**LIB – AI paper reading plan**

| **Session** | **Focus Area** | **Paper(s) to Read** | **Key Discussion Points** |
| --- | --- | --- | --- |
| **Session 1** | Introduction to AI & ML | "Attention Is All You Need" (Vaswani et al., 2017) | Transformer architecture, Self-Attention, Role in GenAI |
| **Session 2** | Generative AI Foundations | "BERT: Pre-training of Deep Bidirectional Transformers" (Devlin et al., 2018) | NLP Pre-training, Contextual Representations |
| **Session 3** | ChatGPT & Large Language Models (LLMs) | "GPT-3: Language Models Are Few-Shot Learners" (Brown et al., 2020) | Scaling Laws, Prompt Engineering, Emergent Abilities |
| **Session 4** | Google Gemini | "PaLM: Scaling Language Models with Pathways" (Chowdhery et al., 2022) | Multi-modal capabilities, Scaling Pathways |
| **Session 5** | IBM Granite | IBM Research Whitepaper on Granite Models | Enterprise AI, Model Efficiency, Adaptability |
| **Session 6** | Open-Source GenAI Models | "LLaMA: Open and Efficient Foundation Models" (Meta AI, 2023) | Small vs Large LLMs, Efficiency Gains |
| **Session 7** | Multimodal AI Models | "Flamingo: A Visual Language Model for Few-Shot Learning" (DeepMind, 2022) | Vision-Language Integration, Few-shot Learning |
| **Session 8** | AI in Scientific Discovery | "AlphaFold: Deep Learning for Protein Structure Prediction" (DeepMind, 2021) | AI in Biotech, Impact on Drug Discovery |
| **Session 9** | RLHF & Fine-Tuning LLMs | "InstructGPT: Aligning Language Models to Follow Instructions" (OpenAI, 2022) | Reinforcement Learning with Human Feedback (RLHF) |
| **Session 10** | AI Ethics & Risks | "On the Dangers of Stochastic Parrots" (Bender et al., 2021) | Bias, AI Hallucinations, Ethical Considerations |
| **Session 11** | Quantum AI & Hybrid AI Models | IBM Quantum AI Papers (Hybrid Models) | Role of Quantum ML in AI Efficiency |
| **Session 12** | Future of AI & AGI | "Sparks of AGI" (Microsoft Research, 2023) | Path to AGI, Limitations of Current LLMs |

**LIB-AI Guest Speaker / Non tech panel Discussion**

| **Session** | **AI Concepts** | **Use Cases & Business Impact** | **Challenges & Ethical Considerations** | **Speaker Name** |
| --- | --- | --- | --- | --- |
| **1** | Introduction to AI & ML | AI in everyday life (Netflix, Google, ChatGPT) | Myths vs Reality of AI |  |
| **2** | How AI Learns (Supervised vs Unsupervised) | AI in Healthcare, Finance, Retail | Data Bias & AI Fairness |  |
| **3** | Machine Learning vs Deep Learning vs GenAI | How AI helps in decision-making | AI and Privacy (GDPR, data security) |  |
| **4** | Explainable AI (XAI) | Case Studies: AI in Fraud Detection, Marketing | Risks of AI in Business (Hallucinations, Bias) |  |
| **5** | AI Implementation in Business | AI Adoption Strategies | Human-AI Collaboration & Future of Work |  |
| **6** | Future Trends in AI | Emerging AI applications (Quantum AI, AGI) | Open Discussion & AI Strategy Planning |  |

**LIB-AI – Tech -Basic**

| **Sessions** | **Main Theme** | **Topics covered** |
| --- | --- | --- |
| **1** | **Introduction to ML** | What is ML? Types of ML, ML pipeline, Applications |
| **2** | Data Handling & Preprocessing | |  | | --- |  | Data types, Pandas, Data Cleaning, Feature Scaling, Encoding | | --- | |
| **3** | Regression | Linear Regression, Assumptions, Model Training |
| **4** | Regression | |  | | --- |  | Multiple Regression, Polynomial Regression, Model Evaluation (RMSE, R²) | | --- | |
| **5** | | **Classification** | | --- |  |  | | --- | | Classification vs Regression, Logistic Regression, Decision Boundaries |
| **6** | **Classification** | Decision Trees, Confusion Matrix, Precision-Recall, ROC Curve |
| **7** | | **Ensemble & Tuning** | | --- |  |  | | --- | | |  | | --- |  | Ensemble Learning (Random Forest, XGBoost), Hyperparameter Tuning (GridSearchCV) | | --- | |
| **8** | **Ensemble & Tuning** | Neural Networks, Introduction to TensorFlow/Keras |
| **9** | Unsupervised Learning | Clustering (K-Means, Hierarchical), PCA |
| **10** | Feature Engineering | |  | | --- |  | Feature Selection, Feature Engineering, Bias-Variance Tradeoff | | --- | |
| **11** | Explainability & Deployment | |  | | --- |  | Explainability (SHAP, LIME), Model Deployment (Flask, FastAPI) | | --- | |
| **12** | Capstone Project | End-to-End Capstone Project |

**LIB AI - 12-Month Capstone Project Roadmap (Advanced AI & Cloud AI Services)**

| **1** | **Foundation of AI, Transformers and Architectural Study** | **Understanding the core underlying architectures** |
| --- | --- | --- |
| **2** | **Understanding Generative AI (GenAI) & RAG Models** | Basics of GenAI, LLMs, embeddings, RAG principles. |
| **3** | **Working with Large Language Models (LLMs) via APIs** | Calling LLM APIs, fine-tuning prompts, optimizing queries. |
| **4** | **NLP & BERT-Based Models for Text Processing & Summarization** | Text classification, named entity recognition (NER), summarization, Q&A. |
| **5** | **Retrieval-Augmented Generation (RAG) for Knowledge-Based AI** | Setting up vector stores, embedding retrieval, advanced RAG workflows. |
| **6** | **Fine-Tuning Open-Source LLMs & Deploying Custom AI Models** | Customizing AI models for domain-specific applications. |
| **7** | **Introduction to Reinforcement Learning and Robotics Simulation** | Using Open AI’s Gym and other simulation Libraries |
| **8** | **Scaling AI Models in Production (MLOps & AI Deployment)** | Automating model deployment, retraining, and real-time monitoring. |
| **9** | **Model Validation and Evaluation Techniques** |  |
| **10** | **End-to-End Capstone Project: Building a Real-World AI Solution** | Developing a fully functional AI system using learned techniques. |
| **11** |

Project Topics

**Automated Research Paper Summarization & Citation Generator**

* AI tool that **analyses and summarizes academic papers** using **llama3 model**

**Build a restaurant recommendation system** based on **user’s choice of cuisines & mood**

* using **RAG-based models**, **the recommendations** allow **flexible, real-time conversational recommendations** using LLMs unlike traditional recommendation system

**Agentic AI: Optional**

* Agentic AI is simply a wrapper up on the core AI using good Data Engineering Skills. Will keep this Optional for now.
* The only difference between an agent and a language model is that agents complete task autonomously. So, you should get the idea if you have ever worked on automating any application. 🙂Lets get the basics right first, shall we? 😬