING WITH LANGCHAIN

Chapter 3 Building a Memory-Enhanced Chatbot with LangChain

Hands-on Session

- **Chatbot Creation:** Guided session on crafting a chatbot using LangChain's tools and features, incorporating the core building blocks
- **Memory Enhancement:** Techniques and strategies to imbue the chatbot with memory capabilities, allowing for more dynamic and context-aware interactions
- **Testing & Iteration:** Engaging with the newly created chatbot, testing its functionalities, and iterating based on feedback and observations

Course 6

Multilingual Tokenization & Word Embeddings - Exploring Arabic & English

MULTILINGUAL TOKENIZATION & WORD EMBEDDINGS - EXPLORING ARABIC & ENGLISH

OVERVIEW: Course 6 dives deep into multilingual tokenization and word embeddings, focusing on Arabic and English. Participants will explore foundational concepts, various embedding methods, and tokenization techniques. The session emphasizes the unique challenges and tailored techniques for Arabic and English, concluding with insights into multilingual models.

LEARNING OUTCOMES:

- Understand the core concepts of word embedding and diverse tokenization techniques.
- Recognize the specific challenges and techniques for tokenization and embedding in Arabic and English.
- Gain insights into the capabilities and applications of multilingual models.

COURSE OUTLINE: MULTILINGUAL TOKENIZATION & WORD EMBEDDINGS - EXPLORING ARABIC & ENGLISH

2 Dec, 2023 - 10 AM to 4:00PM

Chapter 1 Introduction to Word Embedding & Tokenization

- **Overview of Word Embedding & Tokenization:** Grasping the foundational concepts and their significance in NLP
- **Types of Word Embeddings:** Delving into popular methods like Word2Vec, GloVe, and FastText
- **Libraries & Tools:** Exploring the tools available for creating and managing embeddings

Chapter 2 Tokenization Techniques

- **Rule-based Tokenization:** Understanding the principles of deterministic tokenization methods
- **Statistical Tokenization:** Exploring methods that rely on statistical properties of the text
- **Subword Tokenization:** Techniques that tokenize text into smaller units or subwords
- **State-of-the-Art Techniques:** Investigating advanced methods like SentencePiece, Byte Pair Encoding, and Hugging Face Tokenizers

Chapter 3 Tokenization & Word Embedding for Arabic & English

- **Challenges:** Addressing the unique challenges of tokenization and embedding in Arabic and English
- **Language-Specific Techniques:** Techniques tailored specifically for Arabic and English languages
- **Multilingual Models:** Exploring models that cater to multiple languages simultaneously

Course 7

Transformers: The Core Technology of LLMs

TRANSFORMERS: THE CORE TECHNOLOGY OF LLMs

OVERVIEW: Course 7 delves into the transformative world of Transformers, the backbone of LLMs. Charting the journey from FNNs to Transformers, participants will dissect the intricate architecture, understanding self-attention, multi-head attention, and positional encoding. The day culminates in a hands-on session, where attendees build and evaluate a transformer model from scratch.

LEARNING OUTCOMES:

- Trace the evolution from FNNs to Transformers in NLP.
- Understand the core components and mechanisms of the Transformer architecture.
- Acquire practical experience in building and evaluating a transformer model.

COURSE OUTLINE:

TRANSFORMERS: THE CORE TECHNOLOGY OF LLMs

9 Dec, 2023 - 10 AM to 4:00PM

Chapter 1 Evolution to Transformers in NLP

- **From FNN to RNN:** A brief overview of the progression from Feedforward Neural Networks to Recurrent Neural Networks
- **LSTM's Emergence:** Addressing the memory limitations of RNNs with Long Short-Term Memory networks
- **Challenges with RNN & LSTM:** Highlighting processing bottlenecks and parallelization issues
- **Advent of Transformers:** The shift towards transformers for parallel processing using self-attention

Chapter 2 Dissecting the Transformer Architecture

- **Self-Attention Mechanism:** Understanding how transformers assign attention scores to different words in a sequence
- **Multihead Attention:** The rationale and benefits of using multiple attention heads
- **Positional Encoding:** Introducing sequence information to transformers
- **Encoder/Decoder Blocks:** A brief overview of their roles in the transformer architecture
- **Transformers as a Whole:** Understanding the holistic structure and flow of transformer models
- **Build a Transformer from Scratch in Practice.** Preparing tools, implementing the transformer model, and evaluating its performance on sample data

Course 8

Building a LLAMA-like LLM Model with PyTorch from Scratch

BUILDING A LLAMA-LIKE LLM MODEL WITH PYTORCH FROM SCRATCH

OVERVIEW: Course 8 immerses participants in building a LLAMA-like LLM using PyTorch. Starting with a deep dive into LLAMA's architecture, attendees will set up a base model, train, and evaluate it. The day progresses to infuse LLAMA-specific elements into the model, culminating in training and comparative evaluations, offering hands-on experience in advanced model development.

LEARNING OUTCOMES:

- Understand the LLAMA framework and its distinction from traditional transformers.
- Gain hands-on experience in setting up, training, and evaluating a base LLM model.
- Implement and evaluate an LLAMA-specific LLM, appreciating its unique features.

COURSE OUTLINE: BUILDING A LLAMA-LIKE LLM MODEL WITH PYTORCH FROM SCRATCH

16 Dec, 2023 - 10 AM to 4:00PM

Chapter 1 Steps to Build a Base Model: LLAMA Insights

- Understanding the LLAMA Framework
- Recap of the LLAMA architecture and its components
- Differences and similarities between LLAMA and traditional transformer models

Chapter 2 Setting up a Base Model

- **Setup:** Repository clone, dataset download, and environment setup
- **Configuration:** Transformer choice, hyperparameters, and tokenization
- **Data Prep:** Adjusting tokenization for LLAMA

Chapter 3 Base Model Training & Evaluation

- Building a simple model without attention
- **Training:** Training loop and progress monitoring
- **Evaluation:** Testing on unseen data and result analysis

Chapter 4 LLAMA Specifics

- Implementing a Transformer Model
- Adding LLAMA-specific building blocks

Chapter 5 Training & Evaluation

- **Training:** Running the LLAMA training loop
- **Evaluation:** Testing and comparing with the base model

PRICING

Pricing Model for Specialization Packages (4 Courses per Specialization)

CATEGORY PACKAGE	Full Price	PSU Affiliate	Academic	Non-Academic
One Specialization	4,500	2,250	3,000	4,500
Both Specializations	7,800	3,900	5,400	7,800

Pricing Model for Individual Courses

CATEGORY	PRICE (SAR)
Full Price	1,500
Prince Sultan University Affiliate	750
Academic	1,000
Non-Academic	1,500

Pricing Model for Two Individual Courses

CATEGORY	PRICE FOR 1ST COURSE (SAR)	PRICE FOR 2ND COURSE (SAR)	TOTAL
Full Price	1,500	1,000	2,500
Prince Sultan University Affiliate	700	500	1,200
Academic	1,000	700	1,700
Non-Academic	1,500	1,000	2,500

NOTE: Prices mentioned above are in Saudi Riyals (SAR) and VAT exclusive. If VAT needs to be added, it should be calculated based on the prevailing VAT rate in Saudi Arabia. For **group discounts** (5 people and above), contact mabdela@psu.edu.sa.

for application

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